Materials of Conferences

INTEGRATED RESEARCH POLLUTION BY HARMFUL SUBSTANCES SOIL AND WATER ACTIVITIES OF THE REGION OGM «ZHAYIKOIL»

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The main elements of the relief, at different distances from pollution sources, on the border of SPZ to assess the pollution and on the border of the residential area were selected soil samples.

The results of analyzes on the contents of trace elements in soil, are shown in Tables 1 and 2. Analysis of the influence zone OGM «Zhayikoil» on the soil of residential settlements are shown in Tables 3 and 4 [1–5].

Observation of the state of water in the region is carried out in 2 directions: since1991–observation of surface water, and since 1994 in addition – observation of groundwater [1–5].

Sampling point located approximately 10 km from the coastline. Because of the low slope of the Caspian Sea in the sampling points of the depth does not exceed 1 m. This defines the pollution effects on flora and fauna in the coastal area. If during the summer due to the wind and the movement of water pollution in the coastal areas oilfield naturally neutralized, in the autumn-winter period to living organisms creates unfavorable conditions.

Table 1

The chemical analysis of the soil. Macrocomponents

Number of laboratory	Number of sample order	The location of the sampling	Macrocomponents, mg/kg of soil				
			pH	CO_3	HCO_3	SO_4	Cl
165	1	SPZ OGM (north)	6,5	not found	936,0	154,0	10,9
166	2	SPZ OGM (south)	6,4	not found	696,0	256,0	10,2
167	3	SPZ OGM (west)	6,2	not found	366,0	20,0	11,8
168	4	SPZ OGM (east)	6,3	not found	329,0	14,0	12,0
169	5	Nuclear test site (north)	6,8	not found	489,0	1951,0	14,9
170	6	Nuclear test site (south)	6,5	not found	712,0	2934,0	15,8
171	7	Nuclear test site (west)	6,4	not found	670,0	15,0	10,0
172	8	Nuclear test site (east)	6,9	not found	1653,0	9,8	14,8
173	9	Balgimbaev village	6,6	not found	305,0	10,0	15,2

Table 2

The chemical analysis of the soil. Heavy metals and petroleum products

Number of laboratory	Number of sample order	The location of the sampling	Various components, mg/kg of soil								
			Cr	Ni	Zn	Cu	Pb	Cd	Fe overall	Mn	oil products
1	2	3	4	5	6	7	8	9	10	11	12
165	1	SPZ OGM (north)	0,7	3,6	less than 0,1	2,4	0,010	found	9,3	30,0	16,8
166	2	SPZ OGM (south)	0,4	3,4	less than 0,1	2,6	0,010	not found	1,0	10,0	not found
167	3	SPZ OGM (west)	0,3	3,4	less than 0,1	0,9	foot-prints	not found	2,0	14,9	18,5
168	4	SPZ OGM (east)	0,3	2,7	less than 0,1	1,2	0,004	0,003	8,0	18,0	19,3
169	5	Nuclear test site (north)	3	3,4	less than 0,1	2,0	foot-prints	0,001	0,3	10,9	39,2
170	6	Nuclear test site (south)	3,2	3,7	less than 0,1	2,9	0,003	not found	0,6	10,0	not found

End of Table 2

1	2	3	4	5	6	7	8	9	10	11	12
171	7	Nuclear test site (west)	2	2,8	less than 0,1	2,0	0,004	0,005	3,5	38,0	12,4
172	8	Nuclear test site (east)	1,2	3,8	less than 0,1	1,3	0,001	found	1,2	58,1	not found
173	9	Balgimbaev village	less than 0,1	2,4	less than 0,1	1,9	0,004	0,003	8,9	12,0	not found
MPC, mg/kg			6	4	23	3	32	1			1000

Table 3

Results of chemical analysis of soils inhabited villages. Macrocomponents

Number of laboratory	Number of sample order	The location of the sampling	Macrocomponents., mg/kg of soil				
			HCO_3	CO_3	Cl	SO_4	pH
158	T-1	village	305,0	not found	14,8	20,0	5,7
159	T-2	village	366,0	not found	12,3	20,0	7,2
160	T-3	outside the village	427,0	not found	10,6	30,0	6,5

