

**ECOLOGICAL PROBLEMS IN RUSSIA CAUSED WITH DIOXIN
EMISSIONS OF CHEMICAL INDUSTRY**

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The functioning of different chlorine and bromine technologies on Russian chemical plants not secure nowadays the ecological safety for employees, people health and environment.

The hardest problem is the waste disposal. For instance, on the "Caustic" plant (Sterlitamak) there are arising up to 2 thousands ton of wastes annually, including chlorinated sludge. All over the country, on plants of Volgograd, Dzerzhinsk, Ufa, Zima, Sterlitamak, Usolje-Sibirian etc., up to 2-3 million tons sewages are annually arising in chloroorganics productions, based on alkalic dehydrochlorination in liquid. The solution of this particular problem and of the problem in general is still absent.

The most part of chlorinated wastes are extremely toxic and contain the different dioxin contaminants. For instance, in Ufa the wastes of 2,4,5-T production (plant "Chimprom"), are very contaminated with 2,3,7,8-TCDD, in particular owing to accidents. In the 60-ths those wastes were buried on the plant territory directly and were not revized in following. There are no any reliable information about wastes burial-places of 2,4,5-TCP and 2,4,5-TCP Cu-salt productions, also large contaminated with 2,3,7,8-TCDD. Beside this, the destruction of chlorophenols sewage in modern production of 2,4-D is carrying out by chlorination, and the result of such purification is the unavoidable formation of PCDD and PCDF in addition to those, naturally arising during the processing.

The similar situation takes place on the Plant of chemical fertilizers in Chapaevsk (Samara province, former Kuibyshev). Wastes of chemical processing

hexachlorocyclohexane → trichlorobenzene →
→ hexachlorobenzene → pentachlorophenol,

contaminated by PCDD and PCDF, never were correctly disposed but piled without special treatment directly in the natural hollow near the section. Over the quarter of a century in this spontaneous dump there were accumulated some tens thousands ton of high toxic dioxin-containing wastes.

Thus now, as showed data of episodic measurements, the industrial sites under consideration and their environments are

seriously dioxin contaminated. So in 1987 on the plant "Chimprom" (Ufa) in soil near a section of 2,4,5-TCP Cu-salt production the concentration of 2,3,7,8-TCDD achieved 9,6 ppb (and 4 ppb in silt of Belaya River at 150 m lower the sewage sludge). Also in 1987 on the experimental manufacture of the Institute of chemicals for plants protection (Shchelkovo, Moscow province) which produced pesticide threechlorometaphos-3 with using 2,4,5-TCP as a stuff, the concentration of 2,3,7,8-TCDD was 4.8 ppb in soil near the production depot.

In 1990 in Chapaevsk soil near the section for PCP production had contained (measurements of firm "Taiphun"):

2, 3, 7, 8-TCDD	-	18.7	ppb;
sum of PnCDD	-	17.8	ppb;
sum of HxCDD	-	39.6	ppb;
sum of HpCDD	-	186.6	ppb.

The sludge of spontaneous dump near this section had:

2, 3, 7, 8-TCDD	-	150.8	ppb;
sum of PnCDD	-	38.4	ppb;
sum of HxCDD	-	49.5	ppb;
sum of HpCDD	-	116.4	ppb.

The same concerns to activity of capacitor plant in Serpuchov (Moscow province): in soil of industrial site threechlorobiphenyl concentration in one sample was 49223 ppm.

At the result of this industrial activity townpeople and environment became completely unprotected under an exposure of dioxin-like compounds. However such powerful dioxin loadings on towns environment may differ from town to town depending on specific technology of sewage disposal and purification. So the chlorinated wastes in Chapaevsk were not combusted but directly thrown down to different dumps because the special built incinerator was not started up. The same events take place in Volgograd (plants "Chimprom" and "Caustic"), where during many years wastes disposal are fulfilled without combusting and creating of special dumps. Thus we can tell about the complex dioxins pollution of the towns environment, where the plants on production and/or treatment of chlorine and bromine matters are disposed.

Dioxin trusts at towns air, including incinerator's of chlorine and bromine waste emissions, turned out very powerful. No one of incinerators, used for still bottoms degradation and chlorine wastes in general, was not built (and after 1977 - was not rebuilt) for providing of minimum of dioxin emissions. Now the systematic control of dioxin emissions from those incinerators is absent, and the amount of analytically reliable data is yet insignificant.

