

euro-eco hannover2010

2.— 3. DEZEMBER 2010

DAS INTERNATIONALE SYMPOSIUM

“ÖKOLOGISCHE, TECHNOLOGISCHE UND RECHTLICHE ASPEKTE DER LEBENSVERSORGUNG”

Programm Abstracts

Europäische Akademie für Naturwissenschaften, e.V. Hannover
Europäische Wissenschaftliche Gesellschaft e.V. Hannover

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ISBN 978-3-00-032886-2

Herausgeber:

Europäische Wissenschaftliche Gesellschaft (EWG)

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FEATURES OF RIVER ISHIM BIOCENOSE ON THE BASIS OF INTEGRAL INDEX OF ENVIRONMENTAL CONDITIONS

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Hydrobiological methods of surface waters quality control let give general integral assessment of water bodies conditions and estimate response of biota to man's impact. Principal hydrobiological indicators of mainland water bodies conditions are the following ecological groups of water organisms: phytoplankton, zooplankton, zoobenthos.

Research objective: to give general characteristics to river Ishim biocenose on the basis of integral index of environmental conditions (IIEC).

Threshold impact value was estimated by traditional mathematical statistics methods [Sanotskiy, Ulanova, 1975; Kagan, 1978]: parameters of response indicators distribution measured at different levels of impact were confronted (including those measured at control objects with zero xenobiotic factors).

Using rivers classification of International Organization for Standardization by method of G.S. Fomin, we have defined four surface waters quality evaluations in points from 1 to 4: ecological welfare – 4 (natural conditions of biological community), relative ecological welfare – 3 (area of tension still biological community is not damaged), ecological crisis – 2 (moderately damaged biological community), ecological disaster – 1 (heavily damaged biological community, extreme response to man's polluting impact).

As principal hydrochemical indicators of Ishim conditions evaluation we have chosen, first of all, toxic, priority pollutants, including those tending to accumulate themselves in organs and tissues of hydrocoles.

Hydrobiological indices are as follows: basin saprobity index; daily bacteria production; bacterial plankton quantity; bacterial plankton biomass; saprophytic bacteria quantity; average seasonal phytoplankton biomass; average zooplankton quantity; average zooplankton biomass; average zoobenthos quantity, average zoobenthose biomass.

Each index has been given priority grade – numeric value corresponding to importance of this factor.

IIEC takes into account principal components of freshwater ecosystem quality (chemical and biological ones) expressed in relative units (points) and is calculated as follows:

$$IIEC = (B_i + H_i) / (N_b + N_h),$$

where B_i – biological indices used; H_i – hydrochemical indices used; N_b and N_h – quantity of each grade indices included in calculation.

We have based our point system for hydrochemical indices on scientific work of O.P. Oksiyuk with co-authors [1993].

Pollution level of Ishim surface waters was estimated with IIEC as 2,7 which means that

the river is close to ecological crisis i.e. river ecological community has been moderately damaged with economic activity. On the other hand, the river conditions border on the area of tension within which biological community tends either to raise or to bring down its activity. In general, this criterion refers not to the whole plankton community but to certain species, according to their susceptibility to different chemical agents.

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DESULFURIZATION OF FLUE GASES OF NON-FERROUS METALLURGICAL PLANTS

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Sulfur dioxide is the most common pollutant, which emitted into atmosphere as a result of human technological activity. Sulfur dioxide, which is released into air through high smoke pipe with flue gases, quickly deposits on earth, mainly like "acid rain". The rate of deposition of sulfur dioxide makes 0.001-0.02 m/s, which is faster than, for example, deposition of nitrogen oxide and even small parts (aerosols). In atmosphere sulfur dioxide is harmful for human beings, vegetable and animal world, it causes the corrosion of metals and concretes. On the surface of the earth sulfur dioxide leads to decrease of soil fertility, destroys forests, flora and fauna of reservoirs. According to evaluation of American specialists in 2000 general damage, which is done to economics of the planet by wastes of sulfur dioxide, comes to 9,5 billion dollar a year.

For a long time a scientific-research work on recycling of sulfur end gases of metallurgical production with obtaining elementary sulfur has been carried out in the Institute of Chemical Problems of Azerbaijan National Academy of Sciences.

The scientific grounds for processing technology of high concentrated sulfur gases by catalytic and thermal reduction, using methane and converted gas, were developed on the basis of theoretical generalization and experimental researches.

By thermodynamic analysis we determined limits of optimum (under conditions of balance) composition of initial gas phase, temperature regimes and flow rate of reducing agent, at which it is possible to achieve maximum yield of sulfur.

Catalysts, which provide high reduction of sulfur dioxide, have been searched. Among them cobalt and nickel catalysts were more effective in ratio of reduction reaction of sulfur dioxide by converted gas, nickel catalysts and industrial aluminonickel catalyst GIAP-3 for reduction by methane, as well as catalyst, prepared on basis of residues of sulfur-sulfide flotation (wastes of Norilsk GMK enterprise) for Klaus process. The influence of reactionary medium components (oxygen, water vapor and so on) on activity and selectivity of catalysts for reduction of sulfur dioxide by methane, converted gas and hydrogen sulfide was researched in detail.

The status of activating agent was studied by physical-chemical analyses (X-ray diffraction, thermograph, IR-spectroscopy). It was established, that during reduction by methane in catalysts, nickel acts as sulfide, but cobalt- as mixture of sulfide, sulfate and oxide during the reduction by converted gas.

Elena Akhverdova

ENVIRONMENTAL EDUCATION IN RUSSIA: CURRENT SITUATION

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In recent years ecology was enriched by new knowledge and became the science that deals with all spheres of economic, social and spiritual life. Today's ecological situation can be characterized as close to critical.

Among global ecological problems we can highlight the following: thousands plant and animal species are destroyed; the rate of deforestation is very high; mineral reserves decrease very quickly; the World Ocean is exhausted and it ceases natural process regulation because of living organisms destruction; the atmosphere pollution level exceeds sanitary standards and clean air becomes very scarce; ozone layer protecting us against deadly space radiation is partially broken; natural landscapes are polluted and disfigured.

Due to these factors we face the necessity of taking urgent measures for the solution of global ecological problems. It becomes vital for the mankind nowadays to change the philosophy of the attitude towards nature.

The most important point is to form an ecological consciousness in the society. The nature must be understood as a living creature, which can't be dominated without any harm for everyone. Environmental education should be conducted since early childhood at the state level. New ideas and achievements shouldn't impede harmonious coexistence of humanity and nature.

Facing the global challenges of modern life, human's abilities, talents and qualities become more and more significant under the circumstances of hard resource, ecological and demographic limitations. It means that new century is the century of education, because its purpose is to provide human's reproduction as a social creature, moral, thinking and responsible person. The transition to the synergetic model of cognition and assimilation into this world presupposes new goals of the educational system. They are reflected in the educational and ecological doctrines of Russia, which determine the main purpose to form integral world view and attitude, ecological culture and tolerant consciousness.

Modern society produces new professional and training level requirements of future ecologists. New standards are also introduced for methods and organization of informational and communicative technologies application for their training. It is

important for future ecologists to have integrated world view based on fundamental knowledge and skills of applied ecological problem solution. Application of informational technologies is also necessary for their ecological activity. Future specialist must learn how to make informational and environmental models of researched processes and events. According to the recent development analysis of the ecological education conceptions in Russia and abroad, the main aim of the ecologist training nowadays is to form the attitude towards the environment. It gives future specialists motivated and conscious aspiration to mastering skills and knowledge, necessary for their personal participation in prevention and solution of ecological problems. That is why extensive use of modern information technologies is necessary for environmental education. Ecologist training should include interactive possibilities of environmental models visualization to develop their creative thinking.

Michael Balhar

STATUS QUO AND PERSPECTIVES OF MECHANICAL-BIOLOGICAL WASTE TREATMENT (MBT) IN GERMANY

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Germany pretreats a total of around 25 % of urban wastes by means of MBT technology (MBT = Mechanical-Biological Waste Treatment). This technology is based on a material stream specific waste treatment. It means that the material properties of residual wastes - which are varying to a large extent - determine the selection and specification of treatment steps.

A large part of today's residual wastes remaining after the collection of all substances which can't be recycled by means of material recovery and therefore need to be disposed of are a very inhomogeneous mixture of various materials with very differing properties. Some of these wastes are from mineral origin and thus inert, i.e. are not able to react. Others consist of dry materials like plastics, textiles, paper or composites, all of them showing energy contents higher than average.

Some others with higher portions of organic material are able to be biologically degraded and are possibly able to produce usable gas. Here the principle of material stream specific waste treatment starts to become effective.

Material specific waste treatment segregates waste mixtures in different fractions. A first treatment step is the mechanical preparation where the waste mixtures are released from impurities and harmful substances, then classified in different partial streams, comminuted and prepared for the following treatment steps. Used for these purposes are e.g. sorting excavators, shredders, screening and mixing equipment, separators for the heavy and light fraction as well as for ferrous and non-ferrous metals.

In most cases the subsequent biological treatment steps are based on aerobic treatment

by means of different decomposition processes. The scope ranges here from open decomposition processes on landfill areas to completely encapsulated systems with exhaust air treatment. To some extent anaerobic digestion steps are integrated, producing -under air tight conditions - usable biogas.

In Germany about 50 MBT plants have been installed. These plants are pre-treating approx. 6 million tons of municipal solid waste annually.

ASA is the association of German MBT plant operators. The main targets of ASA are: The promotion of waste stream specific waste treatment. Extensive exchange of experience and knowledge in planning, construction and operation of mechanical biological treatment plants by means of meetings of working groups and plant operators with the target to provide all members with the experiences about planning, realisation and operation of plants as well as with findings from research.

- Support in the optimisation of plants and their operation.
- Utilisation of plant capacities in a network / establishment of a common shortfall concept.
- Support of members and public relation work.
- Organisation and management of the international ASA Waste Days Conference.
- Research projects and expertises.
- Statements on legislative drafts and ordinances for German and EU legislation.

ASA is an active member in the European Compost Network (ECN) e. V. and in the Quality Assurance Association for Secondary Fuels and Recycling Wood (BGS) e. V.

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MEASURING OF THE ENVIRONMENTAL CHANGES

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The behaviour of the planet Earth has been continuously studied by geodesists using various techniques and methods on the ground, air and space. These studies reflect the global and local environmental changes caused by both the natural sources and the influence of mankind and its industrial activities. The Institute of Geodesy and Geoinformation of the University of Latvia (LU GGI) applies the space related technologies for the environmental studies in Latvia. The paper presents the techniques and methods developed and used at the Institute of Geodesy and Geoinformation for the ongoing environmental studies.

The small size modern satellite laser ranging system (SLR) and it's control software has been developed at the Institute recently. It will be used for the regular observations of low Earth orbiters (LAGEOS, GOCE, GRACE, ERS2, ENVISAT, CRYOSAT, etc.) within the framework of ILRS. The test observations have proved the results of high quality. The developed SLR could be used as a mobile SLR as well for the transportation to the sites

where and when the proper interest arises.

Application of Global Navigation Satellite Systems (GNSS) in geodesy discovers a powerful tool for the verification and validation of the historically long time ago established geodetic levelling benchmarks. The differential GNSS and RTK methods appear very useful to identify the vertical displacement of landscape by means of inspection of the deformation of levelling networks. Within the framework of ground based GNSS European positioning augmentation system EUPOS® the local EUPOS®-Riga continuously operating geodetic reference system has been developed in co-operation with a Riga GeoMetrics land surveying company. The system consists of 5 GNSS base station network. The system has been properly investigated and controlled. The GNSS observation RTCM corrections produced by the EUPOS®-Riga can be used for high precision position determination in various navigation and land surveying applications.

Recently we have applied the real time kinematics (RTK) measurements for the studies of the earth vertical movement which is to some extent reflected by the state of levelling network. The deformation of Riga levelling network may be caused by the vertical movement of local earth surface. The tectonic continental and intercontinental movement of the earth core is available as well. There are several effects of vertical movement in urban environment. Development of the new building construction, increase of traffic intensities and both the geologic and hydrogeologic conditions in upper layers of ground are additional sources of the up or down movement of earth surface. The vertical movement could be controlled by height determination of levelling benchmarks. The criteria of Mean Sea Level not always is highly useful. The mean Baltic Sea level has risen by 26 cm during 100 years according the records of Riga tide gauge station. It is placed near the Daugava river estuary where the water level changes depending of the work regime at the Riga hydroelectric power station placed on the Daugava river at a distance of about 20 km. Therefore it is rather difficult to fix the real value of mean sea level. It is influenced by the artificially changing water level of river Daugava.

Additional tool for the independent height determination is the application of both the GNSS applied positioning and Satellite Laser Ranging System (SLR) observations.

The high precision geoid model is essential for the normal height determination when the GNSS positioning methods are used. In order to improve the Latvian geoid model quality and accuracy we are taking part in ESA performed GOCE mission. Additionally, we have commenced the development of mobile zenith telescope for determination of vertical deflection. It will serve for the studies of anomalies of regional gravitation field.

At the LU GGI there is a skilled personnel of developers of the geographic information system 2D and 3D data bases for Riga city and for entire Latvia.

All the developments carried out at the Institute of Geodesy and Geoinformation serve for the studies and for monitoring of the environmental changes. The ongoing process is accelerated in co-operation with a Riga Technical University (RTU). The staff of Institute taking part in education of Geomatics bachelor, master and PhD students in RTU and LU. The students of RTU and LU taking part in research of LU GGI.

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HISTOPATHOLOGIC FEATURES OF A RESPIRATORY SYSTEM OF LABORATORY ANIMALS UNDER INFLUENCE OF ALIPHATIC HYDROCARBONS

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Aliphatic hydrocarbons are most commonly encountered hydrocarbons and are most often in contact with a human being. This is because the principal component of petroleum are alkanes. Consequently, the component which determines their effect is hexane. Hexane is a solvent widely used in production of synthetic materials, tyres, glues for shoe manufacturing, extracting vegetable oils, in textile, tanning and furniture manufacture. Experiments on animals showed that hexane affected different enzyme systems in lungs in various ways: atelectasis, pulmonary edema, altered monooxygenase system of liver, thymus and spleen atrophic changes, lymph glands abnormalities.

Thus, hexane is obviously a polytropic poison affecting different tissues of the organism. Analysis of the literature on effect of hexane on the organism shows that there is a lot of information about general influence of hexane while effect of hexane on respiratory system is insufficiently studied. Taking into account high toxin sensitivity of respiratory system, our scientific work seems very promising, this is why we occupy ourselves with this research.

Aerosol influence with hexane fumes was exerted in 200-liter Kurlyandskiy gas chambers on albino Wistar rats weighing from 170 to 210 grams. Xenobiotic influence lasted for 8 weeks, 4 hours every day, excluding weekends. During this period the air in the chamber was tested every 60 minutes according to established chemical procedure which allowed to maintain hexane concentration at the level of $1/20 \text{ LK}_{50}$ which corresponds to subacute experiment. The animals were divided into two groups: the 1st one – intact rats, the animals of the second one were exposed to static aerosol influence of hexane. During the experiment we observed body weight time history. At the end of the experiment the experimental rats were immediately decapitated. Bronchial tubes, trachea and lungs were taken out to determine their morphological characteristics. Microscopic and morphometric studies of the preparations were carried out with computer microscopic videosystem “Quantimet 550 IW” possessing a built-in morphometric programmes package of the English manufacturer “Laica”. The findings were statistically processed with the programme Excel “Descriptive statistics” with application of t-Student criterion.

