



ENVIRONMENTAL ACTION PLAN



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**Karachaganak Petroleum Operating b.v.
Kazakhstan Branch Office, Aksai, Burlinsky Region,
West Kazakhstan Oblast, Republic of Kazakhstan, 418440**

Tel: +44 208 8288 103 (CIS): 8 571 222 2103

Fax: +44 208 8288 132 (CIS): 8 571 222 2132

**For more information about KIO and ITS programmes contact:
PR & Communication Department**

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BRIEF DESCRIPTION

Karachaganak Integrated Organisation, or KIO, is a joint venture between BG (32.5%), ENI (32.5%), ChevronTexaco (20%), and LUKOIL (15%). In Kazakhstan, KIO operates as Karachaganak Petroleum Operating B.V.

KIO oversees the expansion and development of the Karachaganak field - one of the world's largest oil and gas condensate fields, which is located in North West Kazakhstan and holds over 1.2 billion tonnes of oil and condensate and more than 1.35 trillion cubic metres of gas.

KIO's operations are regulated by a Final Production Sharing Agreement (FPSA) between the Partners, who have come together as Contractors to the Republic of Kazakhstan, and the Authority for Kazakhstan which is the Ministry of Energy and Mineral Resources.

The development is bringing income to both the local and national economies, providing long-term jobs for Kazakhstan's citizens. At the peak of construction, the project may provide up to 17,000 jobs, of which about 80% will be Kazakh.

THE KARACHAGANAK FIELD

Karachaganak is one of the world's largest oil and gas condensate fields, situated in West Kazakhstan. It was discovered in 1979 and covers an area of 280 square km. Karachaganak holds over 1.2 billion tonnes of oil and condensate and more than 1.35 trillion cubic metres of gas.

The field is geographically situated to the Northeast of the cross-section of 51 parallel North and 50 meridian East. It is 16 km from Aksai town, 150 km from Uralsk and at elevation of between 80 and 130 m.

The Karachaganak field has been in production since 1984. A gas and condensate separation plant, Unit 3, was installed to treat the gas and condensate for transfer by pipeline to the Orenburg Processing Plant located 130 km North in Russia.

FINAL PRODUCTION SHARING AGREEMENT & FORMATION OF KIO

On 18 November 1997, a 40-year Final Production Sharing Agreement (FPSA) was signed between the Republic of Kazakhstan, and a consortium of partners comprising ENI (32.5%), BG International (32.5%), ChevronTexaco (20%) and LUKOIL (15%). These partners have teamed up to form the Karachaganak Integrated Organisation, or KIO. In Kazakhstan, KIO operates as Karachaganak Petroleum Operating BV.

The FPSA covers the further development and exploitation of the field with the key elements comprising the following:

- Provision for a 40-year contract from 1998-2037 (inclusive)
- Phased development commitments
- \$10 million annual investment in social projects
- Environmental Management Plan
- Provision of 20 MW of electrical power to Aksai township
- Employment and training commitments.

BASIS OF THE ENVIRONMENTAL ACTION PLAN

The Environmental Action Plan consists of a comprehensive monitoring programme and a series of Environmental Protective Measures that are agreed with the Republic of Kazakhstan regulators on an annual basis and includes the requirements of the International Finance Corporation (IFC). The annual plans are derived from an overall Environmental Works Programme covering the anticipated range of activities to be carried out during the 40-year life of the FPSA. The annual plan is updated to reflect changes in regulatory requirements and the priorities within the project.

The plan is constructed in such a way to ensure that KIO is compliant with regulatory requirements and with IFC guidelines and policies. KIO adopts a business led approach for additional measures that go beyond the regulatory agreed plan. The business led approach is more flexible than the mainly prescriptive approach of Kazakh regulation.

Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates	Department Responsible
1. Air Protection				
Total 2002 Budget - Air Protection: \$13,640,000				
1.1 Use of "Supergreen Burner" for well testing activities.	Continued use of a burner with a more effective flame pattern to allow complete combustion of crude oil giving a smokeless and fallout free burn.	Reduction of air emissions	Continuing Work 1999 - 2003	Petroleum Engineering
1.2 Develop a plan for stepwise reduction of flaring volume	Per FPSA Schedule 17-B, 1.1.1 - The Environmental Work Programme shall discuss alternative measures for the discontinuance of flaring, identify those measure the Contractor proposes to implement, and propose a schedule for implementation. Per Environmental Work Programme, develop a plan for stepwise reduction of flaring volume to be executed from 2001 - 2005.	Reduction of air emissions by reduction of flaring volumes.	Continuing Work 2001 - 2004	Production / Petroleum Engineering Dept.
1.2.2	Modify Porta-test equipment with a more efficient ignition system.	Reduction of air emissions	2002	Engineering Dept/HSE QA/QC
1.3 Installation of additional production equipment to control/reduce volume of hydrocarbons going to the flare		Reduction of flash gas going to the flare and resulting associated emissions 2001 - 2002	2001 - 2002	Engineering and Process Optimisation
1.3.1	4th Flash Gas Compressor		2002	Engineering and Process Optimisation

1.3.2		Medium Pressure Flare			2002	Engineering and Process Optimisation
1.3.3		Flare Knockout Drum at Unit-3			2002	Engineering and Process Optimisation
1.4	EEL Draft Revision Project	Revision of the EEL Draft Project to address all existing and new emission sources that are currently projected.	Reduction of air emissions		2002	HSE QA/QC
1.5	Gasoline Sweetening Incinerator - KPC (plan to bring it into compliance)	<ul style="list-style-type: none"> (i) A plan to determine if the incinerator emissions are in compliance with RoK/IFC standards; (ii) Research and selection of alternative technology that will ensure reduction of air emission; (iii) Implement Control Technology Plan 	Reduction of SO _x emissions	(i) and (ii) End of April 2002; (iii) prior to start-up of KPC		HSE QA/QC
	Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates		Department Responsible
2. Land Protection						
Total 2002 Budget - Land Protection: \$300,000						
2.1	Disturbed Surface Areas.	Per FPSA, Schedule 17-B, 2.3 - The Environmental Work Programme shall identify restoration measures required by Environmental, Industrial Hygiene and Safety Legislation to address disturbed surface areas at the Karachagank field and propose a schedule for implementation.	Flora preservation to maintain ecological equilibrium. Reduction of the negative influences of both natural and anthropogenic origin.	Continuing Work 2001 - 2010		HSE QA/QC
2.1.1		Technical reclamation of lands. Continuing programme of remediation of disturbed land including the removal of productive soil before any civil work, and		2002		HSE QA/QC

