PART 3

MASTER PLAN FOR CAPACITY DEVELOPMENT IN ENVIRONMENTAL PROTECTION AND POLLUTION CONTROL

CHAPTER 10 FRAMEWORK FOR POLLUTION CONTROL MASTER PLAN

10.1 Introduction

Part 3 of this report describes the proposed Master Plan to control pollution associated with the oil and gas sector. As it was discussed in the Part 1 and Part 2, pollution control in the petroleum industry involves various stakeholders, and it requires a holistic approach. Hence, the Master Plan is organized in the following four chapters:

- Chapter 10: General conditions and the overall framework for the Master Plan
- Chapter 11: Proposed approaches to build regulatory systems as the foundation of pollution control efforts
- Chapter 12: Recommendations on best practices in the petroleum sector
- Chapter 13: Proposed environmental monitoring and related programs to provide reliable information for pollution control.
- Chapter 14: Information-based measures to induce environmentally-accountable behaviour of stakeholders

10.2 Conditions and Requirements associated with Master Plan Development

10.2.1 Present and Anticipated Pollution

(1) Present Situation of the Pollution

The status of pollutants released from the oil industry in Atyrau and Mangistau oblasts in 2005 is shown in Table 10.2.1. The styles of the annual reports of the territorial MoEPs in Atyrau and Aktau are not the same, and the values were adjusted for comparison.

Table 10.2.1 Emissions and Discharges of Pollutants from the Oil Industry in 2005

Pollutants	Atyrau oblast (tonne/year)	Mangistau oblast (tonne/year)	Total (tonne/year)
Air emission total	70,634	NA（17,097）	(87,731)
SO_2	20,674	NA（2,778）	(23,452)
NO_x	7,692	NA（1,360）	(9,052)
Hydrocarbon	21,989	NA（7,730）	(29,719)
CO	20,135	NA（5,192）	(25,327)
H_2S	43	NA（4）	(47)
Others	101	NA（33）	(134)
Flare gas	NA	14,820,000 (m^3/year)	-
Water discharge to evaporation pond	3,033,000	NA	-
Pollutant in water	4,770	NA	-
Waste generation	705,000 (118,000)	NA（55,000）	(173,000)
Stored Waste (tonne)	*8,500,000* +α	866,147 +α	-
Contaminated soil (ha)	3,585.6 (ha)	1,067.2 +α (ha)	4,652.8 +α (ha)
Dangerous underwater abandoned well	NA	4 +α	90

Note: Not including those from power stations and gas companies. The values in ( ) for Magistau oblast show calculated values using the unit pollutant emissions/discharges of Embumnaigaz. Italic number shows the amount of stored sulphur. “a number +α” implies the total is somewhat larger than the number.

Source : Annual environmental report of Atyrau oblast and Mangistau oblast.

(2) Anticipated Status of Pollution in 2010

The pollution status in 2010 was estimated based on the long-term oil production plan around the Caspian Sea (Table 10.2.2).

Table 10.2.2 Planned Oil Production in the Caspian Sea Region

Crude oil production (million tonne/year)

Year	2005 (present)		2010		2015	
Oblast	Atyrau	Mangistau	Atyrau	Mangistau	Atyrau	Mangistau
TCO	14		24		30	
Other Onshore	4	6	4	6	4	6
Agip KCO	－		22		60	
Other Offshore	－		0-18		40	
Subtotal	18	6	28	6	34	6
Total	24		56-74		140	

Source : JICA Study Team

The emissions/discharges in Mangistau oblast were calculated by assuming the same rates of emission/discharge as Embamunaigaz. The emissions/discharges from the offshore developments other than the Kashagn field were calculated by assuming the same rates as Kashagan except H2S (50% of the Kashagan rate).The anticipated emissions/discharges of pollutants in 2010 are as follows:

Table 10.2.3 Anticipated Emissions and Discharges of Pollutants in 2010

Pollutants	Atyrau Oblast including TCO	Mangistau Oblast	Caspian Sea [Note1)] including Agip KCO	Total (tonne/year)
Air emission total	108,206－α	17,097－α	38,640-70,224 [Note2)]	163,943-195,527
SO_2	31,618－α	2,778－α	12,599-22,907	46,995-57,303
NO_x	11,900－α	1,360－α	13,271-24,129	26,531-37,389
Hydrocarbons	32,919	7,730	2,560-4,655	43,209-45,304
CO	31,554	5,192	8,937-16,249	45,683-52,995
H_2S	72	4	74-104	150-180
Others	153	33	205-372	303-558
Flare gas	Principally 0	Principally 0	Principally 0	Principally 0
Water discharge to evaporation pond	2,017,000	NA	(46,000-83,000)	-
Pollutant in water	(6,300)	NA	(130-230)	-
Waste generation (Hazardous waste) [Note3)]	187,000 (NA)	55,000 (NA)	33,000-60,000 (652-1,185)	275,000-302,000
Stored Waste (tonne)	*7,000,000*+α	866,147+α	*(1,100,000 -1,540,000)*	
Contaminated soil (ha)	3,585.6－α	1,067.2－α	－	4,652.8－α
Dangerous underwater abandoned well	Complete shut off	Complete shut off	－	Complete shut off

Note: 1): Including emission & discharge arising from drilling and transportation activity, 2): Including particle matters emission, 3): Total volume of class-1 and class-2 wastes included in waste generation volume

Other note: Not including those from power stations and gas companies. The values for Mangistau oblast show calculated values using the unit pollutant emissions/discharges of Embumnaigaz. Italic numbers show the amount of stored sulphur. A number followed by "+α" implies the total is somewhat larger than the number. A number followed by "-α" implies the total is somewhat smaller than the number.

Source: Forecasted from the data of annual environmental report of Atyrau oblast & Mangistau oblast, .EIA report of Kashagan (AgipKCO) project and oil & gas sector long-term development plan

Although flare gas is expected to be banned by 2010, if flare gas reduction is not considered, the total emission to the atmosphere will increase 2.2 times from 87,731 tonnes in 2005 to 195,527 tonnes in 2010. The increase in NOx will be 4.1 times, and H_2S 3.8 times.

The total volume of wastewater discharged to evaporation ponds in 2010 will decrease to 2,017,000 tonnes from 3,033,000 tonnes in 2005 by reusing treated water at the Atyrau refinery and the Agip KCO OPF. However, the amount of pollutants in wastewater will increase to 6,300 tonnes from 4,470 tonnes in 2005, or 1.4 times, due to the increase in production at TCO.

Waste generation other than sulphur will increase to 302,000 tonnes from 173,000 tonnes in 2005, which is 1.7 times. If the stored sulphur is included in waste generation, the waste generation will increase to 1,402,000 tonnes from 810,000 tonnes in 2005, again a 1.7 times increase.

The action of flare gas reduction and the works to shut off abandoned underwater wells will be finished by 2010 and on-going restoration works will reduce the remaining contaminated area.

(3) Anticipated Status of Pollution in 2015

The anticipated emissions/discharges of pollutants in 2015 were estimated according to the oil and gas sector long-term development plan as follows:

Table 10.2.4 Anticipated Emissions and Discharges of Pollutants in 2015

Pollutants	Atyrau Oblast including TCO	Mangistau Oblast	Caspian Sea including AgipKCO	Total (tonne/year)
Air emission total	132,623－α	17,097－α	116,700	266,420
SO_2	37,861－α	2,778－α	40,276	80,915
NO_x	15,517－α	1,360－α	36,787	53,664
Hydrocarbons	40,246	7,730	8,427	56,403
CO	38,725	5,192	27,607	71,524
H_2S	88	4	264	356
Others	186	33	533	752
Flare gas	Principally 0	Principally 0	Principally 0	Principally 0
Water discharge to evaporation pond	2,343,000	NA	(207,000)	
Pollutant in water	(7,220)	NA	(585)	
Waste generation (Hazardous waste)[Note3]	213,000 (NA)	55,000 (NA)	150,000 (2,897)	418,000
Stored Waste (tonne)	*4,000,000－α*	866,147+α	*3,964,000*	
Contaminated soil (ha)	Complete Restoration	Complete Restoration	－	Complete Restoration
Dangerous underwater abandoned well	Complete shut off	Complete shut off	－	Complete shut off

Note: The pollutants volume of petrochemical industry is the same as Atyrau refinery except SO_2
Other notes are the same as the note of Table 10.2.3

Source: Forecasted from the data of annual environmental report of Atyrau oblast & Mangistau oblast, .EIA report of Kashagan (AgipKCO) project and oil & gas sector long-term development plan

If flare gas reduction is not considered, the total emission to air in 2015 will increase 3.0 times, from 87,731 tonnes in 2005 to 266,420 tonnes in 2015. The increase in NOx will be 5.9 times,

and that of H_2S will be 7.6 times. The total volume of wastewater to evaporation ponds in 2015 will decrease to 2,343,000 tonnes from 3,033,000 tonnes in 2005 by reusing treated water at the Atyrau refinery and the Agip KCO OPF. However, the amount of pollutants in wastewater will increase to 7,850 tonnes from 4,470 tonnes, or about 1.8 times, in 2005 due to the increase in production by TCO. Waste generation volume will increase to 418,000 tonnes from 173,000 tonnes in 2005, or 2.4 times, if the stored sulphur volume is not counted towards waste generation.

The anticipated status of pollution problems in 2015 is as follows:

(Produced water): The amount of produced water usually increases as the stage of production progresses. The water production rate in several onshore fields has already reached 50%. Presently most production water is injected underground and this practice is expected to be continued in the future by using abandoned wells.

(Process water and grey water): The process water and grey water in Atyrau refinery are already being treated and reused. The process water and grey water in the gas refinery of TCO, the OPF of Agip KCO and the oil terminals are expected to be discharged to evaporation ponds, though treatment and recycling of these waters are desirable. The proposed petrochemical industry should take the same countermeasure as Atyrau refinery, namely treatment and recycling of wastewater for cooling water instead of discharging to evaporation ponds.

(Associated gas (flare gas)): According to the law, flare gas burning is generally banned and the countermeasures for flare gas reduction are expected to be taken by each company by the end of 2009 (refer to Chapter 12). The same law and countermeasures will apply to new oil development and petrochemical industries.

(Waste): New facilities will introduce waste reduction measures and be equipped with modern waste disposal facilities in accordance with international best practice. The main issues of waste disposal are separation, recovery, reuse, and recycling of waste from existing facilities and construction of acceptable waste disposal sites.

(By product (Sulphur)): Refer to Section 12.7.

(Oil spill accidents including blow-outs and tanker accidents): The oil spill response plans (NOSRP, etc.) will be completed, and sufficient trained personnel and response equipment should become available in order to adequately respond to a range of spill accidents at different locations (see Section 12.11 for details).

(Cumulative impact around the new industrial area): New rules for controlling cumulative pollution around new industrial areas such as Karaton (TCO and petrochemical industries), especially on NOx and hydrocarbons, will be required.

(Odor): H2S and mercaptan are odour-causing materials associated with oil development facilities, refineries and oil terminals (details are referred to Chapter 12). At the new petrochemical complex, other odour problems might occur but as they are process-specific it is difficult to predict them without detailed information.

(4) Effort of oil companies to reduce air pollutants

The unit emission volume of the air pollutants (kg-pollutant/tonne-crude oil) in each company is shown in Table 10.2.5. The unit emission volume is affected not only by the production process such as environmental protection systems, but also by the oil field characteristics such as reservoir pressure, impurities (H2S) content and the volumes of associated gas and associated water. Therefore it is difficult to compare and assess the values with a simple comparison, but it is the appropriate action for each company to progressively decrease the value of their own emission volume. Kazmunaigaz plans to decrease the value of their unit

emission volume to 2.3 kg/ tonne-crude oil in 2015. The measures to reduce flare gas that were introduced recently will contribute to reducing the unit emission volume by as much as 0.2 unit. These efforts are not accounted for in the anticipated status of pollution in 2010 & 2015, because the actual plan has not been established yet.

Table 10.2.5 The Unit Emission Volume of the Companies

Unit: kg-pollutant/tonne-crude oil

	2004 (actual)	2004 (actual)	2010 (planned)	2015(planned)
Embamunaigaz	3.0	3.1	NA	(2.3)
TCO	4.1	3.9	NA	NA
Agip KCO (Offshore) (Onshore)	-	-	2.0 +α 1.4 +α 0.6 +α	NA

Note: "a number +α" implies the total is somewhat larger than the number.
Source: Annual environmental report of Atyrau oblast, EIA report of Kashagan (AgipKCO) project

(5) Main environmental issues remaining in 2015

The main environmental issues remaining in 2015 are studied with the data of pollutants emissions/discharges described in Table 10.2.4 and the anticipated status of pollution problems in (3) of this section. It should be noted that environmental impacts may be highly localized, and the low increasing rate of pollutant emission in the Caspian Sea region does not necessarily mean a low increasing rate of pollution for certain locations.

1) Air Pollution

Tengiz area (Around the future industrialized area) : Tengiz area includes the existing TCO facility and the planned petrochemical complex. The emissions from these factories (cumulative impact) will lead to deterioration of the air quality in and around the area. The present status of air quality around the Tengiz area and the anticipated situation in 2015 in the area (with reference to Table 10.2.4) are shown in Table 10.2.6. NO_2 concentration will greatly increase and exceed the MPC standard value and hydrocarbon concentration will also rise to lead to an increase in photochemical smog (Ozone, Oxidant) generation, unless appropriate environmental measures are taken.

Table 10.2.6 Anticipated Situation of Air Pollution around the Tengiz Area

unit : $\mu g/m^3$

Pollutant	MPC (20 min. av.)	2005（actual）	2015（change）	Remarks
SO_2	500	6-22	Small rise	
NO_2	85	42-81	Big rise	Exceed MPC
CO	5,000	1,500-2,500	Small rise	
PM	500	-	Small rise	
Hydrocarbon	(50)	18-24	Big rise	Possibly exceed MPC
Ozone (Oxidant)	-	-	Big rise	High potential forgeneration
H_2S	8 (maximum)	0-7	Small rise	

Source: TCO monitoring report (2005), data of Table 10.2.4 and air emission characteristics of petrochemical industries

Atyrau city: There are no oil and gas industry projects planned around Atyrau city before 2015 except the CPF (Central Processing Facility) of Agip KCO, which is 45 km away from the centre of Atyrau city. According to the EIA, the air pollution impact arising from the CPF is mainly retained within a 10 km area from the source, and the impact to Atyrau city will be small. The air quality in Atyrau city, measured by KAZHYDROMET, shows that the

concentration of NO_2 and particulate matter (PM) sometimes exceed the MPC values, mainly due to mobile sources. The NO_2 emission from mobile origin will increase more and will react with hydrocarbons from open tanks of the existing terminal (almost same concentration of hydrocarbons as the Tengiz area was detected near the existing oil terminal during the pilot project) will lead to an increase in the photochemical smog generation.

Table 10.2.7 Anticipated Situation of Air Pollution in Atyrau City

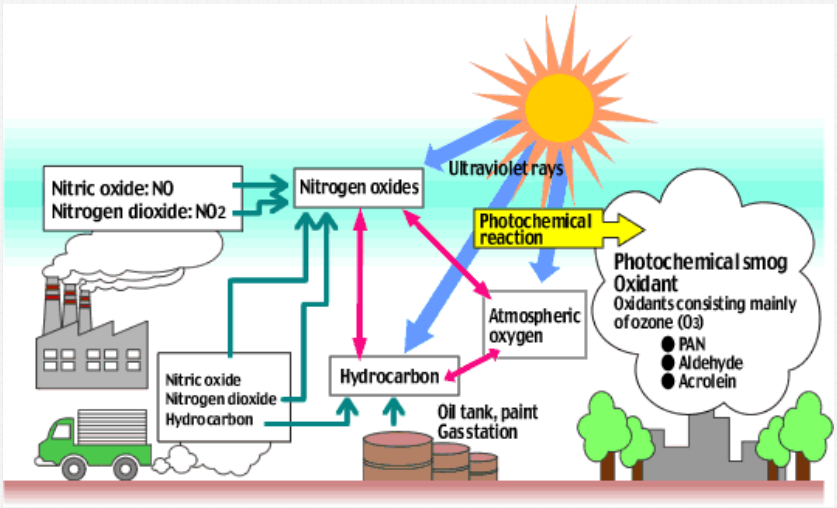
unit : $\mu g/m^3$

Pollutant	MPC (24hrs av)	2005 (actual)	2015 (change)	Remarks
SO_2	50	6-9	Small rise	
NO_2	40	20-70	Rise	Exceed MPC
CO	3,000	1,000-2,000	Small rise	
PM	150	100-800	Rise	Exceed MPC
Hydrocarbon	(50)	-	Small rise	Measurement required
Ozone (Oxidant)	-	-	Rise	High potential forgeneration
H_2S	8 (maximum)	1-2	Small rise	

Source: Air pollution report by KAZHYDROMET (actual)

BOX 1: Photochemical Smog

The generation mechanism and the injurious effect of the photochemical smog (oxidant, ozone) are as follows:



source: Mie Prefecture, based on original diagram by Environmental Agency, Japan

Figure 10.2.1 Mechanism of Generation of Photochemical Smog

Pollutants can be divided into two groups: Primary pollutants, which are directly emitted to the atmosphere. Secondary pollutants, which occur by the chemical and photochemical reactions, aided by sunlight, of primary pollutants after they have been admitted to the atmosphere. Unburned hydrocarbons, NO, and particulates are among the primary pollutants. Ozone and peroxyacetly nitrate are the examples of secondary pollutants. Some pollutants can be counted in both categories. NO_2 is emitted from vehicles, and it is also formed photochemically from NO. Aldehydes are products of exhaust emission. They also occur as the result of the photochemical oxidation of hydrocarbons. CO is emitted from vehicles and it is also the product of atmospheric hydrocarbon oxidation.

Smog is ground level photochemical ozone formation that is the consequence of the reactions between NO_x and hydrocarbons. In Japan, the formation is accelerated in conditions of more than 25ºC maximum daily air temperature and more than 2.5 hours of sunshine during 9:00-15:00 hr. Ozone is a strong oxidizer that affects the respiratory system, leading to damage of lung tissues. Chronic exposures to elevated ozone levels are responsible for losses of immune system functions, accelerated aging and increased susceptibility to other infections. In addition due to its nature as an oxidizer, there are prospects for permanent loss of the alveoli cells.

2) Water pollution

Because of the principle prohibition of wastewater discharge to the Caspian Sea, the impact on water quality arising from the oil industry's activity in the Caspian Sea area is considered small. The discharge of treated sewage water and uncontaminated cooling water to the Caspian Sea is permitted in the area outside of the nature reserves, but the impact of the discharge is dependent on the local ecological characteristics of nearby environments and this has to be evaluated, case by case.

It is estimated that the total volume of sewage water from the oil and gas sector in the Caspian Sea area will be approximately 100,000 m3/year by 2015. Pollutants in sewage, such as nutrient salt (T-P & T-N) and residual chloride will generally affect a limited area but the

cumulative impact of sewage water should be carefully considered near environmentally sensitive areas.

The existing waste dumping facility and evaporation ponds near the coast need to be removed or rehabilitated to controlled-type (impermeable) facilities, as required by the new Environmental Code.

The results of the water quality in the northeast Caspian Sea area that was analysed during the pilot project in October 2006 and anticipated change in water quality are shown in Table 10.2.8. The results satisfy the MPC standard for a fishery area.

Table 10.2.8 Anticipated Change in Water Quality in Caspian Sea by Oil Industry Activity

Unit：mg/L（except pH）

Items	MPC for fishery area	2006 (actual)	2015 (change)	Remarks
pH	7-8	-	Same as	-
COD	15.0	(2.2-4.8)	Same as	-
Oil	0.05	(0.011-0.031)	Same as	-
T-Phosphorus	0.35	(0.008-0.17)	Small rise	-
T-Nitrogen	(9.42)	(0.15-0.32)	Small rise	-
Residual chloride	-	-	Rise	Sewage water treated with chloride treatment

Source: Data obtained from the pilot project in Oct. 2006

(Waste disposal)

The waste volume generated from oil industries in the Caspian Sea region will be approximately 400,000 tonne/year by 2015 and include 2-5% hazardous class-1 and class-2 wastes. Development of internationally acceptable, controlled waste disposal facilities for hazardous waste is underway, but further efforts by the oil industries are needed.

The waste in Mangistau oblast, which amounts to approximately 1,000,000 tonne is now temporary stored without any adequate management.

The priority given to management and disposal of waste in the oil industry is in general not particularly high, and there tends to be procrastination about the appropriate response to waste problems. It is possible that waste management problems will still exist in 2015. The oil sector and local companies are urged to study and vigorously purse appropriate actions.

10.2.2 Other Conditions and Requirements

(1) New Environmental Code and Related Regulations

As presented in Chapter 4, the new Environmental Code was enacted early 2007. Overall, the new environmental code is highly ambitious and various new ideas were incorporated, such as simplification of emission regulations, introduction of the new environmental permit system based on Best Available Technique (BAT), a quota system for emission trading, etc. However, secondary laws and regulations are yet to be devised in accordance with the Environmental Code. This is the next critical step toward development of new pollution control systems.

(2) Institutional Constraints

The number of staff at MoEP engaged in policy development, which is roughly 100 in the central MoEP, is considerably small compared with those in OECD nations1. Although the

[1] The budget of Japanese Environmental Ministry in 2006 was $ 1.8 billion with staff of about 1,200. These officials are primarily responsible for national-level environmental policy development. In addition, there are

population of Kazakhstan is smaller, the tasks of policy development may be similar, and the limited manpower is a significant constraint to MoEP if it tries to develop detailed pollution control regulations from scratch. Likewise, many other public institutions have limited human capital, technical expertise and budget. Hence, the Master Plan should take an incremental approach, and consider how to allocate internal resources and how to utilize other available resources, especially the expertise in the petroleum industry, academicians, international experts and experiences of other CIS nations, such as Poland, Lithuania, Latvia, Estonia, and Russia.

(3) Restructuring, Decentralization and Fiscal Policy Reform

Kazakhstan is a country in transition, and many things are uncertain. Among the possible changes that could significantly affect implementation of the Master Plan would be restructuring of ministries, restructuring within ministries, decentralization and fiscal policy changes. It is too premature to know if any such changes could take place in the near future. Therefore, the possibilities of such changes are left open in developing this Master Plan.

(4) Lessons from Industrial Countries

Box 2 summarizes pollution control experiences in Japan, the US and European nations. Overall these countries have developed similar systems of pollution control based on a wide range of instruments, such as environmental permitting and inspection, EIA, effluent/discharge standards, environmental impact assessment, punitive measures against environmental violators, environmental monitoring and reporting, economic incentives and disincentives, etc. They all achieved reasonable reductions in industrial pollution over the last few decades.

However, close examination of their pollution control systems reveals significant differences in their approaches to pollution control depending on the nature of environmental problems, social values, political acceptance, fiscal and tax policies, openness to information disclosure, among others. Also, these industrialized countries developed their pollution control system in response to serious pollution problems in the 1960s and 70s, and in this sense, the systems, especially those developed in the early days, were highly reactive. On the other hand, the environmental conditions of the Kazakh territory of the Caspian Sea are still relatively high (see Chapter 2). Such differences have to be kept in mind in developing pollution control policies in Kazakhstan.

about 17,000 environmental officials at the level of municipalities who are engaged in pollution control activities (in 2004). In the case of the US, the federal environmental agency (EPA)'s requested budget for FY2008 is $7.2 billion with 17,324 full-time equivalent. FY 1974, which corresponds to the time the US was developing the secondary laws and regulations for pollution control, the budget of US EPA was $629 million with some 9,200 employees (Yeager, 1991). Source: Yeager, P.C., "The Limits of Law, the public regulation of private pollution", Cambridge, 1991; Ministry of Environment Japan, White Paper on Environment, FY 2006.

BOX 2: Pollution Control – Experiences of Industrialized Countries

Japan: Japan achieved rapid economic development during 1950s-70s, and this resulted in serious industrial pollution problems. Deadly mercury poisoning in Minamata and Niigata, pollution-induced asthma in Yokkaichi, and cadmium poisoning in Toyama are among the notorious examples. In response to such problems, Japan in the early 1970s developed a series of stringent regulations against industrial pollution sources, which were coupled with financial programs and tax exemption to install emission/discharge control apparatus, and a legal requirement to place certified pollution control managers in most enterprises. The Japanese approach in this era is often criticized for relying heavily on sophisticated "end-of-pipe" technologies. However, it is also interesting to note that Japan did not force adoption of specific pollution control technologies, and left development of effective technologies in the hands of industries under administrative guidance of line ministries and local governments. Another interesting aspect of the Japanese system is the wide adoption of flexible environmental agreements between industries and local governments. Japan's approach in this era was reasonably successful, and severe industrial pollution problems have gradually subsided. Compared to many industrialized countries, Japan generally achieves fairly high environmental efficiency as measured by, e.g., pollution load per GDP. As the serious pollution problems subsided, the environmental management shifted its focus to energy conservation in response to the oil shocks in the 1980s, quality (amenity) of living environment in the 1990s, and recently recycling/material flows and global environment.

US: The rise of the modern environmental movement in the US began in the 1960s, which lead to enactment of National Environmental Policy Act in 1969, establishment of EPA in 1970, and amendment/establishment of Clean Air Act and Clean Water Act, which developed technology-specific pollution control regulations. For instance, the Clean Water Act created the system for permitting discharge of wastewater, known as National Pollutant Discharge Elimination System (NPDES), and introduced two tiers of technology-based regulations, Best Practicable Control Technology Currently Available (BPT, which was later evolved into Best Conventional Pollutant Control Technologies, BCT) and Best Available Technology Economically Achievable (BAT). Like Japan, the US achieved sizable reduction in pollution loads from industrial sources, in particular, atmospheric emissions. Nevertheless, the US's system, especially in the earlier days, was characterized by an inflexible command-and-control system. Many experts criticized the media-oriented approach (air/water/soil) for fragmenting pollution control efforts, and technology-based standards for limiting development of more efficient integrated approaches. Strong reliance on the judicial system is another characteristic of the US environmental management. The large environmental expenses prompted economic evaluations and risk assessments of government policies, and led the US to adopt more flexible instruments, especially economic instruments (e.g., emission trading).

EU: Europe consists of many industrialized countries, and it is somewhat difficult to summarize European pollution control systems in the early days. Like Japan and the US, however, modern environmental management in Europe started in late 1960s – 1970s. In Germany, for example, the Environmental Program was endorsed in 1971, which elevated environmental protection to the same status as other governmental responsibilities, such as social security, education, and defense. Then, a number of important laws, including Federal Emission Act (1974), were enacted to control pollution and other environmental problems. Emergence of an environmentally oriented political party (Green Party) is another interesting aspect of the environmental movement in Europe. Recent environmental management in European nations is largely influenced by the efforts to harmonize environmental laws and standards across the EU. In particular, Integrated Pollution Prevention and Control (IPPC) based on Best Available Techniques (BAT) and Eco-Management and Audit Scheme (EMAS) are pertinent to pollution control.

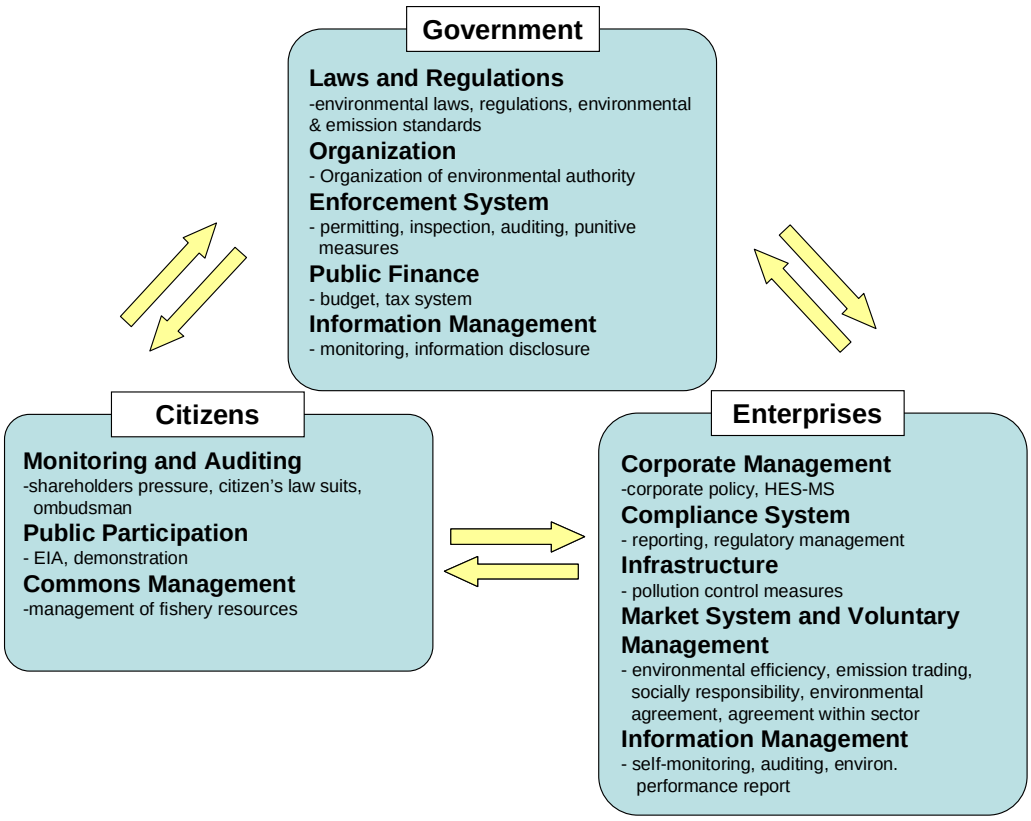
References: M.A. Schreurs, M.A., Environmental Politics in Japan, Germany and the United States, Cambridge, 2002; J.C. Davies and J. Mazurek, Pollution Control in the United States, RFF, 1998; U. Desai (edit.), Environmental Politics and Policy in Industrialized Countries, MIT Press, 2002; H. Imura and M.A. Shreurs (edit.), Environmental Policy in Japan, Edward Elgar, 2005.

10.3 Framework of the Master Plan

10.3.1 Essence of Good Environmental Management

(1) Introduction to the Concept of Social Capacity for Environmental Management

Before designing the Master Plan, let us step back a little and consider what constitutes good environmental management. This is a difficult question to answer, but experiences in Japan and other industrialized countries revealed that sophisticated pollution control technologies or rigorous regulations alone couldn't bring good environmental management. In order for a society to deal with complex issues as environment, the society needs an overall capacity, known as the social capacity for environmental management (SCEM). Government, enterprises and citizens (general public) are the main actors of environmental management, and SCEM is determined by (i) capacity of government to develop, manage, finance and enforce environmental laws and regulations, (ii) capacity of enterprises to comply with regulations and pursue even higher environmental performance, and (iii) capacity of citizens to monitor and participate in environmental management, as well as the interactions among these actors, as explained in Figure 10.3.1(see Matsuoka 2002).



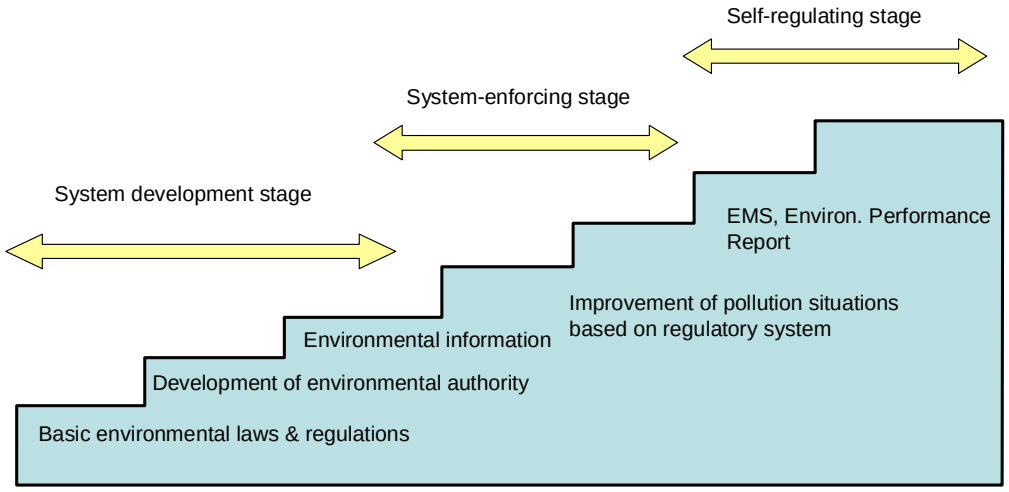
Source: based on Matsuoka 2002[2], modified by the JICA Study Team

Figure 10.3.1 Components of Social Environmental Management Capacity

[2] Matsuoka, S., "International Capital Flow and Environmental Problems in Developing Countries-Sustainable Development and Direct Investment, and ODA (Kokusai Shihon Ido to Tojyo-koku no Kankyo-mondai – Jizokuteki Hatten to Chokusetsu-toushi, Seifu-kaihatsu-enjo)." Morita, Tsuneyuki and Amano, Akihiro. Eds. Global Environmental Problems and Global Community (Chikyu Kankyo-mondai to Global Community). Iwanami Shoten. Pp.125-155. (Japanese). Cited from Japan Society for International Development (JASID), Environmental Centre Approach: Development of Social Capacity for Environmental Management in Developing Countries and Japan's Environmental Cooperation Feedback Seminar Report, March 2004, JICA

It is also important to note that SCEM evolves with the development of the economy, human capital, technology, and maturation of government-corporate-citizens' relation, as these things are the foundation of SCEM. It is believed that the SCEMs in most industrialized countries have evolved in the following three stages (JSIAD, 20043):

- System-making stage: basic environmental laws and regulations are developed and regulatory environmental management is initiated.
- System-enforcing stage: enforcement of the law becomes regular practice, and pollution problems start to improve
- Self-regulating stage: trust between government, enterprises and citizens is increased, and the proactive attitudes of enterprises and citizens drives environmental management toward self-regulation.



Source: JASID 2004[3], modified by JICA Study Team

Figure 10.3.2 Evolution of Social Capacity for Environmental Management

(2) SCEM of Kazakhstan

The analysis of current practices (see Chapter 2-6) revealed that Kazakhstan already has substantial SCEM, and is believed to be at the system-enforcing stage, as summarized in Table 10.3.1. Furthermore, some foreign oil companies brought international practices, and the domestic companies, such as KazMunayGas, are also improving their environmental management. As a result, the oil and gas sector is already moving toward self-regulation, and environmental performance of the sector has been improving in the recent years.

[3] Japan Society for International Development (JASID), Environmental Centre Approach: Development of Social Capacity for Environmental Management in Developing Countries and Japan's Environmental Cooperation Feedback Seminar Report, March 2004, JICA

Table 10.3.1 Major Achievements in SCEM Development in Kazakhstan

Actor	Major achievements in SCEM development
Government	• Revisions of environmental laws and regulations inherited from the Soviet era and their enforcement. • Enactment of new Environmental Code that entails various new environmental management provisions in order to further modernize the legal system. • Enforcement of environmental control of oil and gas development activities in the Caspian region, including general ban on discharging wastewater into the Caspian Sea, development of regulations to control flaring, etc. • Enforcement through environmental inspection, collection of environmental charges and fines, and prosecution of violators. • Environmental monitoring in the Caspian Sea and its coastal area. • Development of the National Oil Spill Prevention Plan
Enterprises	• Wide adoption of underground injection of produced water instead of discharging it to poorly managed evaporation ponds • Construction of environmentally-sound waste disposal facilities • Investigation on flare reduction measures • Preparation of equipment for oil pollution accidents • Study on disposal of sulphur • Establishment of modern HSE management systems by most major enterprises
Citizens	• Coverage of environmental issues by media and NGOs

On the other hand, the reviews of the current practices (see Chapters 2-6) and discussions with the environmental authorities and enterprises identified various issues that are yet to be tackled. They include:

Table 10.3.2 Priority Issues in SCEM Development

Actor	Priority issues in SCEM development
Government	• Overall, the current environmental management system, such as emission standards, permitting and environmental charges, are unrealistically strict and extensive, and not "implementable" and "enforceable". • The new Environmental Code introduced a number of modern environmental management ideas, but cannot be implemented because the secondary laws and regulations are yet to be developed. • Environmental information is generally scarce. As a result, it is difficult to know what environmental consequences mismanagement of the oil and gas development activities will bring. • Reluctance to share information is further preventing "informed" decision-making by the government agencies as well as the enterprises.
Enterprises	• The oil and gas sector in Kazakhstan is very diverse, and represented by various enterprises of different scales from different countries. Some enterprises are already operating at the international-level while others are lagging behind. • There are some unresolved technical issues, such as disposal of sulphur and control of flare gas in large oil fields.
Citizens	• Overall, participation of citizens in environmental management is still limited, partly because publicly available information is often not very reliable.