Microscopic study of trachea mucous tunic in subacute experiment revealed acute catarrhal desquamative tracheitis. Quite large areas of epithelium were desquamated. The remaining epithelium suffered from hydropic degeneration. As stereometric analysis showed, all the layers of trachea wall got thicker because of edema and swelling of mucous tunic plate stroma and unstriped muscle layer of trachea wall. There was vascular hyperemia and disturbed permeability of vascular walls which led to perivascular edema.

Inflammatory cellular infiltration was of diffuse character and reached all the layers of trachea wall. In trachea lumen there was mucus, exfoliated epithelium in the form of sphacelous amorphous masses. As morphometric analysis showed, volume share of ciliated epithelium cells and goblet cells decreased. Quantity of ciliated cells in trachea of experimental group animals reduces dramatically in comparison to characteristics of control group animals. Quantity of goblet cells tended to decrease, too.

Thus, laboratory animals affected by aliphatic hydrocarbons containing fumes suffered from catarrhal desquamative tracheitis, as histological studies carried out on the animals' trachea preparations showed.

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ENVIRONMENTAL AUDITING OF PROTECTED AREAS - A TOOL OF ENVIRONMENTAL MANAGEMENT AND MAINTENANCE OF REGIONAL ECOLOGICAL SECURITY

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At the present stage of development of a competitive economy of Ukraine are added conditions that would require the development of market mechanisms and levers of economic and environmental activities. One of these instruments is the environmental audit as the most effective tool in the environmental management system that allows you to coordinate government environmental policy and politics separate a nature, producer.

Environmental management and audit in Ukraine is introduced based on international standard ISO / DIS 14000 Guidelines for Environmental Audit, developed by the International Organization for Standardization (ISO).

The objects of the environmental audit can be different types of investment, economic, administrative activities of government bodies, enterprises, industrial associations, industries that have or may have ecologically significant effects that affect the environment and human health. The objects of the special environmental audit may also be the territory with definite functional purpose (environmental, recreational, agricultural, etc.) or separate, more narrow areas of activity facilities (for example: waste minimization; safety of the produced product; the control system for environmental pollution, etc.).

The South coast of Crimea is in a critical situation now. It is caused by the imbalance of challenges and needs of the rapidly growing resort and recreation infrastructure in the region and the protected areas of Nature Reserve Fund (NRF).

Privatization of land is leading to a rapid change in land use. It is generates conflicts between the territories of different functional purpose, enhances human pressure on protected areas, leading to fragmentation of the environmental values and the loss of their value. In the current situation requires a full environmental audit of existing areas of

NRF, and all projects (investment, architectural planning, construction, etc.) that can be linked and would entail a transformation of the territorial structure of the South Coast. Customers of environmental audit are the organs of special competence of the state of environmental management, and security holders of the obligations, investors, local governments, etc.

Experience in environmental auditing of environmental facilities and territories in the Crimea have shown high efficiency of environmental auditing as a tool for environmental management. It allows you to align the interests of different land users and landowners, to minimize conflict situations, to ensure the conservation of biological and landscape diversity. This helps to ensure favorable ecological conditions for sustainable development in the region.

The authors have developed and tested methodology and content of the stages of environmental auditing of environmental facilities and conservation areas, as well as a possible scheme of engineering actions to implement the recommendations of the environmental audit.

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ECOLOGICAL ASPECTS OF WASTE COLLECTION AND RECYCLING SYSTEM IN MEDICAL AND PREVENTIVE TREATMENT INSTITUTIONS

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Current medical waste disposal system in Russia is, first of all, focused on contagion prevention. In most healthcare institutions of the Russian Federation potentially infected wastes are disinfected chemically, after that disinfected liquid and semiliquid wastes are discharged into sewerage system, while disinfected solid wastes are collected and removed to rubbish tips along with residential solid wastes. Part of them is cremated. Adding disinfected wastes from healthcare institutions to residential wastes leads to ethical problems in their treatment process. That is why, apart from contagion prevention, there must be a requirement to process this type of wastes till total loss of their properties.

Research objective: to elaborate a recycling scheme as a basis for economically and legally sound system of healthcare institutions waste collection, storage and removal which will provide sanitary-and-epidemiologic welfare and ecological security.

We have considered 3 systems of medical waste disinfection and recycling: centralized, decentralized and cluster ones.

We have conducted a comparative analysis in a megalopolis (St Petersburg). The analysis has shown that for absolute majority of city medical and preventive treatment institutions decentralized system is unacceptable because it runs counter to sanitary regulations and standards, clause 2.2.1/2.1.1.1200-03. This document prescribes a sanitary protection zone of 1000 m around rubbish combustion plants and rubbish recycling plants of capacity under 40 000 tons in case of hazwaste recycling, 500 m – in case of nonhazardous waste recycling.

The findings show that centralized system of wastes disinfection and recycling has significant advantages over decentralized one: firstly, centralized system excludes medical waste disinfection procedures in the place of waste generation, secondly, it implies strictly controlled system of differentiated medical waste collection and delivery to recycling centres with allowance for relevant waste hazard classification. Another important advantage of centralized system is minimizing human factor in waste collection and recycling as specialists in recycling centres are well prepared and few so it is possible to handle production process in an efficient way. Thus, centralized system has high safety margin and fewer risks.

Summary:

1. Centralized system of waste disinfection and recycling meets the requirements to ecological and technological safety at most.
2. Centralized system is economically sound and enables to reduce total expenditures on waste disposal.
3. In the current situation regional regulations have to be elaborated, they must be in accordance with national standards and Russian laws.

Irina Bryukhanova

THE SMALL-SIZED UNITS OF THERMAL WASTE DISPOSAL "ECO "F-2"

"Quartec Ecology" ltd. Co, Moscow, Russia

The company "QUARTEC ecology" has been successfully operating in the field of manufacture and promotion of various ecological and resource-saving equipment for more than 17 years. For this time our firm became the dealer of the several large Russian and foreign companies on sale of the ecological equipment, regularly takes part in ecological exhibitions; closely co-operates with the Ministry of ecology and other nature protection institutions of Russia.

It is well-known, that there are extremely acute problems of destruction of household, industrial wastes in Russia. Annually the payment for storage of a waste at the enterprises increases, and payments for waste recycling increases too. In large industrial regions bases of waste storage and recycling are overflowed, often they mismatch to necessary

sanitary-epidemiologic and to technical requirements, and threaten the population health.

The firm “QUARTEC ecology” offers new device – the small-sized unit of thermal waste destruction “ECO “F-2” which can be used at any industrial enterprises, warehouse terminals, bases of waste storage and recycling, ports, hospitals, etc.

The unit allows to destroy a waste directly in places of their formation and accumulation, that essentially reduces expenses for recycling, considering a payment for storage and transportation of a waste on special waste bases.

The basic advantages: the unit has small size, has high efficiency (180 kg/hour); consumes insignificant quantity of energy; it is easily mounted; the minimum sorting of a waste is necessary; it is safe in operation; it is economic in fuel consumption; it provides observance of norms of maximum permissible concentration on emissions in atmosphere.

The units “ECO “F-2” are successfully maintained in many cities of Russia, the unit is completely certificated according to the Russian legislation.

The “ECO “F-2” allows to destroy the following kinds of a waste: a firm waste of paint and varnish manufacture; rubber, textile; the oiled rags; a paper and cardboard waste; wood sawdust; a bioorganic waste; a firm household waste; oil slimes. It is forbidden to destroy a waste containing heavy metals, substances that include halogens (chlorine materials), solvents.

The unit’s basic elements are: the combustion chamber located on a basic frame; a cover with the reheat chamber of combustion products; a pipe for tap of gases; a control panel combined with the block for fans, a tank for diesel fuel, a diesel burner.

At recycling of a waste there is a burning of the top layer in the turbulent twirled flow of air, with a combination of thermal decomposition of waste under the influence of heats (pyrolysis). The part of generated products is oxidized with a heat release. Released heat is enough for both to pyrolysis, and to moisture evaporation. In a zone of pyrolysis a waste heats up and divides into gaseous and firm components at a lack of air and temperature of 1100 °C.

The generated ashpit in the combustion chamber does not exceed 3-5 % of gross weight of a processed waste.

Ecological safety of units “ECO “F-2” is reached at: use the pyrolyzed decomposition of a waste in the combustion chamber instead of usual process of burning; full combustion of all components of a gas flow in the reheat chamber by maintenance of a high temperature (1100 °C); installation in the reheat chamber the catalytic filter made of heat resisting nichrome.

Thus, operation of the unit “ECO “F-2” allows to lower considerably volumes of a stored waste at the enterprises, improving an ecological situation in region as a whole.

Valentina Burkovskaya
Oxana Ivanova
Oxana Avdeeva

**ELIMINATION OF NEGATIVE EMOTIONS FOR PERSONAL
SELF-DEVELOPMENT AND SELF-ACTUALIZATION**

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Russia*

Ecological situation produces a direct influence on psychoemotional state of a person. There is a pressing problem of emotional and psychic overloads.

The research of this problem is conducted by the innovation creative laboratory “Self-Development and Self-Actualization in the Process of Effective Management”. It was founded under the aegis of the European Academy of Natural Sciences and the European Scientific Society on the basis of the Yelets Branch of Russian New University and Triumph business centre.

“Emotional Health Room” functions on the basis of Triumph business centre. Its activity is directed towards conducting psychological support using highly effective scientific and practical methods based on the application of the self-improvement technology developed by E.V. Miroshnik. “Mobile Emotional Health Room” helps to form the skills of antistress behavior and harmonious communication. This technology was admitted by Russian and foreign self-improvement and self-development experts and it got some awards.

During the implementation of these methods the specialists of the “Emotional Health Room” ascertained that 45.5 per cent of the respondents, being in a conflict situation, attribute different negative traits to people around them as the basis for their rejection and self-acceptance on this background. The technique “Defensive Behavioral Style” developed by E.V. Miroshnik was applied as the diagnostics. Thus different negative emotional experiences and perceptions maintain homeostatic balance and progress at the subconscious and unconscious level.

Psychological defense distorts the reality in order to ensure momentary emotional well-being. It operates without consideration of long-term perspective. Its object is achieved through the disintegration of behavior, which is often connected with the appearance of deviations and deformations in personality development.

In order to increase personal efficiency of self-cultivation there was a suggestion to develop emotional intelligence for elimination of negative emotions and achievement of set goals.

Antistress Room equipment and program system enable to optimize psychoemotional state and develop emotional competence of a person.

According to Professor Martin Seligman at the University of Pennsylvania, your life may go by, if you don't pay attention to the perception of good and joyful things and focus on the difficulties of our life instead.

Valentina Burkovskaya

ECOLOGY AND PUBLIC HEALTH IN POST-SOVIET RUSSIA

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Environmental conditions make a great influence on public health. Every human and citizen has a right to know about the ecological situation in the area, where he lives, and in the whole country.

Ecological situation in Russia remains serious, it causes public health quality lowering. The atmosphere sample results from Moscow, Lipetsk, Tver, Kalinnigrad and other regions are five times greater than the maximum permissible concentration of air pollutants. Chemical and petrochemical industries, ferrous and non-ferrous metallurgy, power industry, building materials industry still remain main sources for pollution. Air pollution irrputed because of car exhaust fumes, which make up 70 per cent of the total exhaust gases (in Moscow and other large cities of Russia – over 70 per cent). At the same time no cardinal solution was made on the issue of the exhausts reduction.

About 70 per cent of harmful atmosphere emissions are captured and neutralized every year in our country. Over 70 million people breathe the air full of harmful substances. The human introduced into the natural environment about four million chemical compounds. Only some of them are examined for toxic influence.

There are about thirty thousand works and facilities in Russia using radioactive materials and production on their basis. Nuclear tests did Russian ecosystem a lot of harm.

Bad ecological situation causes heritable diseases. So, according to the World Health Organization, heavy metals rank second for their danger behind pesticides and they are far ahead of such well-known polluters as carbon dioxide and sulfur dioxide (according to the forecast, they may become most dangerous – even more dangerous than nuclear power plant wastes). Heavy metal salt poisoning begins before the birth of people, babies are born with malformations of the urogenital system. It is quite common when a child has 4 – 6 systemic disorders. Lead level rise results in mental impairment (12 per cent of Russian children are under the impact of this factor).

The problem of potable water remains pressing. 99 per cent of Russian cities, 83 per cent of urban communities and 22 per cent of rural communities have centralized water supply systems. En masse it is 90 per cent of the whole population of the country. There is stable shortage of potable water in the number of regions (Orenburg, Rostov, Yaroslavl and other regions). 20 per cent of all (centralized) potable water supply sources don't meet sanitary standards. As a rule, ground waters have high hardness and salinity levels.

Working conditions remain unfavorable practically in all branches of economy. It is connected with the weakening of working people's social protection and with employers' neglect of their responsibility for labor protection and better working conditions. More than 5 million people (1.5 million of them are women) have outdated workplaces.

Unsatisfactory working conditions always cause high level of industrial diseases. Better working conditions for pregnant women still remain a pressing problem.

Epidemiologic situation is also difficult. From 33 to 44 million infectious morbid events are registered in Russia every year. The rise in tuberculosis morbidity began after 1997, its annual increase is about 10-15 per cent. About 100 hundred alimentary and water-borne enteric infective episodes are registered every year. HIV morbidity has dramatically increased since 1997.

Numerous mobile and stationary noises cause problems for many population aggregates.

Thus, the public health assessment indicates problems, which may cause public health deterioration. It is also clear that the pending problems can't be solved only by department efforts. That is why in recent years the attention is concentrated on the National Project "Health". According to the Chamber of Accounts, Russia will reach appropriate indicators of the Eastern European countries by 2015. A half of total national projects funds is appropriated for these purposes. The program level of costs is maintained despite the world financial crisis. It makes possible to strengthen the material and technical basis of medioprophilactic institutions and complete medical training system. The program will make it possible to increase the efficiency of the health care system.

Igor Burkovskiy

ENVIRONMENTAL PUBLIC AND LAW ENFORCEMENT COOPERATION

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The application of the judicial system to protect civic ecological rights is the most efficient channel of the public influence on the ecological situation. Such institutions as cassational appeal, supervisory appeal, the right of citizens and public organizations to participate in processes, formation of the Commissioners for civic rights institution and some others can be used for this purpose. Russian judicial system partially reacts to initiatives of the ecologically concerned public: judges accept dozens of claims, public organizations won some law suits in Moscow, Tomsk, Chelyabinsk, Khabarovsk, Tyumen, and at Baikal Lake, Sakhalin and in some other regions.

On the other hand, the cooperation of public and law enforcement agencies in environmental protection faces a number of difficulties and contradictions. According to the Soviet tradition, the public opinion regards any reference to the court as a display of claimant's quarrelsome temper. The citizens also don't trust the court system as a government institution. Unfortunately it is confirmed by many examples so far. Sometimes even well-known lawyers conducting nature protection cases may be framed up. The method of

making up artificial barriers for registration and re-registration of public organizations is also applied, as well as liquidation of public organizations by court decisions after the lawsuits started by registries. (For instance, Krasnodar regional public environmental organization “Ekurs” faced such problem in 2002 because it didn’t present its activity report, although, according to the law, this fact can’t cause such court decision).