2.2	Remediation of Grounds - Gryphon.	remediation of disturbed land upon completion of civil work to prepare the land for future use. Prepare and implement a programme of remediation of contaminated areas (including Gryphon). Scientific analysis of reclamation methods and monitoring of the Gryphon. Project is a continuation of work started in 1999.	Recovery of an area contaminated by underground salt water during emergency on the field in 1987 (pre- FPSA)	Continuing Work 1999 - 2010rr	HSE QA/QC & Engineering and Process Optimisation
2.2.1		Ripping of Gryphon surface. Ripping is necessary to allow surface soil hydrocarbon and hydrogen sulphide to evaporate.		2002	HSE QA/QC & Engineering and Process Optimisation
2.2.2		Monitoring of Gryphon soil. Monitoring of hydrocarbon and salinity content will be accomplished through 8 permanent sampling locations and another 50 variable sampling locations.		2002	HSE QA/QC
2.2.3		Scientific research of Gryphon remediation methods. Continuation of research work started in 2000 with West Kazakhstan State University	Recovery of an area contaminated by underground salt water during emergency on the field in 1987 (pre- FPSA)	2002	HSE QA/QC
	Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates	Department Responsible
3.	Water Protection	Total 2002 Budget - Water Protection: \$3,030,000			
3.1	Preservation of Surface and Underground Waters	Study sources of contamination of water resources and perform inventory	Minimise discharges and prevent contamination of ground water.	2001 - 2004	HSE QA/QC
3.1.1		Maximum Permissible Discharge Project - Field Wide		2002	HSE QA/QC

3.1.2		Design and construct water treatment facility at Unit-3 to replace the current BIO-50 unit.		2002	HSE QA/QC & Engineering and Process Optimisation
3.1.3		Install hydro-isolation (liner) on Unit 3 water holding pond.		2002	HSE QA/QC & Engineering and Process Optimisation
3.1.4		Install monitoring wells at the Firewater Pond at Unit-3 in accordance with the Project.		2002	HSE QA/QC & Engineering and Process Optimisation
3.1.5		Construct additional holding lagoon for KCC sewage.		2002	HSE QA/QC & Engineering and Process Optimisation
3.1.6		Maintenance of the Settlement Pond at Unit 3 - repair of the concrete protective barrier		2002	HSE QA/QC & Engineering and Process Optimisation
	Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates	Department Responsible
4. Waste Management					
Total 2002 Budget - Waste: \$16,075,000					
4.1	Construction and operation of a Waste Management Complex (WMC)	WMC will handle all waste including drilling waste, cuttings, spent mud and production waste from Unit-2, Unit-3 and KPC.	Reduction of drilling and production related wastes	Continuing Work 2000 - 2002	HSE QA/QC & Engineering and Process Optimisation

4.1.1		Installation of drilling waste disposal facilities		2002	HSE QA/QC & Engineering and Process Optimisation
4.1.2		Determine toxicity characteristics of solids resulting from combustion in the rotary kiln and review free release options.		2002	HSE QA/QC
4.2	Capping of Cell #1 at the "Solid and Liquid Waste Storage Site"	Capping of Cell #1 at the "Solid and Liquid Waste Storage Site" with fertile topsoil.	Reduction of waste emissions	2002	HSE FIELD
	Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates	Department Responsible
5.	Flora and Fauna Protection				
Total 2002 Budget - Flora and Fauna Protection: \$250,000					
5.1	Re-greening of terrain in the field	Conduct measures of remediation and re-greening at places of waste disposal, and also contaminated areas around wells. Create forest belts on the shoulders of roads.	Flora preservation to maintain ecological equilibrium. Reduction of the negative influences of both natural and anthropogenic origin.	Continuing Work 2000 - 2037	HSE QA/QC
5.1.1		Maintain trees and shrubs planted in 1998 - 2001 (75 hectares)		2002	OPERATIONS
5.1.2		Prepare 20 hectares of soil for 2003 tree and shrub planting		2002	HSE QA/QC
5.1.3		Planting of 20 hectares of trees and shrubs (100% indigenous species)		2002	HSE QA/QC

Environmental Protective Measures	Project Description	Anticipated Reduction of Environmental Impact	Project dates	Department Responsible
6. Scientific - Technical Support				
Total 2002 Budget - Scientific Technical Support: \$150,000				
6.1 Research on waste injection	Scientific research on injection of waste streams into the formation unrelated to Waste Management Complex.	Reduction of drilling and production related wastes	2001 - 2005	HSE QA/QC & Reservoir and Petroleum Engineering
	Conduct research project.		2002	HSE QA/QC & Reservoir and Petroleum Engineering
6.2 Field impact on flood-land forests of Ural River Valley	Scientific characterization and mapping of flora, fauna and soil within the Ural River Valley. This 3-year project was started in 2000 with West Kazakhstan State University.	Flora preservation to maintain ecological equilibrium. Reduction of the negative influences of both natural and anthropogenic origin.	Continuing Work 2001 - 2005	HSE QA/QC
	This final phase will complete characterization and mapping of flora, fauna and soil.		2002	HSE QA/QC
6.3 Flora and fauna monitoring study within Karachaganak Field	Scientific characterization and mapping of flora, fauna and soil within the Karachaganak Field. This is a multi-phase project to be accomplished across several years.		Continuing Work 2002 - 2007	HSE QA/QC
	Phase 1 of Field flora and fauna study. Scope and contract yet to be defined and let for bid.		2002	HSE QA/QC

6.4	Seismic monitoring study in the field.	Continuation of study with the Ministry of Education and Science Seismology Research Centre. This project was scoped over a 5-year period in order to obtain statistically valid data to detect any potential for earthquakes caused by subsidence.	Continuing Work 2001 - 2005	HSE QA/QC
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KOGCF Environment Production Monitoring Programme

KOGCF Environment Production Monitoring Programme has been developed according to Article 25 of the Law of the Republic of Kazakhstan on Environmental Protection. It also takes into account the monitoring requirements of the IFC. This Programme is directed to organize supervision, data collection, analysis performance and appraisal of field impact on environment with the purpose of taking timely measures on prevention, reduction and elimination of negative effect on natural objects.