10.3.2 Overall Goal and Target Year

(1) Overall Goal of the Master Plan

Considering the evolution of SCEM in Kazakhstan, the overall goal of the Pollution Control Master Plan is "to build further social capacity in order to minimize environmental impact of oil and gas development activities in the Northern Caspian region".

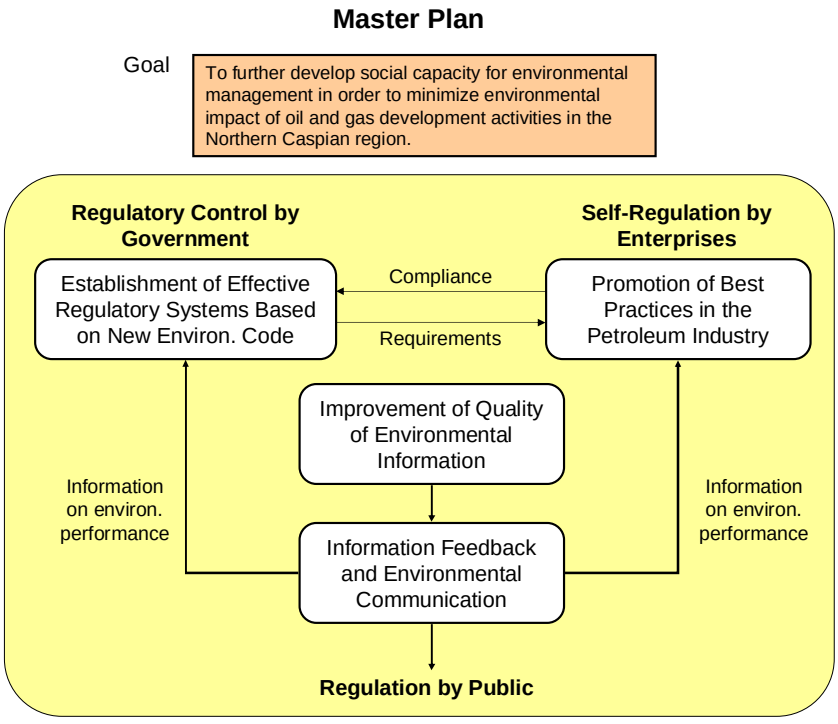
(2) Target Year

The target year of the Master Plan is set in Year 2015.

This is a rather short target for a master plan. Nevertheless, considering (i) the urgency of developing pollution control strategies before large-scale development starts, (ii) consistency with the national oil sector development plan to 2015, and (iii) high uncertainty associated with long-term oil and gas development in the region, 2015 is considered appropriate as the target year of this Master Plan.

10.3.3 Approaches

As reviewed above, Kazakhstan's ability to deal with complex environmental problems is determined by the overall capacity of the society. Thus further development of the social capacity is needed to improve environmental management. While this needs substantial effort, there are a number of priority issues (see Table 10.3.2) that have to be addressed in order to advance pollution control in the petroleum sector. Considering such issues, the team adopted the following approaches in the Master Plan.



Source: JICA Study Team

Figure 10.3.3 Goal and Approaches of the Master Plan

(1) Establishment of Effective Regulatory Systems based on the new Environmental Code

There is an urgent need to fix the glitches in the current inefficient regulatory system in accordance with the newly introduced Environmental Code, and establish enforceable regulatory systems. It was noted that the Environmental Code proposed a number of innovative instruments for pollution control, such as a new environmental permit system, production environmental control, new economic instruments, stiffer punitive measures, etc. In accordance with this direction, the Master Plan suggests adoption of best practices as the regulatory requirement for the oil and gas enterprises, and aims at having environmental control by both "end-of-pipe" (e.g. emissions and discharging points) as well as adoption of "best practice" (upstream). This topic is discussed in Chapter 11.

(2) Promotion of Best-practices in the Petroleum Industry

The oil and gas sector needs to raise the sector wise capacity for environmental management by adopting international best practice as the standard of operation, which are already practiced by some enterprises in Kazakhstan. With the introduction of technical specific emission standards and production environmental control prescribed in the new Environmental Code, adoption of best practice becomes the regulatory requirement. Moreover, this direction will improve the long-term efficiency of oil and gas development, improve the corporate images of the oil enterprises, provide workers with a safer working environment, prevent unnecessary accidents, and minimize environmental pollution. This topic is covered in Chapter 12.

(3) Improvement in Quality of Environmental Information

In the past, environmental management in Kazakhstan was implemented based on a large amount of unreliable and often untraceable information on pollution sources, while other information essential for environmental management, such as ambient environmental quality and environmental risks, was largely unavailable. Such practice is about to change with the introduction of new regulatory systems based on the new Environmental Code. While the legal requirements for environmental permitting and reporting are expected to be simplified and the number of regulated parameters may be reduced, it is expected that the new system of inspection, auditing, environmental litigation, etc., will demand more reliable, defendable information. Therefore, the Master Plan proposes ways to improve quality of environmental information, especially environmental monitoring information. This topic is covered in Chapter 13.

(4) Enhancing Information Feedback and Environmental Communications

Finally, the Master Plan emphasizes the need for feedback of information and environmental communication. These are essential to induce environmentally conscious and accountable behaviour of environmental authorities and enterprises. In particular, feedback of information that leads to evaluation of environmental performance, such as whether the environmental standards are attained in the open section of the Caspian Sea and at the border of sanitary protection zones, is important because once such information is available, responsible organizations become serious about fulfilling their responsibility. Moreover, if such information becomes publicly available, environmental NGOs, local residents, shareholders of enterprises, other interest group (e.g., fishermen) and media, can exert pressure on those who have unsatisfactory environmental/regulatory performance. This topic is covered in Chapter 14.

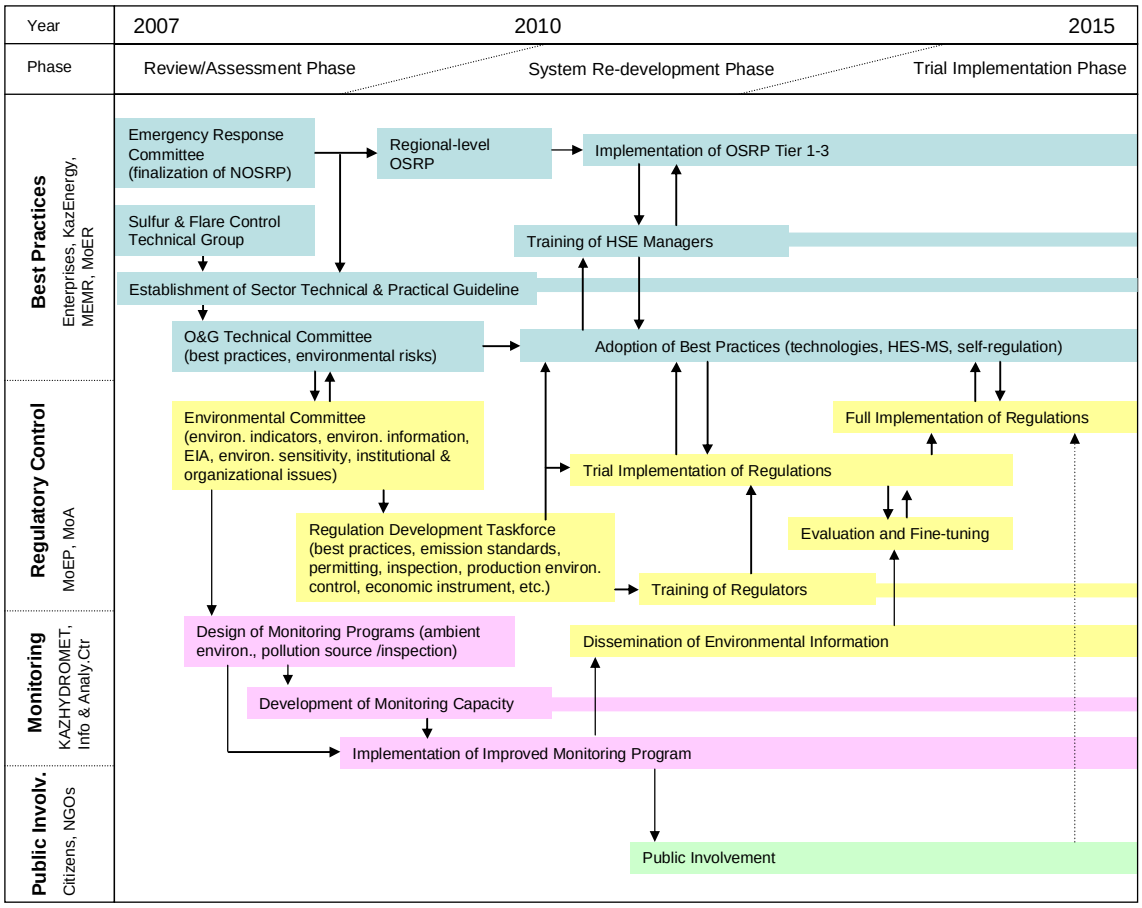
10.3.4 Overall Schedule for Master Plan Implementation

Because the Master Plan covers various regulatory issues that are yet to be developed and approved by the government, and because many stakeholders with different interests are

involved, it is difficult to develop a detailed implementation schedule of the Master Plan. For example, MoEP has already issued by decree a schedule to develop 46 secondary regulations of the new Environmental Code by the end of 2007, which is deemed highly ambitious. There are a number of technical issues (see Chapter 12), and defining best practice tuned to the Caspian region could take a few years. Moreover, these regulations have significant impact on the oil and gas industry, and more consultations are desirable. Considering such needs and uncertainties, the Master Plan suggests development of general systems for pollution control by 2015, which is to be implemented in three phases:

- Review/assessment phase (2007-2010)
- System Re-development Phase (2007-2013)
- Trial implementation phase (2010-2015)

Although the proposed schedule is still very rudimentary, it is important to note that, in order to establish effective pollution control systems, tasks of four core areas, namely, the regulatory system development (Chapter 11), promotion of best practice in the petroleum industry (Chapter 12), environmental monitoring (Chapter 13) and dissemination of information (Chapter 14), need to be implemented in a synchronized way, as suggested in Figure 10.3.2. Development of a detailed implementation schedule is highly desirable, but it requires knowledge about budgeting and bureaucratic processes to develop and obtain approval for public regulations in Kazakhstan, and it is beyond the current capacity of the team to develop a more detailed implementation schedule. Thus, the Kazakhstan government is urged to develop detailed schedules based on the recommended tasks explained in the subsequent chapters.



Source: JICA Study Team

Figure 10.3.4 Suggested Flows for Implementation of the Master Plan

BOX 3: Pollution Master Plan and Its Targets

Figure 10.3.5 shows the pressure-state-effect relation of pollution problems, which is often used to design and evaluate pollution control master plans.

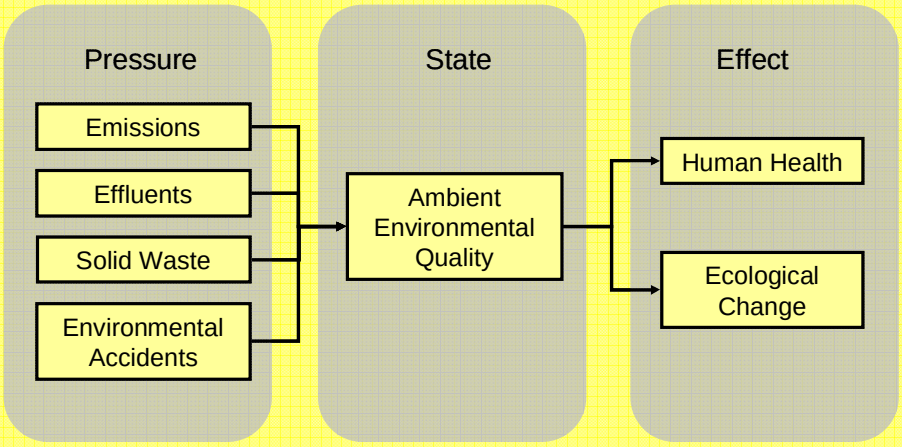


Figure 10.3.5 Pressure-State-Effect Relationship of Pollution Problem

Typically regional pollution control master plans, especially those to control pressing environmental pollution, have objectives to ensure acceptable environmental quality or to limit environmental risks to human health and ecosystem. Then quantitative targets that correspond to such objectives, such as attainment of environmental quality standards within a specified period, specified reduction of exposure to priority pollutants or oil spill impact, are pursued. In order to achieve this target, targets of environmental pressure, such as allowable pollution loads to the environment, are set (e.g., total air/water pollution load control programs in Japan). The achievements of the master plan is then evaluated against these targets, i.e., whether environmental quality standards were attained, environmental risks were reduced, pollution loads were reduced, or whether such targets were attained with minimal cost. This type of framework is generally preferred, because it has specific pollution control targets, and the attainment of the objectives is easy to see.

This is akin to the regional version of MPC-MPE/MPD framework. However, at the moment, this type of master plan is difficult to develop for the Caspian region for a number of reasons. First, information about the environmental states or environmental risks in the Caspian region is too limited, and it is difficult to link environmental pressure, such as pollution loads from the oil industry, to the environmental state (e.g., distribution of pollutants in the Caspian) or environmental impact (e.g., whether the occasional mass deaths of Caspian seals and sturgeons are linked to the oil development activities or not). Second, the environmental issues associated with the petroleum industry are very broad, and regulating point sources alone is not sufficient. Overall environmental risks of oil and gas operations have to be identified. Third, Kazakhstan is in the process of re-inventing pollution control regulations, and the regulatory/legal basis for enforcement is still weak. Considering these constraints and priorities, the team decided not to set pollutant-specific environmental targets, and adopted broader objectives, i.e., (i) establishment of effective regulatory systems, (ii) promotion of best-practice in the industry, (iii) improvement in the quality of environmental information, and (iii) enhancement of information feedback and environmental communication. Pollution management based on the state of the environment and effect on the environment becomes possible once these four objectives are achieved.

Reference: R. M. Friedman, D. Downing and E.M. Gunn, Environmental Policy Instrument Choice: The Challenge of Competing Goals, Duke Environmental Law & Policy Forum 327 (2000), in Making Law Work: Environmental Compliance and Sustainable Development, edit. Zaelke et al., Volume 2, p.273-287, 2005

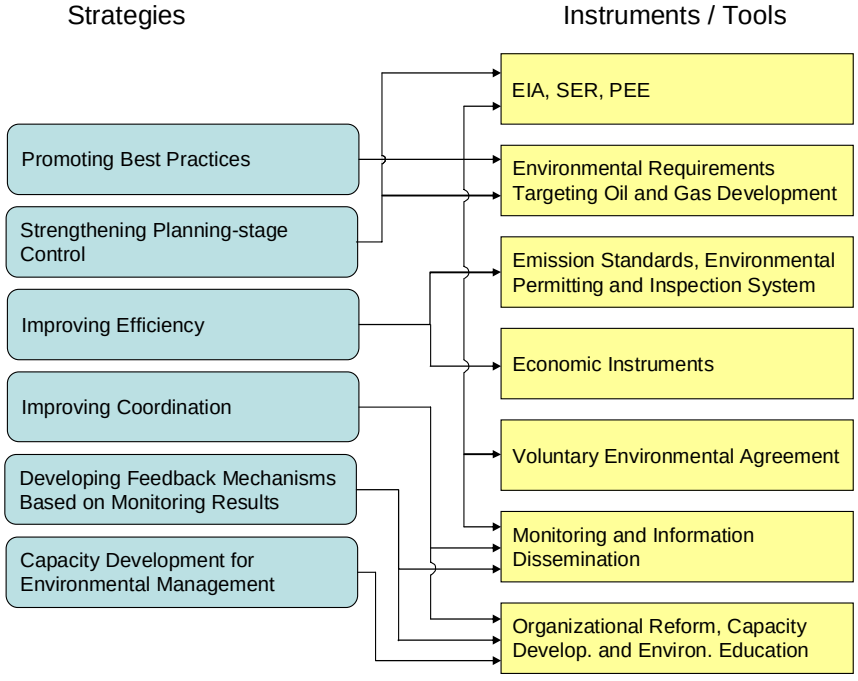
CHAPTER 11 REGULATORY SYSTEMS

11.1 Introduction

This chapter describes the regulatory systems to be developed by MoEP and other regulatory agencies as a part of the proposed Master Plan. There are arrays of pollution control instruments, such as EIA, emission standards, permitting, inspection, punitive system, economic instruments, environmental monitoring, information disclosure, etc., which are widely used in the world in order to (or more precisely, in an attempt to) achieve efficient pollution control[1]. However, choosing the right instruments and building enforceable systems are challenging tasks for any agency. One has to consider various practical aspects of environmental management, such as local environmental problems, technical solutions, institutional/organizational constraints, social and political acceptability, financial constraints, and other requirements (see, e.g., Zaelke et al., 2005[2]). This Master Plan proposes the general principles and policy recommendations for development of regulatory systems in accordance with the new Environmental Code.

11.2 Strategies for Development of Regulatory Systems

Based on unique environmental and socio-economic conditions in Kazakhstan (Chapter 2), status of oil and gas development (Chapter 3), existing regulatory systems and organizational set up (Chapter 4), existing environmental monitoring system (Chapter 5), anticipated increase in oil/gas development activities (Chapter 10), and other conditions (Chapter 10), the following strategies were selected in order to develop specific instruments and tools (Figure 11.1.1):



Source : JICA Study Team

Figure 11.1.1 Strategies and Instruments/Tools for Development of the Regulatory System

[1] Hidefumi Kurasaka, Environmental Policies: History, Principles and Techniques (in Japanese), Shinzan-sha, 2004.

[2] D. Zaelke, D. Kaniaru and E. Kruzikova, Making Law Work: Environmental Compliance and Sustainable Development, Volume 1 and 2, Cameron May, 2005.

11.2.1 Promoting Best Practices

The pollution control system in Kazakhstan used to depend largely on control of point sources through a complex system of emission standards, permitting, inspection, and pollution charge. However, risks of major environmental accidents, illegal disposal of waste due to negligence, poor selection of mining and pollution control technologies, etc., remain legitimate environmental concerns related to oil and gas development. Considering the need to address such broader problems, promotion of best practice by the industry seems the best approach. In this respect, development and improvement of the following instruments is important:

- Environmental Permitting: In accordance with the new Environmental Code, the idea of best practice will be built into the environmental permitting requirements, and adoption of best practice and other self-regulating mechanisms by the industry will become a legal requirement. However, the details of the regulations are yet to be developed.
- EIA/EER/PER: The idea is that best practice must be built into the EIA/EER/PER systems (Environmental Impact Assessment) so that new enterprises have clear understanding about the environmental requirements to be satisfied if they want to operate in the Caspian region.
- Voluntary Agreement: Many oil enterprises already possess sophisticated environmental management technologies in line with best practices. The regulatory system should support environmental initiatives by the industry through voluntary agreements and other informal approaches.
- Monitoring: In order to ensure high-level of environmental management by the industry, self-monitoring by the industry should be promoted further.

This Chapter discusses the regulatory system of promoting best practice. The suggestions on the best practice can be found in Chapter 12.

11.2.2 Strengthening Planning-stage Control

Development of offshore oil fields in the Caspian Sea is still at an early stage. In order to control new development, it is important to strengthen planning-stage measures. The following instruments are particularly pertinent to planning-stage control:

- EIA/SEE/PER: These are the central tools of planning-stage environmental control.
- Environmental requirements targeting oil/gas industry in the Caspian Region: The new Environmental Code has set forth the general conditions and restrictions on oil/gas development activities in the Caspian region. These requirements are particularly important for enterprises that want to develop offshore fields in the area, and the details of such conditions and requirements have to be clarified.

11.2.3 Improving Efficiency

Kazakhstan inherited from the Soviet era complex environmental management systems that are difficult to enforce and demand significant resources of both the regulators and the regulated. Therefore, in order to improve the efficiency of environmental management, these systems should be simplified, and/or replaced with more efficient systems.

- Permitting, Licensing, Inspection and Punitive System: These remain the core of the pollution control system. However, simplification of these instruments is essential because, they are not particularly effective due to complexity, extensive data needs, and lack of focus on priority problems.
- Economic Instrument: The current pollution charge based system is not functioning well as the mechanism for pollution control. The system needs to be re-invented.

11.2.4 Improving Coordination of Environmental Management

Under the current system, governmental responsibilities for pollution regulation, such as permitting and inspection, monitoring of pollution loads, monitoring of the ambient environment, management and monitoring of the ecosystem, system of pollution charge, etc., are delegated to different governmental organizations without adequate mechanisms for coordination. This is one of the weakest aspects of the current public environmental management system in Kazakhstan. In order to improve this, the following changes should be considered:

- Organizational reform and capacity development: There are many ways to improve coordination among organizations. Even a relatively minor change, such as increase in joint inspection and cross training would be highly useful. Another important move would be to streamline the flow of information. Under the current system, a large amount of useful, unclassified information is not available simply because there is no protocol to release information to other organizations. Reforms in such areas would significantly improve coordination.
- Monitoring and information dissemination: In particular, sharing of environmental monitoring information is needed. While various organizations carry out environmental monitoring, such information is not shared, making it difficult to promote environmental management based on solid scientific information.

11.2.5 Developing Feedback Mechanisms Based on Monitoring Results

One of the key factors to develop a robust environmental management system is to develop a feedback mechanism so that the effectiveness of the system is always checked and adjusted. However, the current environmental management system is weak in this area, and it is difficult to see whether the system is effective and/or efficient in controlling pollution and environmental risks.

- Organizational reform, capacity development and environmental education: There is institutional/organizational discontinuity between monitoring of environmental quality and ecological integrity (KAZHYDROMET and MoA) and pollution control and disaster management (MoEP, akimats, MoER and MEMR). In order to develop an environmental quality/risk based pollution management system, coordination among such organizations has to be improved.
- Monitoring and information dissemination: In accordance with the new environmental permitting and other regulations, environmental monitoring systems by environmental authorities and enterprises have to be upgraded. Details of monitoring programs are also discussed in Chapter 13.

11.2.6 Capacity Development for Environmental Management

As reviewed in the previous section, oil and gas development in the region is expected to increase significantly within the next 5 to 10 years, and the tasks of environmental managers in both regulatory agencies and oil companies will become more complex and demanding with enactment of the new Environmental Code and introduction of new pollution control technologies, etc. Therefore, capacity development of environmental administrators and managers will be essential.

- Organizational reform and capacity development: The Master Plan proposes a number of practical capacity development activities.

11.3 Overall Legal Structure

The legal structure of the pollution control system has been described in Chapter 4 above. The recent introduction of the new Environmental Code is a very significant event for the system, which once implemented will represent a significant improvement, as also discussed in Chapter 4. In the circumstances, no changes to the new legal structure for pollution control are proposed.

However, a review of the pollution control system, including discussions with the inspectors and the oil companies, has identified a number of possible directions for improvement of the application of the system, which are discussed below.

11.4 Environmental Impact Assessment (EIA), State Environmental Review (SER) and Public Environmental Review (PER)

Given the expected scale of future offshore oil field development, planning-stage environmental and social impact assessments will be important tools to minimize further degradation of the environment. In order to strengthen the environmental review process, the Kazakhstan government formally introduced the requirement for EIA to complement the traditional State Environmental Review (SER) process. The concept of Public Environmental Review (PER) has also been introduced to enable interested parties to conduct their own, officially recognised, environmental review of proposed projects (see Chapter 14 on environmental communication through EIA). The EIA process as defined in the new Environmental Code now complies with accepted international practice, including for example, the phasing of EIA work, the categorisation of projects for EIA, the environmental media to be considered, and the characterisation of impacts. However, the environmental review system is still evolving as the new Environmental Code is gradually implemented. In the meantime, a number of suggestions can be made about the refinement of various elements of the system to increase its effectiveness.

(1) Follow-up Environmental and Social Impact Studies

The current oil development projects provide valuable lessons for the future. It is, therefore, strongly recommended that detailed follow-up environmental and social impact studies should be carried out. Such retrospective audits would provide an evaluation of the adequacy and problems of both the current technologies in the oil and gas sector, and the environmental management systems to which they have been subjected. They would also determine whether the mitigation measures proposed within the EIA have actually been carried out, and would determine their effectiveness.

(2) Adoption of Best Practices and Environmental Requirements in EIA

The EIA/SER/PER system ought to be able to promote the adoption of best practice and best available techniques (BAT) in industry, and to prevent certain activities that could negatively affect the environment of the region. Section 11.8 explains how this can be promoted by organizing technical committees under MEMR. MoEP should also recruit specialists in the field of oil and gas development, who would serve as members of such a committee and also as SER and EIA reviewers. Other opportunities for improved integration between environmental control and industrial environmental management are discussed in section 11.8 below.

11.5 Environmental Restrictions on Oil and Gas Development in the Northern Caspian Region

In addition to the existing system of emission / discharge standards contained in Emission Permits, environmental management measures for the oil industry must be clearly defined.

The government has a strong stance on protection of the Caspian Sea, and has already banned flaring and the discharge of wastewater to the Caspian.

In addition, the new Environmental Code includes a complete chapter on the control of oil and gas developments in the northern Caspian. A large number of environmental requirements have been introduced including, but not limited to, the following:

- Restrictions on development activities and their seasons in the National Nature Reserve (NNR) of the northern Caspian, in order to protect fish, birds, and Caspian Seals. This will include the prohibition of all economic activities in certain zones of the NNR.
- Restrictions on construction and other activities in the Water Protection Zone, which is defined as the 2000 m wide strip of land above the perennial sea level of - 27.0 m.
- Coastal Water Conservation Areas may also be established in the coastal waters within 3.9 km of the shoreline.
- Restrictions on petroleum operations and the prohibition of waste landfills within the Water Protection Zone.
- Prohibition in the surge / tidal zone (El. -28 to -26 m) of construction of petroleum storage facilities, waste dumps, machine shops, etc., and other activities, such as dredging, blasting, mineral extraction and the laying of cables and pipelines without prior approval.
- Requirements for environmental monitoring in the northern Caspian NNR.
- Prohibition of flaring during well operation, except in an emergency situation.
- Minimization of flaring in the course of well testing.
- Prohibition on the discharge of wastewater within the northern Caspian NNR.
- Neutralization, storage and disposal of drilling waste at a specialized landfill site outside of the NNR.
- Requirements regarding the disposal of effluents at drilling rigs

(1) Clarification of Technical Conditions and Requirements

The details of these conditions are subject to clarification, which in some cases is needed urgently (for example, the boundaries of the NNR and its zoning are yet to be decided). Many of these restrictions are related to technical aspects of oil and gas development, and the development of solutions should be spearheaded by the same committee of the MEMR as suggested in section 11.2 above and section 11.8 below. MEMR has already organized working groups to deal with the problems of flaring and of sulphur disposal. Other issues, such as protection of the ecosystem and social issues, should be handled under the leadership of MoEP, Ministry of Agriculture or the akimat government. See Chapter 12 for further technical suggestions.

(2) Development of Guideline

Based on the results of these discussions, a technical guideline has to be produced. This task should be undertaken by a joint taskforce formed from the technical committees mentioned above, spearheaded by the Environmental Control Committee of MoEP.

11.6 Emission / Discharge Standards, Environmental Permitting and Inspection System

The main problems of the current system have been the complexity, limited transparency, and high implementation costs for both the oil/gas industry and the government. Reform of the permitting system is an important element of the new Environmental Code. Implementation of the Code is expected to introduce the following changes:

- The number of pollutants controlled by the emission standards will be reduced from the current several hundred substances to about 40 categories of hazardous pollutants.
- For some major enterprises such as those in the oil industry, an alternative system of standards and permits will be used. Technical Specific Emission Standards will be established for specific processes and segments of industries on the basis of Best Available Techniques (BAT), and these will be the basis of a Complex Permit. The intention is to gradually convert the permitting of more enterprises to BAT. According to the MoEP, this will eliminate the present complicated calculations of emission loads.
- The permit application process will be simplified, with the amount of information required depending upon the category of enterprise (I-IV). For those enterprises in the least potentially hazardous categories, permits will be granted on the basis of a declaration from the company. It is estimated that this will relieve 75% of companies from the detailed permitting process.
- Fines for environmental violations will be increased.
- The system of environmental inspection will gain the status of a law rather than a regulation.
- Environmental self-supervision by enterprises will be promoted by the obligatory adoption of 'Production Environmental Control'. This goes further than the submission of environmental monitoring results, and is more akin to a company Environmental Management System as recognised internationally. Companies will be required to provide annual environmental programmes, which will specify the nature and costs of environmental improvements to be made during the forthcoming year. The public will have access to the environmental programmes and the monitoring results of enterprises.

The above changes are generally in line with the ideas developed in the present study. However, the details of implementation are yet to be finalised in terms of both secondary law and administration.

(1) Development of Technical Specific Emission Standards, Permitting Systems and Production Environmental Control System

Development of these standards and regulations are substantial tasks, and requires a large number of experts in environmental, economic, legal and petroleum engineering fields. Given the limited specialized human resources at MoEP, it is suggested that the development of technical specific emission standards, regulations on production environmental control, and related permitting requirements be entrusted to a taskforce represented by MoEP, MEMR MoH, MoER, MoA, major oil enterprises, and oil industry associations (e.g., KazEnergy). As this taskforce will discuss technical aspects of oil/gas development, the members of the taskforce will be largely the same as the technical committee spearheaded by MEMR. However, the standards and regulations developed by this taskforce will become a part of the new pollution control regulations under the new Environmental Code. Therefore, it is suggested the taskforce may be organized under MoEP, and it has representatives of environmental lawyers, ecological experts, occupational health experts, economists, etc.

- These regulations should be "enforceable". The pollution control system in Kazakhstan has been theoretically of high standard, but not enforceable, and this has been the major weakness. This mistake should not be repeated. It is suggested that "enforceability" be included as the main criterion for the system development, along with effectiveness and efficiency, and to ensure that the developed system is enforceable by both the regulated and regulator.
- These regulations should consider the entire activities of oil/gas development and production with measures to avoid and minimize pollution, ecological risks and other occupational hazards (i.e., entire HSE issues), rather than end-of-pipe technologies.

Fortunately, there are numerous guidelines for best practice in the oil industry (UNEP, IPIECA, API, OSPAR, etc.), and the first task will be to study these guidelines along with the HSE systems of TCO, Agip KCO and KazMunayGas, which have been developed based on such international practices.

- For the specific issues of pollution control, see Chapter 12.

(2) Inspection System and Punitive Measures

In accordance with the introduction of technical specific standards and new permitting systems, the inspection system will also have to be revised. Overall, the new regulatory system transfers more environmental management responsibility to enterprises rather than making environmental authority/inspectors responsible for environmental issues of private enterprises. Nevertheless, the new regulatory system will deal with broader HSE issues, and in order to enforce such a system, the environmental authority/inspectors will need to be reasonably sophisticated. Another important issue is how to control enterprises that cannot live up to the expectations of the self-regulating system. In order to control such violators, it will be necessary to set punitive measures that are severe enough to deter violations, and also employ a phased approach so that enterprises have time to adjust to the new system. The suggested approaches to development of new inspection and punitive systems are as follows:

- The inspection and punitive system has important implications for permitting and licensing. Hence, the development of the inspection/punitive system may be carried out by a sub-group of the taskforce responsible for development of technical specific emission standards, permitting systems and a production environmental control system.
- The task of reinventing the inspection system is largely the responsibility of MoEP. Therefore, this is left to MoEP, especially the Environmental Control Committee, to lead. Nevertheless, collaboration with other authorities, such as MENR, Geological Committee, MoER and MoH, will be important, because the new system covers broader HSE issues, and some inspection tasks are under the responsibilities of such authorities.
- Inspection activities have to be prioritized according to environmental and health risks of operations, which should be assessed during the development of technical specific standards. High-risk incidents include a large-scale spill/accident in an offshore facility, oil spill during transportation (tanker, pipeline from offshore facility), and use of toxic chemicals, among others. In addition, medium-risk events, such as spills from inundated wells, accidents during exploration phase, etc. need some attention, as the frequencies of such events would be higher than the high-risk accidents. It is suggested that the Environmental Control Committee gives technical guidance to the territorial MoEPs in Atyray and Mangistau about how to prioritize inspection activities.
- As the current inspection has purposes other than deterrence of environmental offences, such as checking emission/discharge records for collection of general revenues for akimats, requirements for such activities should be re-evaluated separately. This should be done in relation to the upgrading of the financial mechanisms (see section on Economic and Financial Measures below).
- In order to ensure fairness of the system, the Environmental Control Committee of MoEP should issue guidelines to inspectors and enterprises, and make sure that all enterprises are subjected to the same regulations.
- Without reliable information, decisions of the inspectorate can be easily challenged in court, and lower the enforceability of the regulatory systems. The quality of technical information for inspection has to be improved. For suggested improvement of pollution source monitoring, see Chapter 13.

- Competence of inspectors is the key to successful inspections. Hence, capacity development of inspectors must be built into the inspection program (see the Capacity Development section below).
- Judicial courts are important institutions of environmental law enforcement. In designing the inspection and punitive systems, it is important to consider the requirements for bringing cases to court.
- It is also suggested that all forms for permitting and inspection activities be standardize, and information be stored in electronic databases, which will be developed as a part of Unified State Monitoring System for Environment and Natural Resources (USMS ENR). This would enable MoEP to relate cause and effect in relation to environmental quality, which can then guide future environmental management initiatives

11.7 Economic and Financial Measures

At present, the main economic instrument for pollution control is the system of fees and fines charged as part of the permitting system according to the quantity of pollutants discharged. The fees and fines are effectively levied as a pollution tax, and have the dual functions of a disincentive for pollution and a revenue source for the akimats. Some of the main criticisms of the current system are as follows:

- It is not very effective in reducing pollution because the scale of the fees has been insufficient to act as an incentive for companies to improve their environmental performance.
- It incurs significant administrative effort and cost to check pollution loads and determine the appropriate charges.
- The pollution fees are now used as a source of general revenue. This system does not provide the authorities with much incentive to control pollution, as the system implies 'more pollution – more revenue'.
- The revenue from pollution charges is not ear-marked for environmental investment. In Atyrau, only about KZT 0.05 billion out of the KZT 4.00 billion collected is allocated for environmental management.
- As a revenue base, it is not very robust because if the companies reduce emissions, the revenue from fees and fines also decreases. Similar comments are found in a number of OECD/EAP documents (OECD 2005[3]; OECD 2004[4]; OECD 2003[5]; OECD 2000[6]).

MoEP is aware of these criticisms, and is trying to reform the environmental financing system. Currently, MoEP has no intention of making any drastic change to the existing system based on pollution fees and fines. However, the new Environmental Code suggests the following new economic instruments:

- State guarantee of non-state loans for the implementation of environmental protection measures.
- Market mechanisms for pollution control (emission-trading).

[3] OECD, 2005, Funding environmental compliance assurance, lessons learned from international experience.
[4] OECD, 2004, Reform of pollution charges in the Russian Federation: Assessment of progress and opportunities and constraints for further improvement, ENV/EPOC/EAP/POL(2004).
[5] OECD, 2003, The use of economic instruments for pollution control and natural resources management in EECCA, Fourteenth EAP task force meeting, CCNM/ENV/EAP(2003).
[6] OECD, 2000, Reforming environmental finance institutions in Kazakhstan, Conclusions and recommendations from the performance review of the Kazakhstan State Environmental Protection Fund, Twelfth EAP task force meeting, CCNM/ENV/EAP(2000).

In addition, MoEP is trying to increase the share of the revenue from pollution charges allocated for environmental management to as much as 50% or more. This idea has been blocked by akimat governments who do not want to lose any sources of general revenue.

