



SOURCES OF POLLUTION IN THE CASPIAN SEA AND ORGANIZATION OF MONITORING

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The Mangyshlac industrial region is laid out on the west coast of Caspian sea. Center of region is Aktau, near which there are the large industrial manufactures, including NPP Aktau with FBR (type of reactor).

The Caspian sea concerns to rich fish-industry reservoir 1 category and consequently to the control for release (drop) of waste waters to it the special attention is given. The contents in release (drop) waters of harmful chemical substances causes negative influence on natural process self-clearness reservoir, poisons water organisms, causes disease of fishes and etc.. The systematic control for the contents them in water Caspian sea and in drop waters of the enterprises is carried out (spent).

The frequency and volume of the control drop in Caspian sea is made according to the rules of the control of wastewater. The control is fulfilled by selection of tests in control points and analysis them in laboratory conditions.

On the basis of received data levels, reasons and sources of pollution drop waters, of the industrial enterprises and coastal zone of the sea are established. A source of water supply and receiver of wastewater is Caspian Sea. The places inlet and outlet of clear and wastewater of the enterprises are shown on the picture.

In outlet the channel 1 acts:

- Cooling water from equipment of TPS-1 (Thermo-power station);
- Drop water after regeneration of filters the system of preparation chemical water for TPS;
- Drop of water from washing surfaces of heating of boilers, from preservation and chemical clearing of equipment;
- The drop concentrates from vapour facilities (the desalting systems) with DF, ODF;
- Urban waste waters after biological clearing;

The most polluted is drop water after washings the equipment and regeneration of filters. These waters contain released in the sea weighed substances (chalk), products of corrosion (iron, copper), raised (increased) acidity.

One of characteristic parameters of pollution are nitrogen containing substances.

To the basic and constant sources of receipt in the channel of 1 raised (increased) contents of inorganic connections of nitrogen waste waters of urban clearing structures are. From received data it is visible, that annual (average) the contents nitrogen exceeds norm limiting - allowable release in 4 times, iron in 10 time, phosphate in 6 times. However, at dilution by other waters on drop of the channel 1 at all ingredients the excess of norms on allowable release is not present.

Release in the sea from a platform 2 comes through the drop channel 2 and intermediate sediment pool ("SOR") extent 13 km. On platform 2 are located TPS-2, NPP Aktau, TES, factory of manufacture distil water (FMDW). In drop channel 2 acts:

- Cooling waters of the equipment TPS-2, TES, NPP Aktau;
- Drop water system of preparation chemical water, TPS-2, TES;
- High salt concentrated water from FMDW;
- Drop water from NPP Aktau.

The basic sources of pollution in flows from FMDW (up to an input (entrance) in "SOR") are: weighed substances (chalk) and products of corrosion (mainly, copper). After dilution in

"SDR" the copper and weighed substances on release of the channel 2 did not exceed normative meanings. The analysis of the contents of harmful chemical substances in wastewater of the channel 2 testifies to an identical level of pollution practically on all ingredients during 1995-1997 years. On all the controlled ingredients the concentration on release 2 does not exceed established norms LAC (Limit allowed concentration) and remains at a level of the previous years.

The special attention is given to the control for releases of technological water from NPP, from the point of view presence in drains radioactive isotopes cesium and strontium, as the most dangerous, from the point of view, influence to an environment and on health sea flora and fauna. At normal mode of operations NPP Aktau the exit radioactive nuclide in an environment occurs and considerably with release by air ventilation systems and drop waters from NPP.

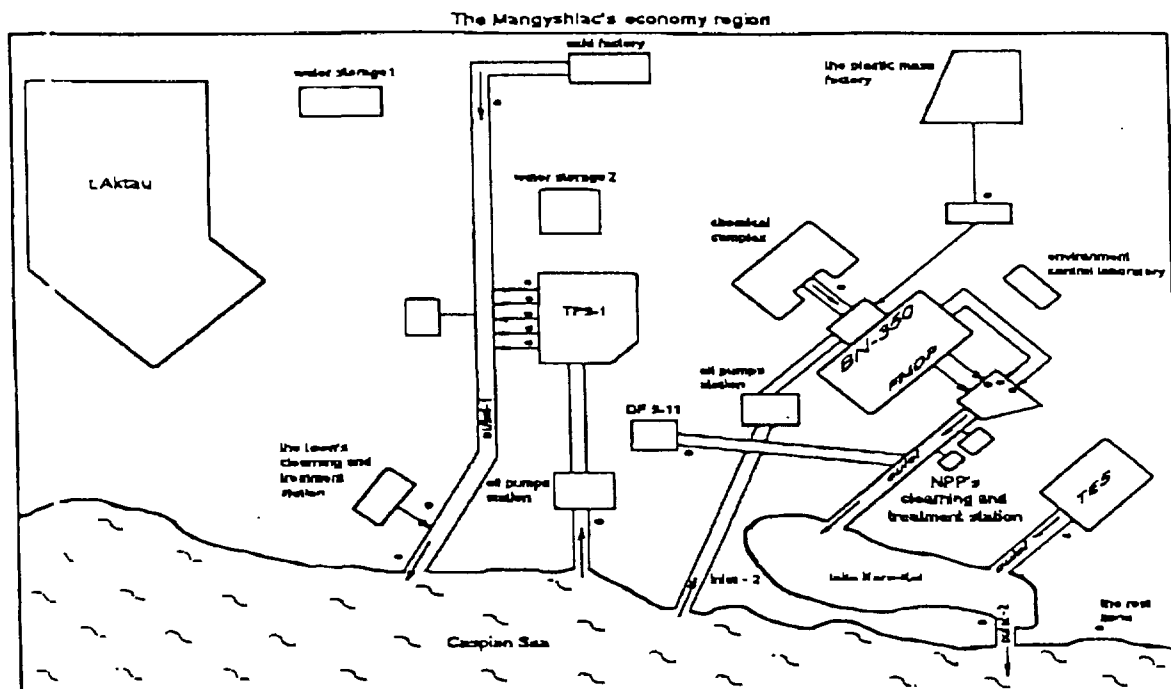
The program of the control includes determination of the contents dangerous in the biological attitude radioactive nuclide in atmospheric air, ground, vegetation in water of a coastal zone of the sea, water plant, bottom disposal deposits sea organism. Volume of waste waters of the enterprises, containing radioactive substances makes no more than 90000 m³/year.