Production Monitoring Data should be submitted to the Oblast Department of Environment Protection (ODEP) by the time fixed. An annual monitoring report will be submitted to IFC. KOGCF Production Monitoring Programme includes the following sections:

- I. Environment objects (air, soil, surface & underground water) monitoring
- II. Sewage monitoring
- III. Industrial wastes monitoring
- IV. Radiation Environment monitoring

The Environmental Monitoring Programme is the responsibility of the Health, Safety and Environment QA/QC Manager.

I. Field Facilities Environmental Monitoring

1.1. Air Monitoring

The goal of air monitoring is to obtain information on pollutant emissions in the populated areas adjacent to KOGCF.

Monitoring programme, location and number of monitoring points and measurement schedule have been designed in compliance with the state standards, such as GOST 17.2.3.01.-86 "Nature Protection. Atmosphere. Air Quality Control in Populated Areas", GOST 12.1.005-88 and RD 52.04.186-89 "Air Pollution Monitoring Guidelines".

Legal standards require that there should be 3 types of Air Monitoring Stations:

1. Stationary – Tungush, Beryozovka, Aksai, Bestau, Karachaganak, Karakemir, Zharsuat, Zhanatalap. Dimitrovo and Uspenovka settlements.
2. Follow-up – Unit-3, Sanitary Protection Zone and Unit-2 (while putting them into operation).
3. Mobile (under-flare)

Atmospheric air sampling is carried out pursuant to two programmes: full (stationary posts) and abbreviated (route posts). Under-flare sampling is performed at the distance of 500 m, 1 km, 3 km, 4 km – for horizontal flare units and 500 m, 1 km, 2 km, 3 km, 4 km, 6 km – for vertical flare units in the line of wind direction.

Atmosphere conditions observation programme is performed in accordance with the Schedule and should be set pursuant to the Standard & Methodical Documents of the Republic of Kazakhstan.

No.	Sampling point	Parameters	Frequency
1	2	3	4
1	Zharsuat Zhanatalap Karachaganak Karakemir Dimitrovo Bestau Uspenovka Aksai	SO ₂ , NO ₂ , CO, H ₂ S	Average daily GOST 17.2.3.01-86
	Tungush Beryozovka	H ₂ S, SO ₂ , NO ₂ , CO, hydrocarbons, mercaptans	Maximum one-time concentration GOST 17.2.3.01-86
2	Sampling under the flare (workovers, etc.)	H ₂ S, SO ₂ , NO ₂ , CO, soot	Every action, once a week, or as required 500 m, 1 km, 2 km, 3 km, 4 km RD 52.04.186-89
	Sampling under the flare (Porta-test)	H ₂ S, SO ₂ , NO ₂ , CO	Every action, once a week, or as required 500 m, 1 km, 2 km, 3 km, 4 km RD 52.04.186-89
3	Sampling under flare at the Unit-3 area	H ₂ S, SO ₂ , NO ₂ , CO	1 time per day 500 m, 1 km, 2 km, 3 km, 4 km, 6 km

			RD 52.04.186-89
4	Sampling under flare at the Unit-2 area	H ₂ S, SO ₂ , NO ₂ , CO	1 time per day 500 m, 1 km, 2 km, 3 km, 4 km, 6 km RD 52.04.186-89
5	Sanitary-protective zone (SPZ) by 4 compass points	H ₂ S, SO ₂ , NO ₂ , CO, soot, mercaptans, hydrocarbons	2 times per day GOST 17.2.3.01-86
6	Meteorological parameters	Wind speed, wind direction, air temperature, pressure, humidity, and weather conditions.	During a day (8 times per day)
7	Industrial emissions at Unit-3 (DEG heaters, boiler house, Flash gas compressor)	NO ₂ , CO, SO ₂	Once a year (during winter time) According to EEL Draft
8	Monitoring programme for Air emissions from new sources - (i) KPC-gas firing & diesel (ii) Unit 2-gas firing & diesel (iii) WMC	H ₂ S, NO _x , SO _x , VOC	Once a year (during winter time) According to EEL Draft
9	4 Air Monitoring Automatic (3 Q)	H ₂ S, SO ₂ , NO ₂ , CO	Continuously

1.2. Top-soil conditions control

The aim of soil monitoring is gaining of information on soil conditions in the field and adjacent to KOGCF settlements.

Organization of control, sampling and observation terms is performed pursuant to GOST (State Standard) 17.4.4.02-84 "Environmental Protection. Soils. Sampling and Sample Preparation for Chemical, Bacteriological & Helminthological Analysis Procedure".

Sample conditions observation programme is performed in accordance with the Schedule and set pursuant to the Standard & Methodical Documents of the Republic of Kazakhstan.