It can be seen that a major problem of the existing system arises from the fact that the objectives of effective pollution control and financing of environmental regulation are not separated. In designing economic incentives, it is suggested that these objectives should be dealt with separately, as follows:

(1) Economic Incentive

Economic instruments are usually introduced in order to improve the overall efficiency of pollution control. A recently introduced instrument is the granting of a 50% cut in pollution fees for those companies that are certified to both ISO 9000 (Quality Management System) and ISO 14001 (Environmental Management System). This has already acted as an incentive for companies to become certified, and should be further promoted, perhaps by the provision of seminars on Environmental and Quality Management Systems.

(2) Revenue Generation

If an objective of pollution fees and fines were revenue generation (whether earmarked for environmental expenditure or not), it would be far simpler to levy a single environmental tax on the enterprises. This environmental tax (the revenue from which could be divided between Oblast and State budgets) could be a percentage of annual turnover or profit, with the percentage being determined by the nature of the industry (i.e. higher rates for the more polluting classes of industry). For the major oil and gas producers, this could be achieved at a stroke by simply adding a very small percentage to the government 'take' in their Production Sharing Agreements (PSAs). This would immediately save a huge amount of time and money in the enterprises and the DUCERs in the calculation and negotiation of ELVs and fees, which would allow this effort to then be put to better use. It would also remove the adversarial relationship between the regulator and the regulated, thus creating a better atmosphere for real co-operative environmental management.

It might be argued that the absence of emission-related fees would remove the incentive for enterprises to improve their performance. However, pollution control itself could then be achieved by a combination of BAT and reasonable enforceable emission / discharge standards (ELVs) as is practiced as part of IPPC in the EU and other OECD countries. Part of the BAT / IPPC 'carrot' could be the 'reward' of a reduction in environmental fees for good environmental performance[7]. The 'stick' of enforcement would then be the due process of prosecution for emissions / discharges above respected standards, with the prospect of very heavy penalties imposed by the court, rather than the present system of payment of regular administrative 'fines'. For the oil industry, this approach would result in a simpler participatory system, which would be cheaper to operate and could concentrate on achievable environmental improvements. The State would also benefit from much easier and cheaper administration; moreover the authorities could direct their energies on facilitating real improvements in environmental management.

Given that BAT is now being introduced for major oil industries via the new Technical Specific Emission Standards and Complex Permits as specified in the Environmental Code, the simplified environmental tax system proposed above could work particularly well.

[7] In fact, companies having internationally recognised certification for both their Environmental Management System (ISO 14001) and their Quality Management System (ISO 9000) are now eligible for a 50% reduction in environmental fees. This is a very substantial incentive, which has resulted in an increase in the number of suitably certified companies from 8 to more than 50 in two years.

(3) Market Mechanism for Pollution Control

The introduction of market mechanisms does not necessarily reduce the administrative burden on the regulatory agencies concerned. Typically, the introduction of emission trading requires the monitoring of emissions, which capability the environmental administration currently lacks. There are other important issues to be considered, such as whether the number of participants is large enough to form a meaningful market, and how to develop and maintain the required registry system. These issues have to be addressed and resolved before the instrument can be implemented (see Greenspan Bell (2003) for critical discussions on market-based mechanism in CIS countries.[8]). Further discussion is needed on this subject.

11.8 Voluntary Environmental Agreements

The present enforcement system based on inspection is quite rigid, and there are few informal communications between the inspection service and the industrial enterprises. However, inspectors understand that required improvements cannot be made 'overnight'. The concept of voluntary agreements or 'environmental memoranda' on phased improvement has therefore been introduced, as discussed at the end of section 4.1.3. Five major oil enterprises have entered into such memoranda so far. This seems to be a way in which the inspection service can help to facilitate the improvement of industrial environmental performance, rather than simply punishing those with poor performance. However, no new environmental memoranda have been signed recently and MoEP does not have any plans to promote them in the future. Nevertheless, this instrument would be a very practical approach to combat environmental problems in the oil and gas sector because:

- The speed of oil and gas development could surpass the government's ability to develop and enforce detailed, prescriptive, command-and-control type regulations. The government needs alternative ways to control environmental issues.
- Oil companies already have high technological capacity and experience in pollution control, which can be effectively utilized to control environmental problems of regional importance.

Given the technical experience of the oil companies, their expertise could also be applied for the benefit of environmental regulation and control, as suggested below.

(1) Environmental Management Systems

It may be that the system of Production Environmental Control referred to in section 11.4 can be operated with co-ordination between the oil companies and the MoEP in the spirit of Voluntary Environmental Agreements. Most oil companies already have some kind of Environmental Management System (EMS), quality control system, health, safety and environment (HSE) system, and/or social relations system. Official endorsement of the implementation of such systems can become a powerful tool to boost the environmental performance and social image of a company. The new Environmental Code provides for a reduction in inspection frequency to three years for those companies that demonstrate good environmental performance. As mentioned in 11.5 above, MoEP already gives a reduction in pollution fees to those companies that are certified to both of the international standards ISO 9000 and ISO14001. This certification could also be used as a factor in the determination of good environmental performance with respect to inspection frequency.

[8] Ruth Greenspan Bell, Choosing Environmental Policy Instruments in the Real World, presented at OECD Global Forum on Sustainable Development, cited from "Making Law Work: Environmental Compliance & Sustainable Development" in 2003, edit. Zaelke, Kaniaru and Kruzikova, Vol. 2, p.317-330, Cameron May, 2005

Another useful approach would be to publicly award companies having good environmental performance, perhaps by the establishment of an annual award ceremony to name the best performing oil/gas company. For more discussions on EMS and HSE Management System (HSE-MS) in the oil / gas sector, see Chapter 12.

(2) Environmental Measures by the Oil Industry

Another useful practice would be the establishment of 'environmental service agreements' between oil companies and the respective authority, in which the oil companies carry out environmental measures using their technology, facilities, and other resources. Activities are voluntary in the sense that that they are not legally mandated. However, the cost may be borne by those responsible for the environmental problems or the government, as appropriate. Suggestions for such agreements include:

- Joint agreement among oil companies and the relevant authorities to mutually assist in the containment and clean-up of oil in the event of a large-scale environmental accident. This is already partially in place, but it should be built into the Oil Spill Contingency Plan and formalized.
- Agreement to assist in the permanent closure of abandoned/inundated wells and the remediation of contaminated soils.
- Agreement among the oil companies, MoEP and the akimat to carry out integrated/co-ordinated environmental monitoring.
- Agreement to assist with establishment of the northern Caspian NNR.
- Sector guideline for environmental protection measures and practice which is coordinated by KazEnergy

Some such agreements already exist. For example, Agip KCO has assisted in the clean up of oil that has leaked from an inundated abandoned well, and has also been conducting ambient air monitoring with the akimat government.

Figure 11.8.1 Agip KCO Signboard Emphasizing its Environmental Protection Policy

11.9 Monitoring and Dissemination of Information

11.9.1 Environmental Monitoring

(1) Introducing "Performance-based" Pollution Control through Environmental Monitoring

It is important to link pollution control programs to ambient environmental conditions, as the primary goal of pollution control is to ensure good environmental quality. The effectiveness of pollution control activities should be evaluated not only according to the amounts of pollutants released or the environmental fees and fines collected, but also whether the pollution control programs are achieving a 'clean' environment, suitable for people and for the ecosystem as a whole. This requires more co-ordination between MoEP, KAZHYDROMET and other stakeholders in the collection and dissemination of monitoring results.

Apparently, the first steps in this direction were taken on 23rd April 2007 when representatives of the MoEP Environmental Control Committee and KAZHYDROMET met to discuss the problems of co-ordination between the two organisations. A joint protocol has been established, setting out the details of the necessary exchange and integration of information.

(2) Strengthening Enforcement Capacity through Environmental Monitoring

There is also the need for Atyrau MoEP or a third party institution to carry out regular monitoring of pollution sources, in order to support enforcement activities with scientific data, perhaps by the use of automatic remote monitoring equipment.

Given the importance of environmental information in pollution control activities, monitoring and dissemination of environmental information are treated in detail in Chapters 13 and 14.

11.9.2 Promotion of Corporate Environmental Performance Reports

In many countries, the trend of environmental management is shifting from a system in which regulatory agencies check compliance and punish violators, to a system in which the government encourages responsible behaviour by companies and lets society (e.g. shareholders and local residents) observe their environmental performance (see, IPIECA and API 2003[9] for examples) by publishing annual environmental reports. (Environmental reporting, with an emphasis on continual environmental improvement, is also an integral part of ISO 14001 certified Environmental Management Systems.) Such a system can certainly be promoted in Kazakhstan's oil and gas sector because international gas and oil companies are already undergoing scrutiny by investors, international environmental NGOs, and some local stakeholders. The government should, therefore, encourage both international and domestic companies to be open about their environmental achievements, and issue environmental performance reports.

'Production Environmental Control' as envisaged in the Environmental Code will do just that when it is fully operational. As mentioned in 11.4 above, the public will then have access to the environmental programmes and monitoring results of enterprises. Corporate environmental reporting as an information strategy is revisited in Chapter 14.

[9] IPIECA and API, 2003, Compendium of Sustainability Reporting Practices and Trends for the Gas and Oil Industry.

11.10 Organizational Reform and Capacity Development

Improvement of Capacity for Social Environmental Management (SCEM) requires a complex set of capacity development at different levels[10]:

- Individual level – competence of environmental administrators/ inspectors, HSE officers of enterprises and others directly involved in environmental management.
- Organizational level – management of organizations involved in environmental management
- Societal level – coordination among the relevant organizations, environmental financing, policy directives that enable sustainable implementation of environmental management activities.

While all of these aspects need continuous improvement, this Master Plan paid particular attention to development of technical capacity of environmental administrators and HSE officers, and coordination among relevant organizations, because these become the keys to develop and implement new pollution control systems based on best practices.

(1) Capacity Development for Environmental Administrators

It is clear from discussions with both the inspectors and the oil companies that the inspection procedure is rigorous and time-consuming. Of course, inspection should be rigorous, but ideally it should also lead to pollution prevention as a result of the inspectors introducing methods of cleaner production and BAT, which are then taken up by the companies concerned. However, the inspection service is already under increasing time pressure on its inspectors, and such pressure will only increase as Kazakhstan's oil and gas sector continues to boom.

In the circumstances, the evolution of the character of inspections from 'inquisitional' to 'advisory' would be doubly beneficial, because it would save a lot of inspection time. That evolution is already partly in progress, as environmental permitting moves to the adoption of Technical Specific Emission Standards and Complex Permits as defined in the new Environmental Code. However, the inspectors on the ground mainly have a scientific training and are ill-equipped to provide advice on the latest technology for the reduction of pollution in the oil industry – indeed, the oil industry managers whom they inspect are, of necessity, far better informed than most of the inspectors. As briefly mentioned under section 4.2.1 above, MoEP inspectors do not receive in-service technical training, and this is because it is assumed that the Ministry only recruits people who are already able to do the job for which they are recruited.

The capacity of environmental administrators will need to be strengthened within a few years for various reasons including: the expected increases in oil and gas production and pollution loads, introduction of the new Environmental Code and related new regulations, and a shift in the focus of environmental management to the introduction of best practice. Administrators will need more knowledge about operations of the oil and gas sector, and also about broader environmental issues, such as ecosystem and social impacts. Among the suggestions to achieve capacity-building are the following:

- Formal training of environmental administrators / inspectors in oil industry operations.
- Recruitment of specialists from the oil and gas industry for inspection and other regulatory activities.
- Secondment of MoEP staff into oil companies for a fixed term of, say, one year.

[10] JICA, Capacity Development, March 2006

- Vice versa secondment of oil industry staff into MoEP, as has been done in some European governments. (Mutual fixed term 'job-swaps' could be envisaged, as has recently been conducted between Shell and IUCN in Europe.)
- More joint inspections by relevant ministries (MoEP, MEMR, Ministry of Emergency Response, Ministry of Health and Ministry of Agriculture) on health, safety and/or environmental practices (such 'integrated inspections' are now recognised in the Environmental Code as a regular category of inspection).

(2) Capacity Development for Oil Company Environmental Managers

Similarly, the capabilities of HSE officers in oil companies have to be kept up to date. When the new Environmental Code is fully implemented, they will have to be informed about the new requirements for environmental management. Similarly, they need to be regularly updated about the latest pollution control technologies, tactics to minimize accidents, case studies from other countries, etc. Such career development activities are the responsibility of the individual oil/gas companies and could also be facilitated through the association of oil/gas companies as mentioned below.

MoEP will need to keep the oil companies and association informed of progress in the implementation of the Environmental Code, as it will make some major changes that will be introduced over a fairly long period of time.

(3) Improvement of Co-ordination at Local Level

Environmental management in Kazakhstan has been fragmented and co-ordination is limited. Moreover, there is no single organization responsible for overall management of the environment at the local level. In order to improve this situation, some environmental management functions (e.g. EIA reviews, environmental licensing, inspection, and environmental monitoring) could be consolidated into a single environmental unit, probably under the MoEP at oblast level, making this the central organization for local environmental management[11]. It appears that MoEP has every intention of increasing its own responsibility for environmental management as part of the implementation of the Environmental Code.

If the current organizational structures are to be retained, it is suggested that co-ordination could be improved by organizing regular provincial-level meetings focusing on environmental issues associated with oil and gas development. Such meetings would be attended by representatives of the oblast-MoEP, DUCER, Regional Environmental Monitoring Centre/local KAZHYDROMET, local office of the MEMR, local Geological Committee, new North Caspian Sea Emergency Response Centre, oil companies, local NGOs, and other stakeholders such as representatives of fishermen.

(4) Improvement of Co-ordination at National Level

Assuming that there is no immediate restructuring of MoEP and other ministries, three committees should be established at national level, as follows:

- Technical Committee on Oil and Gas Development: To be chaired by the MEMR, in order to co-ordinate technical issues, including HSE. The key members would be representatives of major oil companies (KazEnergy), MEMR, MoEP, Geological Committee, Ministry of Emergency Response, among others. Specific issues would be discussed by working groups organized under the umbrella of the main committee.

[11] This is a typical structure of local environmental management in Japan and many other countries, where the implementation of public environmental management is almost completely delegated to local governments. However, there are countries whose environmental management responsibility is partially delegated to local government, and the central government retains a strong overview over local governments.

- Environmental Committee on the Caspian Sea: To be organized under MoEP and the Committee for Forest and Hunting to co-ordinate environmental management issues related in the Caspian Sea. The key members will be the MoEP/KAZHYDROMET, Ministry of Agriculture, Ministry of Transport, major oil companies, coastal police, and representatives of the fishery sector, etc.
- Emergency Response Committee: In addition, a co-ordinating mechanism for emergency situations will be needed, led by the Ministry of Emergency Response, as part of the National Oil Spill Response Plan. The regular meeting of such a committee will enable the swift and smooth mobilization of essential personnel and equipment if and when an emergency arises.

While these committees serve as technical, coordinating and advisory bodies, the actual tasks of developing regulations may be carried out by special task forces organized in order to draft a specific piece of regulation. It is likely that the members of such task forces would be selected from the committees mentioned above as well as other specialists, such as legal experts, economists, and NGOs.

(5) Co-ordination Among Oil Companies

Co-ordination among oil companies is another key to improved environmental management, as they are all facing similar issues and the solutions will be similar. In many countries, oil companies form an association that represents the interests of the industry and also provides technical guidance to member companies. Such an association has been formed in Kazakhstan, the Kazakhstan Association of Oil & Gas and Energy Sector Organisations, known as 'KazEnergy'. This currently has 36 company members (including companies in the renewable energy field), representing the producers of 65% of total crude oil and gas condensate exports from Kazakhstan. KazEnergy is responsible for the provision of information, integration with government, and the promotion of co-ordination in a number of technical areas, including social and ecological issues. It is suggested that an environmental management committee is organized under the association, if that has not already been done, and the implementation of important environmental issues, such as the requirements of the new Environmental Code, co-operation on oil spill response and innovative pollution control technologies, are discussed in this committee. It is entirely possible that such association develops a set of sectoral technical guidelines, which become the basis for the formal regulations.

11.11 Environmental Education

(1) Long-term Development of Environmental Expertise

It has been noted in section 11.8 above that, whilst MoEP inspectors may be scientifically well qualified, they may lack expertise in the technology of the oil/gas sector, including the latest process technologies for the minimisation of effluents, emissions and wastes (or the treatment thereof). Some proposed short-term remedies for this situation have been made above. However, there is also the need to ensure that this situation does not persist in the next generation of MoEP staff. Longer-term investment in environmental education is therefore proposed in the following areas:

- Undergraduate Level – Undergraduate courses in Environmental Science need to include some specialised training in oil industry environmental management. This could be provided as elective final-year units for those students that expect to enter the oil/gas industry, either as regulators or as environmental specialists in exploration and production companies. Whilst environmental science is usually taught in science faculties, such final-year units could be provided by attachment to an engineering faculty, and would preferably include a period of 'internship' in the oil/gas industry to obtain 'hands-on' experience.

- Postgraduate Level – Postgraduate degree courses in environmental management for the oil/gas sector would be the best preparation for potential environmental inspectors in this field. This would again include cross-faculty teaching by environmental science and chemical engineering departments. A Masters' degree course would also provide sufficient time for an industrial internship of useful duration, allowing the students to achieve a comprehensive understanding of relevant technology.
- In-service Training – In the medium-term, in-service training can be provided to bring early-mid career inspectorate staff up to date with technology in the oil/gas sector. It is likely that special courses would have to be designed for this purpose, possibly provided by a Petroleum Institute, either in Kazakhstan or overseas. This would be a relatively expensive solution, as it would require staff to take a break of several months from their normal duties. A cheaper solution would be to provide such training over a longer period on a part-time basis, but that would give fewer opportunities for hands-on experience in the oil/gas industry.

(2) Environmental Education of General Public and Media

During the course of this study, there was media coverage on several occasions on the possible link between the oil/gas development activities and the mass-deaths of Caspian seals and sturgeons in the Caspian Sea. It is very important that such environmental issues in the Caspian Sea are widely covered in the media. On the other hand, some reports were speculative and somewhat misleading. In order to convey accurate information to the public, relevant authorities, such as MoEP, MoA, KAZHYDROMET, and possibly the oil enterprises, should actively make relevant information available to the public and the media.

CHAPTER 12 PROMOTION OF BEST PRACTICES IN THE OIL INDUSTRY

12.1 Introduction

Compared with the present rate, the crude production rate in Kazakhstan is estimated to double by 2015, and it will increase further after 2015. Considering the potential environmental impacts of such industrial activities, e.g., emissions and discharges of pollutants and risk of oil spill accidents, promotion of best practice with proper technologies for environmental protection in the oil industry is particularly important. Recognizing this need, the new Environmental Code is going to mandate adoption of best practice as conditions for an environmental permit, and also promote environmental control in production processes as the mechanism for self-regulation of environmental issues by the industry. However, details of such regulations are yet to be developed, which could take years. Therefore, this chapter suggests best practice on relevant environmental issues in the Caspian area.

12.2 Strategies

12.2.1 General Considerations

Defining best practice for the entire oil and gas sector in the Caspian region is a very difficult task, as it requires an understanding of various aspects of the oil and gas production processes as well as environmental, health and safety issues. There are various international guidelines on best practice (e.g., UNEP[1], IPIECA[2], API[3], OGP[4] and OSPAR[5]) that can assist with such a task. Even then, the unique characteristics of oil fields and environmental conditions in the Caspian region, such as high pressure and high H_2S content oil, shallow and closed water bodies, as well as existence of unique species (e.g., Caspian seal and sturgeon), necessitate development of tailored solutions.

Costs for implementation, managerial/administrative requirements, and other issues have to be taken into account in introducing best practice. Diversity of the oil sector is another important issue to be considered. There are a group of domestic enterprises, i.e., KazMunayGas group, major international companies (e.g., Chevron and Agip) as well as other consortia of international/domestic companies, which all have different backgrounds and technical levels.

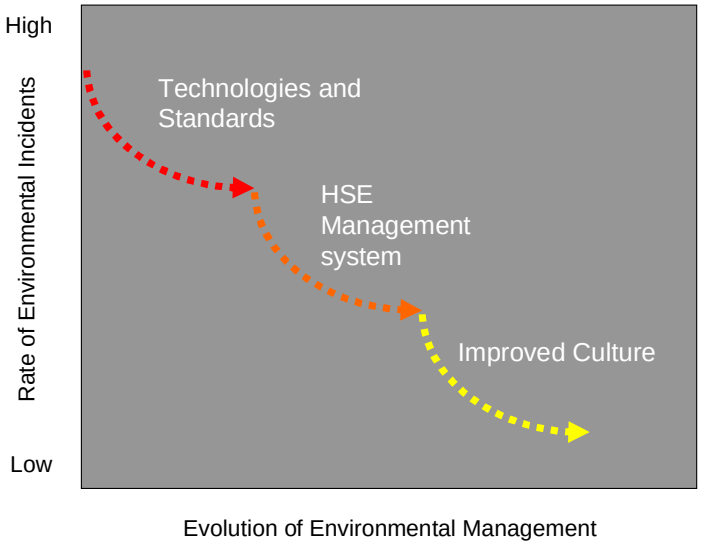
For these reasons, development of best practice requires participation of various experts and stakeholders, such as petroleum engineers, public health specialists, ecologists, geologists, economists and legal experts. Therefore, this study does not pretend to be exhaustive and examine every aspect of best practice. This task is left to the technical committees proposed in Chapter 11. Instead, this chapter raises some of the critical issues to be considered in such committees, and suggests possible solutions.

12.2.2 Strategies

Figure 12.2.1 schematically shows how environmental management in the oil and gas sector evolves. The first stage of environmental management involves introduction of technical measures and standards to control pollution and other HSE issues. These are the basis for good

[1] http://www.oilandgasforum.net/
[2] http://www.ipieca.org/
[3] http://www.api.org/
[4] http://www.ogp.org.uk/index.html
[5] http://www.ospar.org/eng/html/welcome.html

environmental practice, but some enterprises in the region are still lacking adequate environmental measures or depending on outdated technologies, and need further improvement. In order to deal with more complex problems, a more comprehensive approach to HSE issues becomes necessary. KazMunayGas as well as other major enterprises have already developed HSE management systems, and many enterprises in the region are moving on to this stage. As a HSE management system becomes functional and information for evaluation starts to flow in the system, further improvement of HSE performance becomes possible. This is the third stage of HSE management.



source: based on Zijlker[6], modified by JICA Study Team

Figure 12.2.1 Schematic Diagram of Evolution of Environmental Management in the Oil and Gas Sector

Considering such evolution of environmental management in the petroleum industry[7], this Master Plan adopted the following three strategies and relevant environmental measures to improve environmental performance of enterprises.

[6] Volkert Zijlker, The role of HSE Management System: historical perspectives and links with human behaviour, year unknown.

[7] This evolution of capacity of oil enterprises to deal with environmental issues agrees well with the pattern of evolution of Social Capacity for Environmental Management discussed in Chapter 10, which progresses as (i) system development stage, (ii) system enforcement stage, and (iii) self-regulating stage.

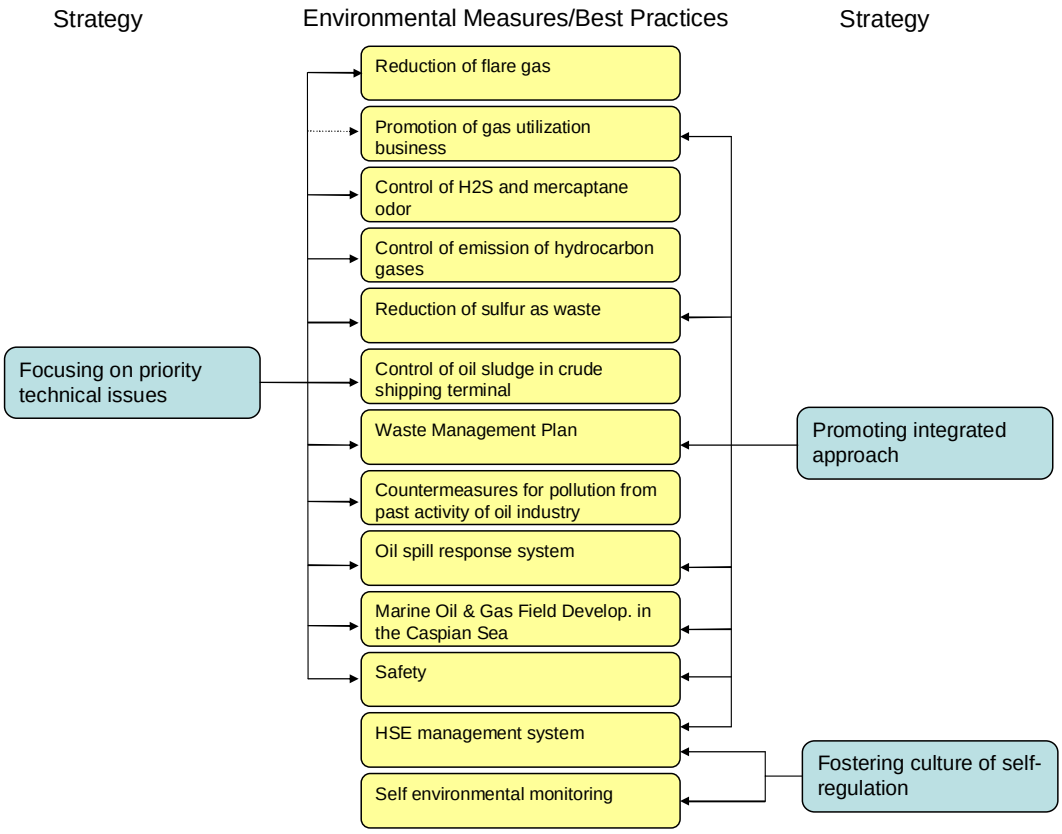


Figure 12.2.2 Strategies and Environmental Measures Selected in the Master Plan

(1) Focusing on priority technical issues

As the new Environmental Code has introduced technical emission standards and integrated permitting, adoption of "best available techniques (BAT)" is likely to become a condition for environmental permitting. Therefore, there is a need to select acceptable BATs. Among various environmental issues associated with the oil and gas sector in the region, there are a number of priority issues, such as control of associated gas, reduction of stored sulphur, etc. As these issues are likely to become the focus of new regulations and permitting conditions, technical solutions to these issues are discussed here. The selected technical topics are:

- Reduction of flare gas
- Control of H_2S and mercaptan odour
- Control of emission of hydrocarbon gases
- Reduction of sulphur as waste
- Control of oil sludge at crude shipping terminals
- Waste minimization
- Oil spill response system
- Countermeasures for pollution from past activity of the oil industry
- Marine oil & gas field development in the Caspian Sea
- Safety

It should be noted that the above list is not exhaustive, and further discussions on these as well as other environmental issues by the technical committee, as suggested in Chapter 11, are necessary.

(2) Promoting an integrated approach

As the next step, the Master Plan will promote more comprehensive approaches to environmental management. This is because effectiveness of the "end-of-pipe" approach to environmental problems is limited, and some issues, such as control of flare gas and sulphur, are best approached if these problems are considered in a broader setting, such as in relation to potential markets for associated gas and sulphur. This idea should be further expanded to a full-fledged Health, Safety, Environmental Management System (HSE-MS), which considers opportunities to improve HSE performance in every aspect and stage of oil and gas operations. Development of HSE-MS will lead to various benefits to the oil and gas enterprises, such as improved material efficiency, reduced risk exposure, positive relations with regulators and pressure groups, lower insurance premiums, etc. Therefore, many oil and gas enterprises in Kazakhstan are adopting approaches based on HES-MS, and the Master Plan encourages standardization of such practice across the sector.

(3) Fostering a culture of self-regulation

Finally, the Master Plan will emphasize the importance of self-regulation of HSE issues by the petroleum industry. This is partly because the new Environmental Code requires enterprises to monitor and manage their environmental performance. However, it is more important to note that self-regulating management tends to push enterprises to continuously and dynamically improve their operations and environmental performance.

12.3 Reduction of Flare Gas

According to the oil law and instruction of MoEP in 2004, flare gas emission is in principle prohibited except for the first 3 years of oil production after the initial start-up period. Therefore oil companies developed and submitted plans for flare gas reduction to MoEP in July 2006. These plans have been reviewed by MoEP and MEMR, and approved on the basis of conformity of the proposed plans with the national rules and regulations. In accordance with these plans, the monitoring of flare gas has been carried out by oil enterprises. The implementation schedules for the reduction plans are different from company to company. According to the latest guideline, the reduction plans are scheduled to start at the beginning of 2010; therefore, the companies involved should take necessary actions before the end of 2009, at the latest.

The anticipated general measures for flare gas reduction are as follows. The actual measures vary depending on the conditions of each enterprise.

- Installing pipelines to assist sale of gas (see Section 12.4 in details)
- Underground re-injection by using compressors for enhancement of oil recovery
- Gas usage as internal fuel such as for power generation for internal use
- Gas supply as raw material for the petrochemical and gas industry (oil /gas sector long term development plan (2015))

External consumers are a prerequisite for sale and supply of gas to the petrochemical and gas industry. Underground re-injection and internal fuel usage are not affected by external conditions. These measures have to be selected considering the efficient use of energy resources and environmental requirements in accordance with the governmental instructions.

Flare stack of oil developing company

Flare stack of oil & gas refinery

Figure 12.3.1 Photographs of Flare Stacks

(1) Underground re-injection

In order to inject gas into high pressure reservoirs for the purpose of flare reduction and pressure maintenance, it is necessary to compress associated gas up to 700-1000 bar. Thus, technical studies on selection of a suitable gas compressor and associated control system will be necessary. In addition, a corrosion control and safety system will be required in case of sour gas injection. The basic technology for underground re-injection has already been established and proven on a small scale, but application at such a high pressure and high H_2S concentration (10-20%) has not been proven. Therefore, re-injection especially in a large-scale oil field is considered a technical challenge for the industry.

TCO started to experiment with sweet gas re-injection in November 2006. If the experiment is successful, TCO will start the sour gas re-injection experiment with the aim of completing the sour gas experiment by the end of 2009 before developing full-scale technology to continuously re-inject surplus gas into the underground oil reservoirs. This plan has already been agreed with MEMR and MOEP.

In the future, re-injection of the sour-component of associated gas is likely to be the main technology for flare reduction. Figure 12.3.2 shows a simplified flow diagram for the gas processing and recovery system (Sweet Gas/Sour Gas Wells) with elemental sulphur production. Also, Figure 12.3.3 shows the general design of the system without sulphur recovery.

(2) Internal use of associated gas as fuel

If the company is relying on fuel from outside for its operation, recovery and internal use of flare gas as fuel is a desirable option for reduction of air pollution associated with flare gas and effective use of energy resources. Even if produced gas is already used internally as fuel gas, further internal use of associated gas may be possible. Many companies receive electric power from external supply grids. Therefore, power generation by surplus gas is an effective option. If the generated power outstrips the internal demand, it is in principle possible to sell excess electric power to external consumers. Some companies are already carrying out such service.

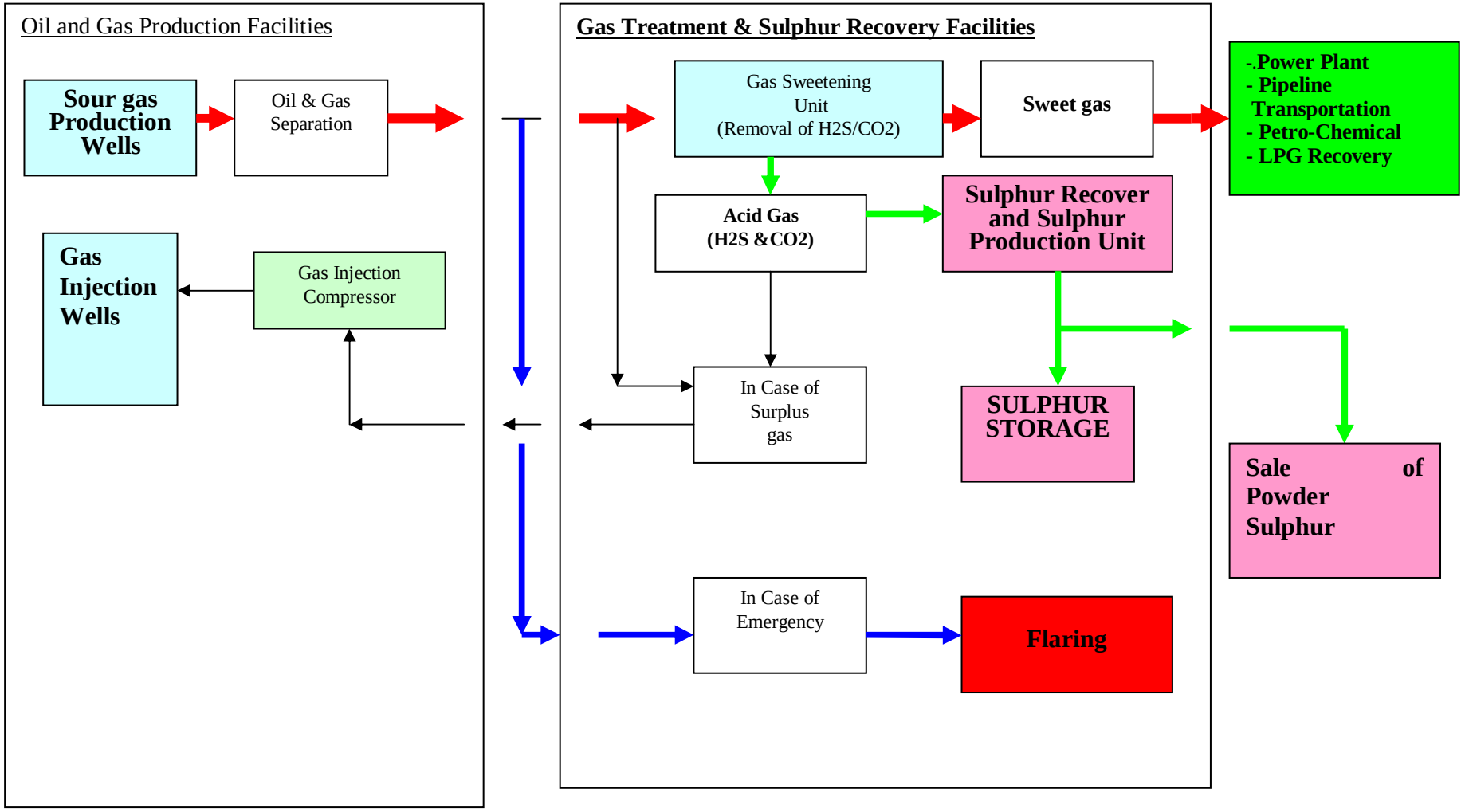


Figure 12.3.2 Basic Process Flow for Gas Utilization with Sulphur Recovery System

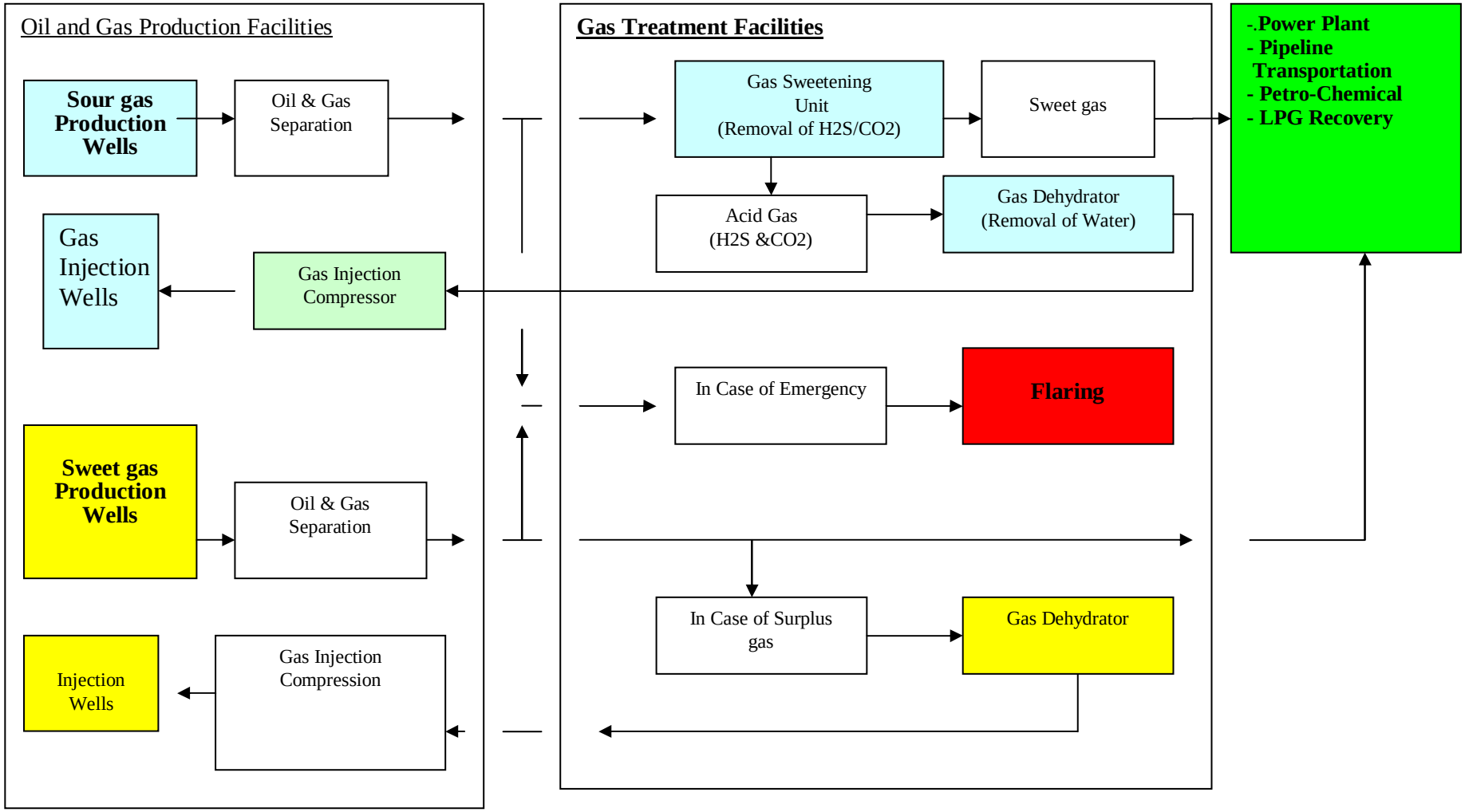


Figure 12.3.3 Basic Process Flow for Gas Utilization without Sulphur Recovery

12.4 Promotion of Gas Utilization Business

(1) Necessity in Kazakhstan

Gas utilization projects in oil field development have been rapidly growing since 2000 in every oil-producing country in the world. The first reason for this has been the higher oil prices in the past 3 years. Secondly, flaring and venting of associated gas from oil production became the target of legal control all over the world in order to reduce environmental emissions of green house gases and other air pollutants. For these reasons, gas utilization is actively pursued in oil producing countries.