The experience suggests that the police function to provide environmental safety is not performed properly. However this direction is not mentioned in the official list of police powers (except GIBDD - Traffic Safety Department). Such form of police and public cooperation as police helpers practically vanished. The experience of the ecological police work approved by All-Russian Conference on Environmental safety didn’t become widespread.

In early 2000-s Russian political regime tended to intensification of its authoritarian principles. There are objective reasons for this historically and objectively reasonable trend to a certain extent. However, if the state concentrates the power in its hands, it shouldn’t relieve itself of responsibility for numerous problems. The public can play an important role in their solution. The state should support constructive and useful public activity, particularly concerning the cause of environmental protection.

Vitaly Burkovskiy

THE SITUATION WITH THE IMPLEMENTATION OF CIVIL RIGHT TO A FAVORABLE ENVIRONMENT IN RUSSIA

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Russian citizens’ right to a favorable environment is guaranteed by federal and regional legislation. Article 42 of the Constitution of the Russian Federation vests this right, it also guarantees the right to reliable information about environmental conditions, the right to compensation for damages to health and property caused by ecological offences. In 2002 the Ecological Doctrine of the Russian Federation was adopted. Ecological rights are also reflected in federal laws “On Environmental Protection”, “On Sanitary and Epidemiological Welfare of the Population”, “On Environmental Expertise” and some others.

At the same time, the right to a favorable environment is most often infringed. Some rights are not exercised, such as the right to compensation for damages caused by ecological offences; to up-to-date and reliable information about the environment; the right to post-conviction remedies etc. The main rights violators are business entities and even environmental and sanitary-epidemiological agencies. The state didn’t manage to implement the principle of the inevitability of punishment for economic offenses.

The existing Russian legislative basis in principle makes it possible to influence on the

government decisions. At the same time, Russian citizens are not informed enough about their ecological rights. Thus in 2002 there were compulsory ecological education standard acts only in 16 subjects of the Russian Federation.

A striking example of civic ecological rights violation in Russia was the failure of the all-Russian environmental protection referendum in 2000. The right for ecological information is sometimes limited by a reference to the necessity of state secrets protection. Consequently many ecological offences remain unpunished. A number of civic rights were violated by the decision to import spent nuclear fuel to Russia (2 thousand tons and 550 cubic meters of highly toxic nuclear wastes). There wasn't necessary technical control for the work with spent nuclear fuel and transparent ecological expenses plan, which could guarantee proper use of the funds raised in Russia.

Many aspects of civic ecological rights implementation depend on the Executive Branch. However, we may face there ecological incompetence, ignorance and adventurism. Besides, some executive officials are easily lobbied by businessmen. They also put obstacles in the way of public participation in decision making and implementation process. Interpenetration of crime and officialdom took place in some branches of nature management. The judicial system depends on executive authorities and there are some reasons for it to allow some environmental violations in particular cases. Thus, there is an obvious gap between declared by the Constitution and legislation ecological civic rights and their practical implement. Among all others reasons for such a situation, the increasing of responsibility for authorities and officials making decisions, concerning the environment, assumes key significance.

N.A. Buzalo
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ECOLOGICAL PROBLEMS OF SMALL TOWNS IN SOUTH OF RUSSIA (TOWN OF NOVOCHERKASSK: CASE STUDY)

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The town of Novocherkassk was founded in 1805 by the Cossack ataman, count M.I. Platov, the hero of the war with Napoleon. The downtown planning was designed after the project by French military engineer De Volan according to European standards of the 18th century, with consideration for the specific terrain relief – the town is located at a high hill, making it visible at long range in the surrounding steppes.

The residential development of the 19th – beginning of the 20th century is basically represented by one-family dwelling-houses. During the Soviet period each room of these houses was inhabited by separate families, leading to replanning, construction of multiple unsightly additional buildings, caused by quite natural residents' desire to improve their living conditions. Nowadays, planning and technical equipment at such houses does

not meet any physical state requirements. From the social and demographic view point, these houses are inhabited by the most vulnerable groups of society.

The houses located in downtown area are of considerable historical and artistic value, have a sufficient remaining life expectancy, however, they require thorough condition survey, engineering documentations renewal, financing of maintenance and repair work, attention from the local administration. Structural damages and flaws, being accumulated in the process of building service, change in terms of quantity and quality. Unattended, even insignificant damages can cause severe structural deformations and breakdown. Safe performance of building constructions is stipulated by effective measures assumed during the service period for damages and flaws elimination and limitation of their deleterious effects.

Environmental condition of Novocherkassk is defined by several peculiar factors, such as industrial enterprises, heavy traffic, poor state of green planting, high degree of urban area underflooding. Additionally, city water objects are heavily loaded by urban run-offs that get to the surrounding rivers without sewage treatment.

City administration carries out environmental actions, aimed at reduction of such industrial emissions, as carbohydrates, carbonic oxide, coke dust, sulfur dioxide, hydrogen sulphide, etc. These actions resulted, for instance, in reduction of carbohydrates emission at 85%; reconstruction of engineering plant gas-cleaning installations made it possible to reduce carbonic oxide and dust emission.

Project of loop road construction with a new bridgework across the Tuzlov river is being developed to reduce environmental pressure from traffic.

The work, carried out at our University with the students' participation, is aimed at implementation of systematic, long-term control over the technical condition of all dwelling-houses in the historic part of Novocherkassk, exposure of their damages and physical deterioration, elaboration of scientifically grounded recommendations for their further maintenance in serviceable condition; development of methods to increase building structure durability under influence of natural and anthropogenic aggressive environments.

Social human environment is connected with preservation of residential sphere and involves solution of technical, technological, ecological, and economic issues.

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INNOVATIONS IN MANAGEMENT OF RUSSIAN GOVERNMENT INSTITUTIONS

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The oncoming information era offers new approaches to the management of modern organizations, including management of government institutions (hereinafter-GI).

One of the essential features of government institutions under modern conditions is the fact that their performance is at the intersection of business processes that require market flexibility along with the execution of government orders and strict regulations. Therefore, there is a necessity to take into account principles of management requiring a combination of competence of narrowly focused specialists, efficiency and high productivity of top management. Traditional functions of management involving planning, organization, motivation and control have undergone certain changes both in terms of transformation of the role of top management and establishment of management communications. Thus, performance of government institutions seems to be organizationally combined or even diversified. In practice, it's always difficult to fulfill all these aspects. There is a lack of clear recommendations on strategic planning activities of government institutions, such as universities.

We assume that performance planning of government institutions, particularly, universities, concerning market interactions is to rely on the Balanced Scorecards (Balanced Scorecards, Harvard Business Review, 1992; hereinafter, BSC) firstly developed by R. Kaplan, D. Norton and L. Meisel. However, there are hardly any scientific works on the Balanced Scorecard of government institutions and those in charge of them often implement modern management by intuition or according to the outdated traditions.

From our point of view, the BSC system is to be adjusted to a particular GI or educational institution in accordance with its mission and strategy for implementation of the following four parameters: performance, education, economic growth and development of labour force. The BSC should not be in contradiction with the essence and parameters of budget planning and program-oriented development.

Such a function of management as work organization is a process of distribution of resources and tasks among the staff and coordination of these processes to achieve the goals of government institutions. The responsibilities of the top management are the following: selection and formation of the organizational object, identification of modes of operation, formation of mechanisms of its adaptation in the external and internal environment.

Management models existing in practice should be complemented by a distribution of rights and responsibilities in a government institution enabling fulfillment of its tasks. This work sometimes requires divisional management structure where centralized management of polystructural economic activities is combined with decentralized item-by-item management of market units oriented at consumers, products, or territories.

As we see it, the divisional structure applied in practice has become less effective than matrix structure, which is usually used in the management of joint stock companies or holdings. Quite often government institutions, which are not holdings, actually function as such because they have divisions where the same specialists can work. To some extent, the work of government institutions may include mini-clusters necessary for implementation of particular projects. In our view, it is the matrix structure that is result-oriented and gets the maximum results from employees. In this case, human capital assets are most fully used by government institutions.

The matrix structure also requires staff support through motivation and incentive activities. Direct financial incentives do not always lead to the necessary motivation, although they provide a chain “work - result.” Moral incentives do not substitute physical, moral satisfaction from work and recognition of employee’s achievements is still important for the worker. Motivation and incentives in modern government institutions also require further scientific development.

Use of other assets of an institution has also changed its priorities. Public institutions tend to possess tangible assets such as buildings and structures as well as intangible assets to be mobilized for the development of an institution itself. Very often fulfillment of intangible capital is more significant than renting of already old buildings. That is, traditional tangible assets have become less important for the successful operation of government institutions than unused possibilities of intangible resources. Government institutions creating or acquiring intangible assets rarely plan their constant use. At the same time, inventions and patents can be a “dead” load for such an institution. Both centralized and in-house systems of accounting and valuation of intangible resources are required. This is how they start being applied. The application of the BSC system, which we have already suggested, will stimulate the exploitation of intangible resources.

The transition to an information-oriented society requires efficiency of manager’s performance and high adaptation to the changing environmental conditions. In other words, government institutions are to have the ability of flexible transformation while using effective market structures and management systems.

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L.A. Masaylova

HYGIENE APPROACH TO JUSTIFICATION OF ADMINISTRATIVE DECISIONS ON REDUCING THE RISK OF IODINE DEFICIENCY DISEASES

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At the regional level, carried out an epidemiological researching on the contribution of environmental factors in the formation of IDD(iodine deficiency diseases)/

The aim of this work was scientific justification for a system of preventive measures to reduce the risk of iodine deficiency diseases caused by unfavorable environmental factors.

Solve problems in complex hygienic assessment of the habitat 33 municipalities of the region to identify the factors and areas of risk, the prevalence of iodine deficiency disorders among the population with an estimate of their severity, the definition of causation, risk assessment of chronic effects of pollutants on the immune and hormonal system. Final objective of the researching was justification of preventive measures for management decision to reduce the risk of developing iodine deficiency disorders, identifying ways of

their implementation and evaluation.

Materials and methods. Performed hygienic assessment antropotekhnogennoy burden on the environment based on the regional system of socio-hygienic monitoring. On the dysfunctional area on the level of technogenic load assessed the risk of chronic effects of pollutants on the hormonal environment and the immune system of the population. The are groups of risk. The researching of daily rations of organized groups. The degree of iodine deficiency states in the pilot areas identified by WHO criteria. To quantify the relationship between the level of antropotekhnogennoy load and morbidity of the population used correlation analysis.

Results and discussion. Calculation of complex human influence has allowed to identify the territory of risk - Voronezh (SR = 16). Identified chemicals that selectively influence on the hormonal and immune systems, the total hazard index (HI) was 15.9 for the immune system and 1.8 for the hormonal system.

Statistically significant association between the total air pollution (Katm) and endocrine disease ($r = 0,63$ at $p < 0,05$); indicators of morbidity diffuse goiter associated with micronutrient deficiency, and manganese concentrations in drinking water ($r = 0.23$ at $p < 0,05$).

Laboratory researching 53 daily rations showed a 30% deficiency of iodine in the body with respect to the daily needs.

The results of the pilot epidemiological researchings on the studing of thyroid diseases among children in four districts of the city of Voronezh, and showed that the incidence of endemic goiter greater than sporadic incidence in rural areas from 5 to 12 times, the median urinary iodine varied from 35,0 to 86,0 micrograms per liter. These neonatal screening for congenital hypothyroidism showed that among the examined groups of newborns increased frequencies.

A model of IDD prevention and advice on minimizing the impact of unfavorable factors, and suggestions made in the regional target program. Economic efficiency by preventing 460 new cases for the city of Voronezh was 2.5 million rubles.

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TECHNICAL APPROACHES TO WORKING CONDITIONS QUALITY ASSESSMENT

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Working conditions of people are to be safe. Besides, a human being needs a feeling of comfort (ecological compatibility of a working place). Obviously, the only way to

create comfortable environment is to normalize factors that are perceived by human sense organs.

In our research we have analyzed assessment criteria and estimated each factor share, as a result we have offered the following mathematical model (1):

$$K = \frac{\sum H_i \cdot m_i}{\sum m_i} \quad (1)$$

where K – working conditions quality index; H_i – assessment of working process factors and working environment quality; m_i – number of working process and environment factors.

We have elaborated the following formula (2) to calculate working process factors quality (heaviness and intensity of work):

$$H = \left(\frac{\frac{P_1 \cdot N_1}{n_1} k_1 + \dots + \frac{P_7 \cdot N_7}{n_7} k_7}{m} \right) \quad (2)$$

where P – working conditions criteria; N – degree of dependence on index category, measured in points; m_n – number of working process factor indices; k – empirical coefficient.

In a similar way we have analyzed criteria of microclimate and illumination environment and worked out algorithms of microclimate comfort index and illumination environment comfort index calculation as well as elaborated mathematical models allowing to describe interaction in the system “working conditions – human health”. This makes possible to determine how comfortable a worker feels in certain microclimatic conditions and illumination environment, which parameters influence a worker and to which extent they do.

To assess microclimate comfort there is model 3:

$$H = \frac{\sum_{j=1}^l k_j \left(\sum_{i=1}^n \frac{P_{ji} \cdot N_{ji}}{n} \right)}{j} \quad (3)$$

Where H – microclimate comfort index; n – number of assessment criteria for each microclimate parameter; N_{ji} – point given to each microclimate parameter (according to five-point system in proportion to each index share); k_j – comfort coefficient according to microclimate parameters; j – total number of indices; P_{ji} – assessment criteria in ascending order in proportion to working conditions class.

To assess illumination environment comfort there is model 4:

Where H – illumination environment comfort index; n – number of illumination

$$H = \frac{\sum_{j=1}^l k_j \left(\sum_{i=1}^n \frac{P_{ji} \cdot N_{ji}}{n} \right)}{j} \quad (4)$$

assessment criteria; N_{ji} – point given to each parameter of illumination (according to five-point system in proportion to each index share); k_j – comfort coefficient according to illumination parameters; j – total number of indices; P_{ji} – assessment criteria in ascending order in proportion to working conditions class.

This method can be used during ISO standards implementation in an enterprise because certification process includes the following elements (at the level of individual executors and departments as well as at the level of enterprises): activity planning, analysis and results assessment, controlling, error correction, documenting, storing documents, staff training and financing of works which correspond to quality management system according to ISO standards terminology.

D.O. Dushkova

CASUAL-CHAIN ANALYSIS OF THE SYSTEM “ENVIRONMENT – HUMAN HEALTH” IN REGIONS OF THE RUSSIAN NORTH

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Casual-chain analysis of the system “environment – human health” includes characteristics of morbidity rate, analysis of the factors, which impact morbidity, finding correlation between human morbidity and ecological factors.

Extreme climatic-environmental situation in the regions of the North creates specific living and labour conditions and is reflected at human health.

The Russian North – a circumpolar region with a rapidly developing economy. The development of the Russian North is focused upon the exploitation and use of natural resources. This economic activity proceeded without adequate understanding of the specific environmental impact and consequent protective response. In addition, no account was taken of the scientific foundations for the sustainable maximum levels environmental pollution within different ecosystems and climatic zones. It caused heavy pollution loads and ecosystems disruptions – “hot spots” of the Russian North. Northern cities – Monchegorsk, Archangelsk, Vorkuta, Noril’sk etc. are among them. There are about 100 such hot spots (Evseev, 2007). Economic development of the northern territories causes deterioration of natural ecosystems and accumulation of anthropogenic pollutants in ecosystems components, which have negative impact on human health reflected in high morbidity and mortality levels.