#	Sampling Points	Parameters	Frequency
1	Field area (8 points)-directional and adjacent to wells 706(S), 340(N), 419(W), 209(E), 321(NE), 408(NW), 230(SE), 442(SW).	H ₂ S, pH, oil products, nitrates, chlorides, sulphates, Cu, Zn, Pb, Cd	Once a year. Depth 0-5 cm, 5-20 cm GOST 17.4.4.02-84
2	Zharsuat Zhanatalap Karachaganak Karakemir Dimitrovo Bestau Uspenovka Aksai Tungush Beryozovka	H ₂ S, pH, oil products	Once a year. Depth 0-5 cm, 5-20 cm GOST 17.4.4.02-84

1.3. Ground Water Monitoring

The purpose of underground water monitoring is gaining of information on qualitative composition of underground water and the field impact upon the underground water. Chemical analysis of the samples selected from pollution sources area is carried out to reveal KOGCF impact upon underground water:

- In well site of industrial drainage injection into formation (RP-1 and others which will be drilled as required);
- In settlement ponds area (BIO-50);
- In holding pond area (Unit-3 and Unit-2);
- In the area of hydro-observation wells of sewage treatment system in KCC;
- Domestic, potable, cultural & welfare facilities use water.

Underground water conditions observation programme is performed in compliance with the Schedule and set pursuant to the Standard & Methodical Documents of the Republic of Kazakhstan.

#	Sampling Points	Parameters	Frequency
1	Underground water from the monitoring wells at the Water- Methanol Mixture Injection area (G-1,2,3)	pH, oil products, nitrates, methanol	Once a month
2	Underground water from the monitoring well (1 HRE control well) BIO-50 reservoir at U-3	pH, oil products, nitrates, chlorides, sulphates, Ca, Mg, dry sediment, total iron, phosphates, ammonium nitrate, nitrites	Once a month According to MPD project
3	Underground water from the monitoring wells (w.2012, w.2013) next to surface water settlement pond at U-3	pH, oil products	Once a month According to MPD project
4	Potable water (U-3, U-2, KCC and villages): Mirgorodoka Aksai Zharsuat Bestau Oblavka Zhanatalap Uspenovka Karachaganak Tungush Dimitrovo Priuralny Karakemir Beryozovka	pH, hardness, oil products, nitrates, chlorides, sulphates, Cu, Zn, Pb, Cd, carbonates, bicarbonates, dry sediment, total iron, odour, colour, turbidity	Once a year SanPiN 2.1.4.559-96 GOST2761-84

5	Underground water from the monitoring wells of the sewage system at KCC (3 wells)	pH, oil products, nitrates, chlorides, sulphates, Ca, Mg, dry sediment, ammonium nitrate, phosphates, K+Na, Cu, iron, nitrites	Once a month According to MPD project
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1.4. Surface Water Conditions

The purpose of surface water conditions control is to gain information on surface water qualitative composition and the field influence upon surface water.

Chemical analysis of the samples selected from the potential pollution sources area is carried out to reveal KOGCF effect on surface water:

- Industrial water pond (Konchubay gully) above the field, down the field and in the middle course;
- Beryozka river – above the field, down the field and in the middle course;
- Aerial crossings of gas & condensate pipelines – Ilek-river (above and down the crossings).

Surface water conditions observation programme is performed in accordance with the Schedule and set pursuant to the Standard & Methodical Documents of the Republic of Kazakhstan.

Konchubai Gully

#	Sampling Points	Parameters	Frequency
1	Utility water pond, the Konchubai gully (3 points – upstream, middle stream, down stream)	pH, hardness, oil products, nitrates, nitrites, chlorides, sulphates, Cu, Zn, Pb, Cd, dry sediment, suspended substance, hydrocarbons (C1-C6), BOD5	Once a month SanPiN 4630-88

Beryozka River

2	Beryozka River (3 points – upstream, middle stream, down stream)	pH, hardness, oil products, nitrates, nitrites, chlorides, sulphates, Cu, Zn, Pb, Cd, dry sediment, suspended substance, hydrocarbons (C1-C6), BOD5	Once a month SanPiN 4630-88
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Ilek River

3	Pipeline bridges across river, (2 points – upstream and downstream)	pH, oil products, hydrocarbons (C1-C6)	Once a month SanPiN 4630-88
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Ural River

4	1 point (near by Zhanatalap)	pH, hardness, oil products, nitrates, nitrites, chlorides, sulphates, Cu, Zn, Pb, Cd, dry sediment, suspended substance, BOD5	Once a month SanPiN 4630-88
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II. Process Wastewater and Sewage Monitoring

The goal of sewage monitoring in KOGCF is performance of treatment plants work efficiency control and compliance of the purified sewage water with the standards approved.

- Work of the treatment plant of Unit-3 (BIO-50 and treatment plant of oily waste);
- Settlement pond;
- Work of the treatment plant of Unit-2 (treatment plant of domestic waste and treatment plant of oily waste);
- Discharge (sink) pond (domestic waste of Unit-2);
- KCC treatment works service;
- Bio-ponds;
- Holding ponds (KCC domestic waste).

Sewage conditions observation programme is carried out in compliance with the Schedule and set pursuant to the Standard & Methodical Documents of the Republic of Kazakhstan.

2.1. Waste Water Monitoring at BIO-50

1	2	3	4
1	Before treatment	BOD5, COD, ammonium nitrate, phosphate, suspended substance, dry sediment, chlorides, sulphates, pH, oil products, nitrates, nitrites, iron, dissolved oxygen, Ca, Mg, odour, colour, temperature	3 times per week According to MPD project
2	After treatment	BOD5, COD, ammonium nitrate, phosphate, suspended substance, dry sediment, chlorides, sulphates, pH, oil products, nitrates, nitrites, iron, dissolved oxygen, Ca, Mg, odour, colour, temperature	3 times per week According to MPD project
3	Seasonal reservoir	BOD5, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, Ca, Mg, oil products, nitrates, nitrites, total iron, Ca, Mg, odour, colour, temperature, pH, hardness	1 time per month According to MPD project
b. Oily water			
1	2	3	4
4	Before treatment	PH, oil products, suspended substances	1 time per month According to construction project

5	After separator	PH, oil products, suspended substances	1 time per month According to construction project
6	Wastewater settlement pond	PH, oil products, suspended substances	1 time per month According to construction project