Like other countries, Kazakhstan is proceeding with the gas utilization business in the northern Caspian area where there are large oil fields. However, the oil fields in the area, such as Tengiz oil field, contain about 20% of H_2S in oil reservoir fluids, and the gas production cost is expected to be somewhat higher than that in other oil producing countries due to the need for gas treatment including H_2S removal. On the other hand, under the oil law of 2004 and new environmental regulation, flaring of associated gas will be prohibited from 2009, and most of the surplus associated gas will be re-injected into underground oil reservoirs to maintain the oil reservoir pressure and to enhance oil recovery (EOR). This injection technology is becoming a mainstream environmental technology in the oil development industry all over the world. For oil development companies, the technology of oil reservoir control and management system is most important for effective recovery of oil from reservoirs. For governments, it is pertinent to the management of national energy resources.

Hence, the best combination of re-injection and gas utilization should be pursued based on simulations of a deep-oil reservoir for efficient oil production performance and studies on markets for gas. Such optimization is expected to lead to reduction of wasteful disposal/release of surplus associated gas, promotion of gas utilization businesses, and re-injection of unwanted H_2S, CO_2 and harmful gases for pressure maintenance. Therefore, promotion of gas utilization businesses becomes an essential part of integrated environment policy in the 21st century. Prospective gas utilizing businesses to meet the market are listed below. Study and research for such business opportunities should be carried out from the viewpoint of the long-term national policy for gas utilization businesses.

(2) Gas utilization technology

Various businesses that utilize associated gas exist. Among them, the businesses in Figure 12.4.1 are particularly relevant. The characteristics of the businesses, such as their cost and environmental performance are outlined below:

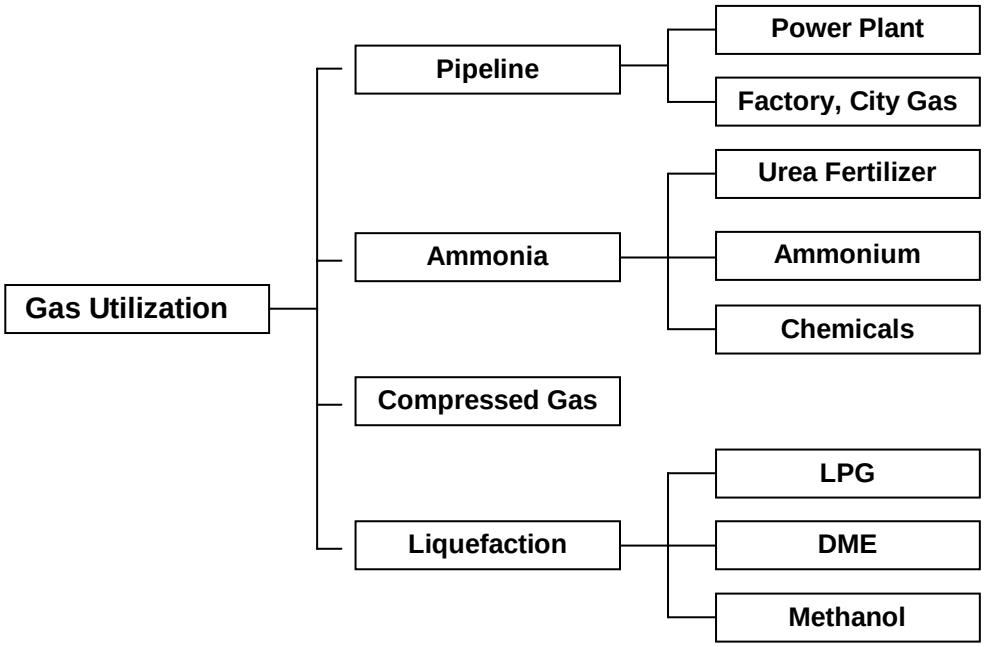


Figure 12.4.1 Technologies for Gas Utilization

1) Pipeline transportation

Pipeline transportation supplies gas to consumers such as a power plant, a chemical factories and town-gas for municipalities. Among the gas utilization businesses, gas transportation often requires the largest investment if the distance of the pipeline network is long. As the environmental impact of natural gas fuel is usually lower than coal and petroleum fuels, many developed countries promote conversion of fuel for thermal power plants from coal to gas. In case of Kazakhstan, the national plan for the long-distance gas pipeline network is being studied by MENR. Such a plan should also consider the opportunities for fuel conversion in order to reduce environmental emissions of pollutants.

2) Ammonia syntheses

This technology produces ammonia from methane in natural gas, and then ammonia is used to make nitrogenous fertilizers, such as urea, ammonium phosphate, and ammonium sulphate. Among these fertilizers, urea is particularly common. There is a plan in Mangistau to make ammonia product using surplus associated gas. From the viewpoint of utilization of available resources, this plan has merit because it considers making ammonium sulphate from ammonia and surplus sulphur from oil production.

3) Gas liquefaction

LPG recovery

The recent rise in natural gas price is advantageous for the LPG recovery business because it requires comparatively small investment and it is easy for the business to make LPG from associated gas. This business is suited for supplying local energy around onshore oil fields far from existing pipeline networks.

Dimethyl ether (DME)

Aside from LNG, large-scale natural gas liquefaction technologies are still in the developing stage, and the main focus is the development of the new liquefaction technologies. DME manufacturing technology is one of the most promising ones among them. DME is gaseous (a

boiling point of -25 centigrade degrees) material at normal temperature, and the property is chemically stable and not highly toxic. Also, it is possible to handle it like LPG because the boiling point is between propane (-42 centigrade degrees) and isobutene (-12 centigrade degrees). It is largely used as the material for aerosol spray, but also it is used as a LPG fuel substitution because the transportation and the storage methods are similar to those for LPG products. It is more favourable in cost than LNG. In China, a DME plant is being constructed in order to use DME as an alternate fuel to LPG. If large-scale demand is anticipated, DME production becomes an attractive option.

Methanol

Methanol is synthesized from methane and CO_2 in natural gas. Methanol is most commonly used as raw material for formaldehyde manufacturing, whose market is influenced by the business conditions of the housing industry. After formaldehyde, MTBE manufacturing and acetic acid manufacturing are the second and third popular markets for methanol. Most of acetic acid is used for the manufacturing of acetic acid vinyl monomer but it is also used for the manufacturing of the solvent, terephthalic acid. Methanol manufacturing in oil producing country requires large investment, and it is generally large-scale and export-oriented. Recently methanol has been getting attention as an alternative fuel source to gasoline.

Compressed natural gas (CNG)

CNG is produced by compressing natural gas into a high-pressure container, and used as a mobile fuel source. The merit of a natural gas car (Natural Gas Vehicle; NGV) is low emissions of NO_x, CO and hydrocarbons, which are 30-50% less than a typical gasoline car, and emission of CO_2 is about 30% less than a gasoline car. There are more than 1,000,000 NGVs running the world including CNGVs (compressed natural gas vehicle). In the future, CNGVs are expected to increase considering the traffic situation in urban areas and associated air pollution problems.

(3) Enlargement of gas utilization in the Kazakhstan

The gas utilization business in the Kazakhstan should be expanded immediately in order to effectively use sweet gas as clean energy, and to promote the elimination of flaring in oil development companies, which is to be commenced in 2009.

12.5 Control of H_2S and Mercaptan Odour

The capability of humans to perceive odour is surprisingly acute, though there are personal differences. Odour is often the most common environmental problem along with noise problems. Main sources of and problems with odour associated with oil and gas industries are as follows:

(1) Oil well drilling of oil reservoir fluids containing H_2S and mercaptan

Drilling into deep oil reservoirs results in generation of cuttings and used mud. These cuttings and used mud are usually recovered, transferred by sealed container, and treated (de-oiling of cuttings and regeneration of used mud), but odour is generated during these processes, especially if the reservoir contains high-levels of H_2S and mercaptan. TCO stores the cuttings and used mud using containers inside the SPZ, and Agip KCO treats the cuttings (de-oiling) and used mud (regeneration) at the Bautino base. Because the Tengis field is far from the residential area, TCO has not received complaints related to the odour of cuttings and spent muds. However, the Bautino base is located near a residential area, and Agip KCO has been receiving odour complaints from the residents.

Agip KCO is now constructing a new cuttings de-oiling plant at a location where there is no residential area within 10 km and, after the plant starts operation; the old plant in the Bautino base will be closed. This will decrease the odour problem at Bautino.

(2) Oil development facility

Crude oil and associated gas also contains odour-causing materials, namely H_2S and mercaptan. These materials in associated gas can be removed by an amine unit, and are recovered as sulphur. Mercaptan in crude oil is oxidized to disulphide (non odour-causing material) and returned to crude oil. H_2S in liquid sulphur is removed by a degassing unit in order to prevent odour generation at the stage of solidification.

Minimization of open space such as flange is the typical measure to prevent odour from production facilities. However, the odour problem affecting the area outside of SPZ is usually generated from point sources at elevated locations such as flare stacks (misfiring) and crude tanks.

Odour associated with crude tanks can be minimized by selecting a containment-type tank such as a Floating Roof Tank (FRT) or sealed tank. KazMunaigaz has a plan to adopt FRTs for new installations.

The flare system should be designed and operated in a way that minimizes flaring of odour-causing materials and misfires.

FRT (Floating Roof Tank)

Open (Vent) type tank

Figure 12.5.1 Photographs of Oil Tanks

The mercaptan concentrations (MPC 0.8 μg/m^3) in ambient air around the Tengiz field are summarized in Table 12.5.1. Odour perception capability of a human being for mercaptan is as low as 0.4 μg /m^3. Therefore even where the concentration is lower than the MPC, residents might perceive mercaptan odour.

Table 12.5.1 Concentrations of Mercaptan around Tengiz Field

Concentration (μg/m^3)	Inside of Sanitary Protection Zone of TCO					Residence
	1 km	2 km	4 km	8 km	SPZ	
Monthly average	0.4-0.5	0.4-0.5	NA	NA	NA	NA
Annually average	NA	NA	NA	NA	NA	NA

12.6 Control of Emission of Hydrocarbon Gases

Hydrocarbon concentrations in ambient air are monitored only near the Tengiz field, as shown in Table 3.5.2. There is no MPC standard for hydrocarbons in Kazakhstan, and the material safety standard (50 $\mu g/m^3$) is used as a guideline.

Table 12.6.1 Concentrations of Hydrocarbons around Tengiz Field

Concentration ($\mu g/m^3$)	Inside of Sanitary Protection Zone of TCO					Residence
	1 km	2 km	4 km	8 km	SPZ	
Maximum	14.1	16.4	7.5	6.9	NA	42.5
Monthly average	2.3-4.5	2.2-4.5	2.2-4.3	2.4-4.4	2.1-4.1	2.0-11.7
Annually average	NA	NA	NA	NA	NA	1.7-5.6

Source: Monitoring report of TCO

TCO uses old open type crude tanks as well as FRTs. Therefore, the relatively high concentration of hydrocarbons may be caused by the open tanks. At the oil terminal area near Atyrau city, CPC has FRTs and KIC has sealed crude tanks. On the other hand KTO uses open type crude oil tanks. There is no long-term data of hydrocarbon concentration at the location, but the hydrocarbon concentration may be high. It is desirable to monitor the ambient air concentrations of hydrocarbons and oxidant (oxidant is generated by the reaction of hydrocarbons and NO_2), and if necessary to consider selection of tank types with less fugitive emission. (see Chapter 8 for the results of hydrocarbon measurement in the Pilot Project).

Construction of a petrochemical complex near Karaton in the Tengiz area is planned for 2015. Because large volumes of hydrocarbons and NO_x will be emitted from the complex in addition to the emissions from the Tengiz field, generation of photochemical smog (oxidant) is a concern. It is desirable to set a fair rule for controlling the cumulative impact and to minimize emissions of NO_x and hydrocarbons from these sources.

12.7 Reduction of Sulphur as Waste

The crude oil from the existing onshore shallow oil field (500-2,000 m) has low pressure and low H_2S content. On the other hand the crude oil from the chasm area from Astrahan in Russia to Tengiz including the Kashagan field, where the width is almost 100 km by 4,000-6,000 m depth, is high pressure and high (10-20%) in H_2S content.

The H_2S separated from the crude oil of the chasm area is recovered as liquid sulphur by a sulphur recovery unit and after solidification the sulphur is sold or stored. The present international sulphur market has a supply surplus, and it is very difficult to secure a stable market. This forces the oil industry in the region to store sulphur, and dust of weathered sulphur blown by wind is becoming an environmental problem in the region.

The anticipated sulphur volume (total of Atyrau oblast and Mangistau oblast) is as follows (The H_2S content of crude oil from the Caspian Sea area except Kashagan field is assumed as 50% of the Kashagan crude oil):

Table 12.7.1 Anticipated Amount of Sulphur Production in the Caspian Region

unit: million tonnes/year

Year	2005 (present)	2010	2015	Remarks
TCO	1.50	0.80*-2.00	1.10*-2.50	*sour gas re-injection
Agip KCO	—	1.10-1.40	(3.00-4.00)	
Atyrau Refinery	—	0.10	0.10	
Others	—	(0.00-1.00)	(1.00-2.00)	Including Caspian sea development
Total	1.50	(2.00-4.50)	(5.20-8.60)	

Note: The value in ( ) is calculated based on Oil & Gas sector long term development plan

(1) Counter-measurements at presence

1) TCO

TCO has been storing sulphur blocks outdoor (peak stored volume 9.0 million tonnes). The present situation is as follows:

- At present (2006), sulphur production and export are balanced. (production is 1.50 million tonnes and export 1.54 million tonnes, and stored volume slightly decreasing).
- Anticipated maximum sulphur production rate (in the case of no associated gas reinjection) is 2.5 million tonnes/year.
- The main markets are China (due to the difference in the railway gauge between the countries, transportation capacity of sulphur is limited), Africa and East Europe. The competition is fierce because the market is saturated.
- The output of granular sulphur will increase to 0.8 million tonne/year by 2008.
- The crushed sulphur will be changed to granular sulphur by introducing a re-melting facility by 2009.
- If successful, associated gas (sour gas) re-injection will rapidly decrease the stored sulphur volume from 2009 even if the export volume remains the same.
- Other solutions for sulphur disposal, such as injection of sulphur slurry into the ground, have been studied. However, these methods have some technical issues. Thus, a realistic approach, namely storage and sales, was selected as the disposal method.

Sulphur Recovery Unit (Atyrau refinery)

Shipping facility of granular sulphur

Figure 12.7.1 Photographs of Sulphur Recovery Unit and Shipping Facility

Considering the dust problem mentioned above and the need to reduce storage of sulphur, TCO is trying to implement the following:

- To obtain a larger secured market for sulphur (at present about 1.5 million tonnes/year is secured, which includes 0.6-1.2 million tonnes/year for China and the rest for Africa and East Europe)
- To re-inject associated gas (sour gas) underground (reducing volume of recovered sulphur)
- To increase the production capacity of granular sulphur (prevention of powdering)
- To ship the stored block sulphur

2) Agip KCO

Sulphur from the OPF of Agip KCO produced after 2009 will be stored in an outdoor storage facility that has six storage pits capable of taking more than four years production. Each pit has capacity for 1.3 million tonnes, is a sub-underground type, has concrete paving of the bottom and side, and covering for the top of the storage. The final disposal methods such as sale of granular sulphur and storing at an abandoned mine (old Kaskor) will be studied and decided in the four-year period.

3) Working Group of MEMR

With the increase in crude oil production from the chasm area, the amount of recovered sulphur is expected to increase rapidly, and sale of sulphur alone cannot solve this problem. Both oil companies as well as relevant authorities have raised this issue and there has been a preliminary study, which found the following:

- If the amount of sulphur to be produced in the future is taken into account, the combined solutions by selling of sulphur, sour gas re-injection, and mixing with cement and asphalt will not be enough to solve the problem.
- The maximum rate of sour gas re-injection will be limited to 70%, and a minimum of 30% of the sour gas will have to be treated.
- TCO and AgipKCO were instructed to study long-term storage facilities (the outdoor block sulphur storage of TCO and covered sub-underground outdoor storage of AgipKCO are not considered as long-term storage facilities).
- The Canadian and Japanese technologies of mixing sulphur with cement and asphalt have been examined. These technologies are still under development, and their practical potential has not been demonstrated.
- The pre-study group has been studying the potential of long-term underground storage such as an abandoned uranium mine and underground reservoir.

Considering these findings, the working group (WG) on sulphur is going to be established as a legal entity as outlined below:

- To be established by law on 10 Dec. 2006 and report the conclusion to MEMR by the end of 2008. The secretariat is the department of technical development and state assets management of MEMR.
- The WG members are being selected (anticipated members are KazMunayGas, TCO, Agip KCO, consultant companies and other companies (e.g., ExxonMobile) who want to be involved).
- To study the disposal methods comprehensively including the possibility of underground long-term storage

The sulphur issue is not avoidable as long as high H_2S oil is developed. Therefore, the establishment of the WG is appropriate and timely. As far as the administration of the WG is concerned, the experiences of the Heavy Oil Research and Development Association of Japan, which includes pilot testing, may be instructive.

12.8 Control of Oil Sludge at Crude Shipping Terminals

According to the national oil production plan, crude oil production is expected to increase rapidly from 2011, and many large-capacity crude storage tanks will have to be constructed in the crude shipping terminals for marine tanker transportation and the expansion of onshore pipelines. There will also be an increase of oil sludge in the tanks at the terminals. The oil sludge has to be periodically cleaned out to prevent corrosion of the bottom plates of the tanks. Thus, controlled disposal of sludge becomes necessary to prevent environmental problems like oil pollution of soil. In this section, new technology for cleaning of crude oil tanks and the best practice in oily sludge treatment are introduced.

The objective of waste reduction is to control the quantity of waste generation. The biggest known source of oily sludge is the crude oil and/or product storage tanks in oil production facilities. The sludge consists of the heavy components of oil such as wax, asphaltene, etc. and solids including sand particles in the oil reservoir and iron oxide generated in the pipelines and production facilities. They accumulate on the bottoms of the storage tanks as a result of the years of crude oil production. The volume of sludge in the tanks varies according to the specification of crude oil. However, it is estimated that 1,500-2,500 ton /10 years operation is accumulated in a 40,000-60,000 KL crude storage tank.

Generally, in order to prevent unexpected leaks in the bottom plates due to possible corrosion defects, a periodic overhaul inspection of the tank is carried out every 5-10 years. With this periodic inspection, the tank is opened and the accumulated sludge on the bottom is eliminated and discharged outside as waste.

The elimination of this sludge (by tank cleaning) is usually carried out after discharging the crude oil from the tank, then the tank is filled with water or solvent liquid such as diesel oil, and cleaned by forced circulation using pumps. The large volume of residual sludge remaining in the tank is then removed manually from the tank. It is considered that the quantity of residual sludge accounts for about 30-50% of accumulated sludge. This sludge generally contains about 30-60% oil. For appropriate treatment of the sludge, an effective process for separation and recovery of oil content from the sludge is necessary.

Presently in Japan, an automated tank cleaning system is employed for the purposes of recovering the valuable components in the sludge and the reduction of waste discharge. This method not only saves on labour cost but also is highly efficient for cleaning work. According to the experience in Japan, it is possible to effectively reduce the sludge in the tank to just a few percent of the accumulated quantity, though the effectiveness is dependent on the type of oil in the tank (the components of sludge materials). The outline of this automated cleaning system is shown in Figure 12.8.1.

Some conditions for the effective application of the automated tank cleaning system such as type of tank, configuration of the facility, operational schedule, etc. need to be studied.

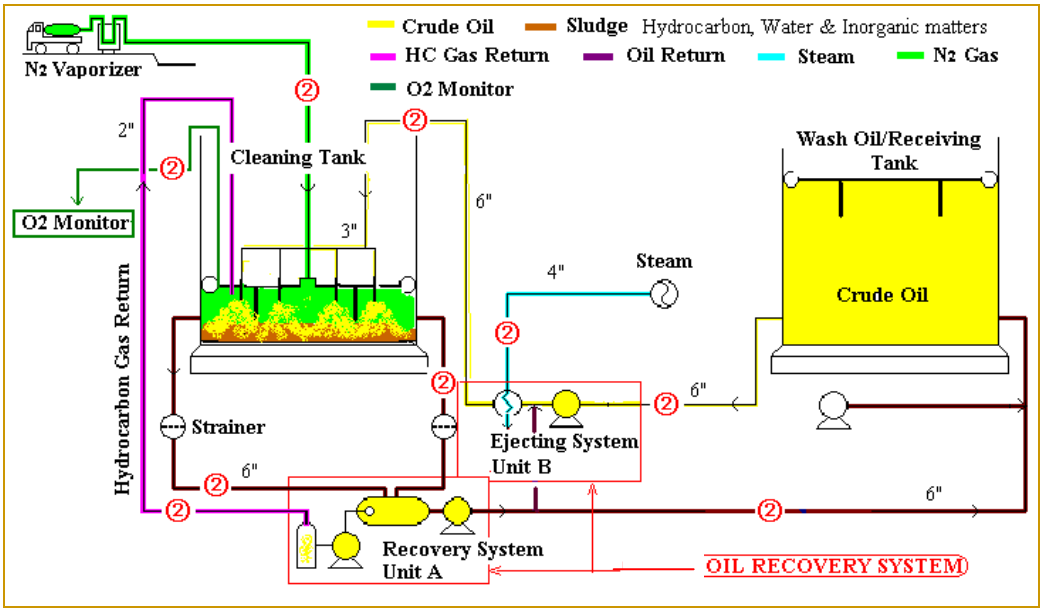


Figure 12.8.1 Automatic Tank Cleaning Method

This technology is fully applicable to ordinary crude oil tank terminals with floating roof type of tanks, and it is likely to be applicable in some oil terminals in Kazakhstan. It is expected that this technology would be highly effective for reduction in the discharge of sludge and improving oil recovery.

Furthermore, because of the recent high concern for safety and health of personnel engaged in the tank cleaning work, there has recently been a trend towards the installation of such advanced automated and un-manned cleaning systems in industrialized countries and some oil producing countries.

12.9 Waste Management and Control System

Waste management is one of the most important aspects of environmental management in the oil and gas sector. The importance of waste management is obvious from the previous two sections, which discussed management of by-product sulphur and oily sludge. As waste problems are very common, an integrated approach to waste management is essential. Hence this section introduces the general waste management system established in most industrialized countries, like Japan, Europe and the US, and proposes to establish a similar system in Kazakhstan.

In principle, waste management is the responsibility of the generators, and it is the responsibility of each generator to monitor and control the flow of waste in the entire production cycle, which includes waste minimization, recycling, and discharge to final disposal including transportation. To take such an integrated approach, it is necessary that the government establishes a clear regulation for waste management.

(1) Waste treatment plan

Waste management should be carried out in accordance with a waste management plan that controls generation, treatment and final disposal of the waste. The generator should obtain an official approval and licenses from the administrative agency concerned, and execute the plan in conformance with the approved procedures. The plan includes the following aspects:

1) Basic policy

The waste generator makes and clarifies the basic policy for management and treatment of waste, and then controls and treats waste in compliance with the policy.

2) The management system

In order to implement appropriate control and treatment, a system is established to clarify the work roles and responsibility of the personnel in each level of the organization.

3) Treatment facility management

Operational and maintenance organization and procedures for the treatment process and storage facility are to be established.

4) Generation of waste

The location of waste generation, kind, properties, characteristic and volume (rate) are to be identified.

The future generation of waste is also predicted.

5) Treatment and disposal plan

A plan for separation, pre-treatment and final disposal of the waste is to be developed. The targets for pre-treatment and a reasonable final disposal method are to be determined.

6) Reduction of waste discharge and re-use plan

Plans for the reduction of waste generation and the promotion of re-use and recycling of the treated waste are to be studied and the target is to be determined.

7) Evaluation

The achievement is to be evaluated in accordance with the plans and targets. Treatment plans are to be regularly reviewed and revised adequately.

8) Document management

Procedures for the management of documents related to discharge, treatment, disposal of the waste and external entrustment of the work are to be established.

(2) Manifest System

This system uses control slips to confirm if the appropriate transportation, treatment and final disposal of the waste are carried out when the discharger entrusts the works to other company.

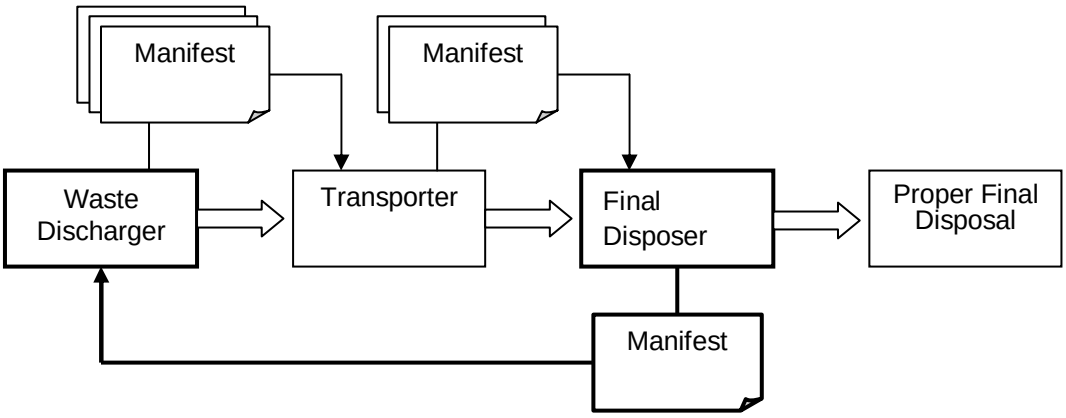


Figure 12.9.1 Manifest System

The waste generator has accountability until the final disposal of the waste. So, by this system, the generator can verify the work performance through the process including generation, pre-treatment, transportation and final disposal. The waste generator establishes a contract with a contractor for collection, transportation and disposal, as authorized by the local government office. Based on the contract, the generator issues documents called a "manifest", which record a description of waste, quantity, final disposal place and final disposal method. Then he hands over the waste and the manifest to the transportation contractor. After completion of the final disposal, the contractor completes the details on the place of final disposal, method of the final disposal and the completion date in the manifest and then sends back a copy to the waste generator. The flow of waste and the manifest is shown in Figure 12.9.1.

12.10 Countermeasures for Pollution from Past Oil Industry Activity

The pollution problems arising from past oil and gas industrial activity are apparent in the presence of oil contaminated soil and oil spills from improperly shut-off abandoned underwater wells.

12.10.1 Restoration of Oil Contaminated Soil

(1) Status of Restoration

Contaminated land and its restoration situation are as follows:

Table 12.10.1 Status of Restoration of Oil Contaminated Land

Oblast	Contaminated land (ha) (beginning of 2004)	Restored land (ha) (2004-2005 actual)	Remaining (ha) (end of 2005)
Atyrau	3,844.6	259.0 (7 %)	3,585.6
Mangistau	1,100.2	33.0 (3 %)	1,067.2
Total	4,944.8	292.0 (6 %)	4,652.8

Source: Annual report of Environment protection department of Atyrau and Mangistau oblast

The restoration options include mechanical removal, bio-remediation and incineration. There has been technical support by USAID, though the preferred disposal method has not been established yet.

The restoration works are progressing each year, but the progress of the works is different from one company to another, therefore it is desirable to clearly set the date for finishing

restoration by talking with MOEP and to setup a working group for studying the final disposal methods and disposal facilities.

(2) Oily Soil Cleanup and Remediation Technologies System

As there has been a delay in the restoration of oily soil in the above oblasts, the following section provides a guideline for oily soil cleanup and a remediation system .

Technology of cleanup

The treatment of oil-contaminated soil intends to make it clean to meet environmental standards by separating, decomposing, neutralizing and solidifying (stabilizing) the sources of pollutants. To carry out effective treatment, it is necessary to study whether the soil can be treated with a single or a combination of cleanup technologies in consideration of the properties, components of the oil-contaminated soil and the treatment specification to be satisfied. The cleanup technologies generally adopted for oil-contaminated soil are shown in Figure 12.10.1. The outlines and features of various soil cleanup technologies are described below:

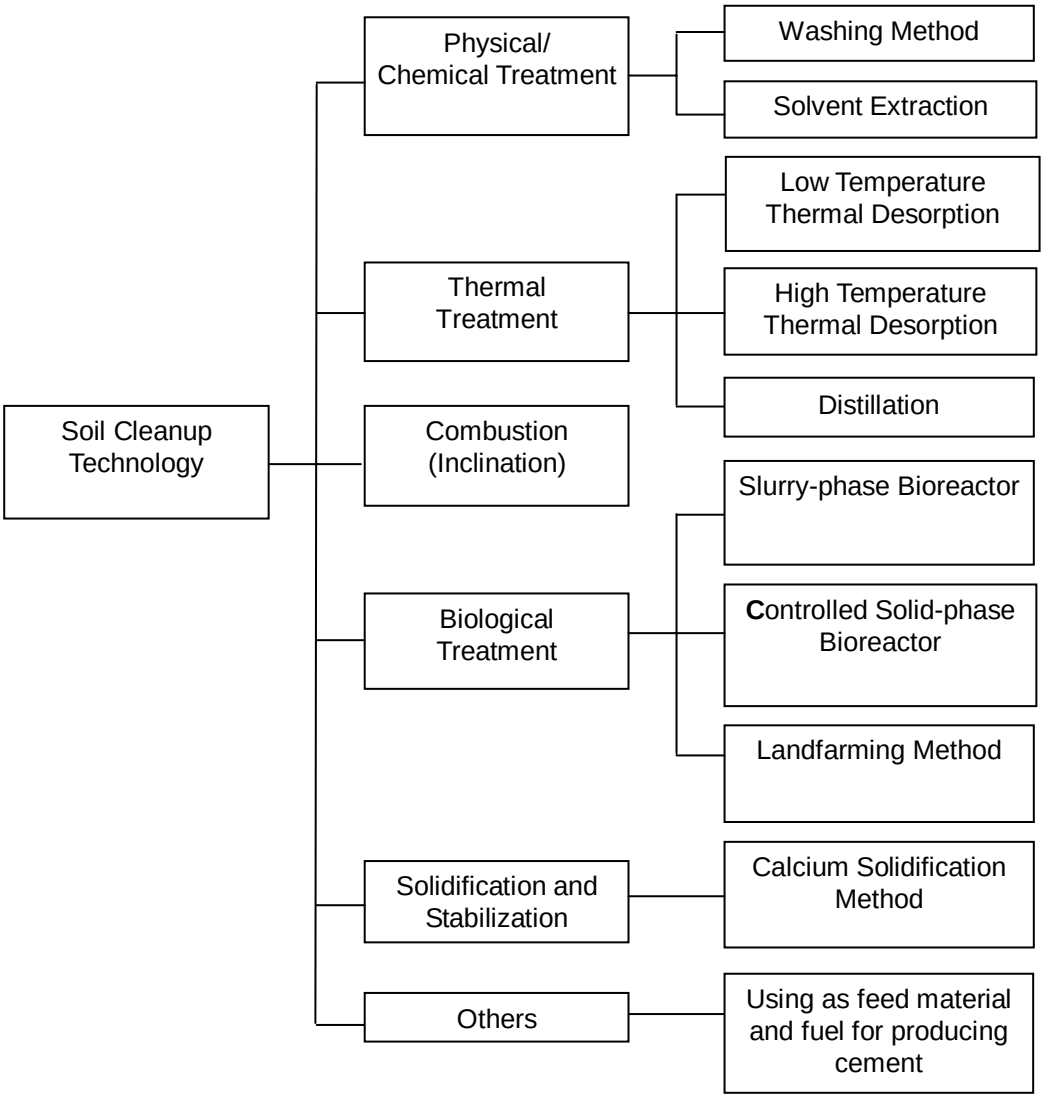


Figure 12.10.1 Oil-contaminated Soil Cleanup Technologies

1) Washing Method

In this method the pollutant is washed with water or hot water to separate the oil adhered to and penetrated into the oil-contaminated soil. The efficiency of separation is promoted by adding surfactant, stirring and heating. The separating ability is somewhat low, but this method is comparatively advantageous in the cost of treatment. (Residual oil >30%)

2) Solvent Extraction

In this method the oil component is dissolved and separated from oil-contaminated soil with diesel oil or kerosene as a solvent. It is suitable for processing oil-contaminated soil with oil concentrations of 50% or more, and the application with the washing method is very effective with a high ability to separate oil. It is also effective for recovering oil. (Residual oil < 15%)

3) Thermal Treatment

Low-temperature Thermal Desorption

Oil-contaminated soil is heated at low temperature (90 - 300℃) in a furnace and low temperature volatile oil components are evaporated and separated from the soil. The separated volatile gas is recovered by adsorption and/or cooling condensation. This method has a wide range of application for treatment of oil-contaminated soil and is applicable for soil with around 10 - 30% oil or medium concentration. The process of oil recovery is comparatively simple and the equipment expense and operational cost are superior in comparison with the high-temperature heating method.

High-temperature Thermal Desorption

Oil-contaminated soil is heated up in high temperature (300℃ or more) in a furnace, and high temperature volatile oil components are evaporated and separated from the soil. The separated volatile gas is recovered by desorption and/or cooling condensation. This method is applicable to oil-contaminated soil including oil components of high boiling point, such as heavy oil. The process for oil recovery is complicated and the investment and operational cost for the facility are comparatively high.