Table 4

Results of chemical analysis of soils inhabited villages. Various components

Number of laboratory	Number of sample order	Various components, mg/kg of soil								
		Cr	Ni	Zn	Cu	Pb	Cd	Fe общ.	Mn	н/п
158	T-1	not found	1,2	not found	3,0	0,01	not found	6,5	91,1	175,1
159	T-2	not found	0,9	not found	1,6	н/о	not found	6,8	19,1	not found
160	T-3	not found	0,3	not found	2,1	0,03	not found	2,1	90,0	not found

Table 5

The chemical analysis of the water. Macrocomponents

Point	The location of the sampling	pH	Concentration of chemical substances, mg/lit				
			HCO_3^-	CO_3^-	NO_2^-	NO_3^-	SO_4^{-2}
I quarter of 2003							
1	Drinking water wells	7,2	591,7	not found	0,05	3,5	290,6
2	The river at the entrance of the SPZ	7,0	335,5	not found	0,15	0,5	286,0
3	River at the outlet of the SPZ	7,3	384,3	not found	0,15	0,7	240,0
4	Water intake № 1	7,1	128,1	not found	0,07	0,6	20,0
5	Water intake № 2	7,4	134,2	not found	0,01	0,5	26,2
II quarter of 2003							
1	Drinking water wells	6,9	353,8	not found	0,01	8,6	390,0
2	The river at the entrance of the SPZ	6,8	164,2	not found	0,01	0,2	184,0
3	River at the outlet of the SPZ	6,9	195,2	not found	0,01	0,2	204,0
4	Water intake № 1	6,7	51,5	not found	н/о	0,0	17,0
5	Water intake № 2	6,4	79,9	not found	0,02	0,2	22,0
III quarter of 2003							
1	Drinking water wells	6,8	360,0	not found	0,01	2,2	398,0
2	The river at the entrance of the SPZ	6,9	227,0	not found	0,03	0,2	230,0
3	River at the outlet of the SPZ	6,9	265,4	not found	0,01	0,2	270,0
4	Water intake № 1	6,6	88,1	not found	0,01	0,3	н/о
5	Water intake № 2	6,5	82,3	not found	0,005	0,3	21,5
IV quarter of 2003							
1	Drinking water wells	7,5	384,3	not found	0,008	2,1	430,0
2	The river at the entrance of the SPZ	8,3	237,9	not found	0,023	0,2	230,0
3	River at the outlet of the SPZ	8,0	274,6	not found	0,009	0,2	270,0
4	Water intake № 1	7,3	97,6	not found	0,010	0,4	н/о
5	Water intake № 2	7,0	97,6	not found	0,004	0,3	20,0
MPC (fishery water), mg/lit		–	–	–	**0,08**	**40,0**	**100,0**
MPC (drinking water), mg/lit		–	–	–	**3,3**	**45,0**	**500**