2.2. Treatment Facilities at Unit-2 (after commissioning)

a. Sanitary sewage water treatment facilities

1	2	3	4
7	Before treatment	BOD5, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, hardness, pH, oil products, nitrates, nitrites, dissolved oxygen, iron hardness	3 times per week According to construction project
8	After treatment	BOD5, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, hardness, pH, oil products, nitrates, nitrites, dissolved oxygen, iron hardness	3 times per week According to construction project
9	Wastewater settlement pond	BOD5, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, Ca, Mg, oil products, nitrates, nitrites, total iron, hardness, pH	1 time per month According to construction project

b. Oily water (after commissioning)

10	Before treatment	PH, oil products, suspended substances	1 time per month According to construction project
11	After separator	PH, oil products, suspended substances	1 time per month According to construction project
12	Wastewater settlement pond	PH, oil products, suspended substances	1 time per month According to construction project

2.3. Treatment Facilities at KCC

#	Sampling Point	Parameters	Frequency
13	Before treatment (3 KEE units and 1 Atko unit)	BOD5, BOD20, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, Ca, Mg, pH, oil products, nitrates, nitrites, iron, dissolved oxygen, detergents, Cu	3 times per week According to MPD project
14	After treatment (3 KEE units and 1 Atko unit)	BOD5, BOD20, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, Ca, Mg, pH, oil products, nitrates, nitrites, iron, dissolved oxygen, detergents, Cu	3 times per week According to MPD project
15	Ponds for biological treatment – last section (2 ponds)	BOD5, BOD20, COD, ammonium nitrate, phosphates, dry sediment, chlorides, sulphates, Ca, Mg, temperature, pH, oil products, nitrates, nitrites, total iron, Cu, detergents, K+Na.	Once a month According to MPD project
16	Settlement pond	BOD5, BOD20, COD, ammonium nitrate, phosphates, suspended substance, dry sediment, chlorides, sulphates, Ca, Mg, temperature, pH, oil products, nitrates, nitrites, iron, Cu, detergents, K+Na.	Once a month According to MPD project

III. Industrial Waste Monitoring

The goal of the monitoring is to determine classes of hazard of industrial wastes and assessment of their potential influence upon environment quality.

Calculation of classes of hazard of the industrial wastes should be carried out pursuant to ND # 4286-87, ND # 3170-84 and RD 11.17..9971-90.

#	Sampling Point	Parameters	Frequency
1.	All sorts of wastes (solid, liquid)	Determination of hazard level	On as needed basis

IV. Radiation Monitoring

The purpose of this monitoring is to control radiation situation within KOGCF and conduct dosimetric control of gas condensate and processing equipment to timely accept measures to prevent radioactive contamination of environment. Radiation monitoring will be conducted in compliance with the Law of RoK «About Radiation Safety of the Population».

Radiation Monitoring has the following objectives within KOGCF:

- Determination of the background radiation hazard factor in environment;
- Prevention of radiation contamination;
- Determine the areas with the excess level of radiation hazard;
- Routine monitoring of background radiation levels within the area under monitoring (including working places);
- Routine monitoring of radiation contamination levels of equipment and environment;
- Systematic monitoring of specific content of natural radionuclideses in liquid and solid waste within KOGCF;
- Systematic monitoring of specific content of natural radionuclideses in the recovered raw material and infield water.

Sampling places, points, parameters, method, frequency as well as measurements amount of parameters which characterise radiation situation within KOCF have been determined on the basis of the following normative documents: the Law of RoK «About Radiation Safety», «Radiation Safety Norms (RSN-99)», «Main Sanitary Rules on Radiation Safety (MSRRS - 2001)» and «Population Exposure to Ionising Radiation Emitted by Natural Sources: Restriction Criteria (KPR-96)».

Radiation monitoring programme will be conducted according to the schedule and established as per normative and methodological documents approved or agreed by the authorised bodies of RoK.

#	Sampling place	Parameters	Frequency
4.1. Unit-3 Area			
1	Industrial premises (working area air)	Equivalent dosage rate, EEVA (equivalent equilibrium volume activity) of radon, volume activity of radon	1 time per 3 year
2	Technological equipment (separators, pipes)	Particle flux density, area contamination, equivalent dosage rate in reference points	1 time per year
3	PPM Waste	Absorbed dose rate, alpha particle flux density, total alpha activity, specific activity of NOR (naturally occurred radionuclideses)	1 time per year during scheduled maintenance
4	Horizontal flare		
	Ground	Absorbed dose rate, alpha particle flux density, specific activity of NOR, total alpha activity	1 per 3 years during scheduled maintenance
	Planting along the perimeter of horizontal flares	Specific activity of NOR, total alpha activity	1 time per 3 years

	air	EEVA of radon, dust radiation factor	1 time per 3 years during pit operation
5	Condensate	specific activity of NOR	Annually, 1 time per each month at every train
6	Water methanol mixture	Specific activity of NOR	Annually, 1 time per each month at every train

4.2. KOGCF Area

#	Sampling Points	Parameter	Frequency
1	1. Workovers, scheduled maintenance, drilling operations and Brine Plant		
	Solid waste	Absorbed dose rate, alpha particle flux density, specific activity of NOR, total alpha activity	Annually, as per waste generation
	Liquid waste	Specific activity of NOR	Annually, as per waste generation
	Ground	Specific activity of NOR, total alpha activity	Annually, as per work completion
	Tubing	Absorbed dose rate, area contamination with NOR, density of alpha particles stream	Annually, selectively
2	Horizontal flares (soil)	Absorbed dose rate, alpha particle flux density, specific activity NOR, total alpha activity	1 time per 3 years at those pits where purging took place
3	Pits reclaimed (cuttings) (soil)	Absorbed dose rate, alpha particle flux density, specific activity of natural radionuclideses, total alpha activity.	Annually, In pits, already put to reclaiming.
4	Production wells		
	Wellhead equipment	Particle flux density, area contamination.	1 time per three years
	Soil of wellhead areas	Absorbed dose rate, alpha particle flux density, specific activity of natural radionuclideses, total alpha-activity	1 time per three years
	Vegetation of wellhead areas	Specific activity of natural radionuclideses, total alpha-activity.	1 time per three years
5	Exploration of wells (at Porta-Test installation)		
	Condensate	Specific activity of NOR	Annually, as research is conducted

	Working area air	EEVA of radon, dust radiation factor	Annually, as research is conducted
6	Solid waste and spent drilling mud storage site		
	soil	Specific activity of natural radionuclideses, total alpha activity, absorbed dose rate, alpha particle flux density	One time per three years within 8 monitoring wells location site
	water	Specific activity of natural radionuclideses	2 times per year in monitoring wells
	vegetation	Specific activity of radionuclideses	1 time per three years within 8 monitoring wells location site.