Vacuum Distillation

Oil-contaminated soil is heated (around 300℃), and the volatile oil is evaporated and separated at comparatively low temperature in a vacuum distillation vessel (approx. 1 mb). The evaporated oil is recovered by cooling condensation. This method is applicable to oil-contaminated soil with a wide range of oil concentrations. However, the vacuum unit is needed in addition to the heating unit, thus the process for distillation and oil recovery becomes complicated. Consequently, the investment cost for the facility and operational cost are comparatively high.

4) Combustion (Incineration)

Oil components in oil-contaminated soil are processed by thermal cracking at high temperature and disposed of by incineration. However, for this method further treatment of the combustion gas is required generating secondary waste, thus the application of this method tends to be decreasing due to environmental problems. However, in the case of small-scale processing of heavily oil-contaminated soil, this method is able to demonstrate a high cost effectiveness in comparison with other treatment methods.

5) Solidification Method

Oil-contaminated soil is solidified and sealed up with cement so that the oil component is contained and does not seep from the soil. Since the waste is solidified by cement, it is disadvantageous in terms of reducing the waste volume. However, only this method has the big advantage of being able to make heavy metals in the contaminated soils sealed up with cement.

6) Stabilization Method

Oil components in oil-contaminated soil are adsorbed and fixed in a matrix with calcium oxide as a principal ingredient. Thus, the oil component is stabilized into the chemical agent without elution. This method is suitable for cases where there is a need to process 20-30% of oil-contaminated soil and in a short processing time. Moreover, at the same time various heavy metals can be retained in the soil. However, the price of the chemical is comparatively expensive.

7) Biological Treatment

Slurry-phase Biological Process

After adding water to oil-contaminated soil, the slurry is sent to a vessel, called a “Bioreactor” to degrade the oil component with microorganisms. This method is suitable for light oil-contaminated soil of 5 - 10%, but requires a comparatively long period to cleanup the soil. After treatment, it is possible to inject the treated slurry underground by pumping as the final disposal.

Controlled Solid-Phase Biological Process

Oil content in oil-contaminated soil is properly adjusted in pre-processing, and the oil component is decomposed by microorganisms in a solid condition in a bioreactor while artificially controlling the temperature, moisture and the amount of the oxygen.

This method is suitable to light oil-contaminated soil of 5 - 10%, but requires a comparatively long period to cleanup the soil.

Landfarming

Oil-contaminated soil is stirred with topsoil, and oil is decomposed by microoganisms indigenous to the soil. The microbial activity is activated by regular cultivation (tilling) to supply air and application of nutrients and water.

In this method, a large treatment area and long processing time (several months - or more) are required. However, the treatment cost is very inexpensive in comparison with other methods. And also it is suitable for treatment of a large amount of contaminated soil.

8) Others

Application as raw material and/or fuel for cement production

Solids in oil-contaminated soil such as calcium, silica and iron oxide are used as the raw material of cement, and also the oil contained in the soil can be used as a fuel in the process of cement production. In Japan, after proper pre-treatment (adjustments of the components, physical properties, and calorific value, etc.), much of the oily waste discharged from oil refinery plants are reused as a sub-fuel for cement plants, and/or is mixed and burned with the principal ingredients of in the cement process as a substitute for cement raw material.

The wastes are processed at high temperature (1,400 - 1,500℃) in the cement process, and the generation of harmful secondary wastes such as oily wastewater and exhaust gas are restricted by various equipment installed for the purpose of environmental protection.

Other methods mentioned above need processes such as treatment of the wastes and recovery of the valuable oil components as much as possible. While the application to the cement manufacturing process does not need any of such processes and can effectively reuse almost the total quantity of oil-contaminated soil, therefore making the final disposal unnecessary.

However, in this case each component in oil-contaminated soil should fully meet the requirements for the raw materials for the operating conditions in the cement plant. Also required are the receiving facilities such as storage yards, feeding devices and modification of existing facility etc. In addition, stable supply of uniform materials is essential from the viewpoint of stable operation of the cement plant and the quality of cement products. Furthermore, it is also important to consider the relative locations of the generating source of wastes and location of the cement plant.

The comparison of performance (for desorption, decomposition and the cleanup efficiency of oil components) for each treatment method is shown as follows:

Table 12.10.2 Comparison of Performance of Soil Cleanup Technologies

Oil Contamination / Cleanup Technology	80%	60%	40%	20%	
Hot Water Washing			→	→	
Solvent Extraction				→	→
Thermal Desorption			→	→	→
Bioremediation (bioreactor)					→
Bioremediation (landfarming)					→
Cement Solidification					→
Calcium Stabilization				→	→
Application as Cement Feedstock and Fuel		→	→	→	→

We recommend application as cement feedstock and fuel system as the best practice and solution if it satisfies the requirements of the local cement industry.

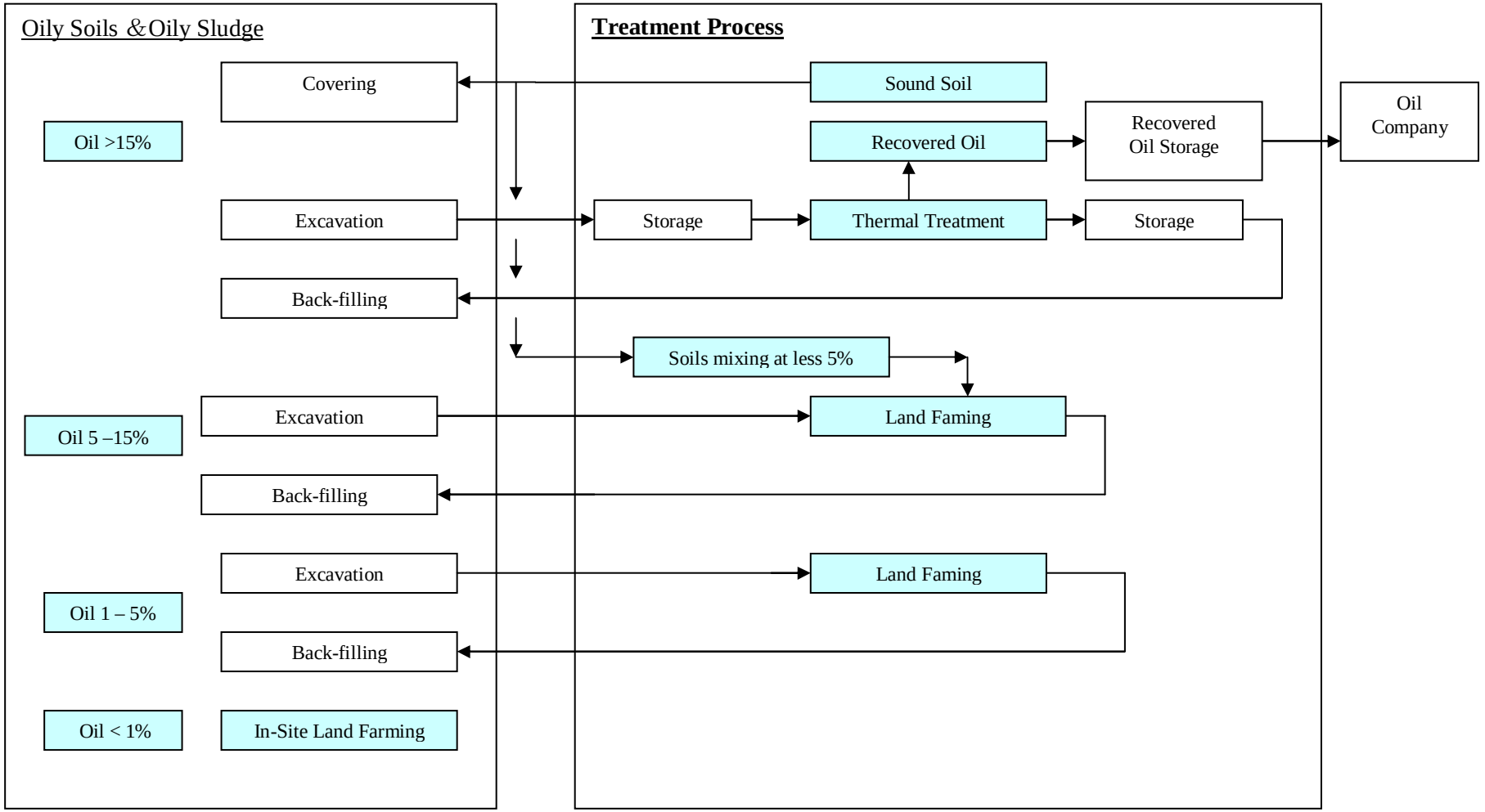


Figure 12.10.2 Basic Clean-up Technologies of Waste Oily Soils and Oily Sludge

12.10.2 Shut-off Works for Underwater Abandoned Wells

The action plan of the geological committee for non-owner abandoned wells is referred to in Section 3.4. The owner has the responsibility for the shut off work of his abandoned wells, which needs to be individually implemented. Therefore it is desirable that the geological committee manages the shut off work schedule.

Contaminated soil in oil field

Shut off works of abandoned underwater well

Figure 12.10.3 Photographs of Abandoned Well

12.11 Oil Spill Response System

The plan for oil spill response is relatively well established and arranged for the relevant area of north Caspian Sea. This section summarizes the latest progress on the implementation of the response plan by, and practices of, governmental organizations and international oil development companies.

According to the National Oil Development Plan, crude oil production will increase rapidly from 2011. This is accompanied by KCTS (Kazakhstan Caspian Transport System) project to ship crude oil over the northern Caspian Sea, and the number of large crude tankers departing from the crude shipping storage terminals is expected to increase. This might increase the risk of large oil spill accidents, which will cause environmental damage of the protection areas of the Caspian Sea. The National Oil Spill Response Plan is a very important governmental environmental protection program for minimizing such damages.

(1) National Oil Spill Response Plan (NOSRP)

- The National Oil Spill Response Plan (NOSRP) is now under revision by the Ministry of Emergency Response (MoER) with the specialist advice of MEMR, MOEP and the Ministry of Transport (MOT) and will be finished in the middle of 2007.
- A tiered response system will be introduced in the new NOSRP.
- The command system for tier-3 response of large spill accidents will be directed by MoER and tier-2 response of middle oil spills will be directed by Akimat as the local governmental agency.
- MOT and the local port authority at each port have the responsibility to respond to oil spill accidents on the route of oil tanker transportation and in the port area, and has their own response plan for each territory. The integration plan with the new NOSRP will be reviewed and revised by the time the NOSRP is issued.

The system for approval of company's response plan is as follows:

- The company's response plan is mainly controlled and approved by MoER, but the discussion among the related agencies (Ministry of Agriculture and Fishery (MOAF), MOEP, MEMR, MOT) such as consideration of environmental sensitivity is not implemented.

(2) Response for oil spills

The new oil spill response company (Taza Tengiz Lamor) has been established in Aktau and has already organized 7-8 response specialists and response equipment (oil booms, skimmers and pumps), and based on the contract, will be able to respond to oil spills in the Caspian Sea.

This company provides the response for appraisal well drilling by KazamunaiTengiz as the first stage, and will be able to provide the response for oil production in the Caspian Sea with increasing response capability in the future

MoER will require the same response system and capability from Agip KCO (Kashagan development) for new oil developments in the Caspian Sea (but there may be collaboration with Taza Tengiz Lamor in respect to equipment and a mutual aid agreement may be considered).

There is no plan to demand a mutual aid agreement between the oil companies.

There is no response team in MoER now, but the "2006-2010 East Caspian sea development plan" states that MoER should have an oil spill response team (rescue team), therefore a response team will need to be organized in MoER (there has been no decision about response equipment for MoER)

The use of double hull tankers is now being studied for introduction by MOT

Oil Spill Response Equipment (Agip KCO)

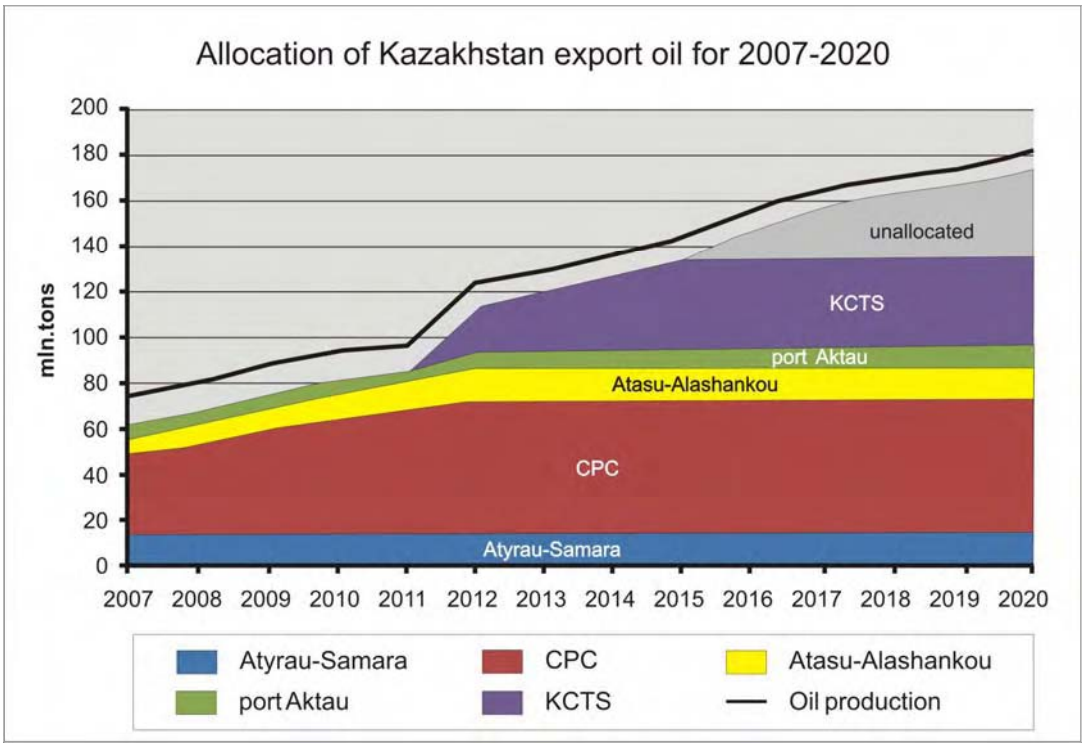
Tanker Shipping facility in Aktau port

Figure 12.11.1 Photographs of Oil Spill Response Equipment and Tanker Shipping Facility

Considering the environmental sensitivities, it is desirable that a concrete zonal response plan be prepared for oil spills in the Caspian Sea (Atyrau and Mangistau oblasts) based on the revised NOSRP.

For preparation of the zonal plan there should be discussions with related agencies and consultants in the WG.

For a comparison of the present NOSRP (not yet revised) with the internationally accepted guideline (IPIECA) refer to Section 3.5.



Source: monthly Magazine of "Kaz Energy No.2 ,2007"

Figure 12.11.2 Allocation of Kazakhstan Export Oil for 2007-2020

12.12 Special Considerations on Marine Oil & Gas Field Development in the Caspian Sea

At present the major offshore activity of oil companies in the Caspian Sea area is limited to the development of the Kashagan oil field by Agip KCO. Other projects are in the development and exploration phases.

The EIA report on the Kashagan project examined the environment impacts and mitigating measurers associated with offshore facilities and structures at the Kashagan oil field. The report considered the following measures / best practices to protect the Caspian Sea. An environmental impact to the Caspian Sea could, in the most severe case, affect other littoral countries of the Caspian Sea.

- Recovery of mud water and cuttings from offshore drilling activities and on-shore disposal of such materials (they are not discharged to the sea).
- Recovery of wastes generated offshore and their proper disposal at onshore waste management facilities.
- Limiting of flaring to emergency cases.
- Minimization of H_2S and mercaptan leaks, detection by automatic detectors and monitoring of ambient environmental concentrations.
- Prevention of emission of hydrocarbons (HC)
- Underground injection of associated water
- General ban on discharging of waste water to sea except cooling water (All sewage shall be recovered and treated at an onshore plant)

- Response plan to an oil spill accident (Stock yards for oil clean-up materials and equipment on an artificial island for Tier-1 response materials and stock yards in the Bautino terminal for Tier-2 response)
- Removal of H_2S and mercaptan gases as well as recovery of sulphur at onshore facilities

Compared with open sea, the capacity of natural water purification in closed Caspian Sea is likely to be limited, and once the sea is polluted, it might be difficult to rehabilitate it within a short time. Therefore, special considerations for a closed sea should be introduced during the entire cycle of exploration, operation and decommissioning. As the previous paragraphs explained environmental measures during operating phase, this section focuses on other phases of operation.

(1) Drilling Plan

1) Flow test on drilling

As for the flow test, burning is the only established technology to treat testing fluids, and emission of pollutants such as SO_2 and environmental pollution by hydrocarbon oil are of concern if burning is not used.

In order to protect the environment, the drilling test period should be minimized to be as short as possible and should be avoided to implement in the important season for regional ecosystem, such as breeding or migrating period of birds to be conserved. Otherwise, Extended Reach Drilling (ERD) including horizontal drilling technology should be applied in environmentally-sensitive areas. The local authority is urged to establish a checking and control system for the drilling plan.

It is desirable to prohibit the discharge of sewage from the drilling rig, and to monitor the water quality around the rig before, during and after drilling.

(2) Facility plan

1) Offshore Structures

The choice for the offshore production facility in the area is generally an artificial island because the water depth in the northern area of Caspian Sea is shallow and because the sea freezes in the winter.

Before construction, the installation site should be carefully investigated especially with respect to impact on the ecosystem and the hydrological condition. As sophisticated ERD technology is becoming available, it is preferable to site the facility in a less environmental-sensitive place and also to reduce the number of secondary offshore facilities.

As for decommissioning, it has to be decided whether to re-use the island or to abandon it after the operation stage, and also to make sure that hazardous substances are not released into the environment.

2) Pipeline facilities

Best practices should be followed and proper technologies should be applied:

- Selection of the material with corrosion resistance to H_2S
- Route of the pipeline and whether or not the pipeline should be underground

- Shoreline approach method for pipeline laying. In general the traditional construction method has greater environmental impact. Thus, the tunnel construction method is preferred as it has less environmental impact to the shoreline ecosystem.
- The history of offshore oil development in the world has been filled with technical challenges and the development of new technologies to overcome problems. In the case of northern Caspian Sea, it is important to introduce new technology for environmental protection and to monitor the water quality because the sea is rather closed and shallow.

12.13 Safety

The crude oil from the chasm area has high pressure and high (10-20%) H_2S content, therefore not only environmental considerations but also safety considerations will be required.

(1) Blowout

Because of high reservoir pressure (500-700bar) it is necessary not only to install the latest technology for blowout prevention but also to prepare an appropriate mud plan and to implement it.

It is desirable that the geological committee strictly examines the mud plan while the emergency response agency should strictly implement the inspection of the related facilities.

(2) Leakage of H_2S containing gas

H_2S is a dangerous gas for human beings, therefore it is necessary to install H_2S detectors and alarm system at proper locations for early detection of H_2S leakage and early evacuation, and it is also necessary to prepare an emergency manual and provide appropriate training related to H_2S leak accidents.

The large international oil companies working on the Caspian Sea have already prepared the proper practice manuals for the safety of operators and maintenance staff according to the international practice.

It is desirable that the emergency response agency or MEMR (including KazMunayGas) make and promote the necessary guidelines for H_2S danger prevention based on international rules and regulations.

12.14 Health, Safety and Environmental Management System (HSE-MS)

In recent years, International Standard ISO 14000 series and similar management methods have been widely introduced for environment protection and management in many countries including oil producing countries and developed countries, such as Japan, European countries and the United States. In addition, occupational safety and health management system guidelines for personnel safety and hygiene (OHSAS 18000 series) have also been introduced. These systems have become the mainstream approach to environmental management in developed countries as development of social capacity for environmental management (see Chapter 10) has enabled a more integrated, proactive approach to environmental issues rather than a reactive approach to defined regulations.

In the oil and gas sector, in which occupational health, safety, environmental issues and relationship with the local communities constitute particularly important aspects of operations, these issues are managed as a part of the Health, Safety and Environmental Management System (HES-MS). Table 12.14.1 summarizes the key elements of HSE-MS.

Table 12.14.1 Key Elements of HSE-MS

HSE-MS Element	Addressing
Leadership and commitment	Top-down commitment and company culture, essential to the success of the system.
Policy and strategic objectives	Corporate intentions, principles of action and aspirations with respect to health, safety and environment.
Organisation, resources and documentation	Organisation of people, resources and documentation for sound HSE performance
Evaluation and risk management	Identification and evaluation of HSE risks, for activities, products and services, and development of risk reduction measures.
Planning	Planning the conduct of work activities, including planning for changes and emergency response.
Implementation and monitoring	Performance and monitoring of activities, and how corrective action is to be taken when necessary.
Auditing and reviewing	Periodic assessments of system performance, effectiveness and fundamental suitability.

Source: E&P Forum, 1994[8]

Because there are a number of guidelines on HSE-MS (e.g., E&P Forum, 1994[2]; E&P Forum and UNEP, 1997[9]), IFC/WB[10], and because major oil enterprises in the area already have HSE-MS systems, details are not explained here. Nevertheless, those enterprises that do not have a HSE-MS system and those enterprises whose general HSE-MS is developed by the head company (e.g., KazMunayGas), and have to develop more detailed systems, need to fully understand the requirements of HSE-MS. Involvement and commitment of top management of the individual enterprise to HSE issues is important, as stressed in ISO14000 series and HES-MS.

MoEP is aware of the benefit of environmental management systems, and already has an economic incentive for those companies that are certified by ISO14000 series and ISO9000 series (see Section 11.7). MoEP is further encouraging the promotion of environmental management systems by adopting the framework of such a system as the general structure for production environmental control. This is particularly useful for the oil and gas industry because environmental management by HES-MS is already the international norm in the sector, and in order to standardize environmental performance of oil and gas enterprises, it is useful to set realistic requirements in accordance with the framework of HES-MS. In order to set such requirements, environmental authorities, especially MoEP, MEMR and MoER should be familiar with the general practice of HES-MS.

Another recommendation for an environmental management system is not to make it too inflexible, because an inflexible environmental management system tends to choke

[8] E&P Forum, Guidelines for the Development and Application of Health, Safety and Environmental Management Systems, Report No. 6.36/210, July 1994
[9] E&P Forum and UNEP, Environmental Management in Oil and Gas Exploration and Production, UNEP IE/PAC Technical Report 37, 1997.
[10] International Finance Corporation / World Bank Group, Environmental, Health and Safety Guidelines, http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

management with unnecessary requirements and inefficient paperwork. The system should be reviewed periodically, and if it is not improving environmental performance of the enterprise, it has to be revised.

12.15 Self-Monitoring by Enterprises

The oil and gas enterprises in Kazakhstan have been monitoring emissions and discharges of pollutants in accordance with the environmental regulations (see Chapter 3 and Chapter 4). In addition, many enterprises monitor ambient environmental conditions, so that they can prove their activities comply with the regulations. These activities are expected to increase with the promulgation of the new Environmental Code, which introduced technical specific emission standards, complex permitting, and production environmental control. In the future, emission trading may be introduced, and in order to monitor emissions, a sector guideline for self-monitoring jointly prepared by the oil and gas enterprises (association of the oil and gas enterprises) will be required. Considering its importance, self-monitoring is discussed further in Chapter 13.

CHAPTER 13 ENVIRONMENTAL MONITORING

13.1 Introduction

This section discusses how to improve the quality of environmental information in order to support the implementation of pollution control measures. The proposal was developed considering the current issues related to monitoring, and with opinions and experience acquired through the pilot project (Chapter 7-9).

13.2 Strategies

13.2.1 General Considerations

Figure 13.2.1 illustrates the inter-relationships between environmental monitoring, pollution control programs by enterprises and government agencies, and environmental inspection/auditing.

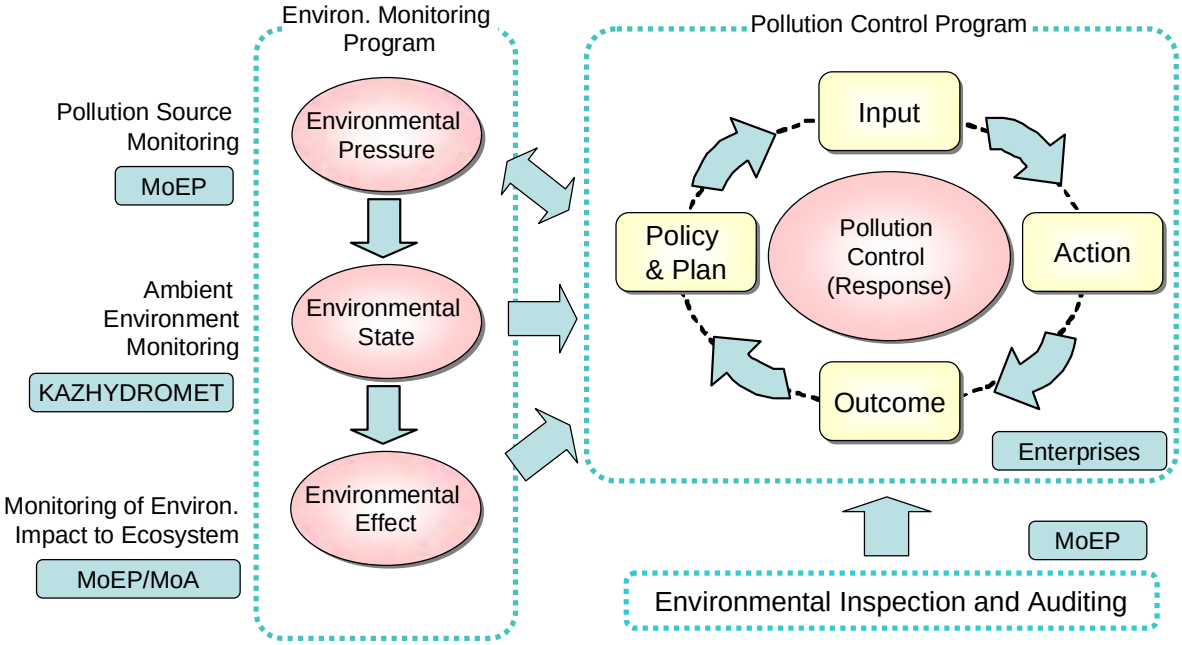


Figure 13.2.1 Relationship between Environmental Monitoring Program, Pollution Control Program and Environmental Inspection/Auditing

The environmental monitoring system should be able to provide information on environmental pressure, environmental state and environmental effect. Then, the information is provided to the pollution control (environmental management) program in order to design, estimate resource requirements, implement and evaluate environmental measures. For these tasks, the pollution control program (response) also needs a separate set of information on the contents of policies and plans, input (e.g., budget and other resources), actions (e.g., activities carried out), outcomes (e.g., reduction of pollution loads). The implementation of pollution control programs is also checked by environmental inspection and auditing for regulatory compliance and possible improvement. These are the basis for “performance-based” environmental management.

In view of such flows of information, the following problems need to be addressed:

- Environmental pressure has not been regularly monitored by the environmental authorities, and environmental authorities are largely depending on reviews of monitoring reports produced by enterprises.
- Environmental state is being monitored by KAZHYDROMET, but the monitoring has been sporadic as discussed in Chapter 5.
- There seems no structured program to monitor environmental effect, and environmental impact is being evaluated only on an ad hoc basis.
- Official responsibilities for environmental monitoring are split among territorial MoEP, KAZHYDROMET, akimats and Ministry of Agriculture. Due to the limited coordination among these organizations, the environmental information required to run and evaluate pollution control programs is hard to obtain.
- Although major oil enterprises have already introduced health, safety and environmental management systems (HSE-MS) with self-monitoring programs, other enterprises are still in the process of adopting such systems.
- With the introduction of the new permitting system and production environmental control, the regulatory requirements for environmental information are likely to change. Hence, the inspection (State Environmental Control) and auditing systems also have to be upgraded.

Box 1: Environmental Indicators

"Environmental indicators" corresponding to "Environmental Pressure", "Environmental State" and "Environmental Effect" shown in Figure 13.2.1 are useful as tools for evaluating the performance of environmental management.

To collect useful information to evaluate the effectiveness of environmental management, monitoring items should be set considering the above environmental indicators. The following table shows an example of indicators considering environmental management in the petroleum industry.

Type of Indicator	Example of Indicator
Pressure	Amount of wastewater generated Chemical characteristic of wastewater generated Amount of emission discharged Chemical characteristic of emission discharged Amount of hazardous waste generated Type of hazardous solid waste generated
Status (including environmental impact)	Water/Sediment Quality: Concentration of DO, COD, T-N, T-P, heavy metals, organic chemicals Air Quality : SO_2, NO_x, PM_{10}, hydrocarbon Change in the distribution of protected and endangered species
Response	Condition of operation status of emission/wastewater treatment facilities Reduction amount of hazardous solid waste Recovery rate of process water

13.2.2 Strategies

Considering these gaps between the information needs for "performance-based" environmental management and the current practice, the Master Plan set out the following strategies.

(1) Establishing an integrated environmental monitoring program

The current environmental monitoring system (monitoring of environmental pressure, state and response) is highly fragmented and needs re-designing based on needs for environmental information. Thus, the Master Plan proposes a new framework for the environmental monitoring system.

(2) Promoting dissemination of information

While various institutions, including both environmental authorities and private enterprises, are carrying out environmental monitoring, such information is largely unavailable to other organizations mainly due to institutional problems, and this is preventing informed decision making. Coordination among these organizations should be improved. This issue is also discussed in Chapter 14.

(3) Modernizing the inspection system

The new Environmental Code introduced technical specific emission standards, integrated permitting, production environmental control, and other instruments (see Chapter 4 and Chapter 11). Accordingly the inspection system needs major revision. As the details of such emission standards, permitting and self-regulation requirements are yet to be developed, it is still premature to decide the details of the new inspection system. Nevertheless, there are a number of general suggestions, and they are presented in this Chapter. Also see Chapter 11.

13.3 Objectives of Environmental Monitoring

(1) Precondition to Set Objectives of Environmental Monitoring in the Caspian Sea

When the objectives of environmental monitoring activities were set, the following requirements were considered:

- To follow the requirements of the Environmental Code in Kazakhstan.
- To collect information to contribute to environmental management with environmental indicators categorized as "pressure – status (condition) – response".

Additionally, considering the off-shore oil fields in the northern Caspian Sea that will be extensively developed in the near future, and which may become the main possible source of pressure from the petroleum industry on the northern Caspian Sea, environmental monitoring is required to contribute to the establishment of an effective emergency response system to deal with massive accidents. From this viewpoint, the following was required:

- To provide useful information to establish and operate an effective emergency response plan for massive oil spills.

(2) Objectives of Environmental Monitoring in the northern Caspian Sea

Based on the condition mentioned above, the objectives of Environmental Monitoring in the Caspian Sea were proposed as shown below.

1) Requirements by Environmental Code

According to Article 137 of the new Environmental Code, the objectives of the environmental monitoring are to monitor the status of the environment, natural resources in order to evaluate and forecast those changes due to natural and human impacts, and control those changes. In Article 119, the new Environmental Code describes inspection to collect information on the users of natural resources. Considering the requirements of the new Environmental Code, the following objectives were set for the environmental monitoring activities in the Master Plan for the northern Caspian Sea.

- To monitor the status of air quality, water/sediment quality, and natural ecosystems in and around the northern Caspian Sea in order to evaluate and forecast those changes due to possible impacts from the petroleum industry.
- To collect information on the activities of the petroleum industry with inspection to evaluate their adequacy as natural resource users in the northern Caspian Sea region.

2) Collecting information of Environmental Indicators

Environmental monitoring data obtained should contribute to the planning and implementation of environmental management to avoid or mitigate the negative impacts. To get useful monitoring data for environmental management, it is necessary to collect information that can be used as "environmental indicators". Generally, environmental indicators can be categorized into three types, called pressure, status (condition) and response. From this viewpoint, the following objective was set.

- To set and monitor environmental indicators (categorized as pressure, status (condition) and response) useful for controlling possible pollution due to the petroleum industry in and around the northern Caspian Sea.

3) Provision of Useful Information for Establishment and Operation of Emergency Response Plan on Massive Oil Spill Cases

To implement rapid and effective response to massive oil spills which are categorized as Tier 2 or Tier 3 level. It is not enough to establish a monitoring system to grasp the condition of accidents after an oil spill occurs. It is also essential to formulate a simulation model to predict the spread of the plume of spilled oil for examination of impacts and planning of countermeasures. From this viewpoint, the following objective was set.

- To collect information to contribute to an emergency response plan for when massive oil spills occur.
- To collect necessary information to formulate and verify a simulation model to predict contribute to emergency response plans for massive oil spills.

13.4 Monitored Parameters

13.4.1 Water/Sediment Quality Monitoring

Currently, the Atyrau HYDROMET Centre implements water quality monitoring three times a year and sediment quality monitoring once a year. Because it is difficult to implement periodical ambient environmental monitoring satisfying all the above needs at such frequency, it is recommended that the ambient monitoring activities be categorized as shown below and the analyzed parameters be set for each category of activity.

- Periodical ambient environmental monitoring regarding formulation of a state monitoring system
- Ambient environmental monitoring following special programs to confirm the impacts on the environment and ecosystems by large scale facilities related to petroleum resource development or submerged oil wells

The proposed main parameters to be monitored by each category of ambient environmental monitoring is shown in Table 13.4.1.

Table 13.4.1 Proposal on Main Parameters to be Monitored

Category	Current status and trend in the environment	Impacts on northern Caspian Sea by petroleum industries	Factors other than petroleum industries	Information to examine impacts on ecosystems
Periodical ambient environmental monitoring for formulation of a state monitoring system	pH, chemical oxygen demand, suspended solids dissolved oxygen, heavy metals, inorganic ions	oil products (total petroleum carbon), heavy metals	total nitrogen, total phosphorous, heavy metals	---
Ambient environmental monitoring following special programs	pH, chemical oxygen demand, suspended solids, dissolved oxygen, heavy metals, inorganic ions	oil products (total petroleum carbon), petroleum related pollutants, heavy metals	nitrogen, phosphorous, chlorophyll, heavy metals, pesticides	concentration of heavy metals and petroleum derived pollutants

Source : JICA Study team

13.4.2 Air Quality Monitoring

From the viewpoint of controlling pollution from the petroleum industry, hydrocarbons may cause photochemical smog and will be added as analyzed parameters. Air samples will be taken by a sampling pump in the field and hydrocarbons in the samples will be analyzed by GC-FID.

In existing conditions, particulate matter is one of the air quality monitoring parameters. It should be noted that the degree of impact of particulate matter on health depends on the particle size. From the viewpoint of health risk management, it is recommended that the fraction of particulate matter, named PM_{10} with diameter of less than 10 micrometer, be analysed.

13.5 Monitoring Points

13.5.1 Water/Sediment Quality Monitoring

Examples of the factors to be considered for setting water/sediment quality monitoring points in a marine environment are bathymetry of the water body, currents, utilization of the water body, location of main pollutant sources, and inflow of river water to the sea[1]. Additionally, the Caspian Sea has a unique ecosystem, so it is necessary to consider such characteristics. The factors to be considered are shown in Table 13.5.1.

[1] "Water Quality Survey Measurements3 (Japanese Environmental Agency Announcement issued on 30 September 1971)

Table 13.5.1 Factors to be Considered to Set Monitoring Points

Factor	Description
Bathymetry of the water body	Water depth in the area approximately 20 km from the coast is very shallow, 1 to 2 m. Generally, water depth in the northern Caspian Sea is 3 to 6m.
Currents	The direction of currents is significantly affected by wind direction, except in winter when the sea surface freezes. Average wind speed in the northern Caspian Sea is 4 m/s to 6 m/s. Main wind direction is from east to west in spring and autumn and from northwest to southeast in summer. This means that currents change direction several times per year. Where the water depth is 5 m or less there is no difference in the current direction between the surface layer and bottom layer.
Utilization of water body	Fishing is carried out in the northern Caspian Sea.
Main source of pollution load	There are two main oil fields named Kashagan and Karamkas.
Inflow of river water	The Ural River is the main river flowing into the northern Caspian Sea and is also one of the main sources of pollution load.
Status of ecosystems	Vegetation of the north coast including the Ural delta is important not only because of the distribution of flora to be conserved but also its function as bird habitat. The east coast is also an important area for the same reasons. The Ural delta is important habitat for sturgeon. The northern Caspian Sea is a feeding and breeding area in winter for Caspian seals.

