Materials of Conferences

THE KEMEROVO CITY ENVIRONMENTAL POLLUTION ECOLOGICAL MONITORING

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The Kemerovo city atmospheric air pollution specific feature and its peculiarity is the fact, that the chemical and the chemical – recovery enterprises and the productions atmospheric emissions and the organized industrial discharges are constantly being met, such as the ammonia, the aniline, the amines, the chlorides, the carbon bisulphide, the isopropyl alcohol, the cyanic hydrogen and the others, at the same time with the widely – spread motor vehicles and the motor transport and also the heat and power engineering emissions [1,6].

So, the atmospheric air pollution most typical specific features and its peculiarities of the Kemerovo city territories, which are built – up, having intended for the following buildings, the gardens and also the roads by the chemical and the chemical – recovery enterprises and the productions atmospheric emissions and the organized industrial discharges have already been singled out by means of the cluster analysis [5].

They are being consisted in the fact, that: firstly – such the leading atmospheric air pollutants, as the ammonia, the carbon bisulphide, and the formaldehyde are usually being defined the general situation just in the air basin on all the territories, which are being under the control; secondly – by the concentrations totality, the city territory leading harmful substances are being divided into the several and some groups with their atmospheric air pollution likeness unequal and the different degree; and, at last, thirdly – the chemical and the chemical – recovery enterprises and the productions smoothing influence upon the situation with the atmospheric air pollution of the zone, which is built – up, having intended for the following buildings, the gardens and also the roads is being expressed in the more degree, than at the atmospheric emissions from the heat and the power plants, the motor vehicles and the motor transport, and also from the other enterprises, and the productions.

So, it can be seen from the Table No.1, that the Kirovsky district is being occupied on the first place (e.g. 34,21), the Zavodskoy, the Czentralny, the Leninsky districts zones, which are built – up, having intended for the following buildings, the gardens and also the roads are being occupied on the second place (e.g. 15,32; 15,22; 11,96, correspondingly) [3,4] by the atmospheric air pollution index (AAPI) average value in the Kemerovo city's districts zones, which are built – up, having intended for the following buildings, the gardens and also the roads for the previous 7 years (e.g. 1997 – 2003 years).

Table 1. The Atmospheric Air Pollution Index (AAPI) in the 1997 – 2003 years

The District	**The Average Value**	The Tendency Rate
The Kirovsky one	34,21	-1,02
The Zavodskoy one	15,32	-2,46
The Czentralny one	15,22	-1,72
The Leninsky one	11,96	-1,80
The Rudnichny one	8,62	-0,37

The atmospheric air pollution index (AAPI) least mean value among all the districts and, moreover, the statistically significant one has been in the Rudnichny district (e.g. 8,62, $p<0,05$). For all this, the highest tendency rate to this indicator and the sign decrease has been registered in the Kirovsky district (e.g. – 2,46); so, the atmospheric air pollution index (AAPI) tendency rate lowering has been varied in the range of from – 0,37 down to – 1,8 in the other districts.

Thus, the carried out analysis by the atmospheric air pollution index aggregate indicator (AAPIAI) average values for the previous 60 months or for the 5 years (e.g. 1999 – 2003 es.) has been shown, that having had the highest values by the phenol, the formaldehyde, the carbon bisulphide, the dust, and the ashes in the Kirovsky district, it has been observing also the highest tendencies to their decrease (see, the Table No.2). The atmospheric air pollution index aggregate indicator (AAPIAI) average values by the phenol, the formaldehyde, the carbon bisulphide considerably have not been differed in the other districts, when it depends the least value has been in the Rudnichny district (e.g. 0,11) with its minimum tendency rate to the lowering (e.g. – 0,01) by the dust and the ashes. The least tendency rate to the atmospheric air pollution index aggregate indicator (AAPIAI) decrease by the phenol has been observed in the Zavodskoy district (e.g. – 0,10), and by the formaldehyde – has been observed in the Leninsky district (e.g. – 0,15).