V. Environmental Monitoring Programme for the Karachaganak – Bolshoi Chagan – Atyrau Pipeline

Environmental Monitoring Programme for the Karachaganak – Bolshoi Chagan – Atyrau export condensate pipeline has been designed as required by Article 25 of RoK Regulations On Environmental Protection. The program details monitoring arrangements and data collection and describes the anticipated pipeline environmental impact, as well as measures to be taken to mitigate such impact.

Monitoring data shall be submitted to Oblast Ecology by specified dates. The Environmental Monitoring Programme includes the following sections:

1. Environmental monitoring by media (air, soil, surface and ground water)
2. Monitoring of process wastewater and sewage
3. Monitoring of air emissions and solid wastes
4. Radiation monitoring

5.1. Environmental Monitoring by Media

5.1.1. Air Monitoring

The objective of air monitoring is to obtain information of contaminating substances content in the atmosphere of neighboring to Karachaganak field inhabited settlements and field territory.

Control, allocation, number of stations, program and period of monitoring is carrying out in accordance with GOST 17.2.3.01-86 «Environmental protection. Atmosphere. Regulations of air quality control in inhabited settlements», GOST 12.1.005-88 and RD 52.04.186-89 «Instructions of atmosphere pollution control».

Air sampling is carrying out by reduced program (two-phase sample taking per day at KPC pumping station and Atyrau Pumping Station.).

Monitoring Program of air conditions is executed in accordance with schedule and RK regulations.

Air Monitoring before construction of condensate pipeline (Karachaganak-Bolshoi Chagan section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	At planned location of Pumping Station at KPC	CO, NO ₂ , SO ₂ , hydrocarbons (C1-C6)	Single (recording of background figures)
2	At planned location of Pumping Station at Bolshoi Chagan	CO, NO ₂ , SO ₂ , hydrocarbons (C1-C6)	Single (recording of background figures)
3	At planned location of valve junction (12 un.)	Hydrocarbons (C1-C6)	Single (recording of background figures)

*Air Monitoring during operation of condensate pipeline
(Karachaganak-Bolshoi Chagan section)*

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Pumping Station at KPC	CO, NO ₂ , SO ₂ , Hydrocarbons (C1-C6)	Twice per day
2	Pumping Station at Bolshoi Chagan	CO, NO ₂ , SO ₂ , Hydrocarbons (C1-C6)	Twice per day
3	Valve junction (12 un.)	Hydrocarbons (C1-C6)	Once per month

*Air Monitoring before construction of condensate pipeline
(Bolshoi Chagan-Atyrau section)*

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Pumping Station at Atyrau	CO, NO ₂ , SO ₂ , Hydrocarbons (C1-C6)	Single (recording of background figures)
2	Valve junction (20 un.)	Hydrocarbons (C1-C6)	Single (recording of background figures)

*Air Monitoring during operation of condensate pipeline
(Bolshoi Chagan-Atyrau section)*

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Pumping Station at Atyrau	CO, NO ₂ , SO ₂ , Hydrocarbons (C1-C6)	Twice per day
2	Valve junction (20 un.)	Hydrocarbons (C1-C6)	Once per month

5.1.2. Soil Monitoring

The objective of soil monitoring is to obtain test results of soil condition to estimate their quality and to forecast soil condition at pipeline area during operating period. Opportunely determination of all possible emergency-dangerous areas along condensate pipeline.

Soil monitoring is carrying out as periodical monitoring at stationary ecological sites of monitoring network which is covering all territory of condensate pipeline.

Methods of natural and interrupted composition soil samples taking and preparation are carrying out in accordance with GOST 17.4.4.02-84 «Environmental protection. Soil. Sampling methodology for chemical, bacteriological and helminthologic analysis», GOST 17.4.3.01-83 «Environmental protection. Soils. General requirements of samples taking».

Soil condition monitoring program must be in accordance with RK normative documents.

Soil Monitoring before construction of Condensate Pipeline (Karachaganak – Bolshoi Chagan Section)

#	Sampling point	Parameters	Sampling Frequency
1	2	3	4
1	Condensate pipeline underground passage through Ural, Barbastau, Karaoba and Utva rivers (sample from each bank of the river - 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
2	Condensate pipeline aerial crossing above Solianka river (sample from each bank of the river- 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
3	Intermediate station № 8 with reception chambers sites, scraper pig injection and stop valve (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
4	Chamber of scraper pig injection at Inhabited settlement of B.Chagan (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
5	Monitoring stations (12) (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)

**Soil Monitoring during operation of Condensate Pipeline
(Karachaganak – Bolshoi Chagan Section)**

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Condensate pipeline underground passage through Ural, Barbastau, Karaoba and Utva rivers (sample from each bank of the river- 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
2	Condensate pipeline aerial crossing above Solianka river (sample from each bank of the river- 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
3	Intermediate station № 8 with reception chambers sites, scraper pig injection and stop valve (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
4	Chamber of scraper pig injection at inhabited settlement of B.Chagan (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
5	Monitoring stations (12) (0-5cm, 5-20cm deep)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year