Source : Preliminary Environmental Assessment Report for Kasyagan Experimental Programme (2002) Agip KCO

Considering the information shown in Table 13.5.1, the following approaches are adopted to set monitoring points for the Regional Environmental Monitoring Centre/Atyrau HYDROMET Centre.

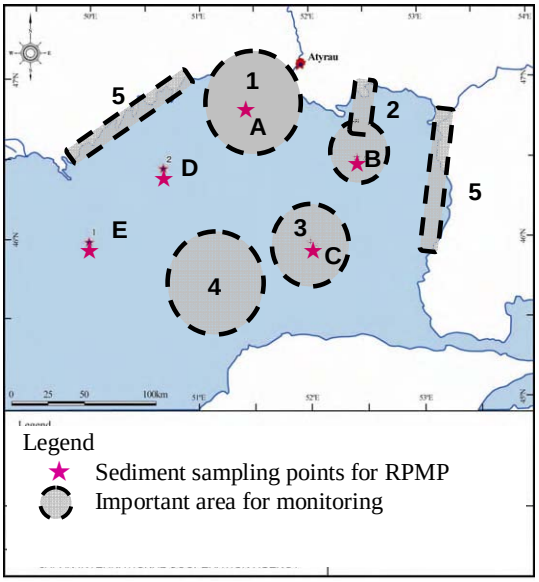
- Currents are affected by wind direction, and their direction changes in accordance with the main wind direction. Therefore monitoring points will be stationed in all areas of the northern Caspian Sea.
- Considering the main pollution sources, the estuary of the Ural River and adjacent area of the Kashagan oil field are important areas for ambient environmental monitoring of existing conditions. In the future, the adjacent area of the Karamukas oil field will also become an important area.
- Considering the value of their ecosystems, the estuary of the Ural River and coastal area in the northern Caspian Sea are important for ambient environmental monitoring.

Based on the above approach, the important areas for ambient environmental monitoring are as shown in Table 13.5.2 and Figure 13.5.1. Figure 13.5.1 also shows the sediment quality monitoring points under RPMP. These points can be adopted as the representative of all water/sediment quality monitoring points for continuous monitoring.

Table 13.5.2 Important Areas for Monitoring

No.	Area	Description
1	Estuary of the Ural River and adjacent areas	Inflow from the Ural River is the main source of terrestrial pollutants. The area is an important habitat for birds.
2	Kashagan oil field and its pipeline and adjacent areas	The area in and around the Kashagan oil field may become the main pollution source in the near future.
3	Centre of the northern Caspian Sea	This should be one of the representative areas for water quality monitoring in the survey area of this study.
4	Karamkas oil field	Large-scale development may be carried out in the future.
5	Northern and eastern coast area	The area is important as bird habitat. It is difficult to implement monitoring due to the shallow water level, so monitoring points will be set under the special program.

Source : JICA Study Team



Source : JICA Study Team

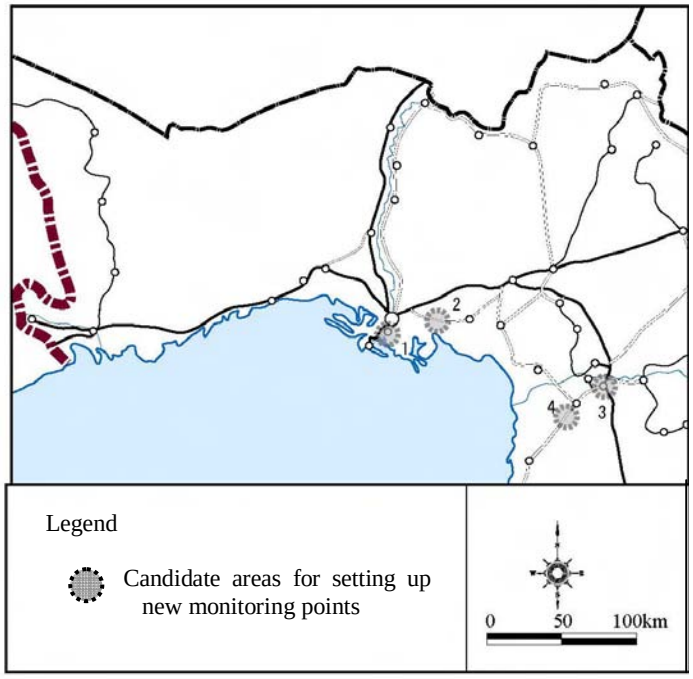
Figure 13.5.1 Important Areas for Monitoring

13.5.2 Air Quality Monitoring

In accordance with the future construction plans for petroleum facilities, areas outside of Atyrau city will be examined for new monitoring points. The approach for setting new monitoring points is as follows:

- An area will be selected from which to obtain background information on air quality in the Atyrau region. The topography of the region is uniformly flat, so only one candidate area will be selected for setting up new monitoring points because it is considered that an extended period would be necessary to secure enough human resources/equipment for operating a sampling pump at many monitoring points.
- The impact of new petroleum related facilities will be considered.
- An area, adjacent to the city, around existing oil and gas terminals will be selected.

Figure 13.6.2 shows candidate area to set new monitoring points.



1. Suburb area of Atyrau city (to gauge background concentrations)
2. Area adjacent terrestrial facilities of Agip KCO (to gauge the impact of pollutant sources)
3. Kurusali city (the city area around the oil and gas terminal)
4. The area adjacent to the construction site of an oil chemical complex (to gauge the impact of the pollutant source)

Source : JICA Study Team

Figure 13.5.2 Important Areas for Monitoring

13.6 Sampling Frequency

13.6.1 Water/Sediment Quality Monitoring

The frequency of sampling to be conducted by the Regional Environmental Monitoring Centre/Atyrau HYDROMET Centre will be once each in spring, summer, and winter for water quality monitoring and once a year for sediment quality monitoring. In winter, it is difficult to take samples from vessels sailing from Atyrau because of freezing of the seawater surface in the northern Caspian Sea and the estuary of the Ural River. Consequently, the monitoring in winter will be separated from the periodic monitoring and will be considered under a special program.

13.6.2 Air Quality Monitoring

In Atyrau city, monitoring will be carried out throughout the year. At other points, one week of continuous sampling will be carried out quarterly, for the meantime, with air sampling pumps. In the future, the setting up of fixed monitoring points such as the monitoring station operated in Aturau city will be evaluated in accordance with the monitoring results or the development of new petroleum related facilities.

13.7 Proposal on Pollution Source Monitoring and Spilled Oil Monitoring

13.7.1 Monitored Parameters

(1) Petroleum Derived Pollutants

The desired parameters for monitoring are shown in Table 3.6.6. Among them, hydrocarbons are analyzed at present with a mobile analyzer. To monitor hydrocarbons as a substance causing photochemical smog, it is necessary to have the capacity to analyze hydrocarbons of low concentration by GC-FID.

Table 13.7.1 Petroleum Related Parameters

Substances	Target
Constituents of petroleum Hydrocarbons, especially unsaturated hydrocarbons, are affected by photochemical reaction with nitrogen oxides, and changes in ozone, which is a secondary pollutant causing photochemical smog.	air
Volatile hydrocarbons Volatile hydrocarbons may evaporate to the atmosphere when storage tanks are opened and petroleum is transported. From oily wastewater, volatile hydrocarbons may evaporate. Some volatile hydrocarbons, such as benzene, show carcinogenic properties.	air
Hydrogen sulphide Hydrogen sulphide is included in associated gas generated from oil wells.	water
Polycyclic aromatic hydrocarbons (PAHs) Some parts of the polycyclic hydrocarbons (PAHs) included in petroleum are hazardous and carcinogenic substances, and need to be examined for environmental risk. These substances may be controlled under the Stockholm Convention in the future.	air, water/sediment

Source : JICA Study Team

(2) Constituents of Petroleum

In the future, when petroleum related industrial activities in the northern Caspian Sea increase, a capacity for pollution source monitoring and oil spill monitoring may be needed. When pollutant sources are unclear, fingerprint analysis is adopted as one of the measures to attempt to identify the pollution sources. Fingerprint analysis compares the physical and chemical characteristics of spilled or discharged oil in the environment, and oils that might be pollution sources, such as those used by or carried on vessels/facilities. Examples of fingerprint analysis are shown in Table 13.7.2. It is desirable for the Regional Environmental Monitoring Centre/Atyrau MoEP to have the capacity to carry out this analysis. Additionally, knowledge of the limitations of this analysis, such as the difficulty of identifying pollution sources due to the weathering of spilled/discharged oil, is required.

Table 13.7.2 Examples of Fingerprint Analysis

Standard	Type	Outline
ASTM	UAS D3415-90	First Step: Constituents of hydrocarbons are analyzed by GC-FID, and a comparison made between the spilled/discharged oil in environment and that used in pollution source. When the results are compared, consideration is given to the impact of weathering. Second Step: Particular analysis is carried out on the oils used in pollution sources. Analytical parameters are as follows: - Constituents of hydrocarbon - Inorganic substances: nitrogen, sulfur, nickel and vanadium
NORDTEST	Finland NT CHEM 1 1991	First Step: Constituents of hydrocarbon are analyzed by GC-FID. Second Step: Particular analysis is carried out on the oils used in suspected pollution sources by GC-MS. As necessary, weathering tests are carried out in the field.
JCG Protocol	Japan Japan Coast Guard 1977	First Step: Constituents of hydrocarbon are analyzed by GC-FID. Second Step: If the pollution source cannot be reliably identified by the first step, particular analysis is carried out. Analytical parameters are as follows. - Constituents of petroleum - Inorganic substance: nitrogen, sulfur, nickel and vanadium - Physical analysis : viscosity, fluxion, reflection rate

Source : JICA Study Team

(3) Tar Balls

Figure 13.7.1 Monitoring of Tar Ball

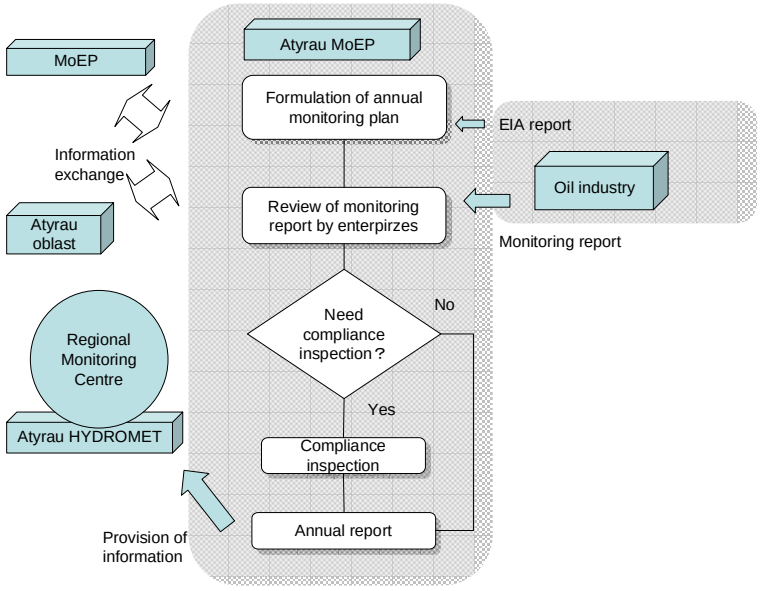
Tar balls are weathered heavy oils derived from discharged bilge from vessels or oil spilled in accidents that forms into balls after evaporation of volatile compounds. Tar balls float in the sea and are sometimes washed onto beaches. Generally, tar balls are from one to several mm in diameter, sometimes ten to twenty cm in diameter. Tar balls are collected with a sampling net dragged by a sampling vessel. After collecting tar balls, their weight is measured and recorded as a density of occurrence by dividing the measured weight by the area of seawater surface surveyed by the sampling net. Tar ball monitoring can indicate oil pollution conditions without the need for chemical analysis.

13.8 Environmental Inspection and Self-Monitoring of Private Enterprises

13.8.1 Framework of Inspection Activity

Figure 13.11.1 illustrates the general flow of environmental inspection. With the promulgation of the new Environmental Code and introduction of a number of modern pollution control instruments, such as technical specific emission standards, integrated permitting, production environmental control, etc., the system of inspection by the environmental authority, namely State Environmental Control, will also have to be revised. This will significantly affect activities of oil enterprises as well as territorial MoEP/inspectors.

Overall, the new inspection system is likely to shift its focus toward upstream compliance, such as adoption of the best available technique (BAT), rather than downstream compliance, such as satisfaction of emission/discharge standards for a large number of parameters. Nevertheless, monitoring of emission and discharges will continue to be important in order to deter serious violators. Without reliable emission/discharge information, it is difficult to know the extent of environmental pressure, and this will make it difficult to prove that the violation has a serious environmental consequence. Moreover, the current pollution charge system is based on emission/discharge data. Hence, the design of a new inspection system has to take into consideration the effectiveness of downstream/upstream approaches and available resources for inspection.



Source : JICA Study Team

Figure 13.8.1 Flow of Environmental Inspection

13.8.2 Plan of Compliance Inspection

When a compliance inspection plan is formulated, target enterprises are chosen by reviewing past compliance inspection results to examine their need for education regarding pollution control and the discharge condition of pollutants shown in Table 13.8.1. When the target

enterprises are selected, it is necessary to be aware that all enterprises will eventually be inspected.

Table 13.8.1 Factors to be considered for selecting of Target Enterprises

Factor	Contents
Necessity of instruction	Record of past penalties, record of claims on enterprises, process of improvement after instruction of necessary activities
Discharge condition of pollutants	Amount of discharged pollutants, utilization of hazardous substances, results of monitoring reports by enterprises, land use and water resource use conditions around enterprises

Source : Prepared based on "Guideline for Formulation of Compliance Inspection Manual under Law of Water Pollution Prevention (2006, Japan)"

The compliance inspection plan should include the items shown in Table 13.8.2. Based on the compliance inspection plan formulated, compliance inspection sheets are needed to record the findings of the field inspections.

Table 13.8.2 Contents to be included in the Compliance Inspection Plan

Item	Contents
Objectives	- Facts to be confirmed by compliance inspection
Work Item	- Records, files, licenses, and regulations to be checked - Industrial process and type of effluent/wastewater treatment facilities to be inspected - Information to be collected in field observation and interview - Kinds of samples to be taken
Procedure	- Procedure of compliance inspection - Role of each member of inspection team - How to prepare record
Resource	- Necessary human resources, equipment and analytical laboratory - Budget
Schedule	- Schedule of inspection for each enterprise - Important phase to confirm progress of compliance inspection plan - Follow-up work

Source : "Tool kit to develop better environmental inspectors in Eastern Europe, Caucasia, and central Asia"(OECD)

13.8.3 Implementation of Compliance Inspection

Several inspectors are used for compliance inspection, as it is not possible for a sole inspector, to avoid accidents and to ensure that sufficient inspections are carried out, and also that adequate instructions are issued. If the inspections find anything that needs to be tackled immediately, the inspector instructs the managers of the enterprises concerned. In the case of collecting analytical samples such as wastewater, the samples are taken at the start of the inspection. Checking of relevant documents should be carried out in accordance with the particular inspection sheets prepared. Examples of items to be confirmed are shown in Table 13.8.3.

Table 13.8.3 Items to be Confirmed in Compliance Inspection

Items	Contents
Conformity of actual condition with license	Type, number and location of emission/effluent treatment facilities
Pollution control system	Selection of person responsible for pollution control system, management system at night, accident prevention system, accident response system, monitoring system, storage condition of monitoring results, sub-contractor of analytical work
Operation condition	Current condition, future plan, industrial process
Others	Observation of soil condition and illegal dumping around enterprise

Source : Prepared based on "Guideline for Formulation of Compliance Inspection Manual under Law of Water Pollution Prevention (2006, Japan)"

In the future, it is desirable for inspectors to not only have the capacity to identify violations of the regulations, but also to propose the best available technique (BAT) and best environmental practice (BEP) to enterprises. The particulars of possible BAT and BEP advice will be examined in this study.

13.8.4 Storage of Compliance Inspection Records

The inspection records are useful for the formulation of a compliance inspection plan. The records of violations of standards and instructions of necessary action against such violations will be stored in a database for easy reference. When the database is formulated, it will be easy to not only refer to information of each enterprise, but also to group the same types of violations and instructions. Such information can be utilized for compliance inspection of other enterprises in the same sector.

13.8.5 Review and Recommendation on Self-monitoring of Private Enterprises

Through the inspection, it is desirable that the inspector reviews the self-monitoring activities of each private enterprise and provides recommendations on their activities to bring about more suitable self-monitoring, as necessary.

Monitoring parameters is one of the important activities of the reviewing work. The items for monitoring in the oil development field (so called upstream) are different from those in refining & transportation (so called downstream). Examples of the monitored items adopted in the oil development field and refinery are shown in the following boxes.

Several recent trends in self-monitoring activity in the private sector are shown below:

- The oil & gas producers association (OGP), representing the world oil & gas development sector, accepts the calculation methods for pollutant emission monitoring to the atmosphere.
- A measured value is sometimes significantly different from the calculated value. Therefore some countries such as Saudi Arabia require actual measurement of flue gas flow and analysis of the concentration of pollutants, instead of calculation, especially for large-scale combustion facilities.
- Flare gas flow is usually estimated from the combustion situation of the flare stack. But recently in many countries, the direct measurement of flare gas flow for large capacity flare stacks has been required and also semi-quantitative prediction of flare stack combustion from satellite imagery.
- The improvement of combustion (efficient combustion) in fuel combustion facilities for the reduction of CO_2 emission is now a worldwide trend. Some oil development companies have devised a voluntary plan to install O_2 meters to control combustion more efficiently.

This option will be only applied when sufficient usage of surplus associated gas can be guaranteed.

- Naturally occurring radioactive materials (NORMs) are recognized as one of items for environmental monitoring and the appropriate handling and management are prescribed in the guidelines of the related national oil company or the sector association.
- Periodic ground water monitoring for prevention of ground water pollution is required for treatment and landfill site for hazardous wastes.

Considering the monitoring items shown in the following boxes, and the above trend in self-monitoring activities in the private sector, the following recommendations are given here:

- The monitoring programs of TCO and Agip KCO are highly demanding even at the international level, and considered internationally acceptable. It will be worthwhile for the oil development companies in the Caspian Sea region to refer to these monitoring programs.
- The oil companies' monitoring results for items such as marine biota, coastal and territorial flora and fauna, and meteorology and oceanography etc, shall be integrated into the governmental network and utilized as a part of the USMS ENR.
- The subject of environmental monitoring for world oil development companies will be considered for each company and/or oil & gas sector in Kazakhstan and action plans for improvements, such as actual monitoring of air pollutants from large scale combustion facilities, will be prepared.
- Monitoring of ozone (O_3) in ambient air, H_2S & Mercaptane concentration at emission sources will be required in the near future.

Box 2: Monitored Parameters in Oil Development Fields

Environmental monitoring programs that were planned from 2003 to 2006, which covered the Australian offshore, Mexican Gulf, Arabian Gulf and the Caspian Sea, have been comparatively analyzed based on the disclosed Environmental Impact Assessment (EIA) reports available. The details are shown below:

Environmental Monitoring Items of Oil development industry

Company	**Woodside**	**PEMEX**	**QPD**	**BP**		**Agip KCO**		**TCO**
Project Name	**WA-271** (FPSO)	**KMZ**	**AL Karkara**	**ACG**		**Kashagan**		**Tengiz**
Location	Offshore (WA)	Offshore (Gulf of Mexico)	Offshore (Gulf of Arabia)	Offshore	Onshore (TM)	Offshore	Onshore (OPF)	Onshore
Country	Australia	Mexico	Qatar	Azerbaijan		Kazakhstan		Kazakhstan
Ambient Monitoring								
Ambient air	x	CO, CO_2, SO_2, O_3, HC,NO_X, NO_2, H_2S, PM, VOC, PAH	SO_2, O_3	SO_2, NO_2,	SO_2, NO_2, CO, PM_{10}	CO, SO_2, NO_2, H_2S, HC, PM, RSH	CO, SO_2, NO_2,HC, H_2S, PM, RSH	CO, SO_2, NO, NO_2,HC, H_2S, RSH
Water	Temp, Salinity, Oil, Heavy Metal, T-N & T-P	Temp, PH, Salinity, DO, TSS	X	X	Ground-water	PH, Salinity, DO, THC, T-N, T-P, Heavy Metal etc	Ground-water level, PH, Oil etc	Groundwater Level, PH, Oil etc
Sediment	X	Sulphide, Oil, TOC Heavy Metal, Coliform	X	X	X	HC, TOC, Phenol Heavy Metal etc.	(On land soil) Oil, Heavy metal	(On land soil) Oil, Heavy metal
Benthos	○	X	X	○	X	○	X	X
Flora & fauna	X	X	X	○	○	X	○	(○)
Bird	X	X	X	X	○	○	○	(○)
Mammal	○	X	X	X	X	Seal	X	X
Meteorology	X	(○)	X	(○)	(○)	(○)	○	○
Sea conditions	Tide, current, temp.	(○)	X	(○)	X	Wave, current, temp.	X	X
Monitoring of Emission & Discharge								
Air	Fuel & Flare flow SO_2, NO_x, PM, BTX	Fuel & Flare flow, SO_2, NO_x, PM	Fuel & Flare flow (NO_x)	Fuel & Flare flow SO_2, NO_x, H_2S	Fuel & Flare flow SO_2, NO_x, H_2S	Fuel & Flare flow, NO_x SO_2, , RSH, PM etc	Fuel & Flare flow SO_2/H_2S NO_x, CO	Fuel & Flare flow, Temp, SO_2, NO_x, CO
CO_2 (Calc.)	○	○	○	○	○	○	○	○
Water	Flow, Oil , (Heavy metal), (T-N), (TP)	Flow, PH, TSS, Oil, CL, (BOD, T-P, Heavy metal)	Flow, PH, TSS, Oil, CL, Heavy metal	Flow, Oil , CL, Heavy metal	Flow, Oil, Heavy metal	Flow, TSS, PH, Oil, COD, T-N, T-P etc,	Temp, TSS, PH, Oil, BOD,	Flow, Temp, TSS, PH, Oil, BOD, Heavy metal
Chemical	Input & output Drilling mud	X	Input & output Drilling mud	Input & output Drilling mud	Input & output	Input & output Drilling mud	Input & output	Input & output
Waste	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume
Radiation (NORMs)	○	X	(Cuttings)	○	X	○	X	○

Source : each EIA report (TCO: Annual monitoring report)

Box 3: Monitored Parameters in Oil Refineries

The environmental monitoring program of a recently planned oil refinery in Saudi Arabia is compared with a similar program in Japan. The environmental monitoring program of an oil terminal can be considered to be almost the same as that of an oil refinery.

Company	**FOC**	**Rabigh JV**
Location	**Sodegaura**	**Rabigh**
Country	**Japan**	**Saudi Arabia**
Monitoring Items		
（Environment）		
Ambient air	(SO_2, NO_2, SPM, O_3, CO, NMHC)	SO_2, NO_2, NO, CO, O_3, H_2S, CO, (PM)
Water	（PH, DO, Salinity, TOC, COD, TN, TP Heavy metal etc）	Surrounding sea NA
Groundwater	PH, Heavy metal, MTBE, T-N	PH, Heavy metal, MTBE, T-N
Sediment	X	On land soil
Noise	○(boundary)	(○)
Sea bed feature	X	X
Marine biota	X	○
Benthos	X	○
Coastal flora & fauna	X	X
Territorial flora & fauna	X	X
Bird	X	X
Cetacean	X	X
Meteorology	X	○
Sea conditions	(○)	(○)
（Emission & Discharge）		
Air	Fuel flow & sulphur SO_2, NO_X, O_2 SO_2 (S/R)	Fuel flow & sulphur Flare gas flow SO_2, NO_X, O_2 SO_2 (S/R)
CO_2 (Calc.)	○	X
Water	Flow, temp, PH, COD, TSS, Oil, TN, TP, Phenol Heavy metal etc.	Flow, temp, PH, COD, TSS, Oil, TN, TP, Phenol Heavy metal etc.
Chemical	Input & Output	NA
Waste	Volume & Disposal	Volume & Disposal
Noise	Worker	Worker
Radiation (NORMs)	X	X

13.9 Analytical Techniques and Quality Control

13.9.1 Adoption of New Analytical Techniques Considering International Information Exchange

Principally, the laboratory control system of the Regional Monitoring Centre will follow GOST and SNIP. However, analytical data of water/sediment, especially TPH and heavy metals required by RPMP, will be exchanged between the Caspian countries. For such analysis, it is recommended that pre-treatment and analytical measures be adopted in accordance with the objectives of the survey. For example, RPMP prepared the sediment sampling protocol and analytical manual, so the procedure for RPMP should follow the manual. Based on "The Framework Convention for the Protection of the Marine Environment of the Caspian Sea" issued in August 2006, new international monitoring programs will be formulated in the future. Under such programs, pre-treatment and analytical measures that are different from GOST may be adopted, so it is necessary to have the capacity to implement such analysis.

13.9.2 Quality Control

It is desirable to start preparing to obtain certification of ISO 17025. Table 13.9.1 shows the framework for quality control under ISO 17025. Through joint work with the Atyrau HYDROMET Centre and Atyrau MoEP during the period of the pilot project, it was considered that the weakest point of the current quality control system is the management of analytical data such as verification of analytical results, and this needs to be improved. In addition, there needs to be the capacity to calibrate newly purchased analytical equipment.

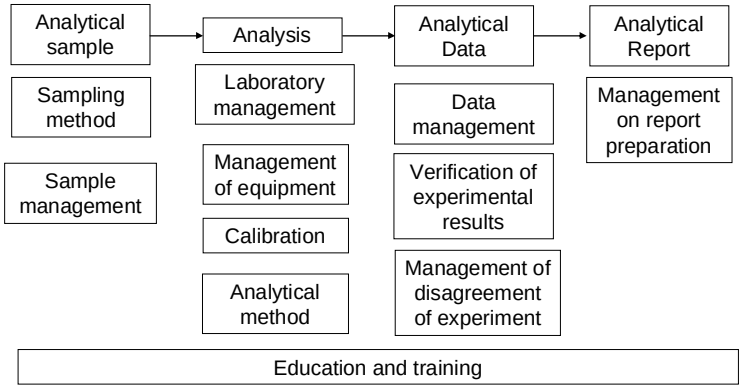


Figure 13.9.1 Framework of Quality Control by ISO 17025

13.10 Capacity Development

13.10.1Contents of Capacity Development

To implement the environmental monitoring activities, the institutional, organizational and technical issues discussed in Section 5.6 need to be improved, and this requires capacity development for the people involved in monitoring activities. According to the "Capacity Development Handbook (2004)" prepared by JICA, the following are the three target areas of capacity development:

- Personal knowledge and skills
- Process of decision making, management systems and framework
- Process and system for decision making regarding formulation and implementation of policy and strategy

The outline of capacity development for the above targets is shown in Table 13.10.1.

Table 13.10.1 Capacity Development for Environmental Monitoring in this Study

Target of Capacity Development	Outline of Capacity Development
Personal knowledge and skill	To improve the technical issues shown in section 2.2, the following capacity development will be carried out. - Capacity development to enhance the capability of analytical experts of the Regional Environmental Monitoring Centre/Atyrau HYDROMET Centre, Atyrau MoEP for analysis of petroleum related substances. - Capacity development for enhancement of knowledge/skills to utilize satellite image analysis technique for environmental management
Process of decision making, management systems and framework	To improve the institutional issues shown in section 2.2, the following capacity development will be carried out. - Capacity development for formulation of environmental monitoring plans by relevant organizations in Atyrau, such as the Regional Environmental Monitoring Centre/Atyrau HYDROMET Centre, Atyrau MoEP - Formulation of a system to share monitoring results
Process and system for decision making regarding formulation and implementation of policy and strategy	A policy on environmental monitoring will be proposed through formulation of a petroleum pollution prevention program and a control master plan.

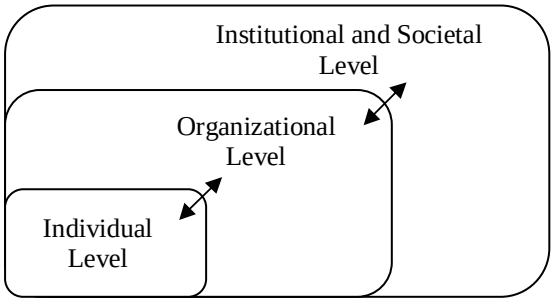
Source : JICA Study Team

JICA defines capacity development (CD) as the process in which individuals, organizations, institutions, and societies develop "abilities" either individually or collectively to perform functions, solve problems, and set and achieve objectives.[2]

[2] Capacity Development Handbook (March 2004) Task Force on Aid Approaches Japan International Cooperation Agency

13.10.2 Target of Capacity Development

Within the general CD framework, there are three layers – individual, organizational, and institutional or societal levels. These layers are not mutually exclusive, but rather each level is interconnected in a systemic way as shown in Figure 13.11.1.



Source : Capacity Development Handbook (March 2004) JICA

Figure 13.10.1 Layer of Capacity Development

To implement the environmental monitoring activities mentioned above, CD will be required at the individual, organizational, and institutional levels. The targets of CD for the purposes of establishing the monitoring system mentioned above are shown in Table 13.11.2.

Table 13.10.2 Target of CD

Ambient monitoring

Layer	Required Capacity	Target of CD
Institutional level	Policy frameworks and legal systems to collect suitable environmental indicators and disseminate them to relevant stakeholders	- Regulations or systems to collect suitable environmental indicators under the new Environmental Code
Organization level	Administrative system to collect environmental monitoring data contributing to environmental management and distribute the data to relevant organization.	- Ability to formulate environmental monitoring plans under consensus of the relevant regional organization in Atyrau
Individual level	Knowledge and skill of sampling and analysis of pollutants derived from the petroleum industry	- Knowledge and skill of analytical staff of the Regional Environmental Monitoring Centre

Inspection for Pollution Control

Layer	Required Capacity	Target of CD
Institutional level	Policy frameworks and legal systems to monitor and assist private industries with pollution control systems	- Regulations or systems to monitor and assist private industries with pollution control systems under the new Environmental Code
Organization level	Administrative system to implement a suitable inspection activity for pollution control in the petroleum industry	- System to enhance ability of local inspectors for inspection and pollution control
Individual level	Knowledge and skill of inspection and pollution control in the petroleum industry	- Knowledge of inspection to control pollution in the petroleum industry - Knowledge and skills to utilize the satellite image analysis technique for environmental management

Source : JICA Study Team

13.10.3 Capacity Development at the Institutional Level

The program for capacity development in institutional aspects is shown in Table 13.10.3.

Table 13.10.3 Capacity Development in Institutional Aspects

Monitoring	Menu	Contents
Ambient environmental monitoring	Securing of budget and human resources for the Regional Environmental Monitoring Centre	Regulation or system to secure necessary budget and human resources for the Regional Environmental Monitoring Centre
Spilled oil monitoring	Formulation of a monitoring system for oil spill accidents	A monitoring system will be formulated for emergency monitoring to confirm the conditions of accidents and long-term monitoring to identify environmental impacts.

Source : JICA Study Team

13.10.4 Capacity Development at the Organizational Level

The program for capacity development in organizational aspects is shown in Table 13.10.4.

Table 13.10.4 Capacity Development in Organizational Aspects

Monitoring	Menu	Contents
Ambient environmental monitoring	Establishment of joint committee to examine monitoring plan	A joint committee, organized by the local relevant organizations will be established to examine water/sediment quality monitoring in the Caspian Sea.
	Enhancement of capacity for planning in the Regional Environmental Monitoring Centre	The capacity to formulate ambient environmental monitoring plans will be developed for the Regional Environmental Monitoring Centre.
	Formulation of a database and promotion of information dissemination	Atyrau HYDROMET Centre and Atyrau MoEP will develop and operate a monitoring database and formulate a system to disseminate information to relevant organizations.
Inspection	Enhancement of ability of local inspectors for inspection and pollution control	The training program for local inspectors will be reviewed and improved to enhance the capacity of local inspectors for inspection in the petroleum industry.

Source : JICA Study Team

(1) Enhancement of Cooperation among Local Authorities

At the workshop held during the pilot project (Chapter 8), participants emphasized the need to share necessary information. It seems that the current level of information sharing is not enough even though each organization, such as Atyrau MoEP, or KAZHYDROMET, prepares environmental monitoring reports.

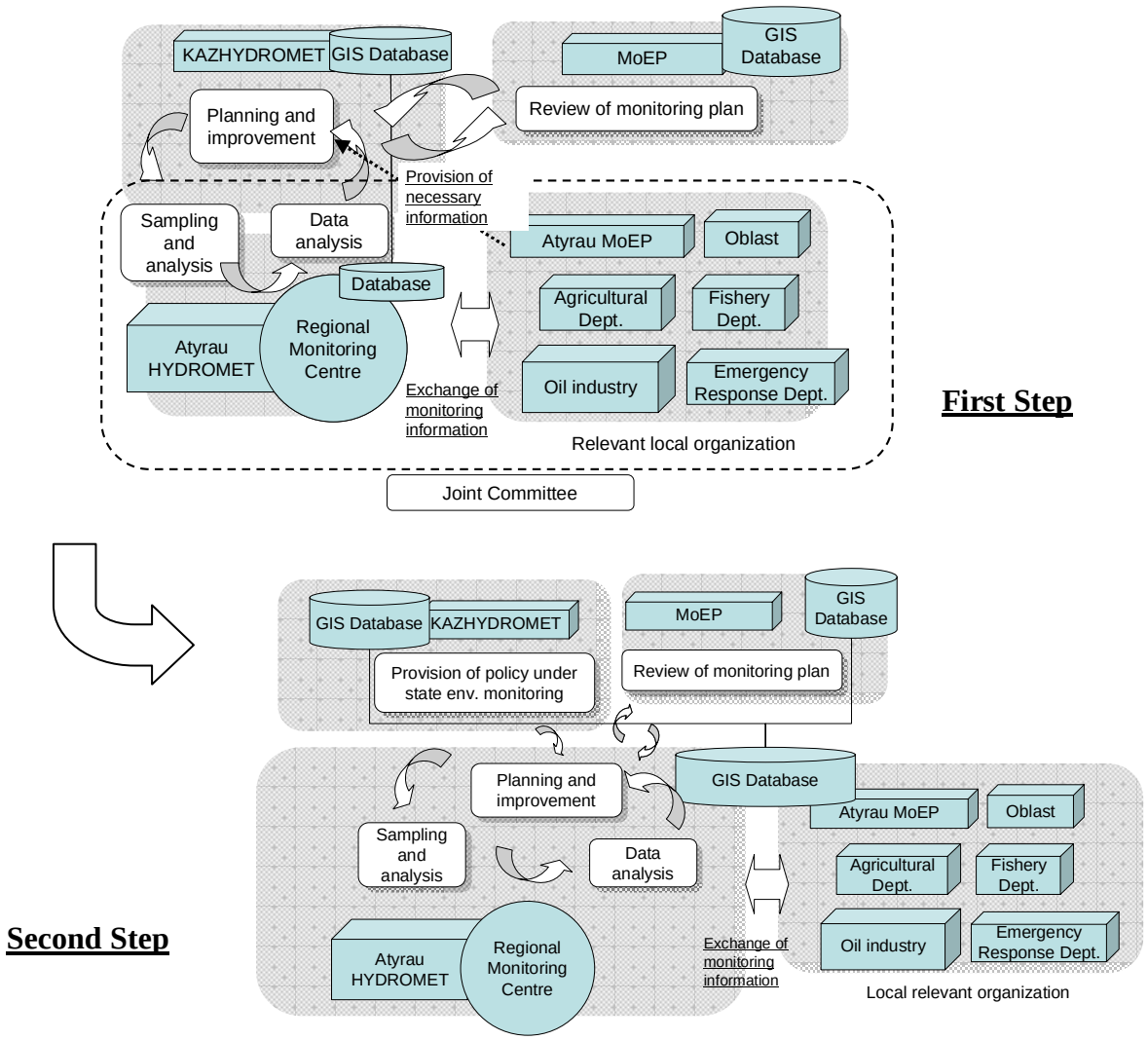
To improve this condition, the following changes are suggested. The changes will enable the collection of environmental information in accordance with the framework of the USMSENR based on the new Environmental Code, and also provide environmental information that is necessary to balance development of oil resources and environmental conservation in the Caspian region.