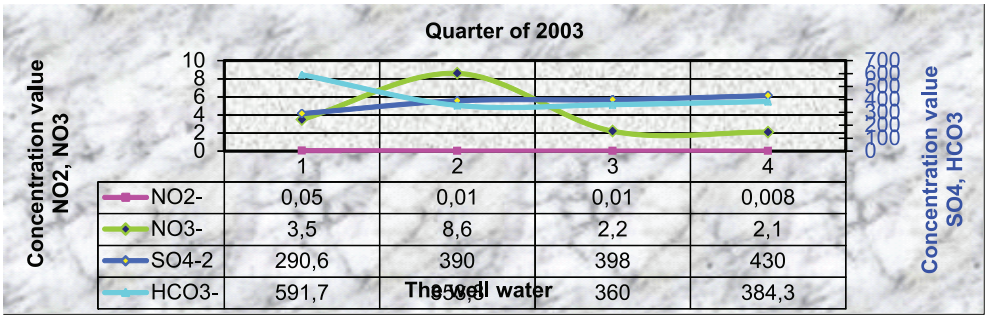

Fig. 1. The concentration of chemicals in drinking water wells

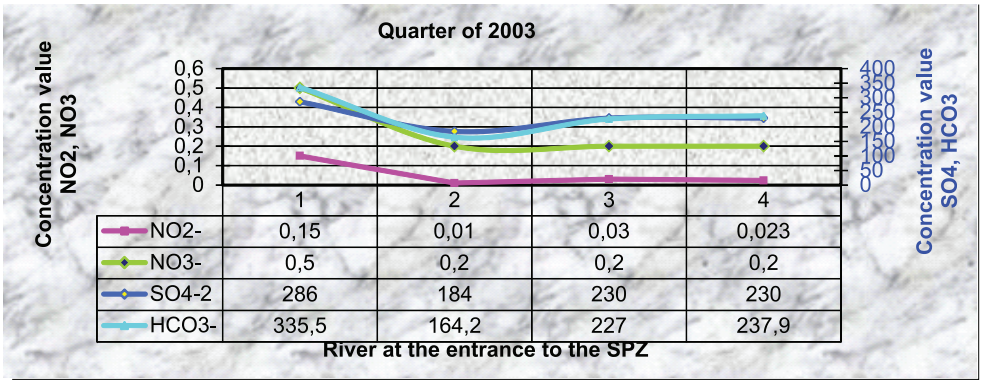

Fig. 2. The concentration of chemicals in the river at the entrance of the SPZ

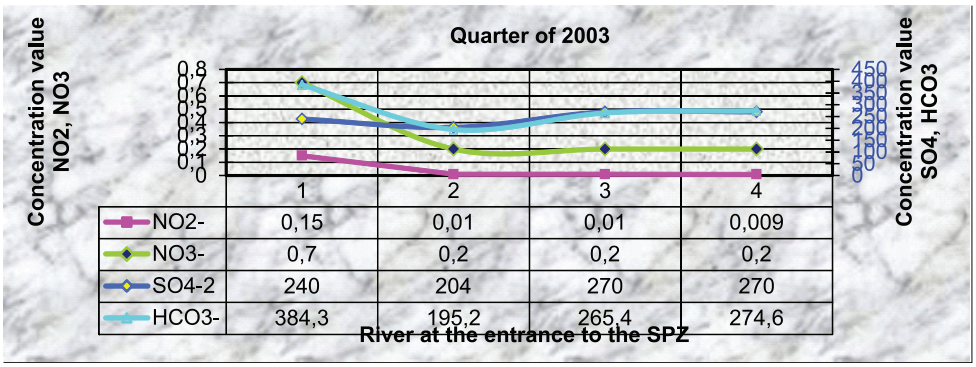

Fig. 3. The concentration of chemicals in the river at the output of the SPZ

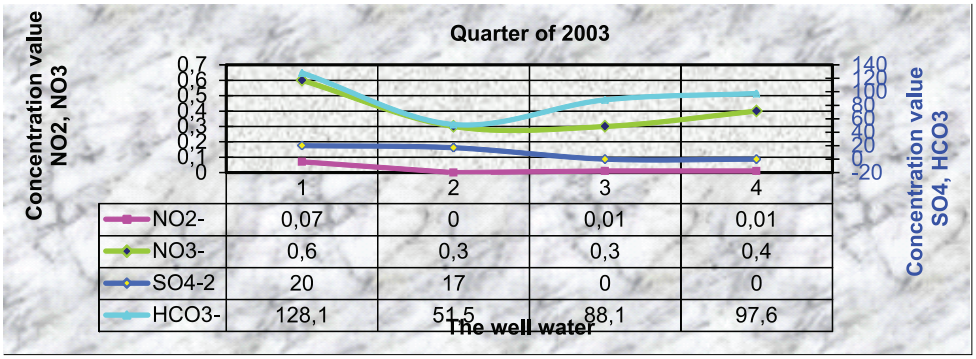

Fig. 4. The concentration of chemicals in water wells

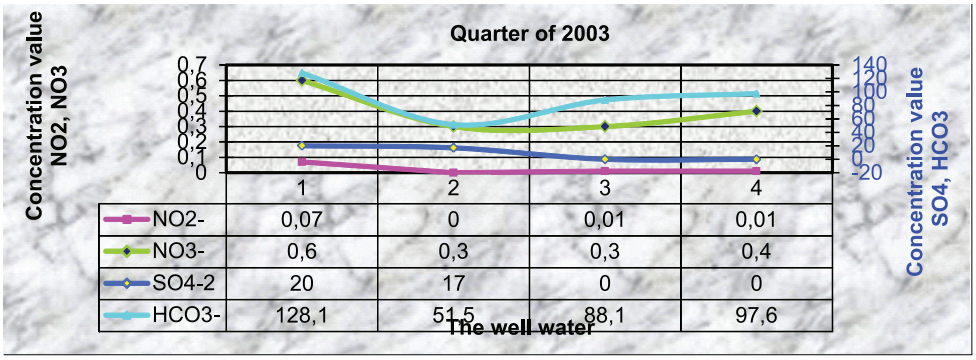

Fig. 5. The concentration of chemicals from the water intake № 2

Within 120 days on the surface of the water keeps the ice. At this time, the accumulation of dirt on the surface of the ice and under it due to seepage of oil from flooded wells. Therefore, in the spring creates an increased concentration of hydrocarbons in water, due to reach the surface of water accumulated over the winter, and with the influx of meltwater from the coastal area adjacent to the mine.