Table 2. The Atmospheric Air Pollution Index Aggregate Indicator (AAPIAI) in the 1999 – 2003 years

The district	The Phenol		The Phormaldehyde		The Carbon Bisulphide		The Dust, the Ashes	
	The mean value	The tendency rate	The mean value	The tendency rate	The mean value	The tendency rate	The mean value	The tendency rate
The Kirovsky	0,63	-0,14	4,34	-0,70	2,98	-0,42	0,99	-0,21
The Czentralny	0,44	-0,11	2,91	-0,49	1,36	-0,35	0,37	-0,07
The Leninsky	0,38	-0,10	3,16	-0,15	1,29	-0,26	0,16	-0,02
The Rudnichny	0,36	-0,08	3,20	-0,45	1,48	-0,31	0,11	-0,01
TheZavodskoy	0,32	-0,05	3,07	0,29	1,24	-0,31	0,38	-0,05

It has been observed, at the special tests percent average value calculation on the suspended solids concentrations in the atmospheric air (e.g. 2001 – 2003 es.) in the Kemerovo city's different districts, that the Kirovsky district has the highest its value (e.g. 2,45), the Zavodsky district is on the second place (e.g. 0,94), and in the contrast to the other districts, it has the tendency to the following increase (+0,64).

If to estimate the atmospheric air pollution total indicators and the signs, then the Kirovsky district has the highest average values for the 48 months or for the 4 years (e.g. from 2000 till 2003 – es.) as by the atmospheric air pollution degree by the separate substances (e.g. the «P» value), well as by the «K_{total}» hazardous and the harmful substances complex pollution total indicator and the sign, having had the highest average values, (e.g. 9,39 and 10,77, correspondingly). However, the Kirovsky district has the highest tendency to the following lowering by the «K_{total}» indicator and the sign (e.g. – 1,42). Thus, the Rudnichny district has the highest tendency to the following lowering by the «P» value (e.g. – 1,08), at the same time, the highest tendency to the following increase is being observed at the Zavodskoy district (e.g. + 0,88).

By its complex anthropogenic load on the atmospheric air (e.g. $K_{atm.air}$), the Kirovsky district is being on the first place (e.g. where the average value for the 84 months or for the 7 years, that is from 1997 till 2003 – es., it is equal to 31,65), the Czentral district – is being on the second place (e.g. the average value – 18,84). Thus, the Czentral district has the highest tendency to this indicator and the sign lowering (e.g. – 1,58).

The solid industrial wastes and the concentrated liquid industrial wastes (e.g. SIW and CLIW), the spilled and the poured out raw materials, and the finished commodity and the integrated products at the chemical enterprises' territories during the equipment storing, the transportation and the operational service are the main soil and the ground contamination sources.

The soil and the ground contamination is being observed together with the following hazardous and the harmful substances migration into the adjacent mediums with the soil and the ground in the places of the chemical and the chemical – recovery enterprises and the productions placement. So, it is taken its place in the buffer belt zones (e.g. BBZ), the suburban and the zones, which are built – up, having intended for the following buildings, the gardens and also the roads – in the result of their settling upon the soil and the ground just from the atmospheric emissions and the organized industrial discharges.

The chemical and the chemical – recovery enterprises and the productions the atmospheric emissions and the organized industrial discharges influence upon the Kemerovo city's soil and the ground contamination has been tracking in the 12 – 15 km radius. The atmospheric pollutions and the organized industrial contamination influence parts upon the phenol, the formaldehyde, the sulphates and the ammonia concentrations increase probability in the soil and the ground have been made up in the range of 47 – 78%.

The Kemerovo city's chemical enterprises and the productions territories are being considered, as «the extremely dangerous ones», the industrial wastes storage sites – «the dangerous ones», the buffer belt zones (e.g. BBZ), and the zones, which are built – up, having intended for the following buildings, the gardens and also the roads – «the moderately dangerous ones» by the ground chemical contamination total index (GCCTI).

Thus, the ground chemical contamination total index (GCCTI) average values by the Kemerovo city's districts for the 60 months or for the 5 years (e.g. 1999 – 2003 es.) are being varied in the range of from 19,89 up to 26,33. However, the Rudnichny district has the tendency to the following its lowering by this indicator and the sign (e.g. – 2,48), it depends when the Leninsky and the Kirovsky districts have the tendency to the following its increase (e.g. +2,33 and +2,23, correspondingly).