First Step

- When the Atyrau HYDROMET Centre formulates the monitoring plan, a series of meetings organized by a joint committee will be held to discuss necessary information regarding the ambient environment for environmental conservation activities. The joint committee will be organized by KAZHYDROMET and local relevant organizations, such as Aturau MoEP, Atrau MoE, Emergency Response Department, Agricultural Department, Fishery Department, AKIMAT, and petroleum industries.
- According to the discussion in the joint committee, KAZHYDROMET will formulate the ambient environmental monitoring plan consistent with the state monitoring framework. The formulated plan will be reviewed by MoEP.
- Other organizations, under their own responsibility, will implement ambient environmental monitoring to complement the plan executed by the Atyrau HYDROMET Centre.
- A capacity to formulate ambient environmental monitoring plans will be developed within the Regional Environmental Monitoring Centre.

Second Step

- Local level meetings mentioned above will be held periodically to progressively improve the ambient environmental monitoring plan.
- Once the activities of the Regional Monitoring Centre are working along the right lines, planning work for ambient environmental monitoring under KAZHYDROMET will be transferred from its central office to the Regional Environmental Monitoring Centre.



Source : JICA Study Team

Figure 13.10.2 Proposed Framework for Future Water/Sediment Quality Monitoring

13.10.5 Capacity Development at the Individual Level

The program for capacity development at the individual level is shown in Table 13.10.5.

Table 13.10.5 Capacity Development on Technical Aspects

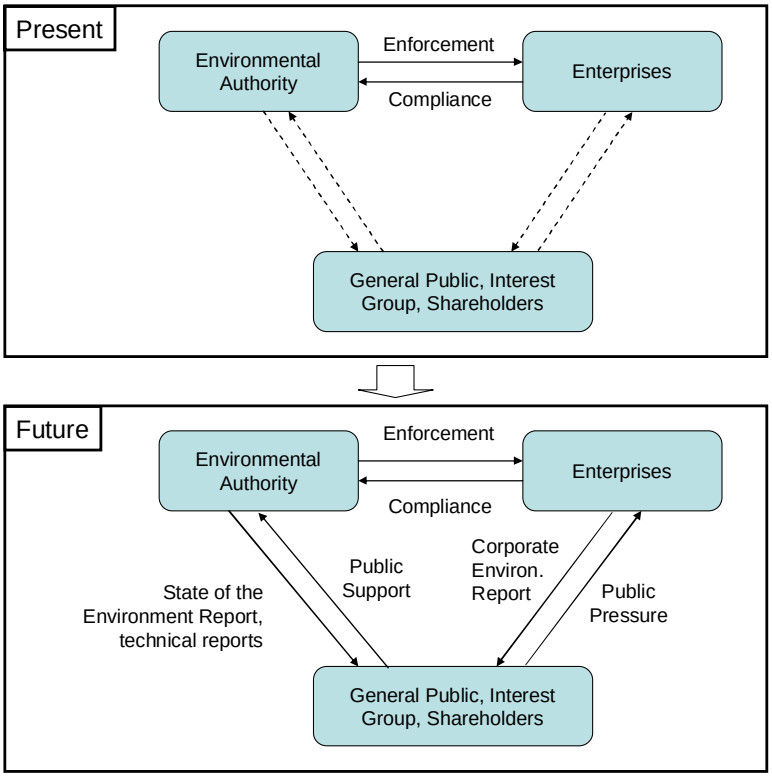
Monitoring	Menu	Contents
Ambient environmental monitoring and pollution source monitoring	Enhancement of analytical capacity for petroleum derived pollutants	Analytical capacity will be developed to analyze unsaturated hydrocarbons, volatile hydrocarbons and PAHs. Capacity for heavy metal analysis will also be enhanced.
	Enhancement of analytical capacity for constituents of petroleum	Analytical capacity for analysing the constituents of petroleum and the technique of fingerprint analysis will be developed.
Spilled oil monitoring	Utilization of satellite image analysis for spilled oil monitoring	Under the cooperation of KAZHYDROMET and the GIS database department of MoEP, capacity for the utilization of satellite image analysis for spilled oil monitoring will be developed for Atyrau MoEP and relevant organizations.

Source : JICA Study Team

CHAPTER 14 INFORMATION FEEDBACK AND ENVIRONMENTAL COMMUNICATION

14.1 Introduction

This chapter discusses the use of environmental information in order to induce environmental responsible behaviour of oil and gas enterprises and the government organizations. Information-based approaches do not achieve direct improvement of the environment like pollution control technologies. Nevertheless, they are very potent as information can influence decision-making in every aspect of environmental management, including budgeting, organizational reforms, recruitment of new staff, enforcement and compliance of regulations, litigations of environmental violations, etc. Moreover, information will improve the capacity of all stakeholders, including the government, enterprises and citizens, and thus lead to improvement in the overall "Social Capacity for Environmental Management (SCEM)" discussed in Chapter 10. Figure 14.1.1 shows how information can augment overall environmental management by involving all actors of SCEM into environmental management.



Source: JICA Study Team

Figure 14.1.1 Augmenting Environmental Management Capacity Using Environmental Information

14.2 Strategies

This Master Plan focuses mainly on approaches to feedback information on environmental performances of enterprises and the government organization to all stakeholders, in order to ensure that regulatory instruments and best practices discussed in Chapter 11 and Chapter 12 are contributing to pollution control in effective and efficient ways. In particular, the Master Plan suggests the following strategies:

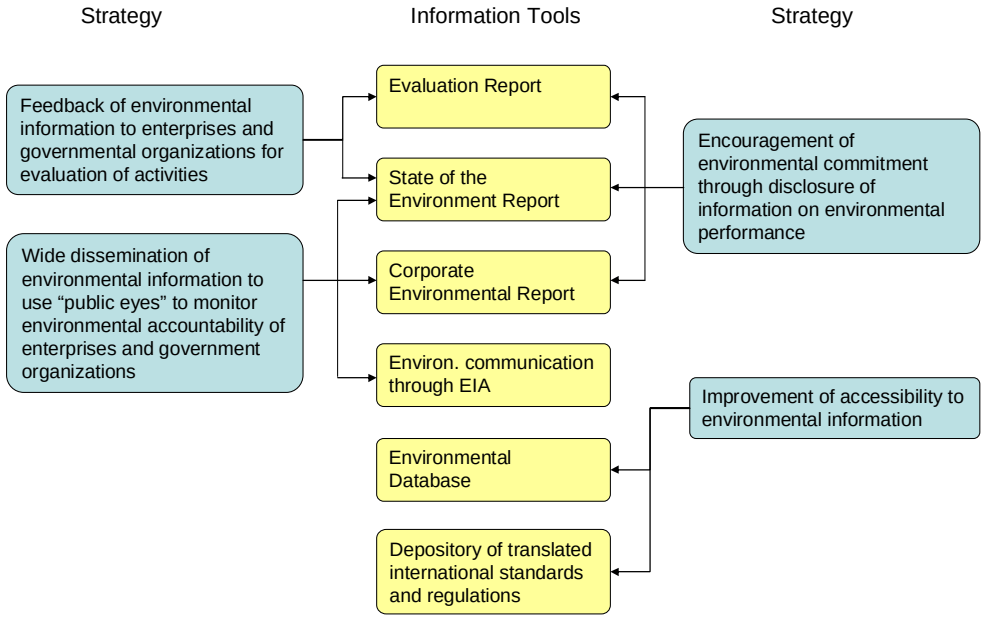
- Establish mechanisms to feedback environmental information, especially the monitoring information, to oil and gas enterprises and government organizations so that these organizations can evaluate their environmental performances.
- Disseminate environmental information to the general public in order to use "public eyes" to watch environmental performances and accountability of enterprises and the governmental organizations.
- Encourage enterprises and governmental organizations to release information on environmental performance, and have them commit themselves to environmental causes.
- Improve accessibility to environmental information

It was noted that most stakeholders in Kazakhstan are already aware of the importance of environmental information. For example, the territorial MoEPs regularly use media, such as TV, to educate residents about local environmental issues and activities of the authorities to control environmental problems. Other organizations issue various reports, and some organizations, including the central MoEP and KAZHYDROMET in Almaty disseminate information through the Internet. Nevertheless, these practices are still limited compared to what is being done in many OECD countries.

This is partly because these organizations do not have sufficient resources to improve their activities for information management and dissemination. It is also true that the capacity of the society to make use of environmental information is still limited, and the demand for environmental information is still weak. Organizational fragmentation in environmental management and limited policy in information disclosure are also blamed for this. Furthermore, most organizations have ad-hoc approaches to the use of information, and have not developed clear strategies to achieve their environmental objectives by using information as an instrument. All of these lead to limited dissemination and use of information.

The question is then how to optimize the use of information in the era of the new Environmental Code. As the objectives and benefits of using environmental information are different from organization to organization, information-based tools have to be tailored by each organization. However, comparisons of current practices in Kazakhstan with OECD countries suggested some potential uses of environmental information to boost environmental performances and accountability of enterprises and governmental agencies (see Figure 14.2.1), as explained below:

- State of the environment report as the information basis for comprehensive, performance-oriented environmental management and administration
- Corporate environmental reports to lead environmental management beyond compliance and toward self-regulation
- Environmental database to improve accessibility to information and to manage information required for implementation of the Master Plan
- Environmental communication through EIA in order to make use of the capacities of the entire society to pursue environmentally-sustainable development
- Depository of translated international guidelines and regulations in order to raise the knowledge-level of all stakeholders



Source: JICA Study Team

Figure 14.2.1 Strategies and Information Tools

14.3 Environmental Reporting by Public Authorities

14.3.1 Environmental Reporting by Environmental Authorities

Dissemination of environmental information by environmental authorities is a highly effective means to induce environmental conscious behaviours by oil enterprises, other governmental organizations and the general public. There are many advantages:

- Dissemination of information is not very resource-intensive (expensive), as the main task of environmental authorities is to obtain reliable information and make sure the target audience receives it. The pollution control works are mainly done by enterprises and other organizations based on the information provided.
- This tactics can involve third parties, such as the general public, shareholders, or courts to judge the meaning of information, and use the pressures they can impose to achieve environmental management objectives while avoiding direct confrontation between the environmental regulator and the regulated.
- Information of environmental authorities carries certain "authority", because it comes from public institutions.
- There is nothing new about the strategy. Most environmental authorities regularly report environmental information to head ministries or to the akimat government (For example, the territorial offices of MoEP produce annual reports, and KAZHYDROMET also submits reports to MoEP.).

Nevertheless, these advantages of the information-based strategy have not been fully tapped. In order to make more strategic use of information, the following approaches are recommended.

(1) State of the Environment Report

One of the first things that the team noticed when they started the study was that the annual environmental reports by territorial MoEP offices do not cover information on state of the environment. Now it is understood that this is because territorial MoEP offices are mainly responsible for pollution control, while monitoring of ambient environmental conditions is under the responsibility of KAZHYDROMET, and akimat governments also do not have

broad mandate to oversee environmental conditions in their territories. This fragmentation in responsibilities makes it difficult to produce the kind of environmental report known in many countries as an environmental white paper[1] or a state of the environment report, which covers environmental conditions, environmental pressures (e.g., pollution loads), environmental impacts on humans and ecosystems, as well as governmental actions to control environmental problems. Such reports are usually open to the public, and can answer most of the common questions that the general public have, such as whether the environment is safe to live in, what the main environmental problems in the area are, and what the government is doing to control local environmental problems. Such information leads to public support for environmental management by the government organizations as well as the enterprises.

While the fragmentation of environmental authorities makes it difficult to produce such a comprehensive report, a large amount of information to be included in a state of the environmental report is already available. Thus, it is suggested that the territorial office of MoEP, akimat, KAZHYDROMET, territorial office of Ministry of Agriculture (e.g., Fishery and Hunting Committee) along with the local statistics office should produce a report jointly. Such effort may be spearheaded by either the territorial office of MoEP or akimat, and the central MoEP should provide guidance to territorial MoEPs about how to produce such reports. A digest version of the state of the environmental report would be also useful to widely disseminate information.

(2) Technical Reports

The environmental authorities should also issue high quality technical reports targeting specialists. In order to develop effective pollution control systems, this Master Plan suggests various technical studies, such as the follow-up of environmental impact studies, evaluation of best available techniques, study on economic instruments, etc. (see Chapters 11 and 12). The results of these studies should be properly reported, and be disseminated to stakeholders.

14.3.2 Environmental Reporting by Public Organizations

Although many public officers still believe environmental management is the job of MoEP, activities of other public organizations, such as MEMR, MoER and MoA are very important in environmental management, and can significantly affect the environment both positively and negatively. Thus this section considers how to make all public organizations environmentally accountable.

(1) Environmental Evaluation Reports

In addition, all governmental organizations, including MEMR, MoER, and MoA, are encouraged to include environmental aspects relevant to their duties in their evaluation reports, and to submit them to the supervising organizations. Such reports should discuss the environmental goals, performance of the organization with respect to resources (e.g., budgets, human resources), programs, activities, achievements, and the plans for the future environmental activities.

(2) External Evaluation of Activities of Governmental Organizations

In addition, external evaluation of the activities of public organizations with respect to environmental issues can help improve their environmental performances. For example, the Ministry of Economy and Budget Planning and akimat governments can include environmental aspects in their evaluation criteria for the national and local budgets, and make sure that tax money is used in environmentally accountable ways.

[1] For Japanese Environmental White Papers, see http://www.env.go.jp/en/wpaper/

14.4 Corporate Environmental Report

As it was mentioned in Section 11.9, the "image" of the company to shareholders and other interest groups is becoming increasingly important for management of an enterprise, and sometimes this, rather than regulatory compliance, becomes the major reason to adopt environmentally sound practices. Therefore, more and more enterprises produce corporate environmental reports to disclose information on their environmental performance and their environmental efforts.

The Ministry of Economy, Industry and Trade and the Ministry of Environment in Japan have issued guidelines on corporate environmental reporting (see, e.g., http://www.meti.go.jp/policy/eco_business/sonota/report01.html), and maintains a database of such reports (see e.g., http://www.japanfs.org/db/118-e). While the Japanese guidelines on corporate environmental reporting is designed for a wide variety of sectors, corporate environmental reporting in the oil and gas sector is somewhat specialized because it often deals with occupational health and safety aspects in addition to environmental issues. There are a number of guidelines on corporate environmental reporting in oil and gas businesses (e.g., IPIECA & API, 2003[2]; IPIECA & API, 2005[3]). Table 14.4.1 summarizes the typical structure of a corporate environmental report in the oil and gas sector.

Table 14.4.1 Typical Structure of Corporate Environmental Report in the Oil and Gas Sector

Typical Report Sections	Examples of Topics
Executive Performance Summary and CEO Statement	• Report overview and organization's vision and strategy regarding such matters as: the benefits provided by its products/services, potential impacts of products and operations and a discussion of sustainable development
Company/Corporation/Organization Profile and Boundaries	• Major products and services • Operational structure, divisions, subsidiaries, joint ventures • Countries of operation • Size of reporting organization (employees, quantities of products, net sales) • Key stakeholders • Governance structure • Significant changes in organization size, structure, ownership since last report • Basis for reporting joint ventures, subsidiaries, partnerships, etc. • Restatement of any key information stated in previous report
Principles, Policies, Mission, Value Statement, Codes of Conduct	• Health, Safety and Environment (HES) • Social (e.g., employment, community engagement) human rights (e.g., labor, equal opportunity, security, suppliers/contractors) • Economic (e.g., anti—corruption, contracting) • Industry association participation
Management Systems	• Type or scope (ISO 14001 or other) • Objectives and targets • Implementation and certification status • Assessments • Contractor/Supplier (EHS) performance/management systems
Performance	• Major performance improvement programmes • Internal communication and training • Performance indicators • Internal and external auditing

Source: IPIECA & API, 2005[4]

[2] IPIECA and API, Compendium of Sustainability Reporting Practices and Trends for the Oil and Gas Industry, 2003.

[3] IPIECA and API, Oil and Gas Industry Guidance on Voluntary Sustainability Reporting: Using Environmental, Health & Safety, Social and Economic Performance Indicators, 2005

[4] IPIECA and API, Oil and Gas Industry Guidance on Voluntary Sustainability Reporting: Using Environmental, Health & Safety, Social and Economic Performance Indicators, 2005

Use of performance indicators is strongly recommended to make corporate environmental reports objective and unbiased, and in order to provide information that enables readers to evaluate the performance of the enterprise. Table 14.4.2 summarizes examples of environmental performance indicators.

Table 14.4.2 Examples of Environmental Performance Indicators

Category	Indicator
Spills and Discharges	• Hydrocarbon spills to the environment • Controlled discharges to water • Other spills and accidental releases • Other effluent discharges
Wastes and Residual Materials	• Hazardous waste • Non-hazardous waste • Recycled, reused or reclaimed materials
Emissions	• Greenhouse gas emissions • Flared and vented gas • Other operational air emissions
Resource Use	• Energy use • Freshwater use • New & renewable energy resources
Other Environmental Indicators	• Environmental management systems • Biodiversity

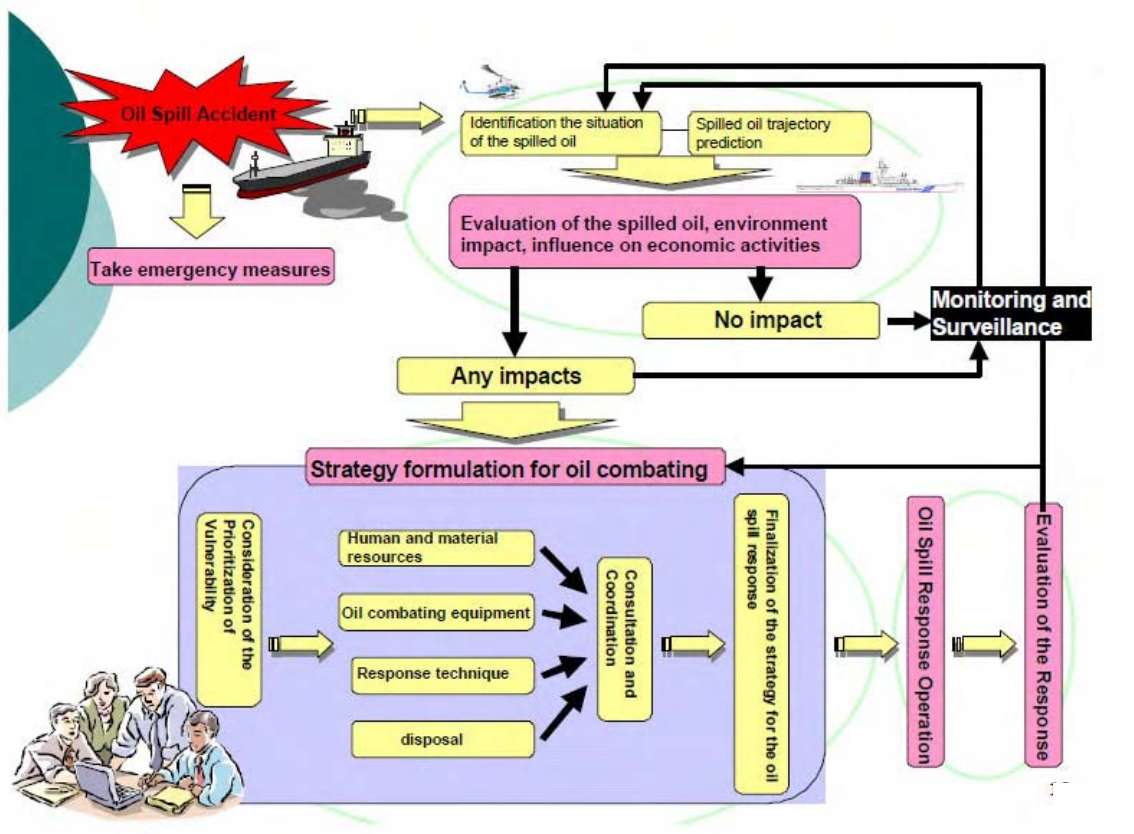
Source: IPIECA & API, 2005[1]

In addition to environmental performance indicators, performance indicators on health and safety, social responsibility and economic performance are often incorporated into a corporate environmental report. A corporate environmental report can also present the environmental efforts of the company, such as new environmental technologies introduced, voluntary project to protect local ecosystem, and so forth.

Although production of a corporate environmental report should be left to the initiative of each enterprise, it becomes difficult to compare environmental performance of enterprises, if each enterprise produces completely different reports. Thus, it is suggested that KazEnergy (or Kazakhstan Association of Nature Resources Users for Sustainable Development) should set a general guideline on corporate environmental reporting for the oil and gas sector, and also set indicators that are consistent with the environmental regulations of Kazakhstan.

BOX 1 Communication for Oil Spill Response

Figure below summarizes a typical process of oil spill response. The process involves emergency on-site measures, evaluation of the spill, formulation of the strategy, spill response operation, evaluation, monitoring and surveillance. These activities have to be done quickly and thus preparation against oil spill accident is very important.



Source: Japan Coast Guard, 2005

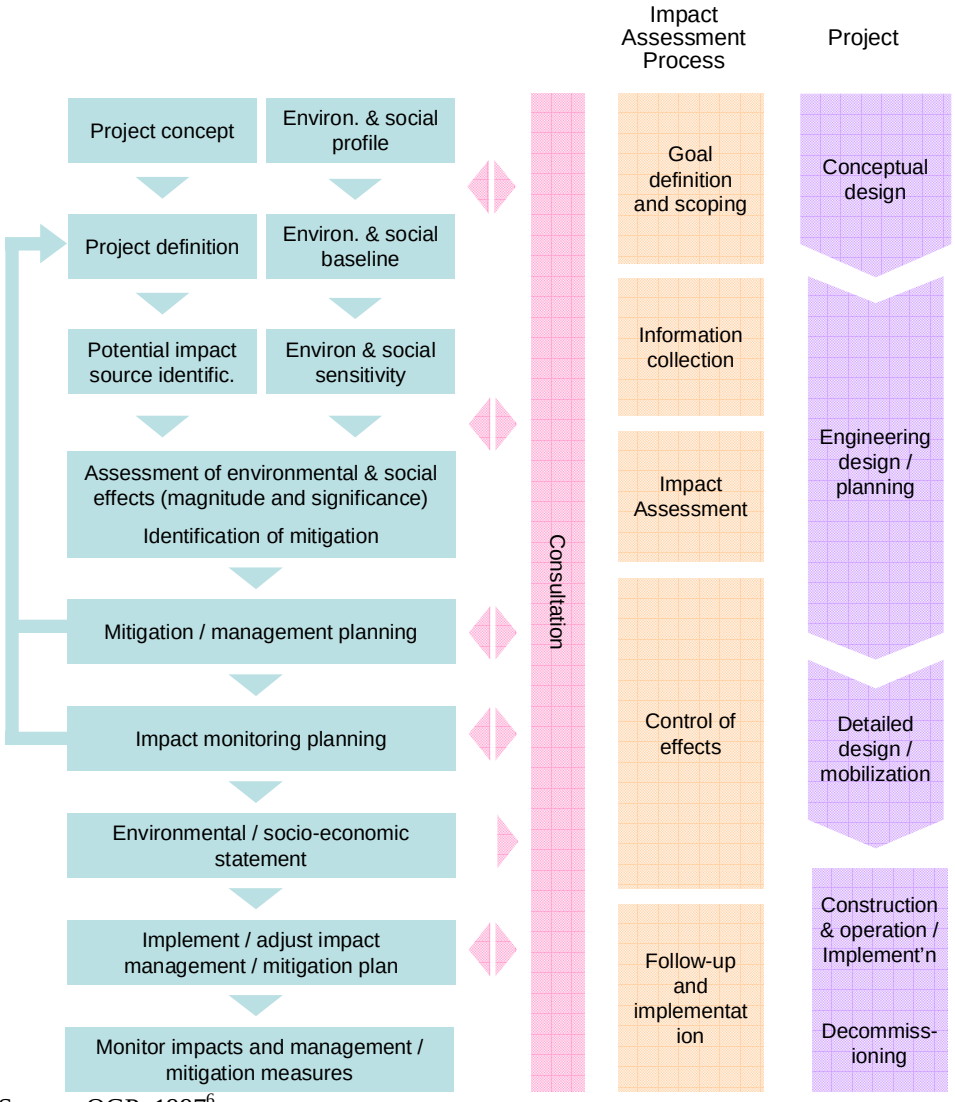
This is particularly true for response against large-scaled accidents for which cooperation of various organizations becomes essential. There are a number of conventional as well as modern tools to facilitate smooth communication among relevant organizations, such as telephone, FAX, internet, etc. Likewise, there are tools to enable rapid assessment of situations, such as remote sensing technologies, hydrodynamic and oil spill simulation, on-site sensors, GIS, etc. In order to build an effective response system, the potentials of these tools as well as human aspects of decision-making and line of communication, need to be taken into account. Training and practices are keys to improve practicality of the response system. For the status of National Oil Spill Response Plan (NOSRP), please see Chapter 3 of the report.

References:

Japan Coast Guard, Countermeasures against Oil Pollution at Sea in Japan, 2005

14.5 Environmental Communication through EIA

The EIA/SER/PER process is an ideal stage to consider environmental impacts of development projects and pursue sustainable development. Kazakhstan used to rely on the SER process, by which a small number of experts evaluate compliance with regulatory requirements. However, large development projects like oil development projects have profound environmental, economic and social implications, which cannot be evaluated by review of regulatory requirements alone[5]. Recognizing such limitations, Kazakhstan has officially introduced EIA and PER, and thus broadens the scope from regulatory reviews of requirements to integrated planning/decision making through in-depth analysis of social/environmental implications and consultation (see Chapter 4 and Chapter 11). Figure 14.5.1 schematically depicts the general process of EIA in oil and gas development.



Source: OGP, 1997[6]

Figure 14.5.1 Processes of Environmental and Social Impact Assessment in Oil and Gas Sector

[5] In the case of oil development in the Caspian Sea, it has even international implications as the Caspian Sea is shared by 5 littoral countries, and oil development and transport across the Caspian Sea could have significant environmental and economic impacts to many foreign countries.

[6] OGP, Principles for impact assessment: The environmental and social dimensions, Report No. 2.74/265, 1997

EIA/SER/PER (hereinafter referred to EIA) is theoretically an ideal process to pursue sustainable development because all actors of the society, namely the enterprise (proponent of the project), government and the citizens including environmental NGOs and other interest groups are at the same table to discuss possible options / alternatives and mitigating measures based on comprehensive EIA documents. The documents cover proposed development plans, social and environmental conditions, legal requirements, anticipated social and environmental impacts and risks, assumptions used to make such predictions, and proposed mitigating and monitoring measures.

Nevertheless, the process is highly dynamic, and can be unpredictable and frustrating because the interests of various stakeholders, including local residents, local industries, other governmental organizations, and politicians, are at stake. Often the ideas of these stakeholders are not objective and consistent. There could be political pressures to sway the decisions. How well an EIA functions is largely dependent on the capacity of the participants. Thus, it is necessary to design the procedures so that all stakeholders participate in the process in constructive ways.

There are a number of international EIA guidelines available from various sources, such as JICA[7], JBIC[8], World Bank[9] (operational policies and procedures were referred to when the current national EIA regulations were drafted), OGP[4], among others. On consultation, for example, OGP[4]suggests the following guiding principles:

- There is no single standard approach that can be used for consultation.
- Effective consultation is two-way
- Allow sufficient time and resources
- Consultation programs should be integrated to project planning and decision-making
- Programs require appropriate representation and expertise
- Realistic objectives should be set
- Process should be open and transparent

In addition, the following recommendations are provided here:

- Focus on the big picture. Don't get caught in minor technical issues.
- Present technical information in a manner that can be easily understood by all participants including non-technical participants.
- To ensure fair processes, develop common guidelines and procedures for selection of committee members and other decision-making processes.
- Involve international experts if sufficient expertise cannot be secured in the country

14.6 Environmental Database

With the development of social capacity for environmental management, decision-making processes demand more and more information, and management of enormous amounts of environmental information for decision-making becomes a challenge. This necessitates development of an information database.

[7] Japan International Cooperation Agency (JICA), Guidelines for Environmental and Social Considerations, 2004 (available in Russian; http://www.jica.go.jp/english/about/policy/envi/)
[8] Japan Bank for International Cooperation, http://www.jbic.go.jp/english/environ/guide/eguide/index.php
[9] World Bank, http://go.worldbank.org/OSARUT0MP0

14.6.1 Database of Ambient Environmental Conditions

The new Environmental Code has a special section on Environmental Monitoring and Cadastres, Section 5). The core of this is the Unified State Monitoring System of Environment and Natural Resources (USMS ENR), which is, according to the Code, "a multi-purpose information system which includes monitoring of the state of the environment and natural resources, as well as analysis of data on the actual state of the environment and natural resources for the purpose of making management and business decisions with a view to ensure ecological safety, protection, reproduction and rational use of the natural resources, and sanitary and epidemiological well-being of the population."

The USMS ENR, which is going to be open to the general public for free, covers (i) monitoring of the state of the environment, (ii) monitoring of natural resources, and (iii) special monitoring. KAZHYDROMET [10] and the Informational Analytical Centre for Environment Protection[11] are already developing GIS systems that become the core of USMS ENR. The idea of USMS ENR has been around at least since 2001 (UNEP/GRID, 2001[12]), and it has taken a long time, but these databases are no longer dreams. Overall, Kazakhstan is on the right track with the development of environmental database. Nevertheless, development of an environmental information database is a substantial task, and Kazakhstan is advised to take an incremental approach to develop the USMS ENR database, because development of an extensive database cannot be achieved over-night.

- Most end users of an environmental database have limited knowledge about the environment, and they are not interested in detailed information. Thus, MoEP should develop a central website on environmental information, to summarize important information, including pollution levels, natural resources, main environmental problems, environmental laws and regulations, structures and responsibilities of environmental authorities, etc. Detailed environmental databases should be linked to such a central website.
- KAZHYDROMET and the Information Analytical Centre for Environmental Protection have already compiled substantial information on air quality, water quality, land, natural resources, etc. It is suggested that MoEP should support these organizations and officially launch the database.
- Aside from KAZHYDROMET, a number of other organizations, such as akimats and oil companies, are carrying out ambient environmental monitoring. It is difficult to collect all the information from these organizations. Nevertheless, it is still possible to add a link to the databases of other organizations.
- MoEP should also support development of local-level environmental databases to be used internally by territorial MoEP offices. These offices do not have enough expertise to develop information management systems, even though efficient management of day-to-day information is desirable. Because the tasks of territorial MoEP offices are similar, once a prototype information management system is developed, all offices will benefit from it. See Section 14.6.2 for suggested database on pollution sources.

[10] KAZHYDROMET's GIS system manages the state of the environment information (air quality, water quality, hydrology, etc.), and its development is partially supported by ADB project TA 6155-REG.

[11] The Information-Analytical Centre of Environmental Protection is developing the national cadastres of environmental / natural resources.

[12] UNEP/Grid-Arendal, Assess report of the environmental and natural resource information network in the Caspian region at the national and sub-national levels, 2001.

BOX 2 Environmental Information in Japan

(1) National-level environmental information

Ministry of Environment Japan maintains a comprehensive information database (http://www.env.go.jp/sogodb/index.html, in Japanese), which has a keyword search function to search the enormous website contents, including electronic versions of technical and other reports, in the system. The ministry also has a comprehensive national-level database of environmental information known as "Environmental Statistics". This database, (http://www.env.go.jp/doc/toukei/contents/index.html, in Japanese), which was developed based on the OECD's Pressure (driving force)-State-Response framework, covers the following indicators:

- Socio-economy, 33 indicators
- Global environment, 54 indicators
- Material flows, 54 indicators
- Air environment, 49 indicators
- Water environment, 42 indicators
- Chemicals, 22 indicators
- Natural environment, 36 indicators
- Environmental administration, 38 indicators
- Others, 4 indicators

Other ministries also have similar large systems for information management, and most of them cover environmental contents. As an example, a link is provided to the environmental page of the Ministry of Economy, Trade and Industry, which is mainly responsible for industrial and economic issues:
http://www.meti.go.jp/english/policy/index_environment.html

(2) Prefecture-level environmental information

Many municipalities, such as prefectures and cities, also maintain their own databases. Their databases are usually smaller, and typically they disseminate environmental information and statistics on:

- Annual state of the environment
- Technical and other reports
- Environmental plans and budgets
- Historical data on air pollution (including real-time data)
- Historical data on water pollution (including real-time data)
- Historical data on solid waste
- Information on chemical uses / PRTR

14.6.2 Database of Pollution Sources / Enterprises

In addition to the USMS ENR, development of databases of pollution sources / enterprises is recommended. Because development of the system requires some expertise, it is suggested that a prototype database is developed by the central MoEP (e.g., Environmental Control Committee) for all territorial MoEPs.

- The design of the database should be consistent with the requirements of the new Environmental Code, and cover permitting conditions, the results of historical inspections, emission data, and so on.
- The database should be designed to make the works of the staff easier and more productive. Thus, the prototype database should be fully tested by at least one territorial MoEP office before being officially launched. Training of the staff is essential, and this may be done by the Information-Analytical Centre of MoEP.

14.7 Depository of International Guidelines and Regulations

It was noted that many environmental authorities do not have sufficient information on international regulations and guidelines in environmental management and best practices in oil and gas sector. There are many sources for such information, such as UNEP, OGP, INECE, OECD, OSPAR, environmental and energy ministries of other countries, etc. (see, e.g., OGP 2005[13] for the list of international standards used in the oil and gas sector and INECE for environmental enforcement[14]), and a large amount of information is readily available on the Internet. Private enterprises, such as KazMunayGas, are keen to collect such information, as it is directly relevant to their operations. However, public organizations typically have limited access to such information partly because their duties are to enforce domestic environmental regulations, and also because such documents are mostly written in English. Nevertheless, such information becomes very important in the development of new regulatory systems based on best practice. Because translation of such documents could be costly, it is recommended that MoEP, MEMR, KazEnergy and other organizations pool translated documents and share information. In this regard, collaborations with Russian and other CIS authorities would be beneficial for all parties.

14.8 Accessibility of Environmental Information

This section discusses the general issue of accessibility to environmental information. In Kazakhstan, a large part of environmental information and public information on oil and gas development is managed separately by individual authorities concerned, such as MoEP, MEMR, MoER, MoA, KAZHYDROMET, etc., and it is quite difficult for other stakeholders to access relevant information even if it exists. Although management of information by organizations responsible it is understandable, the problem of inaccessibility to information has to be improved. This problem has two aspects, namely authorization to release information, and the mode of dissemination.

(1) Authorization to Release Information

With regard to authorization to release information, it was noted that a lot of data and information are not disclosed simply because subordinates cannot decide whether the information can be made openly available or not. Managers of governmental organizations

[13] OGP, Catalogue of international standards used in the petroleum and natural gas industries, Report No. 362, 2005.
[14] International Network for Environmental Compliance and Enforcement (INECE), http://www.inece.org/.

should carefully consider the nature of the information, and determine the level of information disclosure allowable. Development of policies on information disclosure is helpful.

(2) Mode of Dissemination of Information

While distribution of printed matter has been the main mode of distribution of information, the cost of copying/shipping/handling prevents wide distribution of information. In this respect, the Internet is probably the most versatile tool. It can allow information to be open to the general public, or it can restrict access by putting information on restricted sites. MoEP is already using the Internet to disseminate information at http://www.nature.kz , although further improvement of the website is highly recommended.

Other mode of dissemination of information, such as printed reports, booklets, textbooks for schools, brochures, TV/radio programs, technical articles, etc., should also be considered as such means can be very effective in disseminating information, and many people do not have access to the Internet.