So, this research is presented the classification and assessment of anthropogenic impact and ecological risks in such “hot spots”. Special attention was given to the casual chain analysis of the system „environment – human health“, in particular to the analysis of ecology-connected morbidity indicators. Research data is based on the results of our many years field works in the described regions. Investigations of chemical compositions of air, soil, vegetation and sediment have been carried out. Regional statistic medical data were also used. In our research (Evseev, Krasovskaya, 2009; Krasovskaya, 2008; Evseev, Dushkova, 2006 etc.) we presented an attempt to determine types of activities and sources causing hot spots forming in the Russian North.

Special concern causes morbidity rate in the regions directly connected with environmental pollution. This problem becomes critical in large industrial cities of the region – Monchegorsk, Norilsk, Vorkuta, and etc. regions with high medical-ecological risks. The population of these cities, especially children, is subjected to mass chronic diseases of bronchitis, pneumonia, lung cancer, bronchial asthma, allergy, for women complicated pregnancy is observed, and etc.

Extreme climatic-environmental situation of the North reflected at human health and caused also regional connected diseases: polar anaemia, meteorological neuroses, immunological unsufficiency, avitaminosis, erythrocytes unfavourable changes etc. All this explain heightened sensitiveness of urban northern population to environmental quality.

Physical-geographical conditions combined with heavy technogenic load are to blame for serious health problems in the city. Investigations of morbidity and environment pollution correlations showed their close connection: respiratory diseases (occupy the first place for children (up to 14 years) morbidity), vascular diseases, digestion diseases, cancer, traumas are marked, infectious diseases are relatively rare. It was revealed heightened death rate from cancer for workers of the processing factories. This is connected with emission of some carcinogenic and mutation chemical compounds during technological processes, containing phenols, dioxins, benz(a)pyren etc.

Maps of ecological tension and ecology-connected morbidity were compiled. They enable to compare these territories considering the factors of morbidity connected with adverse environmental impact. The negative trend of human health dynamics was found and territorial differences revealed. The results enable to define regions with high medical-ecological risks.

The investigation was made by project 08-05-00591-a “Analysis of impact of modern nature management structure pattern at the Russian North on the state of its nature capital ecological parameters” (2008-2010) supported by the Russian Foundation for basic research.

Z.V. Dushkova

FORMIERUNG DES KULTURELL-ÖKOLOGISCHEN PARADIGMAS IM KONTEXT VON DER EINHEIT DES MENSCHEN UND DER NATUR

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Ökologisch orientierte Betrachtungsweise ist heutzutage für viele Wissenschaftsdisziplinen von zunehmender Aktualität, meisten davon berichten von einem größeren, transdisziplinären Diskurszusammenhang über die Beziehung von Kultur und Natur. Für eine solche Integrationsleistung steht insbesondere der Dialog zwischen Kultur und Ökologie. In der Arbeit wird solcher Diskurs betrachtet, die gerade aufgrund ihrer ästhetisch-fiktionalen Transformation ein besonderes Potential und eine besondere Funktion in der symbolischen Repräsentation der Kultur-Natur-Beziehung gewinnt. Ökologisches Paradigma in der vorliegenden Arbeit gilt als ein Begründungszusammenhang für Integration der Menschen mit der umgebenden Natur.

Der Begriff Paradigma wurde in den 60en Jahren von dem Wissenschaftstheoretiker und Philosophen Thomas Kuhn in die wissenschaftliche Diskussion eingebracht. Nach T. Kuhn (1967) ist ein Paradigma der Wissenschaft: „...eine wissenschaftliche Schule oder Strömung, die einen gemeinsamen Fundus an Theorien, Methoden, empirischen Befunden, Meinungen und Wertungen aufweist“. Der ökologische Ansatz befasst sich mit der Umwelt des Menschen, besonders mit den Wechselwirkungen zwischen dem Individuum und seiner Umwelt. Definition des Paradigmas kann in den Natur- und Geisteswissenschaften zweifach gedeutet werden: als grundlegendes Element der wissenschaftlichen Erkenntnis von Naturgesetzen, sowie auch als einigen sozialen und kulturellen Imperativ der sozialen Aktivität.

Als Beispiele solches ökologisches Paradigmas sind Konzeptionen von Biosphäre und Noosphäre von W. Wernadskij, die viele Anhänger aus verschiedenen Wissenschaftsdisziplinen gewonnen haben. W. Wernadskij zufolge sind der Mensch und die Menschheit mit dem lebendigen Stoff, der unseren Planeten besiedelt, aufs Engste verbunden. Die Formierung des kulturökologischen Paradigmas bewirkten auch Arbeiten von vielen Wissenschaftlern und Denkern verschiedener Zeiten: französische Aufklärer Wolter, Rousseaus, Kondorse (die Geschichte der Menschheit ist der Prozess der Verstärkung ihrer Vernunft, ihres Einflusses auf das Leben anderer Menschen), S. Monteskje (entscheidende Rolle der Umwelt auf die Veränderung der menschlichen Natur), L. Metschnikow (die Nähe irgendwelches Territoriums von den Wasserressourcen als Triebkraft der Gesellschaftsentwicklung), A. Tojnbi (das Mechanismus „der Aufruf — die Antwort“: der erste kommt aus der natürlichen Umgebung, und die Gesellschaft muss ihm eine adäquate Form der sozialen Organisation schaffen oder umkommen), L. Gumiljow (Entwicklung eines beliebigen Volkes ist das Ergebnis des „Passionaren Stoßes“, der aus dem kosmischen Raum als Signal gekommen war), A. Tschischewskij (der Einfluss

der sonnigen Aktivität auf die Tätigkeit des Menschen als Triebkraft des historischen Prozesses).

Weiterentwicklung des kulturökologischen Paradigmas ist in den 1970-1980-en Jahren zu vermerken, wenn Systemforschungen von Club of Rom, Arbeiten zum UNESCO-Programm „Mensch und Biosphäre“, zunehmend Aufmerksamkeit zu den ökologischen Problemen von der Organisation der Vereinten Nationen entstanden sind. Das alles führte zu dem Wandel des alten anthropozentrischen Herangehens bei Wechselbeziehung von Menschen und Natur zu den neuen ökologischen Paradigmen, die durch kulturelle Aspekte gekennzeichnet wird. So wird das Weggehen vom Prinzip der Einmaligkeit des Menschen bezüglich anderer Tiere charakteristisch, der Mensch ist einer von vielen anderen Tieren, die in der globalen biophysischen Umwelt aufgenommen sind (Dunlap, 2002). Zum Unterschied von alten anthropozentrischen Herangehen, wo Kultur und technischer Progress den unendlichen sozialen Progress gewährleisten, gibt es im neuen Paradigma ökologische Einschränkungen. Dabei ist es wichtig, die Methoden der soziokulturellen Interpretation der ökologischen Wissen und Information auszuarbeiten, die ökologischen Einschränkungen der Massenkultur zu ermöglichen. D.S. Lichatchjov (1991) hat sehr genau gesagt: „Ökologie ist ein moralisches Problem“, sind soziokulturelle Aspekte der ökologischen Programmen sehr wichtig. Nur dann kann die Verantwortung des Menschen für die Umweltbelastung berücksichtigt werden sein.

A.R. Fayziev
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I.S. Oimahmadov
M.L. Gadov

THE ENVIRONMENTAL PROBLEMS CONNECTED WITH MINING OPERATIONS (ON THE EXAMPLE OF TAJIKISTAN)

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The Republic of Tajikistan is a highland where about 93 % of its territory is occupied by mountains. Here large ranges, such as Pamir and Tien Shan are located. On Pamir, the highest mountain knot of the Central Asia, mountain chains of Karakorum, Kunlun and Hindu Kush converge.

In Tajikistan it is revealed and reconnoitered more than 500 mineral deposits from which more than 100 are mastered by the industry. In this small country functioned and a considerable quantity of the mountain-concentrating enterprises functions. Their uncontrolled activity has led to negative consequences, and has broken an ecological condition of environment and a natural landscape of district.

Especially visually it is possible to show it on an example of Karamazar, one of the most developed mining regions of Tajikistan located in the north of the country.

In Karamazar the large quantity of the thrown mountain developments (ditches, tranches, open-cast mines, mines, tunnel, lamellar, etc.) with their sailings, and also “tails”

of ore dressing industrial complexes, factories and factories now is observed. If to it to add numerous ancient mountain developments and a waste of mountain crafts of our ancestors which throughout many centuries extracted silver in Karamazar, gold, copper, lead, iron, arsenic, etc. metals the ecological disaster is available. Only around unique many metals deposits of Big Kanimansur the total amount of the ore which have been taken out by ancient miners, is measured about 1200 thousand cubic meter.

Infringement of a landscape of district in Karamazar Mountains has led to cataclysms, first of all, to erosion of soils. Erosion strengthening, in turn, promoted occurrence of other spontaneous natural processes - landslide, to collapses, earth flows, district desertification, increase of the periods of a drought, degradation of pastures, deforestation. Last as a dominating process of degradation of an ecosystem, have led to decreased flow rate water sources or causes drying.

If all noted natural phenomena break basically district landscape territories where uranium ores were extracted, besides, represent considerable danger to health of the people living there. Sailings of uranium mines and tunnels, and also industrial wastes from processing of this metal which was extracted in Karamazar mining area since 50th years of last century and where hardly any protective actions have been provided. On a day surface, at times in immediate proximity from settlements, the waste of uranium ores, in tens times exceeding admissible doses of radiation. In dangerous affinity from some of them gardens were set up, economic constructions or even premises are erected.

These are problems connected with investigation and mining operations in Tajikistan for future environmental monitoring and sustainable development of the country.

S.V. Fedorov

Die VERARBEITUNG VON PHOSPHOGIPS ALS DER SPIEGEL DER STAATLICHEN ÖKOLOGISCHEN POLITIK RUSSLANDS

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"Die Sorge um den Menschen selbst und sein Schicksal muss immer das wichtigste Interesse aller technischen Unternehmungen sein. Damit die Erzeugnisse unseres Geistes zum Segen und nicht zur Peitsche für die Menschheit gereichen werden. Das sollte man mitten unter seinen Diagrammen und Gleichungen nie vergessen."

A. Einstein

Es ist unangebracht, ökologische Komponente des Problems der Überarbeitung

von Phosphogips wieder auf dem hohen wissenschaftlichen Niveau zu besprechen. Für 75 Jahre der Existenz dieses Industrieabfalles in Russland ist über seinen Einfluss auf Umwelt bereits alles gesagt:

- Es ist einer von größten Technogenen Abfällen, der schweren Schaden an der Umwelt beibringt. Technische Probleme von seiner Überarbeitung auf für Menschen nützlichen Materialien werden erfolgreich gelöst;
- Es gibt dazu etwas Dutzende nur russischen Technologien, die mit Patenten geschützt sind;
- Europäische Erfahrung beweist eine Möglichkeit für Überarbeitung des Phosphogips und des Phosphohalbydrates, die aus Kola Apatitmaterials ihren Ursprung haben, in vollem Umfang seiner Bildungen;
- Die Statistik bestätigt, dass technogener Rohstoff es vollständig zulässt, die Bedürfnisse der Russischen Föderation nach dem natürlichen Gips abzudecken;
- Noch 1983 ist vom Samojlov-Forschungsinstitut für Düngemittel und Schädlingsbekämpfung (NIUIF in Moskau) die Wirtschaftseffektivität von der Nutzung des Phosphogips (nach den gebrachten Aufwendungen im Vergleich zur Nutzung von traditionellen Arten des Rohstoffes) bewiesen.

Die sozialistische Wirtschaft war durch den Kapitalismus ersetzt, aber weder der gesunde Menschenverstand noch Erfahrung von entwickelten Ländern und die Wirtschaftsberechnung haben zur Problemlösung nicht gebracht. Der Phosphogips wird in Russland nicht verarbeitet. Es gibt keine Gesetze der geraden Handlung, die Naturschutztätigkeit, Abfallwirtschaft oder Engriesparen fördern. Die bedeutende Vorräte des natürlichen Rohstoffs und riesigen Territorien erlauben der Wirtschaft auf extensiver Weise noch zu existieren. Aber ob es noch lange dauert? Es sind weltweiten Quoten auf 2- Auswürfe eingeführt.

Eine Bedrohung von Ökokatastrophe wird die Menschheit unvermeidlich erzwingen, auf ähnlichen Maßnahmen in Bezug auf andere Gross-Tonnage technogenen Abfälle zu ergreifen.

Unserer Meinung nach ist Russland zur einmaligen Lösung dieses globalen Problems nicht bereit.

Deshalb ist eine harte langfristige staatliche Politik auf den Abfallwirtschaft Gebiet in Russland und ihre planmäßige strenge Realisierung dringend notwendig. Es ist eine zielgerichtete staatliche Politik des vernünftigen Hinlänglichkeits von Verbrauch natürlichen Ressourcen auf den föderalen, regionalen und lokalen Ebenen, die von Gesetzen, Steuern und Investitionen gefördert wird, und maximale Ersetzung von den Abfällen und des Konsums von natürlichen Mineralrohstoffquellen benötigt. Wichtig ist bei der Lösung der ökologischen Probleme eine breite Teilnahme der Bevölkerung.

E.P. Filimonova
I.P. Ponomarenko

ESTIMATION OF SURROUNDING ENVIRONMENT IN THE ZONE OF THE OLYMPIC OBJECTS

Open Company «New Ecological Company», Krasnodar, Russia

City-resort of federal value Sochi – is a unique in Russia the subtropical resort located at the Black Sea coast of Caucasus. The territory of Sochi is extended along coast of Black sea on 145 km, occupying the 3, 5 thousand square kilometers. Population of Sochi – 406, 8 thousand people.

The basis of Sochi is made by a sanatorium complex which is the largest in Russia. In Sochi 579 various establishments of treatment and rest are located. Mineral sources of river valleys of Matsesta, Agura and the Hosta have generated balneal base of a resort. The greatest popularity have received sulfate-chloride-sodium waters of Matsesta.

As a whole the big Sochi is ecologically safe territory with high degree of forests (95% are covered by woods) and presence of especially protected natural territories (the Caucasian biospheric reserve, the Sochi national park) which make 81,5 % from a total area.

Environmental problems are concentrated now in the Central area, in Sochi. From environmental problems of the most actual for Sochi are:

- Environmental contamination by an industrial and household waste;
- Pollution superficial and ground waters;
- Pollution of atmospheric air;
- High recreational loading;
- Infringement of modes of economic activities within zones with special conditions of use;
- Reduction of a coastal zone;
- Degradation of OOPT.

Within the limits of preparation for winter Olympic games of 2014 in Sochi building more than 200 objects are planned. The program of building of the Olympic objects and a development of the city of Sochi as mountain climatic resort was confirmed by the Government of Russia. In 2006 the Federal Target Program «Development of Sochi as mountain climatic resort (2006-2014) » has started to operate.

In this connection nature protection bodies of Krasnodar region had been spent works according to influence of projected objects of building on environment and the nature protection actions, which purpose are offered – to provide ecological safety of territory, unique under the landscape - biotic characteristics.