**Soil Monitoring before construction of Condensate Pipeline
(Bolshoi Chagan – Atyrau Section)**

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Field Construction Camp (3 points) (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
2	Pumping station at Atyrau (3 points: above Pumping station, within Pumping station territory, below pumping station) (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
3	Condensate pipeline underground passage through gullies (Krutaia, Kolovertinskaia, Dolgaia); channels (Kushumsky, Saroysky, Aktogay, Kursay, Aktikensay, Chernaya rechka, Shalkybay); rivers (Baksay, Naiza, Aksai, Naryn, Bugulozek, Baksay, Ashisay) (sample from each bank- 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)
4	Monitoring stations (16) (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb, salts (Na, Ca, Mg, SO ₄ , Cl, CO ₃ , HCO ₃ , NO ₃)	Single (recording of background figures)

*Soil Monitoring during operation of Condensate Pipeline
(Bolshoi Chagan – Atyrau Section)*

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Atyrau Pumping Station (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
2	Condensate pipeline underground passage through gullies (Krutaia, Kolovertinskaia, Dolgaia); channels (Kushumsky, Saroysky, Aktogay, Kursay, Aktikensay, Chernaya rechka, Shalkybay); rivers (Baksay, Naiza, Aksai, Naryn, Bugulozek, Baksay, Ashisay) (sample from each bank- 0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year
3	Monitoring stations (16) (0-5cm, 5-20cm depth)	Oil products, pH, Zn, Cu, Cd, Pb	Once per year

5.1.3. Surface and Ground Water Monitoring

Surface Water

The objective of surface water monitoring is to obtain information of contaminating substances content in the surface water, estimation of pipeline operation influence to the water quality that is evaluating in accordance with valid RK Sanitary-hygienic requirements 3.01.006.97 CanPR 4630-88.

Control, allocation, number of stations, program and period of monitoring is carrying out in accordance with valid instructions and regulations of RK.

Monitoring Program of air conditions is executed in accordance with schedule and RK regulations.

*Surface water monitoring before construction of condensate pipeline
(Karachaganak – Bolshoi Chagan section)*

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Condensate pipeline passage through rivers: Ural, Barbastau, Karaoba, Utva	pH, BOD5, oil products Cu, Zn, Pb, Cd, Cl, SO ₄ , NO ₃ , NO ₂ , Ca, Mg, mineralization	Single (recording of background figures)

*Surface water monitoring before construction of condensate pipeline
(Bolshoi Chagan - Atyrau section)*

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Condensate pipeline passage through Krutaia gully	pH, BOD5, oil products Cu, Zn, Pb, Cd, Cl, SO4, NO3, NO2, Ca, Mg, mineralization	Single (recording of background figures)
2	Condensate pipeline passage through channels: Kushum, Bagyrlay	pH, BOD5, oil products Cu, Zn, Pb, Cd, Cl, SO4, NO3, NO2, Ca, Mg, mineralization	Single (recording of background figures)
3	Condensate pipeline passage through Ural river at Chapaevo village, Ural river at Atyrau Pumping Station; rivers: Naryn, Baksay, Chernaya Rechka, Kursai, Aksai, Niyza	pH, BOD5, oil products Cu, Zn, Pb, Cd, Cl, SO4, NO3, NO2, Ca, Mg, mineralization	Single (recording of background figures)

*Surface water monitoring during operation of condensate pipeline
(Karachaganak – Bolshoi Chagan section)*

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Rivers: Ural, Barbastau, Utva (above and below of condensate pipeline)	pH, oil products Cu, Zn, Pb, Cd	Twice per year – spring and fall

*Surface water monitoring during operation of condensate pipeline
(Bolshoi Chagan - Atyrau section)*

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Krutaia gully (above and below of condensate pipeline)	pH, oil products Cu, Zn, Pb, Cd	Twice per year – spring, fall
2	Channels: Kushum, Bagyrlay (above and below of condensate pipeline)	pH, oil products Cu, Zn, Pb, Cd	Twice per year – spring, fall
3	Ural river at Chapaevo village, Ural river at Atyrau Pumping Station; rivers: Naryn, Baksay, Chernaya Rechka, Kursai, Aksai, Niyza (above and below of condensate pipeline)	pH, oil products Cu, Zn, Pb, Cd	Twice per year – spring, fall

Ground Water Monitoring

The main purpose of ground water monitoring is to determine possible impact of condensate pipeline to the ground water quality.

In order to determine influence of condensate pipeline to ground water samples are taken within the territory of condensate pipeline passage with further analysis. Methods of sample taking must provide maximum preservation of salt and gas content in the tested water and to ensure avoidance of incidences such as sample polluting or stagnancy.

Monitoring Program of ground water conditions is executed in accordance with schedule and RK regulations.

Ground water monitoring before construction of condensate pipeline (Karachaganak – Bolshoi Chagan section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Ground water analyzing in water pits of inhabited settlements along the pipeline route: Shaptycol, Fedorovka, Podstepnoe, Uralsk, Bolshoi Chagan	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd, Cl, SO ₄ , NO ₃ , NO ₂ , Ca, Mg, mineralization	Single (recording of background figures)

Ground water monitoring before construction of condensate pipeline (Bolshoi Chagan - Atyrau section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Water pits of inhabited settlements: Kushum, Budarino, Chapaev, Mergenevo, Lbishenskoe, Taypak, Eltay, Kulagino, Orlik, Zelenoe, Makhambet, Sarayshyk	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd, Cl, SO ₄ , NO ₃ , NO ₂ , Ca, Mg, mineralization	Single (recording of background figures)

Ground water monitoring during operation of condensate pipeline (Karachaganak – Bolshoi Chagan section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Gas pressure wells at KPC Pumping station	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd	Once per year
2	Gas pressure wells at Bolshoi Chagan Pumping station ГН скважины Б.Чаран (4 wells)	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd	Once per year
3	Ground water analyzing in water pits of inhabited settlements along the pipeline route: Shaptycol, Fedorovka, Podstepnoe, Uralsk, Bolshoi Chagan	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd	Once per year