So, the soil and the ground contamination hygienic and the sanitary significance by the hazardous and the harmful substances, including the organic contaminations, is being defined by the fact, that it is being considered, as the main and the master link in the xenobiotics circulation [2].

So, it should be necessary to be considered at the natural environmental pollution and the contamination composition and the levels consideration, that the hazardous and the harmful substances in the towns

and the cities with the much developed chemical industry, having contained in the atmospheric emissions and the organized industrial discharges, SIW (e.g. the solid industrial wastes) and CLIW (e.g. the concentrated liquid industrial wastes) are quite able to be mutually interacted between each other or to be transformed in the atmosphere, the reservoirs, and also in the soil and the ground with the following the other ones formation, including the more dangerous chemical compounds. So, it should be taken into the consideration the chemical substances transformation at the pollution and the contamination levels definition, the control organization, and the cause – and – effect relationship establishment between the environmental pollution and the following contamination, and also the population health state.

Thus, the average values for the 84 months or for the 7 years in the different city's districts statistically and probably significant are not quite being differed one from each other, by their complex anthropogenic load upon the soil and the ground (e.g. K_{soil}) and, on the whole, upon the ambient environment (e.g. K_{load}). All these indicators and the signs have their tendency to the following increase in all the city's districts.

It also has been cleared out, having estimated the hazardous and the harmful substances discharge facility with the sewages by the Kemerovo city's main chemical enterprises and the productions, that «the Khimprom», that is «the Chemical Industry» is being discharging the suspended substances with the sewages the most of all, in comparison with the others (e.g. 47,23 ton./year) in average for the 36 months or for the 3 years (e.g. 2001 – 2003 – es.), and «the Azot», that is «the Nitrogen» – the total nitrogen, the nitrates, the oil and the petrochemical products (e.g. 80,13 ton./year, 1002,04 ton./year, 2,87 ton./year, correspondingly) [4].

The Hydro – Electric Power Station (HEPS) and the Novokemerovskaya Thermo – Electric Power Station (TEPS) are being leading among them in the Kemerovo city, by the non – utilizable waste products quantity (e.g. 226,094,1 ton./year and 200,698,4 ton./year), in average for the 36 months or for the 3 years (e.g. 2001 – 2003 – es.).

They are being deserved their attention, such as the microorganisms total amount lowering, which has been revealed in the chemical enterprises and the productions, and also the Kemerovo BBZ (e.g. the buffer belt zones) territories soil and in the ground, the humicular microflora reduction in it, which are quite able to be resulted in the biogeocenoses disorder and the soil and the ground self – cleaning possibility lowering towards, as to the natural substances, well as to the anthropogenic pollutions.

So, the chemical productions and the enterprises are usually being presented the hazardous danger, also, as for the superficial waters, well as for the underground waters. The production sewages and the storm discharges and the floods run – off just from the chemical enterprises and the productions territories are usually being served, as the pollution and the contamination main sources. The industrial storm discharges and the floods run – off are directly being thrown down into the reservoirs, in the overwhelming majority cases, and they are being characterized by the hazardous and the harmful substances high level concentrations, as the reservoirs pollution and the contamination sources.

The superficial waters and the underground waters hazardous pollution danger by the storm discharges and the floods run – off from the territories not only the enterprises and the productions, but also and BBZ (e.g. the buffer belt zones) is being presented in the cities and the towns with the advanced developed chemical industry.

The Kemerovo industrial complex and the center, having had the concentrated chemical enterprises, the productions, and the chemical – recovery plant, is being thrown annually: the 1,2 tons aniline, the 1,4 tons phenol, the 6,9 tons methanol, the 0,5 tons cyanides, the 45,1 tons caprolactam, the 2,5 tons formaldehyde, the 46,6 tons nitrates, and the 2,2 tons thiocyanates with the sewages into the reservoirs.