CHAPTER 15 CONCLUSIONS AND RECOMMENDATIONS

15.1 Conclusions

This study was implemented in order to develop a master plan to control environmental problems associated with the oil and gas sector in the Caspian region of Kazakhstan, and to assist development of local capacity to monitor and manage the environment. It was implemented over 1.5 years (March 2006 – September 2007) in three phases: (i) analysis of the current situation (Phase I, Chapters 2-6), (ii) implementation of the Pilot Project (Phase II, Chapters 7-9), and (iii) development of the Master Plan (Phase III, Chapters 10-14).

The major findings from the study are as follows. Overall, the study found that the Kazakhstan government and the oil and gas enterprises in the area have already made significant progress in pollution control.

- Many enterprises observe a general ban on the discharge of wastewater to the Caspian Sea and have adopted re-injection of associated water into the ground as an alternative to the use of poorly maintained evaporation ponds. Some oil enterprises are already equipped with sophisticated systems to combat oil spill accidents, and have constructed controlled-type waste disposal sites in order to minimize the environmental impacts of solid waste. MEMR and the oil enterprises are already working together to control flaring and sulfurous by-products, although the development of appropriate technologies is a major challenge due to the high pressure and high H_2S content of the oil reservoirs in the area.
- Likewise the regulatory control of pollution has been improved in recent years. Kazakhstan already has basic systems for environmental permits, emission/discharge standards, pollution charges, etc., and these instruments have been enforced through State Ecological Reviews, environmental inspection, litigation, and other means. While these systems were largely inherited from the Soviet era, the government had made a number of efforts to improve the effectiveness of the regulatory systems, which include re-establishment of collapsed monitoring programs, introduction of EIA, and development of a National Oil Spill Response Plan.
- One of the most significant achievements in recent environmental management is the enactment of a new Environmental Code in early 2007. This fundamental environmental law addresses the previous inadequacies of the regulatory systems, such as un-enforceable emission standards, and to introduce modern concepts, such as a permit system based on best available techniques and production environmental control. Overall, the regulatory system in Kazakhstan is moving toward self-regulation by enterprises, focusing on upstream environmental control in the production process, such as requirements on modern production technologies, in addition to end-of-pipe control.
- Because of these efforts, and also because the northern Caspian Sea is a vast area, and historical oil development activities were mainly concentrated in the onshore areas, the environmental conditions in the Caspian Sea are still relatively good.

However, with the development of the offshore oil fields, oil production is expected to increase from 24 million tonnes/year in 2005 to 140 million tonnes/year in 2015, and emissions/discharges of pollutants will also increase as estimated in Chapter 10. Hence, Kazakhstan needs to urgently establish and implement more effective pollution control systems. In this regard, Kazakhstan still has a substantial amount of work to do. Among the main issues are:

- The secondary laws and detailed regulations that are needed to implement the new Environmental Code have not yet been developed, and without such a regulatory foundation, it will not be possible to enforce the new pollution control measures.

- There remains issues that need further development of technical solutions, which include sulphur disposal, control of associated gas and water, closure of abandoned leaky wells, restoration of oil contaminated soils, and waste management. The adoption of more integrated approaches, such as beneficial utilization of associated gas and a sophisticated reservoir pressure management combined with re-injection of surplus gas and wastewater, might improve environmental efficiency of operations.
- The oil and gas sector is highly diverse, and while some enterprises are already operating at the international level, others companies are lagging behind. There is a need to raise the sector-wise environmental performance to acceptable levels.
- The capacity for environmental monitoring also needs reinforcement, as it has suffered a period of regression due to the collapse of the Soviet Union and subsequent economic hardships. In order to accelerate the development of monitoring capacity, this study carried out a Pilot Project during the course of the study. The Pilot Project targeted KAZHYDROMET and the territorial office of MoEP in Atyrau and covered environmental sampling, analysis, quality control, and use of GIS and satellite image analysis in environmental management.

15.2 Recommendations

The capacity of a society to overcome environmental issues is known as the Social Capacity for Environmental Management (SCEM), and the government, enterprises and citizens are the three main constituents of SCEM. In order to improve environmental management, the capacities of these actors have to be improved and evolved. This study considered how to improve the capacities of these actors, and proposed a Master Plan (see Chapters 10-14), which was to be implemented in three phases, namely (i) review/assessment phase, (ii) system re-development phase, and (iii) trial implementation phase. MoEP and other stakeholders are hereby recommended to follow the Master Plan to improve the capacities of all actors and achieve better environmental management in order to both protect the environment and to pursue sustainable development in the Caspian region.

- A good starting point for implementation of the Master Plan is the review of this report. All relevant organizations, especially MoEP, MEMR, MoER, MoA,, KAZHYDROMET, Ministry of Economy and Budget Planning, and oil enterprises/KazEnergy are urged to review this report, and consider where they stand now, and where they have to go with their efforts to establish more effective environmental management systems.
- MoEP is urged to organize an Environmental Committee on the Caspian Sea consisting of environmental administrators, ecologists, institutional/organizational experts, pollution control experts, economists, public health experts, etc. These members should examine the environmental sensitivities of the Caspian region, the links between environmental pressures–state–effect, and the institutional/organizational gaps between the current practices and those being introduced by the new Environmental Code. [Chapter 11]
- In parallel, MEMR in collaboration with MoEP, is urged to organize a Technical Committee on Oil and Gas Development consisting of pollution control experts, HSE managers, environmental administrators, engineers, geologists, among others. These members should examine the gaps between the current practices of the oil and gas enterprises and international best practice. The participation of oil and gas enterprises is essential, and this may be co-ordinated by KazEnergy. [Chapter 12]
- Based on these studies, MoEP should spearhead the re-development of effective environmental regulations by organizing specific taskforces. The core of the new regulatory system will be the wide adoption of best practices by the enterprises. The environmental

authorities need to promote and enforce such efforts by updating the permit systems, emission/discharge standards, inspection, EIA, etc. [Chapter 11]

- In order to evaluate and improve the new environmental management systems, enterprises as well as MoEP/KAZYDROMET, akimats and other organizations should regularly monitor and report environmental performance. This includes monitoring of the state of the environment (e.g. air and water pollution), environmental pressures (e.g. pollution loads), and environmental effect (e.g. impact of oil and gas development activities on local ecosystems). In this regard, an improvement of the quality of environmental information is needed, because without reliable information, it is impossible to improve environmental management systems. Support to the Regional Environmental Monitoring Center in Atyrau, and to the territorial MoEPs on scientific approaches to inspections and emissions/discharge monitoring are recommended. [Chapter 13]
- The team also recognized that, currently, 'environmental management' means the enforcement of regulations by regulators and compliance by enterprises. The use of other social forces, such as public pressure from the general public and shareholders on the environmental and financial accountabilities of enterprises and government organizations, has been relatively limited. Such public pressures can become significant driving forces to improve the environmental accountability of enterprises and governmental organizations. MoEP as well as oil enterprises and other organizations are strongly recommended to be strategic about the dissemination of information to a wider audience of stakeholders. [Chapter 14]
- Implementation of the Master Plan requires budgeting, bureaucratic procedures to co-ordinate with other organizations, approval of laws and regulations by appropriate decision-making bodies, etc. These procedures alone can take significant time and resources. Hence, the team recommends that MoEP and the other organizations concerned take an incremental approach and start with that which can be done by setting achievable short-term targets. The suggested first short-term target is to review this report and then to organize the proposed committees, which are certainly achievable short term tasks.

Finally, all members of the team would like to register their appreciation for all the co-operation they have received during the course of the study. It is impossible to name all of our helpful partners – they include MoEP, MEMR, MoER, MoA, MEBP, KAZHYDROMET, the territorial office of MoEP in Atyrau, geology committee, oil companies, and environmental analytical laboratories, among others. The study could not have been accomplished without the participation of these organizations. Similar collaboration among Kazakh organizations will form the foundation on which the Master Plan will be successfully implemented.

Attachment

1. **Minutes of Meeting of Inception Report**
2. **Minutes of Meeting of Progress Report**
3. **Minutes of Meeting of Interim Report**
4. **Minutes of Meeting of Draft Final Report**

カザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画

インセプション・レポートに関わる協議

議事録（ミニッツ）

アスタナ

2006年4月19日

環境保護省副大臣
Braliev A.Kh.

JICA 調査団　団長
奥田　到

１．はじめに

本議事録（ミニッツ）は、2006 年 4 月 19 日に開催されたカザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画（以下、本調査）のインセプション・レポートに関わるカザフスタン側と日本側の協議の合意事項をまとめたものである。協議参加者を添付資料１に示す。

２．インセプション・レポートの提出

JICA 調査団は、2006 年 4 月 19 日にカザフ国側にインセプション・レポート 20 部を提出し、2006 年 4 月 19 日に開催された第 1 回ワークショップにおいてインセプション・レポートの内容を発表した。カザフスタン側は、インセプション・レポートの内容について基本的に合意し、インセプション・レポート作成に関わる日本側の努力に感謝の意を表した。

３．調査対象地域

カスピ海およびその沿岸地域はアティラウ州およびマンギスタウ州にまたがる広大な海域/地域であり、本調査の期間に全地域についての詳細な関連情報を収集し、キャパシティ・ディベロップメントを行い、公害防止マスタープランを作成することには限界があると思われる。むしろ本調査では地域を限定した詳細な公害防止マスタープランを策定し、マスタープランの内容に則したキャパシティー・ディベロップメントを実施する方がより効果的な結果に結びつくと思われる。よって、本調査では主にカスピ海北東部について概略的な情報収集を行い地域の状況を確認して、公害マスタープランの策定およびキャパシティ・ディベロップメントを実施するものとする。なお、詳細な調査対象地域は、調査団が現地踏査を終えてから決定する。

４．調査体制

本調査の円滑な実施を図るため、調査は以下の体制で実施する。

(1)　ステアリング・コミティー

役割	・JICA との調整 ・ジョイント・ワーキング・グループの監理/監督 ・ジョイント・ワーキング・グループの活動に対し政策・戦略面での指針を示す ・調査団の支援 ・他ドナーとの調整	
委員長	環境保護省副大臣	Mr.Braliev A.Kh.
委員	環境保護管理委員会副委員長	Ms.Idrisova S.K.
	環境保護省 環境問題・研究モニタリング局長	Mr.Bekniyazov B.K.
	環境保護省 政策・国際協力局長	Mr.Bragin A.G.
	水文気象庁長官	Mr.Kudekov T.K.

	水文気象庁カスピ海地域環境モニタリングセンター長	Mr.Murtazin E.Zh.
	アティラウ州環境保護局長	Mr.Abdrakhmanov M.G.
	アティラウ水文気象センター長	Ms.Akatieva T.V.
	エネルギー鉱物資源省	後日決定
	緊急事態省	後日決定
	経済予算計画省	後日決定
	農業省	後日決定
	CEP コーディネーター	Mr.Akhmetov S.K.
事務局	環境保護省政策・国際協力局	
開催	・インセプション・レポート、プログレス・レポート、インテリーム・レポート及びドラフト・ファイナル・レポートの提出時 ・調査団およびジョイント・ワーキング・グループからの要望に応じて	

(2) ジョイント・ワーキング・グループ

役割	・調査団と協働で本調査を実施 ・調査に必要な情報の入手支援（他省庁・民間企業等との調整を含む） ・安全・ロジ面における調査団の支援 ・他ドナーとの意見交換、調整	
リーダー	環境保護省環境モニタリング局長	Mr.BazarbaevS.K.
メンバー	水文気象庁カスピ海地域環境モニタリングセンター長	Mr.Murtazin E.Zh.
	アティラウ環境保護局	後日決定
	アティラウ水文気象センター	後日決定
	アティラウ統計局	後日決定
	アティラウ州政府	後日決定
	エネルギー鉱物資源省アティラウ局	後日決定
	その他	後日決定
事務局	アティラウ水文気象センター	
運営	・調査団との日常共同作業への参加 ・調査団およびステアリング・コミティーからの要望に応じて	

(3) 実施機関

本調査の実質的な実施機関は以下の２機関とする。

分野	機関
一般環境モニタリング、リモート・センシング、GIS	水文気象庁
汚染源管理	環境保護省アティラウ局

(4) カウンターパート

調査団とカザフ側専門家が効率的に情報交換できるよう、調査団員各自にカウンターパー

トを配置することとする。調査団員の現地調査期間は短いため、カウンターパートは、調査団員の現地調査期間は原則として本調査参加を優先することとする。

JICA 調査団		カザフスタン側カウンターパート	
ポジション	名前	組織	名前
総括/能力開発支援	奥田 到	環境保護省	Mr.Bazarbaev S.K.
環境行政/環境計画	ポール・ドライバー	環境保護省	Mr.Kerei B.D.
公害防止/環境監査	宮渕 吉洋	環境保護省 環境保護管理委員会	Mr.Tashenev A.Kh.
石油汚染対策技術	冬室 誠	エネルギー鉱物資源省 緊急事態省	後日決定
水質/底質/土壌モニタリング/重金属及び無機分析	長沼 研午	アティラウ水文気象センター	Ms.Akatieva T.V.
水質モニタリング (2)/ 自然環境	谷本 晋一郎	アティラウ水文気象センター	Ms.Akatieva T.V.
石油系物質等分析	佐藤 信介	アティラウ水文気象センター	Ms.Akatieva T.V.
大気モニタリング/CDM 検討	青山 道信	アティラウ水文気象センター	Ms.Akatieva T.V.
リモートセンシング/GIS データベース	兵頭 浩/景山 宗一郎	CEP コーディネーター 水文気象庁	Mr.Akhmetov S.K. Mr.Murtazin E.Zh.

5．関係機関との調整

様々な情報を収集・分析し、将来の環境問題を推定し、パイロット・プロジェクトを実施し、公害対策マスタープランを策定するには、環境保護省の関連組織のみならず、エネルギー鉱物資源省、石油企業、経済予算計画省、自治体、住民、NGO など多くのステークホルダーの協力が不可欠であることから、環境保護省はこれらのステークホルダーと積極的に調整することを約束した。

6．オフィスなど

環境保護省は以下の施設を調査団のために提供することに合意した。なお、調査団オフィスの電話代は調査団が、電気水道代など他の費用はカザフ側が負担する。

都市	機関	施設など
アルマティ	水文気象庁	調査団オフィス（机・椅子、鍵付ファイル・キャビネット、冷暖房、国際電話ができる電話線、電話機/FAX）
アスタナ	環境保護省	調査団がアスタナで作業をする際の作業スペース（会議室など）
アティラウ	後日決定	調査団がアティラウで作業をする際の作業スペース

以上

添付資料１：協議参加者名簿

2006年4月19日
15時30分
カザフスタン国
環境保護省会議室

環境保護省

1.	Mr. Sarsembaev Z.S.	- 副大臣
2.	Mr.Bragin A.G.	- 政策・国際協力局長
3.	Ms.Idrisova S.K.	- 環境保護管理委員会副委員長
4.	Mr.Bazarbaev S.K.	- 環境問題・研究モニタリング局長
5.	Mr.Kerei B.D.	- 環境問題・研究モニタリング局 国家環境問題部長
6.	Ms.Ibraeva G.S.	- 環境保護管理委員会 環境分析・環境利用者事業部長
7.	Mr.Tashenev A.Kh.	- 環境保護管理委員会 環境分析・環境利用者事業部主席専門家
8.	Mr.Karajanov G.S.	- 政策・国際協力局 国際プロジェクト部主任専門家
9.	Ms.Nugumanova T.K.	- 環境規制部主席専門家
10.	Mr.Akhmetov S.K.	- カスピ海環境プログラムコーディネーター

JICA

1.	小島　元	- 国際協力機構 経済開発部 資源・省エネルギーチーム職員
2.	阿部　直美	- 国際協力機構 カザフスタンリエゾンオフィサー
3.	奥田　到	- JICA 調査団 統括/能力開発支援
4.	宮渕　吉洋	- JICA 調査団 公害防止/環境監査
5.	長沼　研午	- JICA 調査団 水質モニタリング/土壌/底質モニタリング/重金属及び無機金属分析
6.	谷本　晋一郎	- JICA 調査団 水質モニタリング/業務調整
7.	上原　牧子	- JICA 調査団 通訳
8.	Ms.STAMKUROVA Kaini	- 通訳

カザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画

プログレス・レポートに関わる協議

議事録（ミニッツ）

アスタナ

2006年7月26日

BEKNIYAZOV, Bolat Kabykenovich
環境保護省環境問題・科学・モニタリング局局長

奥田　到
JICA 調査団　団長

１．はじめに

本議事録（ミニッツ）は、2006 年 7 月 26 日に開催されたカザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画（以下、本調査）のプログレス・レポートに関わるステアリング・コミティー会議の合意事項をまとめたものである。協議参加者を添付資料１に示す。

２．プログレス・レポートの提出

JICA 調査団は、2006 年 7 月 25 日にカザフスタン国側にプログレス・レポート（露文 10 部、英文 10 部）を提出した。また調査団は、2006 年 7 月 21 日にアティラウで開催された第 2 回ワークショップおよび 2006 年 7 月 26 日に開催されたプログレス・レポートに関わるステアリング・コミティー会議において、プログレス・レポートの内容を発表した。カザフスタン側は、プログレス・レポートの内容について基本的に合意し、同レポート作成に関わる日本側の努力に感謝の意を表した。

３．プログレス・レポートについてのコメントの提出

プログレス・レポートについてのカザフスタン側からのコメントは、2006 年 8 月 31 日までに以下の関係機関から調査団にハード・コピーおよび電子ファイルで提出することとする。

- 環境保護省本省および環境保護省アティラウ局
- 水文気象庁本庁およびアティラウ水文気象センター
- エネルギー省
- 地質委員会
- 緊急事態省本省および緊急事態省アティラウ事務所
- 農業省本省
- 経済予算計画省

上記以外の関係機関（アティラウ州政府、石油企業など）のコメントについてもカザフ側が可能な限り収集することとする。プログレス・レポートについてのコメントは、調査団がとりまとめ、ステアリング・コミティー委員に公表する。

４．情報提供の依頼

本調査では石油産業の公害について検討するために様々な省庁からのデータが必要となっており、調査団は衛星画像解析・ＧＩＳの導入に関わるパイロット・プロジェクトに必要な以下の情報の提供をカザフスタン側に依頼した。

- 環境保護省が所有する環境資源ＧＩＳデータ
- 地質委員会が作成した水没油井に関わるＧＩＳデータ
- 緊急事態省が作成した環境脆弱性指標図の基礎情報

- 農業省が所有する生態系データ
- 環境保護省および非常事態省が所有する過去の油流出事故の情報

これに対してカザフスタン側は、情報提供について即答はできないが、2007年に関連機関のデータベースを統合することで約10省庁が既に合意しており、本調査のパイロット・プロジェクトに間に合うようにデータ提供ができるよう各機関が積極的に調整していくことを約束した。

５．協働作業の重要性

カザフスタン側も日本側も本調査で実効性のある石油公害防止のマスタープランを策定するにはカザフスタン側と日本側の協働作業が重要であることを再認識した。またマスタープラン策定段階における協働作業を可能にするため、環境保護省は2007年4-5月に予定されているカザフスタンでの現地作業時の際に、同省内（新庁舎内に移動予定）に調査団の作業スペースを提供する方向で検討する。

６．次回のステアリング・コミティー会議

石油公害防止にかかわる中央省庁と現地関係者の意見交換を可能とするため、インテリーム・レポートに関わる次回のステアリング・コミティー会議（2007年2月）はアティラウで開催することで、カザフスタン側と日本側が合意した。

以上

添付資料１：協議参加者名簿

カザフスタン側出席者：

-	名前	役職
環境保護省		
01	BEKNIYAZOV Bolat Kabykenovich	環境保護省環境問題・科学・モニタリング局局長
02	IDRISOVA Svetlana Kirillovna	環境保護省環境保護管理委員会副委員長
03	NUGUMANOVA Maral Koishybekovna	環境保護省国際協力部部長
04	KUDEKOV Tursynbek Kerimovich	水文気象庁長官
05	MURTAZIN Ermek Zhamseitovich	水文気象庁自然環境汚染モニタリングセンター長
06	ADILOV Tolebai Agshigitovich	環境問題部部長
関連省庁		
07	ONGARBAEVA Oliga Talratovna	エネルギー・鉱物資源省 石油産業局石油企業事業モニタリング・技術的規準政策部主席専門家
08	UKHOVA Elena Stepanovna	農業省漁業再生・開発部主席専門家
09	MUKHITANOV Aset Amangelidievich	経済予算計画省投資政策・専門家

日本側出席者：

-	名前	役職
01	河合士恩	日本大使館三等書記官
02	飯島大輔	JICA 経済開発部
03	阿部直美	JICA カザフスタン・リエゾン・オフィサー
04	奥田　到	JICA 調査団長
05	宮渕吉洋	JICA 調査団
06	兵頭　浩	JICA 調査団
07	青山道信	JICA 調査団
08	谷本晋一郎	JICA 調査団
09	アレクセイ・ニコラエフ	JICA 調査団
10	上原牧子	JICA 調査団

Укрепление потенциала по предотвращению и борьбе с нефтяным загрязнением в Каспийском море и его прибрежной зоне

カザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画

Заседание, посвященное Промежуточному отчёту

インテリムレポートに関わる協議

Протокол

議事録（ミニッツ）

Астана
22-ое февраля 2007 года

アスタナ
2007年2月22日

BEKNIYAZOV, Bolat Kabykenovich
Директор Департамента экологических проблем, науки и мониторинга / 環境保護省環境問題・科学・モニタリング局局長

ОКУДА Итару / 奥田　到
Руководитель Исследовательской группы JICA / JICA 調査団　団長

1. Вступление

Данный протокол составлен на основе договорённостей, достигнутых на заседаниях Руководящего комитета 19-го и 22-го февраля 2007г, посвященных Промежуточному отчёту проекта по укреплению потенциала по предотвращению и борьбе с нефтяным загрязнением в Каспийском море и его прибрежной зоне. Список участников заседаний приведен в приложении 1.

2. Передача Промежуточного отчёта.

Исследовательская группа JICA 12 февраля 2007г. передала казахстанской стороне Промежуточный отчёт (по 10 копий на русском и английском языках). 16-го февраля в г. Атырау Исследовательская группа провела рабочий семинар, на котором был представлен промежуточный отчет. Казахстанская сторона поблагодарила японскую сторону за выполненную работу.

3. Предоставление комментариев по содержанию Промежуточного отчёта.

Министерство охраны окружающей среды собирает до 30-го марта 2007г. комментарии к промежуточному отчёту следующих ведомств и организаций и предоставляет их Исследовательской группе в начале её 4-ой части исследования.

- МООС и Атырауское областное территориальное управление охраны окружающей среды
- КАЗГИДРОМЕТ и Атырауский гидрометеоцентр
- Министерство энергетики и минеральных ресурсов
- Комитет геологии и недропользования
- МЧС и его представительство в Атырау
- Министерство сельского хозяйства
- Министерство экономики и бюджетного планирования

Казахстанская сторона по возможности собирает комментарии и от других заинтересованных сторон.

1. はじめに

本議事録（ミニッツ）は、2007年2月19日および2月22日に開催されたカザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画（以下、本調査）のインテリムレポートに関わるステアリング・コミティー会議の合意事項をまとめたものである。協議参加者を添付資料1に示す。

2. インテリムレポートの提出

JICA調査団は、2007年2月12日にカザフスタン国側にインテリムレポート（露文10部、英文10部）を提出した。また調査団は、2007年2月16日にアティラウで開催された第3回ワークショップにおいて、インテリムレポートの内容を発表した。カザフスタン側は、同レポート作成に関わる日本側の努力に感謝の意を表した。

3. インテリムレポートについてのコメントの提出

インテリムレポートについてのカザフスタン側からのコメントは、2007年3月30日までに以下の関係機関から環境保護省にハード・コピーおよび電子ファイルで提出し、これを同省がとりまとめ第4次現地調査の最初に調査団に渡すこととする。

- 環境保護省本省および環境保護省アティラウ局
- 水文気象庁本庁およびアティラウ水文気象センター
- エネルギー省
- 地質委員会
- 緊急事態省本省および緊急事態省アティラウ事務所
- 農業省本省
- 経済予算計画省

上記以外の関係機関（アティラウ州政府、石油企業など）のコメントについてもカザフ側が可能な限り収集することとする。

I. O

4. Направление разработки Генерального плана

Министерство охраны окружающей среды выразило пожелание о необходимости представления японской стороной предложений по оборудованиию, необходимого для автоматического мониторинга окружающей среды. Исследовательская группа JICA согласилась предоставить соответствующую информацию;

4. 追加情報提供の依頼

環境保護省はJICA調査団に自動環境観測システムに関わる情報の提供を依頼した。これに対して、調査団側は次回の現地調査の際に関連した情報を提供することを約束した。

5. Международный семинар

В рамках данного исследования планируется провести международный семинар. О дате и программе семинара достигнуты следующие договорённости.

Предварительная дата проведения семинара - 18 июля 2007 года, место проведения - город Астана. Дата и место проведения международного семинара будут еще уточняться.

Организаторы: МООС совместно с Исследовательской группой JICA

Участники: около 100 человек (МООС, КАЗГИДРОМЕТ, МЭМР, МЧС, МСХ, МЭБП, Акиматы Атырауской и Мангистауской областей, международные доноры (JICA, UNDP, WB, USAID, OECD и др.), представители нефтяных компаний, экологических НПО, представители прикаспийских стран). МООС рассылает официальное приглашение участникам семинара.

Программа семинара пока не определена

5. 国際セミナー

本調査では2007年7月に国際セミナーを開催することが予定されているが、この日程および運営についてカザフ側と調査団が以下のように合意した。

日程：2007年7月18日

場所：アスタナ

主催者：環境保護省、共催者：JICA調査団

参加者数：100名程度（環境保護省/水文気象庁、エネルギー鉱物資源省、緊急事態省、農業省、経済予算計画省、アティラウ州およびマンギスタウ州アキマット政府、ドナー（JICA、UNDP、WB、USAID、OECDその他）、石油企業関係者、環境NGO、カスピ海周辺国の関係者）

参加者への公式招待レター：環境保護省が送付

プログラム：未定

6. Предоставление офисного помещения

МООС обязуется предоставить Исследовательской группе помещение в период её работы в Казахстане в апреле-мае 2007г для обеспечения возможности вести переговоры и заседания на этапе разработки Генерального плана.

6. アスタナにおけるオフィスの提供

マスタープラン策定段階における協働作業を可能にするため、環境保護省は2007年4-5月に予定されているカザフスタンでの現地作業時の際に、同省内（新庁舎内に移動予定）に調査団の作業スペースを確保することを約束した。

I.O

Приложение 1 / 添付資料 1

Представители с казахстанской стороны:

-	Ф.И.	Должность
Министерство охраны окружающей среды / 環境保護省		
1	Braliev Algan	Вице-министр охраны окружающей среды / 環境保護省副大臣
2	Bekniyazov Bolat	Директор Департамента экологических проблем, науки и мониторинга / 環境保護省環境問題・科学・モニタリング局局長
3	Temirhanov Kenes	Заместитель председателя комитета природоохранного контроля Министерства охраны окружающей среды / 環境保護管理局副局長
4	Bragin Aleksandr	Директор департамента правовой политики и международного сотрудничества / 法政策・国際協力局局長
5	Karibganova Galia	Начальник управления международного сотрудничества / 国際協力部長
6	Zeinullin Talgat	Генеральный директор РГП «Казгидромет» / 水文気象庁長官
7	Tultabaev Muhtar	Начальник управления экологического мониторинга, науки мониторинга / 水文気象庁自然環境汚染モニタリングセンター長
8	Suvorova Olga	Начальник отдела экологического мониторинга / 環境モニタリング部長
9	Erdenova Aselia	Главный специалист отдела международных конвенций и протоколов / 国際プロトコル担当
10	Abdrakhmanov Marat	Директор АОТУООС / ｱﾃｨﾗｳ州環境保護局局長
11	Shankieva Kuralai	Заместитель директора АОТУООС / ｱﾃｨﾗｳ州環境保護局副局長
12	Akatieva Tatiana	Директор Атырауского Гидрометцентра / ｱﾃｨﾗｳ水文気象センター
13	Akhmetov Serik	Координатор выполнения стратегического плана действий по Каспийскому морю / CEP コーディネーター
Другие министерства и организации / 関連省庁		
14	Ongarbaeva Oliga	МЭМР, главный специалист отдела мониторинга деятельности нефтяных компаний и нормативно-технической политики Департамента нефтяной промышленности / エネルギー・鉱物資源省,石油産業局石油企業事業モニタリング・技術的規準政策部主席専門家
15	Latfullin Ladus..	Министерство по чрезвычайным ситуациям, г. Атырау / 非常事態省ｱﾃｨﾗｳ支局
16	Uknova Elena	Министерство сельского хозяйства, главный специалист отдела воспроизводства и развития рыбного хозяйства /農業省漁業再生・開発部主席専門家
17	Maserbaeva Bibigul	Министерство экономики и бюджетного планирования, специалист 経済予算計画省投資政策・専門家

Участники с японской стороны　日本側協議参加者:

-	ФИО	Должность
1	ЁСИДА Мицуо 吉田充夫	Главный эксперт JICA / JICA 国際協力専門員
2	ОКУДА Итару 奥田到	Руководитель Исследовательской группы JICA / JICA 調査団長
3	МИЯБУТИ Ёсихиро 宮渕吉洋	член Исследовательской группы JICA / JICA 調査団員
4	Nikolaev Alex	член Исследовательской группы JICA / JICA 調査団員
5	Уэхара Макико 上原真紀子	член Исследовательской группы JICA / JICA 調査団員

I.O

Изучение укрепления потенциала по предотвращению загрязнения в нефтяной отрасли в Каспийском море и его прибрежной зоне

カザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画

Заседание, посвященное Проекту окончательного отчёта

ドラフトファイナルレポートに関わる協議

Протокол

議事録（ミニッツ）

Астана
17-ое июля 2007 года

アスタナ
2007年7月17日

Бралиев Альжан / Braliev Alzhan
Вице-Министр охраны окружающей среды Республики Казахстан/ 環境保護省副大臣

ОКУДА Итару / 奥田　到
Руководитель Исследовательской группы JICA / JICA 調査団　団長

1. Вступление

Данный протокол составлен на основе договорённостей, достигнутых на заседании Руководящего комитета 17-го июля 2007г, посвященных Проекту окончательного отчёта изучения укрепления потенциала по предотвращению загрязнения в нефтяной отрасли в Каспийском море и его прибрежной зоне. Список участников заседания приведен в приложении 1.

2. Передача Проекта окончательного отчёта.

Исследовательская группа JICA 9 июля 2007г. передала казахстанской стороне Проект окончательного отчёта (по 20 копий на русском и по 5 копий на английском языках). 12-го июля в г. Атырау Исследовательская группа провела 5-ый рабочий семинар, на котором был представлен Проект окончательного отчета. Казахстанская сторона поблагодарила японскую сторону за отчёт.

3. Предоставление комментариев по содержанию Проекта окончательного отчёта.

Министерство охраны окружающей среды собирает до 10-го августа 2007г. комментарии к Проекту окончательному отчёту следующих ведомств и организаций и предоставляет их представительству JICA в Астане.

- МООС и Атырауское областное территориальное управление охраны окружающей среды
- КАЗГИДРОМЕТ и Атырауский гидрометеоцентр
- Министерство энергетики и минеральных ресурсов
- Комитет геологии и недропользования
- МЧС и его представительство в Атырау
- Министерство сельского хозяйства
- Министерство экономики и бюджетного планирования

Казахстанская сторона по возможности собирает комментарии и от других заинтересованных сторон (например, акимат Атырауской области, нефтяные компании).

1. はじめに

本議事録（ミニッツ）は、2007年7月17日に開催されたカザフタン国カスピ海沿岸石油産業公害防止管理能力向上計画（以下、本調査）のドラフトファイナルレポートに関わるステアリング・コミティー会議の合意事項をまとめたものである。協議参加者を添付資料1に示す。

2. ドラフトファイナルレポートの提出

JICA調査団は、2007年7月9日にカザフスタン国側にドラフトファイナルレポート(露文20部、英文5部）を提出した。また調査団は、2007年7月12日にアティラウで開催された第5回ワークショップにおいて、ドラフトファイナルレポートの内容を発表した。カザフスタン側は、同レポート作成に関わる日本側の努力に感謝の意を表した。

3. ドラフトファイナルレポートについてのコメントの提出

ドラフトファイナルレポートについてのカザフスタン側からのコメントは、2007年8月10日までに以下の関係機関から環境保護省にハード・コピーおよび電子ファイルで提出し、これを同省がとりまとめアスタナJICA事務所に渡すこととする。

- 環境保護省本省および環境保護省アティラウ局
- 水文気象庁本庁およびアティラウ水文気象センター
- エネルギー省
- 地質委員会
- 緊急事態省本省および緊急事態省アティラウ事務所
- 農業省本省
- 経済予算計画省

上記以外の関係機関（アティラウ州政府、石油企業など）のコメントについてもカザフ側が可能な限り収集することとする。

4. Предоставление окончательного отчёта

Исследовательская группа получает от Казахстанской стороны комментарии к проекту Окончательного отчёта и составляет Окончательный отчёт. После составления Окончательного отчёта офис JICA в Казахстане передаёт его Министерству охраны окружающей среды.

4. ファイナルレポートの提出

調査団はカザフ側からのコメントを受けファイナルレポートを作成する。ファイナルレポートはJICAが環境保護省に提出する。

5. Дальнейшее сотрудничество

Казахстанская и японская стороны будут обсуждать возможность организации визитов японских специалистов-экологов в качестве дальнейшей формы двухстороннего сотрудничества.

5. 今後の協力

本調査に関わる今後のサポートとしてカザフ側と日本側が環境管理に関わる専門家要請について協議することとした。

Приложение 1 / 添付資料 1

Представители с казахстанской стороны / カザフスタン国側協議参加者:

-	Ф.И.	Должность
Министерство охраны окружающей среды / 環境保護省		
1	Braliev Alzhan	Вице-министр охраны окружающей среды / 環境保護省副大臣
2	Temirhanov Kenes	Заместитель председателя комитета природоохранного контроля Министерства охраны окружающей среды / 環境保護管理局副局長
3	Bragin Aleksandr	Директор департамента правовой политики и международного сотрудничества / 法政策・国際協力局局長
4	Adilov Tolebai	Начальник управления экологических проблем/ 環境問題局局長
5	Shabanova Lyudmila	Заместитель директора информационно-аналитического центра /情報分析センター副所長
6	Chuntonava L.E.	Директор ЦГМ г.Астана/ ｱｽﾀﾅ市水文気象センター長
7	Moldagaliev M.	Начальник отдела Казгидромета/ 水文気象庁部長
8	Akhmetov Serik	Координатор выполнения стратегического плана действий по Каспийскому морю / CEP コーディネーター
Другие министерства и организации / 関連省庁		
9	Ongarbaeva Oliga	МЭМР, главный специалист отдела мониторинга деятельности нефтяных компаний и нормативно-технической политики Департамента нефтяной промышленности / エネルギー・鉱物資源省,石油産業局石油企業事業モニタリング・技術的規準政策部主席専門家
10	Rakhimzhanova Akmaral	Министерство сельского хозяйства, главный специалист отдела воспроизводства и развития рыбного хозяйства / 農業省漁業再生・開発部主席専門家

Участники с японской стороны / 日本側協議参加者:

-	ФИО	Должность
1	ИИДЖИМА Дайсукэ 飯島大輔	Старший сотрудник отдела экономического развития JICA / JICA 経済開発部ｼﾆｱﾌﾟﾛｼﾞｪｸﾄｵﾌｨｻｰ
2	ТАКЭЧИ Наоки 武市直己	Советник по формированию проекта/ JICA 企画調査員
3	ОКУДА Итару 奥田到	Руководитель Исследовательской группы JICA / JICA 調査団長
4	ДРАЙВЕР Паул Driver Paul	член Исследовательской группы JICA / JICA 調査団員
5	МИЯБУТИ Ёсихиро 宮渕吉洋	член Исследовательской группы JICA / JICA 調査団員
6	НАГАНУМА Кэнго 長沼研吾	член Исследовательской группы JICA / JICA 調査団員
7	НИКОЛАЕВ Алексей Nikolaev Alex	член Исследовательской группы JICA / JICA 調査団員
8	Уэхара Макико 上原牧子	член Исследовательской группы JICA / JICA 調査団員