The territory covered by actions the Program «Development of Sochi as mountain climatic resort (2006-2014)» in the geographical relation represents two zones: mountain, dated for a valley of the river of Mzymta, and seaside, located on Imeretinsky lowland, at coast of Black sea. Within the limits of the Program building of 15 Olympic objects,

including 8 objects within functional zones of territory of the Sochi national park is planned.

For each of zones possible influences on components of the surrounding environment are marked, predicted intensity of their course and offered measures on influence minimization.

For the purpose of influence minimization on a soil cover after the building end, all mentioned and broken earths will be recultivated and arranged well. At a stage of carrying out of the Olympic Games of 2014 influence on ground resources will be limited by a building zone.

Regarding protection of a vegetative cover, fauna the following is provided:

- Protection of natural wood vegetation;
- Protection located within lowland in immediate proximity from constructions of vegetative objects and nature sanctuaries;
- Change in similar habitats of especially protected kinds of plants;
- Engineering protection with a view of preservation of a natural hydrological mode of habitats of unique vegetative communities;
- Creation of constantly operating system of biomonitoring of the ecosystems having unique value for preservation biovariety of natural complexes.

Influences on water bioresources is shown in possible negative influence of realization of the Program on fish resources of those reservoirs which settle down in projected territory. The influence estimation is directed on working out of the necessary mechanisms (actions) directed on prevention of such negative influence.

Ruslan Gazarov

ENVIRONMENTAL SITUATION AND DEVELOPMENT OF CAUCASIAN MINERAL WATERS RESORT REGION

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Specially protected environmental and resort region of the Caucasian Mineral Waters (CMW) in the Russian Federation is a unique area.

The Caucasian Mineral Waters region has a population of about 1 million people and an area of 5800 square kilometers. Besides, there are about 40 thousand guests and patients at a time at the resorts of the region.

The share of the CMW region in the economy of Stavropol Territory is 35 per cent of retail turnover, more than 25 per cent of industrial production, more than 20 per cent of capital investment, more than 10 per cent of agricultural industry.

The problem of waste collection and recycling is very serious, it has a negative influence on the resort and recreation area potential of the region. Annual waste generation of the

CMW region is about 500 thousand tons. Only 130 thousand tons of them undergo thermal recycling at the waste incineration plant.

There is superficial waters pollution. Rivers are polluted by domestic and industrial sewage. A significant part of the housing stock is still unsewered. In most cases, storm sewage and meltwater of cities and settlements are discharged without treatment and disinfection. Water protection zone regime is violated. The quality of water bodies in the region requires constant control.

Air pollution level is growing. The main part of it (more than 90 per cent) is motor vehicle air pollution. Emission reduction by the transition to gas fuel of all vehicles is on the agenda (the corresponding program already exists in the CMW region).

Weakening natural recreational resources use control results in unreasonable waste of very important occurrences of mineral water and therapeutic mud.

O.K. Grigorieva
O.V. Borush

ENVIRONMENTAL EFFECT IN OPERATION COMBINED-CYCLE PLANTS

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The report examines the production of electricity and heat in combined cycle (CCP), which is the most effective way to solve economic and environmental problems.

Due to adoption of the Energy Strategy, energy production in Russia will increase. In general, the projected growth should be achieved both through the application of new technologies and by improving the efficiency of existing combined heat power plants (CHPP) by means of their reconstruction. Development Strategy of Energy of Russia provides for the widespread use of combined-cycle technology. The main area will be the transition from steam to a combined heat power plants (CHPP) on gas, and later - at an coal.

The effectiveness of combined-cycle plants is substantially higher than steam. This is due to significant fuel savings, reduced levels of investment and the metal content per unit of input power, reducing the duration of building coal, etc.

Combination gas-turbine unit (GTU) and steam-turbine unit (STU) to one power unit realize in various ways, in this case produces a different thermal circuit: with high-pressure steam generator, the dumping of gas turbine units in the heat-recovery boiler (binary CCP), the dumping of gas turbine units in the furnace and convective shaft (CCP LPSG – with low-pressure steam generator), the dumping of gas turbine units in the gas-water heater (GWH) with the displacement of the regeneration system, the dumping of gas turbine units in the gas-delivery water heater (GDWH) with the displacement of the delivery water, with coal gasification.

The application of CCP enables:

- to ensure the growth efficiency of CCP up to 60%, and heating CCP operating in condensation conditions may have efficiency up to 45...50%, i.e. to level unattainable for other heat engines;

- to improve fuel efficiency (resource- economy technology);

- to reduce the environmental load in place of functioning:

- reduction of harmful emissions into the atmosphere,

- reduction of specific emissions of nitrogen oxides and sulfur through the use of natural gas,

- changes in the content of harmful substances in flue gases as compared to traditional combined heat power plants.

All this allows to reduce costs in environmental infrastructure.

V.M. Grishagin

WELDING FUMES AS A HARMFUL ECOLOGICAL FACTOR (STUDIED IN KUZBASS)

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The continuing environmental pollution with gas, liquid and solid substances and production residues, causing the degradation of human environment and damaging people's health is the most nagging problem having social and economic priority.

Among the main sources of waste pollution in Kuzbass we should note the coal-mining, chemical, engineering, metallurgical, fuel and energy, construction and agriculture industries. Development of the given industries means constantly growing production of large-size welded structures made of ferrous and non-ferrous metals and ferroconcrete. Nowadays welding is used practically in every area of economic activity. Sharp rise of welded structures production and wider use of welding in various economic areas have a significant impact upon the ecological situation in terms of air pollution with solid and gas components of welding fumes and accumulation of welding wastes, which are practically not utilized today – the solid component of welding fumes (SCWF).

Thus, according to statistic data for 2009 in Kuzbass, about 576 out of 726 enterprises have welding industries. The total emission of SCWF into the atmosphere in Kuzbass makes 23.69 tons a year.

The given enterprises emit about 94% of SCWF of the total welding fumes emitted by all Kuzbass enterprises.

It should be noted that SCWF and gases produced in the process of welding are removed mostly by general ventilation. Besides, a significant contribution (about 15%) to the working space pollution is made by unorganized sources.

Development and practical application of efficient filters and ventilation devices will

improve the work environment of the welders, reduce the negative impact upon the environment and, besides, enable utilizing welding wastes, the latter having, as well as dust and gas cleaning sludge in casting and metallurgical processes, resource value. Using the recycled wastes will not only improve the ecological safety but will reduce the resource dependence of the region, allow to use the resources more economically, reduce the costs, increase profitability.

It has been estimated that 1-3% of cover material is turned into vapor in the process of coated electrode welding. The rate of the melted metal and slag vaporization depends on the welding conditions, methods, attitude, electrode coating components, base and filler material. The same factors influence the welding fumes composition. The rate of the single-phase melt evaporation depends on its free surface area and saturated vapor pressure. The lower is evaporation temperature of the substance and the higher is its temperature, the higher is its evaporation rate.

As a rule in the welding process alloy metals are melted, not pure ones. Thus, the vapor is a mixture of the alloy component fumes and elements with lower vaporization temperature will make the major part of the fumes. Selectivity is the most important characteristic of multicomponent systems. For example, iron-manganese alloys being heated first evaporate manganese, the process becoming the more intensive, the more manganese the alloy contains.

The fumes of electrode coating and rod under the influence of plasma flows and arc pressure are forced out of the lower arc part into the surrounding space with lower temperature. Here the vapor phase condenses and some condensation products (metals and lower oxides) are oxidized.

When welding many component elements of the rod and electrode coating can be included into the vapor phase. After condensation solid compound particles are formed – base (Mn, Fe, Si, , Na, Ca, Mg, Ti, Al, Cr, Ni, F) and residual (As, Cu, Rb, Sn, Zr, Sr, Nb, Mo, Ag, Sb, Ba, Pb) elements. The content of base elements vary from 0.1% to more than 10% depending on the welding material type.

V.M. Grishagin

THE INTEGRATED ECOLOGICAL EDUCATION IN COMBINATION WITH THE CONTINUOUS TRAINING SYSTEM

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The international integration of higher school, including that of the European higher school, has resulted in two significant documents: the Lisbon convention in 1997 and the Bologna Declaration in 1999. The aim of these two documents is formation of the

open European space in the sphere of higher education, thus, providing convergence of the educational systems of different countries, mutual acceptance of degrees and qualifications, students' and graduates' mobility. The Russian Federation joined the Bologna Declaration only in September, 2003. That doesn't mean that Russia hadn't been working to transform the educational programs according to modern tendencies in the sphere of higher education. For example, the given transformation took place within the REAP program in the Russian Federation and CIS.

In Tomsk Polytechnic University (TPU) this transformation is carried out along various directions. One of them is development of a bachelor program "Environmental Protection" within the REAP project. The TPU partners in this project were The Open University and two British colleges.

In Yurga Institute of Technology (branch) of Tomsk Polytechnic University the specialists with qualification of engineer-ecologist within the educational program "Engineering environmental protection" are educated according to an integrated multi-stage system which key elements are: institution of supplementary education "Bio-ecological Centre", the UTI of TPU, various enterprises and organizations in Yurga, Kuzbass and neighbouring regions.

The classical educational system supposes that students specializing in different branches of engineering obtain profound knowledge of theoretical disciplines (mathematics, physics, chemistry and others) and then study the general engineering and special sciences, doing this only at the level of theoretical knowledge, without practical application. As a result the graduates sometimes "know everything but can do nothing", so the main disadvantage of the given system, in our opinion, is that it does not accentuate where and how this theoretical knowledge can be practically applied.

The integrated system offered by UTI (branch) of TPU in spite of its rather long history acquires new innovational orientation as a result of changes. It happens, first of all, due to formation of inter-discipline system of knowledge transfer from one field to another, while distribution and combination of fundamental and applied knowledge provides its practical application by the institute graduate.

The most important element of the integrated system "plant-higher technical school" is the engineering production apprenticeship, which is a specific form and an integral part of the educational process based on the personal students' participation in the production process at the base enterprise and other enterprises and organizations (of various forms of ownership). Students also participate in scientific research carried out by the institute departments. The apprenticeship is organized according to a standard regulation concerning the integrated "plant-higher technical school" system, involves all full-time students and is supervised by the leading specialists of enterprises and organizations and professors of the core departments.

The aim of the apprenticeship is the accelerated training of specialists possessing all necessary theoretical knowledge and practical skills for efficient work at the base enterprise. The apprenticeship is to solve the following problems:

- 1) consolidation and intensification of theoretical knowledge required for work at a modern industrial plant either as a specialist or as a group manager;
- 2) acquiring the skills of practical application of theoretical knowledge in managing production processes and the employees;
- 3) providing a job for the young specialist according to his/her performance and personal qualities and plant's needs.

V.Kh. Ibragimova

THE EFFECT OF MEMBRANE ACTIVE CHANNEL-FORMING "INFANVIR" PREPARATION ON PATHOGENIC INFECTIONS OF VEGETABLE PLANTS

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One of the main problem of ecological and soil science is to search preparations protecting vegetable culture against pathogenic microorganisms. The current protective agents cannot completely prevent spreading viral and fungal infections of plants. The intent of this study was to find a biologically active preparation against pathogenic microorganisms of vegetable cultures. The main purpose of these investigations was in determination of more efficient antibiotics having the less toxicity for human's organism and high selectivity of action on pathogenic plant microorganisms. The polyene antibiotics (amphotericin B, nystatin, mycoheptin and levorin) are the main drugs used in human therapy against systemic mycosis. Polyene action's mechanism is based on the formation in cell membranes ionic channels with the specific conductivity. A range of experiments with one of polyene antibiotics has taken place in hothouse facilities and open soils of vegetable farms located within the territory of the Apsheron peninsula in Azerbaijan, where vegetable cultures such as cucumber, tomato, eggplant and pepper are cultivated. "Infanvir", the biologically active preparation developed in the soil science faculty of Baku State University (the preparation content is not disclosed due to the patent consideration) against virus and fungal infections of vegetable cultures has been tested for the first time. The "Infanvir" preparation has been developed on the basis of membrane-active macrolide antibiotics. The mechanism of action of such compounds is based on structural channels of molecular size generated by them in cell membranes and which are selectively permeable for ions and organic compounds. The investigations carried out in hothouse facilities as well as in open soils have demonstrated high efficiency of the "Infanvir" preparation with respect to pathogenic microorganisms. The treatment of plants and soil itself affected by virus (Tobacco mosaic virus) and fungal infections by spraying the affected areas subject to calculation 100 ml initial solution dissolved in 10-100 liter water at 15-35°C has resulted in complete eradication of virus and fungal infections. It has been shown that the used preparation can completely prevent the growth of the Tobacco mosaic virus. It should be

especially noted that after treatment with the “Infanvir” preparation the infected plants are not only cured but also regenerated in full. Moreover, the vegetable plants treated with such preparation had 2 times more harvest than the reference ones. It is supposed that antiviral and antifungal effect of the “Infanvir” preparation is related to their interaction with lipid component of cytoplasmic membranes, causing destruction of the membrane structure pathogenic microorganisms. Polyene antibiotics are effective drugs at treatment of systemic fungal infections. Although this drugs possesses valuable chemotherapeutic properties, their mechanism of action remains largely unclear, especially on the molecular level. It was discovered that “Infanvir” preparation induced a lipid-dependent growth of the cell membrane conductivity. The effectiveness of the antibiotic sharply rises at the increased antibiotic concentration. Polyene antibiotics form in cell membranes pore permeable to ions and organic substances. The study of molecular mechanism of cell membranes selective permeability is an actual problem of membrane biology. The mechanism selectivity properties polyene channel is an open. It's supposed that these properties strongly depend on the structure of polyene molecules. Polyene antibiotics channels are characterized by on conducting state which have the conductance of about 0,3 pS-6,5 pS in 2M KCl. The membranes conductance strongly increased at low pH 3.0 if antibiotics added to one side of the lipid membrane. One-sided effect of antibiotics is the result the formation of half pores alone. The main information about the function of polyene antibiotics in the membrane can be to get by the study of properties single ionic channels in lipid membranes. It is supposed that the properties of the single ionic channels strongly depend on the structure of polar chain of the lactone ring of polyene antibiotics. At present time there is a theoretically possible to get a new and very promising approach to various – virology, fungus and purulent infectious diseases therapy by been using a membrane-active of polyene macrolide antibiotics with different molecule structures.

Victor Ilin

THE STATE OF RUSSIAN ECOLOGICAL MONITORING SYSTEM

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Most characteristics of Soviet environmental protection system didn't meet modern civilization standards. During the pos-Soviet crisis period the situation was getting worse and worse. It was reflected in a number of following indices: the growth of specific environmental emissions and discharges, increase of wastes generation (despite decrease in the number of the production facilities in comparison with 1990); increasing number of industrial accidents (also caused by out-of-date production facilities); obviously low construction and renewal rate of nature conservation facilities; biological diversity reduction; natural ecosystems destruction;

introduction of new artificial substances, chemical compounds and microorganisms into biological cycles, while their influence on the health is still uninvestigated etc. Of course, the main reason for this problem is the social system crisis. Ecological problems in Russia can also be explained by such chronic shortcomings in the state environmental policy as lack of economic basis, shortage of appropriated funds, disincentive to develop ecological enterprise and introduction of new technologies, inconsistency, declarative nature and deficiency of the environmental legislation. The collapse of the state and regional environmental monitoring system is a critical organizational problem and it aggravates the situation. There are also such issues as low efficiency of the state ecological expertise, regulation and licensing; public image deterioration of environmental activity; inadequate transparency of budgeting and expenses for environmental protection; limited citizen participation in environmental decision making; violation of civic rights to information about the ecological situation and environmental protection measures. Local authorities lack for powers to implement the ecological imperative.