**Ground water monitoring during operation of condensate pipeline
(Bolshoi Chagan - Atyrau section)**

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	Gas pressure wells at Atyrau Pumping station (4 wells)	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd	Once per year
2	Water pits of inhabited settlements: Kushum, Budarino, Chapaev, Mergenevo, Lbishenskoe, Taypak, Eltay, Kulagino, Orlik, Zelenoe, Makhambet, Sarayshyk	pH, hydrocarbons (C1-C6), Cu, Zn, Pb, Cd	Once per year

5.2. Monitoring of Process Wastewater and Sewage

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1.	Water analyses after condensate pipeline hydrotest	pH, oil products, Cu, Zn, Pb, Cd	Before and after hydrotest
2.	Field Camp domestic sewage water analyses before recycling at treatment facilities.	pH, BOD5, COD, ammonia nitrogen, SO ₄ , Cl, NO ₃ , NO ₂ , oil products, PO ₄ , suspended substances, dissolved oxygen	As required

5.3. Monitoring of Air Emissions and Solid Wastes

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	All types of wastes	Determination of hazard class	As required

5.4. Radiation Monitoring

Radiation Monitoring before construction of condensate pipeline

(Karachaganak - Bolshoi Chagan section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Condensate pipeline underground passage through Ural, Barbastau, Karaoba and Utva rivers (sample from each bank of the river)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
2	Condensate pipeline aerial crossing above Solianka river (sample from each bank of the river)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
3	Intermediate station № 8 with reception chambers sites, scraper pig injection and stop valve	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
4	Chamber of scraper pig injection at inhabited settlement of B.Chagan	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
5	Monitoring stations (12)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)

Radiation Monitoring before construction of condensate pipeline

(Bolshoi Chagan - Atyrau section)

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Atyrau Pumping Station (one point)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
2	Condensate pipeline underground passage through gullies (Krutaia, Kolovertinskaia, Dolgaia); channels (Kushumsky, Saroysky, Aktogay, Kursay, Aktikensay, Chernaya rechka, Shalkybay); rivers (Baksay, Naiza, Aksai, Naryn, Bugulozek, Baksay, Ashisay) (sample from each bank)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)
3	Monitoring stations (16)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Single (recording of background figures)

Radiation Monitoring during operation of condensate pipeline
(Karachaganak - Bolshoi Chagan section)

№	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Condensate pipeline underground passage through Ural, Barbastau, Karaoba and Utva rivers (sample from each bank of the river)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
2	Condensate pipeline aerial crossing above Solianka river (sample from each bank of the river)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
3	Intermediate station № 8 with reception chambers sites, scraper pig injection and stop valve	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
4	Chamber of scraper pig injection at inhabited settlement of B.Chagan	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
5	Monitoring stations (12)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year

Radiation Monitoring during operation of condensate pipeline
(Bolshoi Chagan - Atyrau section)

#	Sampling Point	Parameters to be Analyzed	Sampling Frequency
1	2	3	4
1	Atyrau Pumping Station (one point)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
2	Condensate pipeline underground passage through gullies (Krutaia, Kolovertinskaia, Dolgaia); channels (Kushumsky, Saroysky, Aktogay, Kursay, Aktikensay, Chernaya rechka, Shalkybay); rivers (Baksay, Naiza, Aksai, Naryn, Bugulozek, Baksay, Ashisay) (sample from each bank)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year
3	Monitoring stations (16)	Measurement of equivalent gamma dose rate, specific content of natural radionuclides	Once per year

VI. Schedule and Cost Estimates for Health, Safety and Environment (HSE) Plans

The table gives details of the status of the various plans identified in the overall Environmental Works Programme that covers the anticipated range of activities to be carried out during the 40-year life of the FPSA.

PLAN	RESPONSIBILITY	SCHEDULE FOR SUBMISSION	TRAINING	APPROX. COST
Plan/Procedures/rules for Emergency situations	HSE Field Manager	Complete plan by end of May 2002	Complete training of employees by the end of 2002 – Ongoing training every year	The cost of the preparation of these plans will amount to around \$125,000 -
Procedures to decontaminate workplace areas from toxic substances	HSE Field Manager	Unit 3 – complete Unit 2 – July 2003 KPC – July 2003	Complete July 2003 for new facilities coming on line 2003	\$75,000
Development of the Emergency Response and Command Center	HSE Field Manager	Unit 3 – existing KPO – existing KPC – July 2003 Czech Camp – May 2002	Completed for existing facilities and prior to completion for new facilities	\$475,000
Development of Emergency Notification Programme	HSE Field Manager	Existing	Provided as part of overall HSE training	N/A
Development of Programmes on Educational Training on Emergency Response	HSE Field Manager	Existing and for new facilities to be completed July 2003 (Unit 2 & KPC)	Completed for existing facilities. July 2003 for KPC & Unit 2	Included within Emergency Plan and procedure development

VII. Health, Safety and Environment (HSE) Training Programmes

ISSUE/IMPACT	MITIGATION MEASURE	TRAINING	COST (Annual)
PPE (Personal Protective Equipment)	(i) Provide all Employees with PPE	(i) Provision of training in use of PPE and hazardous substances to all employees; (ii) Regular on-site training; (iii) Regular staff checks, system checks and field test of emergency procedures by on-site manager/HSE staff	\$ 1 million
Driver Safety	(i) General driving skills training (ii) Winter driving skills	All drivers must be trained	\$50,000
HSE	(i) Full Implementation of HSE procedures is a condition of contract for all contractors and subcontractors (ii) Management, supervision, monitoring and record keeping as set in operational manuals/contracts (iii) Provision of appropriate training on HSE issues for all workers (iv) Provision on health and safety information; (v) Clear marking of work site hazards symbols (vi) Maintenance of high standards for housekeeping at all times;	(i) HSE managers to ensure that all KIO personnel, contractors and subcontractors are aware and receive training of HSE policies & plans; (ii) HSE managers to ensure that all employees are given training on HSE issues, policies and procedures, emergency preparedness and response plans; (iii) training should be provided on a regular basis and at induction of a new employee	\$5 million

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