Basic active nuclide, contained in waste waters of the enterprises, is Cs-137. The waters, polluted with radioactive substances act in industry the water drain system, then in general drop channel of the enterprise. In drop channel occurs strong dilution of a flow, containing radioactive substances. A total drain of water in the channel makes about 1 250 000 000 м³/год. Therefore the concentration Cs-137 in a point of issue of wastewater in Caspian sea is commensurable with background concentration in sea water. General(common) release Cs-137 in 1996-1997 years. was and is at an average annual level and has made 0,41 and 038 K U/year, that makes about 1 % from LAR (Limited Allowed Release).

In the drop channel and nearest territories of the sea the control of accumulation radionuclides in silt deposits, water-plants is carried out. The radioactivity of silt deposits, water-plants is caused the contents in them natural radionuclides, in basic, natural K- 40. The contents Cs-137 is at a level of a natural background.

The items of selection of tests of water, and also tests of bottom deposits and water plants are submitted on a drawing. The results of radiochemical determination St-90 and Cs-137 in concentrates of water tests are submitted in the table. From the table it is visible, that the contents long-term nuclides St-90 and Cs-137 in water tests is rather not enough: their concentration do not leave for a limit $1.1 \cdot 10^{-12}$ K U/L. Inspections of waters of Caspian sea in region of an output channel has shown, that already on distance 1,5 mile from a coast the pollution is away and not defined (not watched) it and in the next points (№ 11 and № 13), located to the south and to the north of an output of the channel, only near to a coast, to the south of an exit of the channel (item № 5) concentration Cs-137 yet is a little bit raised (increased).

General conclusion of the analysis of the contents radionuclides, which produced by NPP and released in an environment shows, that in all surveyed items of a hydro-network of industrial region concentration St-90, the contents Cs-137 corresponds(meets) to a global level.



Content of strontium-90 and cesium-137 in water samples

Index of sample	Place of select sample	Date of select sample	strontium-90		cesium-137		$^{137}\text{Cs} / ^{90}\text{Sr}$
			decay/min. 100L	10^{-12} curie/L	decay/min. 100L	10^{-12} curie/L	
1	2	3	4	5	6	7	8
1	Water-picket canal	12.09.97	70±10	0.30±0.05	70±10	0.30±0.05	1.0
2	Outlet (near plant)	13.09.97	60±10	0.25±0.05	240±40	1.10±0.20	4.0
2a	"-	13.09.97	70±20	0.30±0.10	230±40	1.05±0.20	3.3
3	Outlet (region of overflow)	14.09.97	80±20	0.35±0.10	190±30	0.85±0.15	2.4
4	Outlet (overflow)	15.09.97	70±10	0.30±0.05	160±30	0.70±0.15	2.3
4a	"-	15.09.97	80±20	0.35±0.10	170±30	0.75±0.15	2.1
5	Caspian Sea (region of resting base)	19.09.97	80±20	0.35±0.10	110±20	0.50±0.10	1.4
6	Outlet from TES (overflow)	20.09.97	60±10	0.25±0.05	70±10	0.30±0.05	1.2
7	Caspian Sea (northern of city)	21.09.97	70±20	0.30±0.10	60±10	0.25±0.05	0.9
8	Caspian Sea (pier of Shevchenko)	20.09.97	60±10	0.25±0.05	60±10	0.25±0.05	1.0
9	Drinking-water	10.09.97	<10	<0.05	<20	<0.1	-
10	Drinking-water	21.09.97	<10	<0.05	<20	<0.1	-
11	Caspian Sea (resting base, 1 mile from ripe)	26.09.97	80±20	0.35±0.10	70±10	0.30±0.05	0.9
12	Caspian Sea (athwart of outlet, 1.5 miles from ripe)	26.09.97	70±10	0.30±0.05	70±10	0.30±0.05	1.0
13	Caspian Sea (northern of outlet, 1.5 miles from ripe)	26.09.97	80±20	0.35±0.10	70±10	0.30±0.05	0.9