We come to the conclusion that the arrangement of the efficient ecological monitoring system having economic, legal and public support should become an effective step. Then we should consider the following requirements:

- 1) Guaranteeing of the federal ecological monitoring priority and its definite mechanism;
- 2) Improving the subject of federation participation
- 3) Efficient ecological monitoring development and regulation of practical application;
- 4) Foundation of municipal ecological monitoring services;
- 5) Public ecological monitoring development promotion;
- 6) Intensification of the public and law enforcement environmental cooperation.

A.A. Kasjanenko
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DIE MORPHOFUNKTIONELLEN ASPEKTE DES EINFLUSSES VON CHRONISCHER ALKOHOLINTOXIKATION AUF DIE PRÄNATALE THYMUSENTWICKLUNG

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Die Erhöhung der Anzahl von Kindern, die am alkoholischen Syndrom in der pränatalen Periode gelitten haben, verlangt unsere besondere Aufmerksamkeit zu den Fragen des Einflusses von chronischer Alkoholintoxikation der Eltern auf die Organ- und der Systementwicklung der Nachkommenschaft und insbesondere der Organe des Immunsystems.

Eine Aufgabe dieser Forschung war die Erforschung der Thymusmorphogenese bei

langfristiger alkoholischer Vergiftung von Müttern während des Experiments.

Die Experimente sind an nicht reinrassigen weißen Ratten durchgeführt worden. Weibchen und Männchen hielt man getrennt je 10 Individuen in jedem Käfig, wo sich Behälter mit Ethanollösung und einer Futterkrippe befanden. Die 15 %ige Ethanollösung war verwendet worden, da sie wie angenommen optimal für eine Modellierung der chronischen Alkoholisierung ist. Nach 60 Tagen der Zwangsalkoholisierung haben die Tiere sich gepaart. Die schwangeren Weibchen hielt man unter ähnlichen Bedingungen. Für eine morphologische Analyse haben Thymus von 40 in Experiment teilgenommenen und 30 kontrollneugeborener Babyratten benutzt. Der Thymus war auf den mikroskopischen und ultrastrukturellen Ebenen erforscht worden.

Bei den Weibchen, die unter der Zwangsalkoholisierung unterworfen sind, nimmt die Anzahl von totgeborenen Babyratten sowie die Anzahl von Babyratten mit abgemagerten Körpermaßen zu. Bei der Nachkommenschaft sinkt absolute und relative Thymusmasse. In Thymus der Babyratten, die von alkoholisierten Tieren bekommen sind, verringert sich die Lymphstoff Fläche, und Bindegewebekomponenten den Thymus nimmt im Vergleich zur Norm zu. Es zeigt sich die Lymphozytenproliferation Unterdrückung. Der Anteil von zerstörten Lymphozyten und aktiv phagozytierenden Makrophagen nimmt im Experiment mehr als verdoppelt zu. Es zeigen sich die Veränderungen von Ultrastruktur der retikulo-epithelialen Zellen. Die retikulo-epitheliale sekretorische Vakuolen sind ausgebreitet und sehen aus wie Alveolen, die leer sind oder einen flockigen Material enthalten. Öfter als normalerweise erscheinen die granulaterehaltlichen Zellen, die wahrscheinlich zu einer APUD Serie gehören.

So gilt der Ethanol, der durch die Plazenta leicht durchgeht und überschüssig in einen entwickelnden Organismus kommt, wie ein mächtiger Agent, der morphologische Prozesse im Thymus verletzt.

Es ist bekannt, dass Effekte, die Ethanol provoziert, mehrzählig und vielfältig sind. Ethanol beeinflusst zentrale Nervensystem und endokrine System des Organismus. Es sieht so aus, dass die morphologische Veränderungen in dem Nachkommenschaftsthyms von den alkoholisierten Weibchen meistens wegen der Verletzung von neuroendokrinen Status in der funktionalen System Mutter-Embryo bedingt ist.

In embryonalen Thymus entwickelt sich ein Repertoire von Antigen-bindende Besonderheiten des T-Zell-Rezeptor, also T-Lymphozyten eine Fähigkeit erwerben, Antigene zu unterscheiden, mit denen der Organismus im Laufe des Lebens treffen kann. Dann erforscht man diesen Zellen für Toleranz gegenüber Antigenen. Die Dysfunktion des T-Systems der Immunität aufgrund von Verstößen gegen Prozesse der Proliferation und Differenzierung von T-Lymphozyten kann einen Grund von Reihe der Autoimmunerkrankungen in den postnatalen Phasen sein.

Die bekommenen experimentalen Daten haben eine bestimmten Bedeutung um Immunstatus der Nachkommenschaft beim Alkoholismus der Eltern zu bewerten und Varianten seiner Korrektur zu entwickeln.

A.A. Kasyanenko
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DIE FOLGEN DER TSCHERNOBYL-KATASTROPHE AUF DEM GEBIET DES MITTLEREN RUSSLANDS (AM BEISPIEL DES GEBIETES DES LANDKREISES DER STADT ORJOL)

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Obwohl seit dem Super-GAU im Kernkraftwerk von Tschernobyl fast ein Vierteljahrhundert vergangen ist, bleibt das Problem der radioaktiven Umweltverschmutzung nach wie vor aktuell. Ab dem Zeitpunkt der Explosion und bis hin zur Schließung des zerstörten Kernreaktors wurden ca. 190 Tonnen radioaktiver Stoffe, die 520 Radionuklide enthielten, in die Atmosphäre freigelassen. Das am weitesten verbreitete, Strahlendosis erzeugende Radionuklid auf dem größten Teil der verseuchten Landstriche ist das Zäsium-137 (die Periode der Halbwertszeit beträgt 30 Jahre). Die gesamte Emission des Zäsiums-137 beträgt 8×10^{16} Bq, davon ca. 30 Prozent auf das Hoheitsgebiet Russlands.

Gebiete, auf denen das Niveau der Bodenverunreinigung mit Zäsium-137 höher als 1 Ci/km² ist, wurden auf dem Territorium der 19 Landkreise Russlands entdeckt; ihre Gesamtfläche beträgt 59,3 Tausend km². Am meisten verseucht sind: Landkreis der Stadt Brjansk (11,8 Tausend km² verseuchter Territorien), Landkreis der Stadt Kaluga (4,9 Tausend km²), Landkreis der Stadt Tula (11,6 Tausend km²) und Landkreis der Stadt Orjol (8,9 Tausend km²).

Einige Folgen der radioaktiven Verseuchung kann man am Beispiel des Landkreises der Stadt Orjol beurteilen. Erhöhte Strahlung wurde hier am 30. April 1986 registriert. Der radioaktiven Verseuchung fielen zum Teil 22 der 24 administrativen Bezirke des Landkreises mit einem Bevölkerungsanteil von ca. 350 Tausend Menschen zum Opfer. Dabei wurden mehr als 2 Tausend Ortschaften betroffen. Die radioaktive Wolke bedeckte fast 40 Prozent des Territoriums des Landkreises. Eine Million Hektar der landwirtschaftlich genutzten Fläche wurde radioaktiv verseucht (Dosis: mehr als 1 Ci/km²).

Im Jahre 1991 trat das Gesetz der Russischen Föderation „Über den sozialen Schutz der Bürger, die der Einwirkung der Strahlung infolge der Katastrophe im Kernkraftwerk von Tschernobyl ausgesetzt waren“ in Kraft. Entsprechend diesem Gesetz wurden alle verseuchten Gebiete, je nach Verschmutzungsgrad, in entsprechende Zonen aufgeteilt.

Nach dem Artikel 7 dieses Gesetzes wurden auf dem Territorium der Russischen Föderation folgende Zonen radioaktiven Verseuchung gebildet:

1. Die Zone der „Entfremdung“ – das Territorium um das Kernkraftwerk von Tschernobyl, sowie die Gebiete, mit dem Niveau der radioaktiven Bodenverunreinigung mit Zäsium-137 von über 40 Ci/km² und aus denen die Bevölkerung evakuiert wurde.
2. Die Zone der „Evakuierung“ – der Teil des Territoriums, mit dem Niveau der radioaktiven Bodenverunreinigung mit Zäsium-137 von über 15 Ci/km², oder mit Strontium-90 von über 3 Ci/km², oder dem Plutonium-239,240 von über 0.1 Ci/km².
3. Die Zone des „Aufenthaltes mit dem Recht auf Evakuierung“ – Teil des Territoriums

mit dem Niveau der radioaktiven Bodenverunreinigung mit Zäsium-137 zwischen 5 und 15 Ci/km².

4. Die Zone des „Aufenthaltes mit dem privilegierten sozial-ökonomischen Status“ – Teil des Territoriums mit dem Niveau der radioaktiven Bodenverunreinigung mit Zäsium-137 zwischen 1 und 5 Ci/km².

Für die Bevölkerung jeder dieser Zonen sind verschiedene Kompensationen und Ermäßigungen vorgesehen.

Mit dem Gesetz der Russischen Föderation „Über die Strahlungssicherheit der Bevölkerung“ von 09.01.1996 wurden folgende Normen der Strahlungseinwirkung auf die Bevölkerung bestimmt: Die durchschnittliche jährliche Dosis beträgt 0,001 Sv. Die durchschnittliche lebenslange Dosis (bei einer Lebenserwartung von 70 Jahren) beträgt 0,07 Sv.

Im Landkreis der Stadt Orjol wurden 65 Ortschaften in die Zone des „Aufenthaltes mit dem Recht auf Evakuierung“ und 889 Ortschaften in Zone des „Aufenthaltes mit dem privilegierten sozial-ökonomischen Status“ eingeteilt.

Die aktuelle Zoneneinteilung wird durch die Verordnung der russischen Regierung vom 18. Dezember 1997 „Über die Erstellung des Verzeichnisses der Orte, die sich in den Grenzen der Zonen radioaktiver Verschmutzung infolge der Katastrophe im Kernkraftwerk von Tschernobyl befinden“ geregelt. In Jahr 2005 wurden Änderungen und Ergänzungen am geltenden Verzeichnis der Orte vorgenommen. Aktuell werden dank der Verbesserung der Strahlungslage für einige Ortschaften die Ermäßigungen gestrichen.

Für die unabhängige Einschätzung der Strahlungslage wurden von uns Bodenproben in einer Reihe von den Ortschaften des Landkreises der Stadt Orjol (Dörfer Droskowo, Domnino, Korownik, Lubjanki, u.a.) genommen. Diese Proben wurden einer Gammaspktrometrie unterzogen.

Die Untersuchungen ergaben folgendes Bild:

1. Der Mindestbodgehalt von Zäsiums-137 betrug $9,75 \pm 4,16$ Bk/kg (Proben aus dem Dorf Droskowo. Dieses Dorf befindet sich nicht auf dem verstrahlten Territorium).

2. Der Maximalbodgehalt von Zäsiums-137 betrug $60,90 \pm 10,70$ Bk/kg (im Dorf Domnino) und $62,70 \pm 11,40$ Bk/kg (im Dorf Korownik). Beide Ortschaften befinden sich in der ursprünglichen Zone des „Aufenthaltes mit dem Recht auf Evakuierung“.

3. An praktisch allen untersuchten Stellen betrug die Stärke der Expositionsdosis (SED) der Gammastrahlungen 0,1 – 0,2 mkSv/Std. (Dies entspricht den Werten aus der Zeit vor der Katastrophe).

Als Ergebnis der Forschung gestattet sich folgende Schlussfolgerung: Die Situation mit der radioaktiven Verseuchung des Gebietes des Landkreises der Stadt Orjol, die infolge der Katastrophe im Kernkraftwerk von Tschernobyl entstanden ist, hat sich stabilisiert. Im Vergleich zu der anfänglichen Zeitperiode (erste Messungen nach der Katastrophe) ist das Niveau der Strahlung infolge des natürlichen Zerfalles von Radionukliden, sowie der natürlichen Prozesse der Selbstsäuberung und der durchgeführten Schutzmassnahmen mehrfach gesunken.

Wenn man dem Wortlaut des Gesetzes "Über den sozialen Schutz der Bürger, die der Einwirkung der Strahlung infolge der Katastrophe im Kernkraftwerk von Tschernobyl ausgesetzt waren" und des Gesetzes "Über die Strahlungssicherheit der Bevölkerung" folgt, dann erscheint die Streichung der Ermäßigungen rechtmäßig und gerecht.

Dabei gibt es jedoch einige wissenschaftliche Erkenntnisse, wie z.B. schwellenlose und entfernte Wirkung der radioaktiven Strahlung und die Wirkung der angesammelten Strahlendosen. Diese Erkenntnisse werden von den genannten Gesetzen und anderen normativen Akten bei der Einschätzung der Folgen des Aufenthaltes auf den strahlungsverseuchten Territorien nicht berücksichtigt. Daraus folgt die Schlussfolgerung, dass an der Zeit ist, die ursprünglichen Methoden der Einschätzung der Gefahr für die Gesundheit der Bevölkerung, zu revidieren. Die neuen Methoden sollen auf der Einschätzung der Gesundheitsrisiken infolge langwieriger Einwirkung der Strahlung basieren.

N.Ya. Kirilenko

NEW LOCAL SYSTEMS OF VENTILATION

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For maintenance of the maximal efficiency of animals and their high stability to diseases it is necessary to creation favorable factors in the environment of their dwelling.

The success of animal industries is defined on 60 % by feeding of animals, on 20 % their cultivation and age and on 20 % - conditions of the environment, including a microclimate.

In cattle-breeding facilities local supply of a plenty of air directly in a zone of an arrangement of animals is required. Thus speed of movement of airflow should be within the limits of the admissible values providing a comfortable content of animals and required sanitary-and-hygienic parameters of a microclimate.

The new way of local ventilation when the airflow goes around the whole length of the bodies of the animals was developed. It is located in a horizontal direction from a forward part of a body of an animal to a back part. It allows withdrawing ammonia and carbonic gas from a head of an animal, that essentially improves their comfort.

In this case the arrangement for ventilation of cattle-breeding facility contains stalls with inlet and the exhaust punched tubular lateral protections which are connected according to inlet and exhaust the main pipelines. The punched pipes of a protection are located vertically and towards each other on opposite sides of a stall. Apertures in inlet and the exhaust punched pipes are executed on opposite them sides.

The arrangement as follows works. Air moves on inlet to the main pipeline through pipelines in inlet the punched tubular lateral protections and leaves through apertures in

facility around of an animal from its lateral faces. Then air is soaked up through apertures in exhaust lateral protections, pipelines and exhaust main pipelines. It reaches the directed tap of ammonia and carbonic gas from a zone of a feeding trough and a head of an animal.

The new arrangement for local ventilation which contains stalls with horizontal and in parallel located inlet the punched tubular lateral protections connected with inlet by the main pipeline is offered also.

Inlet the punched tubular lateral protections are established in parallel each other in a vertical plane with formation of a clearance. Thus apertures in inlet the punched pipes are executed on them opposite sides and located towards each other.

The arrangement works as follows. Air on inlet to the main pipeline moves to the parallel punched pipes established in a vertical plane with formation of a clearance. Further air leaves counter compact jets from opposite apertures. At opposite interoperability of system of counter jets it is formed fan a stream of air with the expanded range having blown, the raised turbulence and a degree of clearing of speed of a stream.