The sewages composition hygienic and the sanitary significance from the chemical productions and the enterprises is being conditioned by the fact, that they are considerably being widened the reservoirs pollution spectrum by the hazardous and the harmful substances, they are being given the toxic qualities to the superficial and the underground waters, they are adversely being affected upon the reservoirs hygienic and the sanitary regime, they are being promoted to the more toxic chemical compounds formation, foe example, the trigalomethanes, which, in their turn, are being characterized by their genotoxicity.

The volatile chlorine – organic compounds (such as, the tetrachlorated carbon, the dichlormethane, the trichlormethane, the trichlorethylene), the amines (such as, the monomethylamine, the dimethylamine, the trimethylamine, the diethylamine), the phthalates (such as, the propylphthalate, the dioctylphthalate, the dibutylphthalate, the butylizobutylphthalate), the caprolactam, the caproic acid, the phenols (such as, o – chlorphenol, the 2,6 – csylenol, the thymol, the methylphenol, the o – cresol, the ethylphenol), the bromoganic chemical compounds (such as, the bromoformum, the bromdichlormethane) and the others have been found out down the city's river, in the Tomj river.

The hazardous and the harmful substances, having thrown down by the chemical enterprises and the productions into the water – sources, are being the initial products for the further transformation, especially at the discharges and the floods run – off, and the drinking water chlorination. So, the trigalomethanes challenge in the drinking water is quite the well – known one, having consisted in the chloroform, the dichlorbrommethane, the chlormethylene formation

and the others at the waters chlorination, having contained the organic impurities, as the anthropogenic, well as the natural origin.

Thus, the complex anthropogenic load upon the drinking water (e.g. $K_{water\ drink.}$) by the Sanitary and Epidemiological Service (SES) data has the same values in all the city's districts (e.g. the average value for the 84 months or for the 7 years – has the 28,17; the tendency to the growth +12,15).

The environmental pollution analysis and the contamination by the chemical substances, which are being the highly level toxic and the carcinogenically hazardous and dangerous ones for the people, is being given the possibility for the subsequent investigations of the cause-and-effect relations between the environmental pollution, and the contamination, and also the Kemerovo city's population socially significant diseases and the illnesses for us.

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RECYCLING OF OIL-SLIMES BY CHEMICAL METHOD

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Oil-slimes, formed during manufacturing process, transport and oil refining, accumulate in huge quantities on a territory of oil refining factories and negatively influence atmospheric air, hydrosphere and letosphere. More over oil-slimes belong to the most persistent environment pollutants.

There are some methods of oil-slimes recycling, which include methods of division into three phases with use of special substances - demulsifying agents, methods of creation fuel compositions, methods of hardening and burning and so forth. The choice of a method depends on their origin, composition and structure. As a rule in most cases it is enough to know the quantity of mineral oil, water and mechanical impurities to choose a direction of the oil-slimes usage.

So, at first the phase structure of oil-slime is determined. Oil-slimes contain water 26,25 %, mineral oil 33,75 %, mechanical impurity 40,00 %.

For recycling of oil-slimes it is offered the way of its processing by chemical method with lime-containing reagents. As an adsorbent it was suggested to use exhausted silica-gel – gas industry waste on the stage of gas dehydration. The given technology of joint recycling of oil-slimes and exhausted silica-gel allows converting viscous-flowing oil-slimes into combined and safer powder state. The essence of the method consists in the interaction of components, which leads to the formation of dry, waterproof powder substance. Silicon oxide exhausted silica-gel plays a role of the dehydrating agent and influences the process of granulation, carries out functions of adsorbent of hydrocarbons and also influences a migration of contaminants into water.

The compositions of quicklime and exhausted silica-gel are investigated. It is established the proportion of those components depends on the quantity of mineral oil in the oil-slime and may be from "one to one" to "one to two". The quantity of silica gel can be up to 30 %.

For the substantiation of the ecological safety of oil-slimes recycling products it was analyzed their water extracts. From this analysis it follows that a migration of contaminants into water is less than in case of waste. Calculation of danger class is also carried out. Oil-slimes recycling products fall under the category of the 4th danger class.

As a result both oil-slimes and exhausted silica-gel are neutralized and utilized and can be used as a secondary raw material, for example, in manufacture of building materials.

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