Table 6

Results of chemical analyzes of water. Heavy metals and petroleum products

Point Number	The location of the sampling	Concentration of chemical substances, mg/lit						
		Cr	Ni	Zn	Cu	Pb	Cd	Petroleum products
1	2	3	4	5	6	7	8	9
I quarter of 2003								
1	Drinking water wells	0,02	0,005	0,05	< 0,003	0,003	0,001	not found
2	The river at the entrance of the SPZ	0,02	0,002	0,07	0,02	not found	not found	not found
3	River at the outlet of the SPZ	0,06	< 0,001	0,05	0,02	not found	not found	not found
4	Water intake № 1	0,02	0,013	0,06	< 0,003	н/о	н/о	not found
5	Water intake № 2	0,03	0,002	0,07	0,02	0,005	0,002	not found
II quarter of 2003								
1	Drinking water wells	0,02	not found	0,02	not found	0,003	0,001	not found
2	Temir river (at the entrance of the SPZ)	0,02	not found	0,02	0,005	not found	not found	not found
3	Temir river (at the outlet of the SPZ)	0,02	not found	0,02	0,005	not found	not found	not found
4	Water intake № 1	0,02	not found	0,02	0,003	not found	not found	not found
5	Water intake № 2	0,03	not found	0,03	0,003	0,005	0,002	not found
III quarter of 2003								
1	Drinking water wells	0,02	not found	0,02	3,0	0,002	0,001	< 0,005
2	Temir river (at the entrance of the SPZ)	0,02	not found	0,03	0,08	not found	not found	< 0,005
3	Temir river (at the outlet of the SPZ)	0,03	not found	0,04	0,17	not found	not found	< 0,005
4	Water intake № 1	0,02	not found	0,02	not found	not found	not found	< 0,005
5	Water intake № 2	0,02	not found	0,02	0,02	0,003	0,001	< 0,005
IV quarter of 2003								
1	Drinking water wells (Sorkol village)	not found	not found	0,02	3,45	0,002	0,001	< 0,006

End of Table 6

1	2	3	4	5	6	7	8	9
2	Temir river (at the entrance of the SPZ)	0,02	not found	0,02	0,09	not found	not found	< 0,006
3	Temir river (at the outlet of the SPZ)	not found	not found	0,03	019	not found	not found	< 0,006
4	Water intake № 1	0,01	not found	0,01	0,05	not found	not found	< 0,006
5	Water intake № 2	0,01	not found	0,03	not found	0,004	0,001	< 0,006
MPC (fishery water), mg/lit		**0,001**	**0,01**	**0,01**	**0,001**	**–**	**0,001**	**0,05**
MPC (drinking water), mg/lit		**0,05**	**0,1**	**1,0**	**1,0**	**0,03**	**–**	**0,3**

The results of data analysis studies of soil, surface water and groundwater have shown that the presence of heavy metals, macro components, petroleum products requires a special attention, supervision and control over these environments.

References

1. Aidossov A.A., Azhieva G.I. The study of environmental pollution Zhylyoi oil-producing region // Vestnik KazATK Kazakh Academy of Transport and Communications. – Almaty, 2007.

2. Shakirova T.A. Carcinogenic substances in wastewater Guryev oil refinery, and ways to reduce the use of irrigation in the fields of: Abstract of Candidate. – Almaty, 1991. – 24 p.

3. Kuanov M.S. The positive decision on 26/08/97 for a patent on the application of the RK number 960417 from 11.04.96 Method of measuring the concentrations of oil in the water.

4. Serikov F.T. Nature protection methods of transportation and processing of oil and gas offshore – Atyrau, 1999. – P. 45–105.

5. Statistical reporting IPM for the year 2000.

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