For increase of a range having blown animals other new arrangement for local ventilation of cattle-breeding facility which contains machine tools with inlet and exhaust vertical and towards the installed punched flat protections connected according to inlet and exhaust pipelines is offered still. Apertures in inlet and exhaust protections are executed on them towards sides. The vertical punched protections are executed in the form of hollow box. Hollow box can be executed, for example, in the form of metal or concrete designs.

This arrangement reaches the directed supply and tap of air in a zone of a finding of animals, the appropriating microclimate is provided.

The new arrangements of local ventilation providing substantial increase of a degree of attenuation of a stream expiring from a branch pipe due to impact inlet of a jet with jets, acting of an internal cavity of the central body from a source of the operating environment are offered also.

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DYNAMICS OF TYPE DIVING REACTION IN STUDENTS SUBJECTED TO COLD – HYPOXI - HYPERCAPNIC TRAINING

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Modern condition of ecological systems - result of long history of managing of the person on the Earth. In Kazakhstan ecological conditions continue to remain strained. The basic environmental problems are pollution of atmospheric air, including hotbed gases; progressing accumulation of an industrial and household waste, degradation and

desertification of the earths, pollution of superficial both underground sources of water and their exhaustion, radioactive and chemical pollution of territories, biodiversity reduction.

Protection of health of the population against adverse influence of factors of environment is one of the important elements of a state policy in the field of a sustainable development. In this connection, inspection and improvement of students from ecologically unsuccessful industrial regions of Kazakhstan is actual.

We had been used technique cold – hypoxi – hypercapnic influences (CHI) (the Patent of Russia Nr. 2161476, 10. 01. 2001).

Students took part in research, at the age of 17 - 22 years, from industrial region of Kazakhstan. Training lasted within three weeks, the individual schedule has been developed for each student. In a rest condition, before immersing, during immersing and in the course of restoration after the termination apnoea registered an electrocardiogram (in the second standard deviation) and arterial pressure.

For a basis of classification of types diving reactions character of development of a reflex bradycardia during time apnoea with immersing of the person in water is accepted. Depending on a specific feature it is warm - vascular system on CHI examinees shared on 4 types: high reactive, jet, paradoxical, areactive. Diving reaction at the person is caused by a complex of simultaneously operating factors: hypoxia, hypercapnia and colds also grows out of difficult interaction of reflex physiological and psychological processes.

As a result of the spent researches it was found out, that before improvement by means of training CHI group surveyed as realisation diving reactions it was distributed as follows: high reactive reaction type 25 % had, areactive type - 50 %, the jet type was observed at 25 % of students. For people with high reactive reaction type the low threshold of excitation tactile and cold receptors of the person and nasal courses and activation of a sympathetic link of the nervous system, indirectly specifying in intense functioning regulatory systems is characteristic. The areactive type of reaction is shown by absence of changes in reply to CHI and a high threshold of activation cold face skin receptors, chemoreceptor a vascular channel and low sensitivity to the raised concentration of coal acid. For jet type stability of an organism to a cold and less expressed intensity regulatory systems is characteristic.

The spent training by means of CHI has improved a parity of students with the above-named types of realization diving reactions, authentically having increased quantity of students with jet type of reaction. Proceeding from the received data, it is possible to assert, that CHI has rendered positive improving effect on an organism of students from ecologically unsuccessful region, having reduced intensity regulatory systems.

The paradoxical type of reaction of an organism on CHI among surveyed both groups of students is not found out, as it is characteristic for professional sportsmen.

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MONITORING TECHNIQUE IN APPLICATION TO ACOUSTIC DISCOMFORT RISK ASSESSMENT

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Share of noise among environmentally harmful factors is growing steadily. Currently there is no efficient noise pollution monitoring system for cities in Russia. We offer technical approaches to determine factual and anticipated noise pollution by traffic flows and to single out rail transport impact share or motor transport impact share. The approaches are based on theoretical and pilot research.

Conducting calculation monitoring, one should integrate all information resources available: digital city map containing data about the area, buildings, functional zones; information about noise sources, their type, location, sonic action volume; information needed for noise propagation calculation with allowance for noise degeneration and its reflection from obstacles; information about population, health indices and life conditions.

Calculation results may be assumed as a basis for health hazard assessment, managerial decisions concerning environmental protection, justification of acoustic protection measures and their benefits evaluation.

Assessment of noise health hazard is a controversial issue for several reasons: there is no dose-effect model applicable in conditions of chronic exposure to traffic noise; it is not possible to substantiate cause-effect relation between somatic diseases (cardiovascular diseases, neuroses, etc.) and exposure to traffic noise.

Meanwhile, according to experts, the most widely spread indicator of noise nuisance is subjective sensations of people expressed in complaints. For example, 40% of all letters of complaint forwarded to the city administration of St Petersburg are against noise.

Psychological reaction of a person (irritation) is obviously a specific response to noise and a starting physiological mechanism of somatic pathology formation. In such conditions statistically verified interconnection between sound pressure level (noise), dB, and share of population which reacts to it, is a classical dose-effect model and can be applied in health hazard assessment. International standards take into consideration this interconnection. For example, Intergovernmental standard ISO 1996-2003 ICS B.140 describes people's reaction to traffic noise with "Schultz curves".

Thus, probability of causing psychological reaction, determination of probable share of population exposed to noise, in other words, risk assessment may be calculated from the following equation which describes these curves:

$$\text{Risk} = 100 / 1 + \exp (10,4 - 0,132 L_{\text{Rdn}}), \text{ where}$$

Risk – degree of risk, %;

L_{Rdn} – estimated daily level of noise in day and night period; L_{Rdn} value –annual average.

Studies show that morbidity rates among people living in areas of acoustic discomfort calculated on the basis of results of monitoring conducted in St Petersburg will vary from 2107‰ to 3650‰, among which 206,8-287,7‰ of nervous system diseases, 18,37‰; of cancer, 124,6‰ of endocrine system diseases, if no sound-suppressing measures are taken. If sound-suppressing measures are launched, morbidity rate will not exceed 1893,5‰, among which 188,3‰ of nervous system diseases, 9,6‰; of cancer, 59,7‰ of endocrine system diseases.

Application of monitoring technique for acoustic discomfort risk assessment is a promising area of ecological research.

O.I. Kopytenkova
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ECOLOGICAL AND HYGIENIC FEATURES OF AMBIENT AIR IN AREAS WITH DEVELOPED TRANSPORT INFRASTRUCTURE

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There is a high percentage of backlashes among inhabitants of industrial regions even if limits of compounds content in environment are not exceeded. This is the result of hostilities combination impact. Current burning issue is to establish connection between environmental aspects and people's state of health. In this connection it is important to reveal health risk factors.

Objective of the research is to describe the air in areas with developed transport infrastructure from hygienic viewpoint.

It is known that ambient air is influenced significantly by soil pollution through secondary dust formation.

Motor transport is the source of diffuse pollution of residential and recreational areas. Besides, motor transport emissions are a complex mixture of toxic components which normally get accumulated in the atmosphere bottom layer and which are hardly subject to dissipation in the city zone.

Principal harmful admixtures in motor transport exhausts are as follows: carbon oxide, nitric oxides, carbohydrates, including carcinogenic 3,4-benzopyrene, aldehydes, sulfur oxides, ultramicroscopic soot particles. Furthermore, PM_{10} particles escape into ambient air as a result of vehicle parts friction, especially friction with paving. As brake blocks get rubbed off, copper, vanadium, zinc, molybdenum, nickel and chromium escape into air and soil, while tire covers abrasion releases cadmium, lead, molybdenum, zinc and polycyclic carbohydrates. These substances possess carcinogenic and mutagenic properties. PM_{10} forwards deep penetration of the above-listed substances into the organism. Moreover, PM_{10} particles stay in the air for a long time and may carry on their surface pathogenic germs and micromycetes. Emissions accumulate themselves on the level of

human respiratory apparatus. Heavy metals collect themselves densely along highways, 120 m away from the latter. If passability is no less than 10 000 vehicles per day and there are no buildings around, the radius of harmful impact is up to 400 m, in conditions of fair and windy weather– up to 1-2 km.

This research has revealed retardation of pollution-sensitive mushroom species in soils along motor ways. In areas with intense traffic flow and frequent traffic jams “anthropogenic” micromycetes complex emerges which is an indicator of ecological disaster. Some part of micromycetes are toxigenic.

Besides, in ambient air samples taken along motor ways with intense traffic flow PM_{10} particles concentration makes up 0,40 mg/m³ which exceeds hygienic standard by 1,33 times and by 30 times the same index in public green space. In the samples there were detected cocci (25% of them have hemolytic properties) and micromycetes which have allergenic effect.

Thus, doing ecological assessment of the air in areas with developed transport infrastructure one should pay great attention to PM_{10} particles concentration. They penetrate deeply into the organism because of their physical properties, contain heavy metals cations, may have pathogenic microorganisms on their surface and as a result may have negative effect on people’s health.

Alexandr Kornaukhov

THE INTERNET PORTAL PROJECT «ECOLOGY OF YELETS CITY» FOR DEVELOPMENT OF REGIONAL ECOLOGICAL EDUCATION

Yelets Branch of the Russian New University, Yelets, Lipetsk Region, Russia

The problem of harmonious interaction between mankind and biosphere remains pressing in recent years. Researchers and progressively conceived people understand more and more, that the purposes of the humans and means of their achievement should be brought into accord with the ecological requirements.

Global character of environmental problems requires their immediate solution at different levels: international, state and regional. The successful solution of environmental problems in a particular region requires certain knowledge in the field of ecology from the population.

The understanding of interrelation between the humans and the nature demands reorientation of public consciousness to the achievement of harmony between humans and nature. This point of view, unlike the previous one (Dominant Social Paradigm – DSP, that is focused on economic development and material benefits), has received the name «New Environmental Paradigm» (NEP).

Thus the problem of public ecological education is especially important. The purpose of such education is development of ecological thinking, ecological culture. New informational technologies can be applied as an effective mechanism of this problem solution at the regional level. Particularly, there appear to be some sufficient reasons for creation an ecological Internet portal in each certain region. The portal is a web site, the content of which will cover a wide range of environmental issues, urgent and interesting to many inhabitants of the region. Each region has got its own peculiarities, without knowledge of which it is impossible to understand the natural and anthropogenous processes influence on physical, mental and moral health of population.

The Internet portal project «Ecology of Yelets city» has been developed by now. It is at the stage of implementation and includes following sections: 1) General knowledge of natural components (geological environment, landscapes, ecosystems, plant and animal life); 2) Environmental problems (industry and transport effect, influence of city building, waste generation and recycling); 3) Environmental information (state of the environment monitoring, ecological mapping, ecological forecasting); 4) Social ecological situation (ecology of the city territory, ecology of the internal environment of buildings, state of city population health); 5) Administrative mechanisms (administrative and economic aspects of the city ecology; city ecosystems recovery; city ecological organizations and programs); 6) Ecological education. The following sections are also presented in the portal: news, library, references to environmental and ecological Internet resources, ecological dictionary, photo and video albums, forum.

The site is oriented to various social strata; however its target audience is youth. According to the questioning in Yelets branch of “Russian New University”, about 95% of students showed interest to this Internet portal, more than 65% were ready to give information of different kinds (photos, videos, articles, etc.). So this project will be intended to solve the major problems of ecological informing and formation of public opinion and public activity in the field of environment preservation. It can be realized at active participation of youth.

M.M. Korneeva
V.Yu. Bashmakov
V.N. Popov

FREE FATTY ACIDS AS A POTENTIAL PHARMACOLOGICAL AGENT FOR THE CORRECTION OF DIABETES - RELATED PATHOLOGIES

Voronezh State University, Voronezh, Russia

Diabetes mellitus being one of the most significant concerns is the top priority of many healthcare systems. The world prevalence of diabetes among adults (aged 20–79 years) is 6.4%, affecting 285 million adults, in 2010, and will increase to 7.7%, and 439 million adults by 2030. Between 2010 and 2030, there will be a 69% increase in numbers

of adults with diabetes in developing countries and a 20% increase in developed countries. These predictions, based on a larger number of studies than previous estimates, indicate a growing burden of diabetes, particularly in developing countries.

There are 2 types of Diabetes. Type 1 called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes. It develops when the body's immune system destroys pancreatic beta cells. These cells produce hormone insulin that regulates blood glucose. This form of diabetes usually strikes children and young adults, although disease onset can occur at any age. Risk factors for type 1 diabetes may be autoimmune, genetic, or environmental. Type 2 diabetes called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. It usually begins as insulin resistance, a disorder in which the cells do not use insulin properly. As the need for insulin rises, the pancreas gradually loses its ability to produce it. This type of diabetes is associated with older age, obesity, family history of diabetes, history of gestational diabetes, impaired glucose metabolism, physical inactivity, and race/ethnicity. Other types of diabetes result from specific genetic conditions, such as maturity-onset diabetes of youth; surgery; medications; infections; pancreatic disease; and other illnesses. Such types of diabetes account for 1 to 5 percent of all diagnosed cases. The UCPs protein family could be stimulated by fatty acids resulting in reduction of ROS generation. It was shown that UCP2 expression increased dramatically in diabetes.

In our experiments we used alloxan as a chemical inductor of diabetes. 150 mg per kg of rat weight were injected intraperitoneal (intraperitoneal, intra-abdominal). Glucose level was controlled by glucose oxidase system and increased at least twice after injection. Previously it was shown that free fatty acids act as the uncoupling and protector against reactive oxygen species production and that adequate antioxidant therapy can prevent oxidative stress – key etiological factor for many diseases including diabetes. We have studied the expression of genes encoding UCP2 and ANT under the condition of experimental type I diabetes and antioxidant therapy. The experiments were conducted on pedigreeless male rats (*Rattus norvegicus* L.). Alloxan-treated rats were divided into two groups. Some animals have received 250 nM targeted antioxidant SkQ1 solution with water. Others were given water without SkQ1. Total RNA was obtained by phenol-chloroform extraction method with LiCl. Reverse transcription was performed according to manufacturer's protocol («Fermentas»). cDNA was amplified by qPCR with SYBR Green I. The program was: 94 °C 20 seconds; 56 °C 35 seconds; 71 °C 45 seconds. It was shown that in pancreas UCP2 mRNA expression under the condition of mitochondrial-addressed antioxidant therapy is 2,2-fold less than in alloxan-treated rats without the therapy. That means that the process of uncoupling as well as UCPs becomes unnecessary when transmembrane potential growth is suppressed by the antioxidant action. The similar situation was observed with ant gene, but the difference was more considerable. The expression level under SkQ1 treatment was 5-fold less than under the conditions of alloxan diabetes.

The fibrates are a class of amphipathic carboxylic acids have been used for the treatment of hypertriglyceridemia or mixed hyperlipidemia for >30 years. It is now known that fibrates

act by stimulating the activity of peroxisome proliferator-activated receptor (PPAR). Now we have started experiments with fibrates treatment to check the hypothesis that activation of lipid degradation through PPAR could results in “mild” uncoupling, ROS production reduction and potential preservation of pancreas undo alloxane treatment.

