

# FORMATION AND SOURCES I –POSTER

## INVENTORISATION OF THE SOURCES OF PERSISTENT CHLORO-ORGANIC POLLUTANTS – PREDECESSORS OF DIOXINS IN THE CITY OF SUMGAIT.

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### Introduction

The city of Sumgait is located in the northern part of the Absheron peninsula and is one of the most polluted cities of Azerbaijan. Metallurgical, machinery, oil-chemical and chemical industries are geographically concentrated in this city. In this work we consider the chemical industry of the city of Sumgait, in particular, the chlorine chemical complex, which has been functioning since the 1950s and is a major source of environmental pollution with persistent chloro-organic pollutants (PCPs). Chlorine was widely used in the industry to obtain mineral and organic chlorine-derivatives [1]. However, the technologies used in the enterprises of the chlorine chemical complex were insufficient for the requirements of technical and scientific progress, resulting in leakages and the generation of large amounts of toxic co-products and wastes [2,3].

The purpose of this investigation is to identify the main sources of PCPs - predecessors of dioxins in Sumgait. We have studied the technological processes of enterprises and identified the main sources of environmental pollution in the city by toxic and persistent chloro-organic pollutants.

### Methods and Materials.

In the enclosed map-scheme you can see the enterprises of chlorine chemical complex of Sumgait, which are the main sources of environmental pollution with persistent chloro-organic compounds: Production Union "Orgsynthesis", Sumgait Plant of Detergents, Oil Additives Company, Superphosphate Plant, Plant of Polymeric Construction Materials, Plant of Domestic Chemistry.

It is noteworthy that the production of the chlorine chemical complex was based on the usage of local raw material –salts, organic compounds (kerosene, paraffin, naphthalene) and cheap energy. Production was intended to satisfy the local demand in chlorine, alkali and chloro-organic products (hexachlorocyclobenzene, DDT, herbicides on the base of 2,4-D acid, sulphanol, "depressorator AzNII" (dialkilynaphthalene), insecticide "preparat-30" (content of transformer oil in the product - 74%), detergents, oil additives, polymeric materials etc.)[1,6].

Territorial proximity and the co-operation of a number of chemical factories promoted the effective production and utilisation of chloro-organic products[1].

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There were a number of disadvantages in the development of the chloro-organic industry [6]:

- Obsolete processing technology of hydrocarbon raw material with a resulting low level of final product.
- Out-dated and worn out equipment
- Usage of technologies which polluted the environment

Due to the absence in the Republic of the established methodical parameters for categorization of toxic substances, long time chemical enterprises produced and distributed toxic chloro-organic products, which were prohibited in developed countries [3,4].

The main contaminants from these enterprises were phenol, chlorine and chloro-organic substances discharged into the environment in gaseous, liquid, and solid conditions. Apart from production discharges, out-dated furnaces for disposal of solid wastes made a special contribution to environment contamination [5].

Unused solid wastes from the chemical enterprises are stored on land territories close to the chemical enterprises. These wastes are either burned, or are kept in the open, being subjected to the meteorological changes. There are 19 dumps in the city occupying 120 ha of land in total[3,4].

The waste water from the chemical enterprises comprises 80 thous. cub.m./day while the total volume of waste water of the city is 140 thous.cub.m./day[10]. There is only Regional Water Processing Station in Sumgait (RWPS) which has already expired its operational term. Therefore water flowing into the RWPS is not cleaned appropriately and flows out into the Caspian Sea with the average content of phenols - 0.233 thous.t. and chloro-organic pesticides - 0.130 thous.t.[3,8].

In 1992 with the collapse of the USSR, there was a rapid decline in the industry of the Republic. That was also reflected in the status of chemical industry and the volume of environmental pollution was reduced. However, above-mentioned enterprises continue to function on average at 15% of capacity, using worn out technologies, which continues to contaminate the environment[7].

## Results and discussion

The concentration and long-term operation of the chlorine chemical complex in Sumgait has resulted in serious contamination of the atmosphere, soil and water resources of the region with PCPs - predecessors of dioxins. It is also reflected in the health condition of the personnel, the city's population and in the biodiversity of the contiguous part of the Caspian Sea [3,4,10].

The analyses of hydrobionts in the Azeri sector of the Caspian Sea have shown high concentrations of chloro-organic pesticides in their organisms, in total 20 chloro-organic compounds, such as - chlorbenzene, hexachlorbenzene, pentachlorbenzene, [9]. More than 20 sq.km of the Sumgait coastal zone has been declared a «dead zone» [10].

Arising from above stated sources of PCPs in Sumgait our recommendations are:

- 1) Realization of legislative reforms with the purpose:
  - To attract investment for restoration of the industrial sector, the creation of a Free Trade Zone.
  - Prohibition of usage and burning of toxic industrial wastes.
  - Regulation of maximum permissible concentration of discharges from the enterprises.

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2) Realization of industrial reforms with the purpose:

- To shut down especially dangerous chloro-organic productions.
- To introduce international environmentally safe standards and technologies.
- To introduce safety measures in production and liquidation of toxic chemicals.
- To construct new RWPS to comply with international standards (to replace chlorine method of water disinfection with the methods eliminating formation of dioxins and related compounds).

Also it is necessary to establish agreement with donor organizations for the creation of a special coordinating centre in Sumgait for:

- 1) Regular biological, chemical and toxicological monitoring of PCPs, inventory of sources;
- 2) Regular conferences and seminars on the problem of dioxin;
- 3) Development of the scientific database for investigation of the dioxin problem from the position of different sciences, the elaboration of educational program[4];
- 4) Coordination of the efforts of non-governmental environmental organizations for solution of the dioxin problem in the region;
- 5) Realization of the measures on melioration of land territories, used under waste dumping;
- 6) The greening of the city, protection of water resources and biodiversity of the region.

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