For instance, Ufa's incinerator built in the early 70-ths for chlorinated wastes destruction has the designed t° of combustion 1300-1400 $^{\circ}$, but the real one is 800-900 $^{\circ}$. The snow analysis outside of plant in 1987-1988 winter at 1,5 month after a snow fall, showed 3.5 ng/l 2,3,7,8-TCDD concentration at 1 km distance from plant. In winter 1990-1991 at 200 m distance from the incinerator in direction of down wind in snow

there were detected (measurements of firm "Taiphun"):

2, 3, 7, 8-TCDD	- 61	ng/l;
2, 3, 7, 8-TCDF	- 59	ng/l;
sum of PCDD	- 672	ng/l;
sum of PCDF	- 11600	ng/l.

The similar problems caused with the work of incinerators for destruction of chlorinated wastes exist in some other towns - Dzerdzhinsk (e. g., on plants "Caprolactam" and "Synthesis"), Zima ("Chimprom"), Usolje-Sibirian ("Chimprom") etc. The more difficult problems arise during combustion of mixed chlorinated and brominated wastes in incinerators of Slavgorod (plant "Altaichimprom", Altai Territory) and Perm ("Halogen").

Dioxin air pollution may have also other sources. So in 1991 summer in Chapaevsk large dioxin content was found in workmen's settlement and only 1, 2, 3, 4, 6, 7, 8-HpCDD concentrations were (measurement of firm "Taiphun"):

at the house-top	- 880	ppt;
at the hospital wall	- 970	ppt;
on shrubbery leaves on the territory		
of nursery school	- 23	ppt;
in the street dust	- 660	ppt.

The evident dioxin source is wind transfer from the plant territory.

There is few information about dioxin pollutions of towns soils. Some notion give the results of the capacitor plant activity in Serpuchov (Moscow province): in 1988 r. at 2 km distance to the nord side from plant the PCB concentration in soil was up to 35.7 ppm, and at 0.3 km to the south side - up to 11000 ppm.

There is serious dioxin pollution in water sources of towns under consideration - Belaya River with tributaries in Ufa, Chapaevka River in Chapaevsk and than Volga etc. Let's point out the data of some episodal measurements. So in spring 1990 in Ufa River near sauth water-acceptance (waterworks) the concentrations only of PCDD's (without PCDF) were:

1, 2, 3, 6, 7, 9-HxCDD	- 8	ng/l;
1, 2, 3, 4, 6, 7-HxCDD	- 80	ng/l;
1, 2, 3, 4, 6, 7, 9-HpCDD	- 95	ng/l;
1, 2, 3, 4, 6, 7, 8-HpCDD	- 25	ng/l;
OCDD	- 760	ng/l.

In spring 1991 the drinking water for Ufa (i.e. after cleaning) was contaminated with 0.14 ng/l 1, 2, 3, 6, 7, 8-HxCDD.

Extremely dangerous consequences are related with solvent enhanced penetration of dioxin-like compounds from contaminated territories to aquifers. The curiers are chlorophenols, organic vsolvents, hydrocarbons etc, evidently caused in autumn 1990 the appearance of 2, 3, 7, 8-TCDD in ppq level (together with mixture of HxCDD and HpCDD) in Chapaevsk artesian drinking water. The same events have taken place in Ufa, where in the spring 1991 Cl₂-DD was found in the hole on town's dump on 7.3 m depth - the evident result of "Chimprom" activity (production 2, 4-D).

The penetration of dioxins in food chains towns under

consideration is unavoidable result of dioxin pollution of soils, air and water. This problem was not yet systematically considered, so there are available only episodic and preliminary results about dioxin contamination of fish and women milk in Ufa, Chapaevsk and other towns of chlorine chemistry.

However the results of measurements carried out in the end of the 80-th in Serpuchov show the common character of those phenomena. The data concern to revealing PCB in food though without mention of PCDF and the role of high toxic PCB isomers. It was shown that PCB content in yolks of hen eggs in farms located in zone of plant influence increased the background values in 100-200 times. In women milk the PCB concentration achieved 2.39 mg/l and in the whole the PCB level in milk of mothers working at the plant or living near it is in 80-460 times the children safe level.

It must be underlined that the solution of ecological problems, given birth with chemical industry, when and if it begins, will demand a lot of attention, time and moneys.

Conclusions:

1. The environment of many Russian towns - sites of powerful plants of chlorine and bromine chemistry - is continuously influenced with industrial dioxin emissions.
2. The real amounts of dioxins, discharged by chemical industry, are extremely dangerous for human health.
3. Any control of plant's dioxin emissions is absent.
4. There are no programs for any purposeful modernization of the existing technologies and for decreasing of dioxin emissions up to safe levels.