O.S. Korneeva
T.V.Sanina

UTILIZATION OF UNDERUTILIZED MARINE RESOURCES IN ORDER TO OBTAIN MINOR SUGARS

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Nowadays, scientists around the world are paying close attention to studying the biotechnological potential of marine resources. One of the most common, but at the same time the least used sources of raw materials, are algae genera *Fucus* and *Laminaria*, are widely grown in northern and eastern waters of the Russian Federation. Seaweed genus *Fucus* are used as fertilizer and fish meal, but in most parts the collection of algae are not kept, but they are only a pollutant coast and the coastal zone. However, these algae are the valuable source of biologically active substances, such as fucose, the contents of which are up to 7%.

Fucose refers to the so-called minor sugars and plays a unique biological role in living organisms: take part of the carbohydrate part of many hormones, is a marker of blood involved in the synthesis of antibodies, and therefore in shaping the immune response, plays an important role in cell differentiation, intermolecular and intercellular recognition. Accordingly, preparations of pure fucose and fucose-containing oligo- and polysaccharides (fucoidans) have a broad spectrum of biological activity. However, the use of *Fucus* as a source for the production of fucose is difficult because of the lack of simple and inexpensive methods of fucoidans hydrolysis and isolation of pure fucose.

We have developed a biotechnology of fucose from plant material. The main problem in the development of this technology was the lack of industrial enzymes that can efficiently hydrolyze fucoidan. Therefore, we performed a broad screening of microorganisms possessing carbohydrates hydrolyzing activity, and the results of selected strain of *A. awamori*, which has high fucosidase activity. Optimal conditions for fucosidase biosynthesis by selected producer were found: temperature 30 °C, pH 7.0-7.5, the concentration of fucoidan as inducer 0.5 %, the duration of cultivation of 72 h. Optimization of cultivation conditions allowed to increase the activity of enzyme precipitated by alcohol in 28%.

Also the rational conditions for hydrolysis of fucoidan by derived enzyme preparation were chosen, resulting in a release fucose 83-85% of the weight of fucoidan, which is quite a high rate and demonstrates the usefulness of this method of hydrolysis for industrial applications.

As a result, the technology for production of fucose from algae has developed,

which includes the extraction of fucoidan, fucoidan enzymatic hydrolysis by obtained enzyme, purification of fucose by ion-exchange chromatography and drying. Developed biotechnology can reach the output of fucose in 4.1% of air dry biomass algae.

Currently research on the effect of fucose on the immune status and reproductive function of a living organism are conducting, as well as its prebiotic activity, with the aim of creating on the basis of a developed biotechnology of fucose substances for food, pharmaceutical and feed industries.

This work was supported by the Federal Target Program "Research and scientific-pedagogical staff for Innovative Russia" for 2009-2013.

O.M. Kotsar

**ECOFRIENDLY POWER EFFICIENT STOCKBREEDING
COMPLEX SEWAGE CONDITIONING TECHNOLOGY FOR
PRODUCTION OF LIQUID AND SOLID FERTILIZERS**

POTENTIAL-4, Kiev, Ukraine

Nowadays the issue of improvement of flow processes and systems for conditioning of not provided with a system of sewers industrial enterprises and public utilities liquid effluent with the purpose of these facilities technotronic security upgrade is getting more and more urgent all over the world.

This problem appears to be a real challenge in the process of stockbreeding complexes, dealing with hog fattening, industrial sewage purification, treatment and conditioning.

Privately owned enterprise POTENTIAL-4 worked out the technology of conditioning of liquid manure which is generated if pigs are bred on the slatted floor without bedding and fattened with the help of mixed fodder.

Sewage drainage and purification process scheme involves three systems of sewers on the territory of the complex: K1 – for drainage of industrial and domestic effluents (shower, washstands, tidying up) to the local purification installations like sewerage pumping unit with built-in full-scale biological treatment and disinfection block; K2 – for drainage of the polluted aerial water to the sediment ponds; K3 – for the drainage of liquid manure (industrial sewage) – through the grating to the inleak chamber of the sewerage pumping unit. According to the Ukrainian regulations sanitary-hygienic zone (SHZ) length of the local purification installations (LPI) of the industrial sewage and polluted aerial water purification shall comprise 60 m to the industrial facilities of the stockbreeding complex, settlement zone of the residential areas shall be determined by the SHZ of the stockbreeding complex if they are situated on the territory of the complex. Provided the complex and residential areas are situated separately, SHZ shall be determined according to the Ukrainian Settlement Housing System Sanitary Rules and comprise 150-300 m depending on the power and structure of the local purification installations.

For biological treatment of industrial and domestic effluents local purification installations of the ASTRA unit (model line UNILOS), which are installed below ground level, and bioplat for purified return water drainage to the topsoil for the all-year-round soil irrigation of the decorative landscaping perennial plantings are used; SHZ – 8m.

Aerial water LPI involve construction of the grit removal dome with biosorption slick bar for floating oil-product biodeterioration, sediment pond and purified aerial water inleak chamber fitted with drowned pump for purified water supply for landscaping plantings wetting; SHZ – 20m.

Industrial sewage LPI involve construction of the inleak chamber fitted with the grating, electric mixer and drowned pump for supply of liquid manure to the engine house of the sewerage pumping unit with the built-in treatment block (SPU with BTB), where reagent preparation and dosage unit and spiral separator for physicochemical sewage treatment and phase distribution are installed.

To provide the disinfection of industrial sewage which contains phenols, hydrogen sulphide, urea, ammonium salts, ammonia, phosphates etc. it should be conditioned by the coagulant with pH guidance.

Coagulant is treated while the electric mixer is switched on, mixing lasts until hydroxide of the coagulated metal ion and sorption of phenols on its surface, insoluble residue of phosphates and ammonium salts from ammonia after the fall of pH to 6.5-7.0 units are formed.

After the coagulation process is over, sewage is supplied to spiral separator for phase distribution. Precipitation of 80 % of dampness is inladed to the motor transport and is removed to composting ground, turbidity-free sewage reaches fermenting box, fitted with mechanical aerator by gravity, fermenting box capacity provides for 7 days of turbidity-free sewage holding.

For cultivation in fermenting box of microorganisms biomass – nitrifiers and denitrifiers, which are treated to sewage in the period of commissioning to provide the biological treatment process of return water biological treatment, biological product BIOMIX can be used.

Termination process of stockbreeding complex industrial sewage conditioning takes place in bioponds.

Bioponds are usually 3 m deep and consist of 4 sections where biological advanced treatment – return water conditioning for its use for fertilizing wetting of grain and fodder crops during non-vegetative spring-autumn period in the agricultural fields - takes place.

Biologically purified industrial sewage of the hog enterprise is aged in bioponds 6 months, after this it can be used for wetting. Return water which reaches bioponds in the period from June,1 till November, 30 is used in spring of the next year, return water which reaches bioponds in the period from December,1 till May,30 is used in autumn.

Mechanically dehydrated sediments are brought by the motor transport to composting ground in storage pits, each of the pits is 2 meter high, width on the mark of the hard ground surface is 3 m, width on the top of the pit is 1 m, length of the storage pit is

determined by calculation.

While aging in storage pit under the soil layer of 20cm with biological product BIOMIX for the period of 6 months, dehelminthization of sediments and biodeterioration of sediments into biohumus is taking place. In six month foliar feed is ready to be added to soil with the aim of improvement of its fertilizing and structural-mechanical properties, storage pit is opened and removed soil is used to form a new storage pit. So, one storage pit is formed from the soil which covers foliar feed. Storage pits filled with sediments, refined into foliar feed, in summer, are carried to the fields in spring, those filled in winter and spring – are carried to the fields in autumn. Polluted aerial water from the composting ground is drained to the nearly located bioponds.

Technology suggested by the privately owned enterprise POTENTIAL-4 allows over the longer term to complement it with the blocks for biomethanation before the use of water for fertilizing wetting and production of sediments for soil fertilization after sewage gas utilization. The worked-out technology is implemented in the hog stockbreeding complexes with capacity from 5 till 100 thousand head per year in Kiev, Cherkassy and Donetsk regions of Ukraine. Decisions taken ensure ecological security of facilities which are in operation from year 2008.

N.V. Krauze
D. Serikbayev

TRENDS IN INNOVATIVE TREATMENT OF SOLID DOMESTIC WASTE IN KAZAKHSTAN

EKSTU, Ust-Kamenogorsk, Kazakhstan

Rapid growth in well-being of people leads to increasing of solid domestic waste (SDW). It poses some problems with SDW treatment. Systematic approach to environmental quality control gives key role to application of innovative techniques and technologies for environment protection. It is the direction that should be moved in to provide ecological development of society. Industrial innovative technologies are to be supported by economical instruments to integrate ecological factor into economic development.

Total annual output of SDW is about 15 mln. m³ or 2 m³ for a habitant in Kazakhstan. In developed countries this number is 0,3-0,6 m³.

In the republic some joint pilot projects have been launched to solve the waste problem. Some projects already have or will have feasibility studies.

The main way of waste treatment in the republic is to landfill and to dump without dividing into components. In towns SDW is stored at landfills but in rural it is dumped at waste sites spontaneously. Only 5% of republic SDW is composted or burned.

East-Kazakhstan Oblast (EKO) is a large industrial region in Kazakhstan with its center in Ust-Kamenogorsk. Nowadays EKO produces about 400 tons of SDW per year. Total waste production in EKO is the following: towns – 70% of annual waste production;

district centers – 20%; townships – 6%; villages – 4%; 69% of total town waste production is produced by Ust-Kamenogorsk.

Selective sorting of SDW is only applied spontaneously at large dumps and landfills and not all SDW is sorted. SDW is only sorted into the following components: rubber, leather, leatherette, wood to be burnt; plastic and polyethylene items are used to be recycled into tare and containers or as an astringent to different products (bricks, tiles etc.) by entrepreneurs. Sorting is primitive therefore volume of regional recycled products is about 0,9% versus 1,3% of republic ones. The most preferable method of waste processing is depositing. The following are the reasons for using this method:

- Low danger level of landfills – IV;
- It is the cheapest way for disposal of waste;
- Considerable experience in rational storing of waste and processing of waste at landfills;
- There are many suitable natural grounds with low natural filterability
- It can be used in any climate region which facilitates SDW regional management

In accordance with best practices of developed countries, in Kazakhstan, in EKO particularly, it is intended to careful presorting of waste, separate recycle resources and depositing useless waste at landfills.

Thus, the existing scheme of waste treatment in towns and large townships is the following: “collecting of waste – transportation – landfill (partial or selective sorting). It should be changed into more flexible and better scheme “careful and separate collecting of waste – transportation – sorting station (careful sorting) – landfill”.

Made calculations of efficiency estimation of waste transshipping station in Ust-Kamenogorsk shows that applying of waste transshipping method makes it possible to decrease operating costs by 13%, garbage disposal rate by 12%.

It is important to mention that the problem can be solved by applying up-to-date technologies as well as by education and informing of population and authorities responsible for ecology safety.

V.N. Kurochkin

APPLICATION OF BIOLOGICAL PRODUCTS BIOMIX TO OPTIMIZE THE TREATMENT AND TO PROVIDE ENVIRONMENTAL SAFETY IN CONDITIONS OF POLLUTED WATER AND SLUDGE

000 EKBIT, Kiev, Ukraine

The non-uniformity incoming waste water is a widespread problem on the municipal treating systems of average and small cities in Ukraine. This situation is caused of the sewage inflow to the treatment system from nearby industrial plants. Sudden changes in the composition of flows in the overloaded sewage treatment systems leads to instability or

failure of the treatment system.

Usually, to ensure stable operation of overloaded treatment system, costly reconstruction or modernization of the system is required. In the current economic conditions, capital expenditure is not always possible.

In such a situation the application of biologics products in order to stabilize the operation of treatment systems is a reasonable alternative.

There are laboratories on the treatment plants which on a regular basis spend measurements of sewage ratio in the system. With a sudden deterioration in the incoming sewage quality, applying of biologics BIOMIX to the system will improve the biological treatment from organic pollutants and prevent emergencies. For example, applying of a biological product can reduce COD\BOD by 60-80%.

From the existing number of biologics BIOMIX, which differ in composition and concentration of bacteria, the most suitable product should be selected for the related pollution. Knowing the specifics of local industrial plants, it is usually sufficient to apply one or two types of biologic products. Thus, it can be flexible to respond to shock loads from industrial plants related to the different technological cycles if the certain stock of BIOMIX is available.

Even properly projected treatment systems are not always able to work well in situations when shock loads of industrial effluents inflow as a result of the emergency at the industrial plants. Using of BIOMIX in this case is appropriately.

Duly applying of the biological product in an emergency situation can prevent the distraction of active sludge, the failure of process equipment, and as a result, collapse of the treating system.

The practical application of biological products on the municipal treatment systems proves the technological and economic expedience and effectiveness.

A.S. Kutergin
A.V. Voronina
T.A. Nedobuh

STUDY OF POSSIBILITY TO USE MODIFIED GRANULATED GLAUCONITE FOR WATER TREATMENT OF CAESIUM AND STRONTIUM RADIONUCLIDES

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The use of local water purification systems will allow preventing the ingress of radionuclides into human organism through water in case of nuclear accidents and on territories with water contaminated by natural radionuclides. Filters for decontamination of drinking water are to extract the wide range of natural and artificial radionuclides from large water volumes.

The using of thin-layer inorganic sorbents (T-LIS) based on granulated natural carriers open up new possibilities of increasing of resource of individual filters (IF), improvement of their hydrodynamic and sorption features.

Such T-LIS as mixed iron – potassium ferrocyanide (IPF), nickel – potassium ferrocyanide (NPF) and also iron phosphate (IP) were developed by Radiochemistry and Applied Ecology chair of UrFU. The granulated glauconite from Karinskoe deposit in Chelyabinsk region was chosen as the carrier. The hygiene and sanitary conformance for this material is executed. The art of manufacture of the granulated glauconite is patented in Russian Federation (# 2348453). The possibility of using of this T-LIS for decontamination of drinking water from caesium and strontium radionuclides is established.

The sorption of caesium under static conditions was studied. The dependence of caesium removal degree on duration of contact of phases, concentration of sorbate and pH of model solution was researched. The tap water with pH = 7.3, concentration of stable caesium 0.1 mg/L and tracer Cs-137 was used as the model solution. After mathematical treatment of obtained data features of sorbents were determined. Equilibrium distribution coefficient of caesium (K_d) is $(1.8 \pm 1.1) \cdot 10^4$ mL/g for IPF, $(2.3 \pm 1.1) \cdot 10^4$ mL/g for NPF; that is by order of magnitude greater than K_d for carrier (granulated glauconite). Static exchange capacity (SEC) after exposure during one week is >24.5 mg/g for IPF and >95.5 mg/g for NPF. Removal degree of caesium reaches its peak value (90 – 95%) in the range of pH 4–9 that is usual for natural waters.

Sorption features of obtained sorbent IF-GI-Gr with respect to strontium radionuclides were also studied. “ $\lg C_t - \lg C_p$ ” adsorption isotherms for strontium in drinking water over the range of strontium concentration $10^{-3} - 10^3$ mg/L were obtained. The isotherm is linear within the range of confidence interval until the start concentration of strontium in solution is 100 mg/L. Static exchange capacity is 15.0 mg/g; distribution coefficient of strontium in Henry region is $(3.2 \pm 6.0) \cdot 10^3$ mL/g. The sorbent IF-GI-Gr realizes peak value of removal degree of strontium (90 – 95%) over the range of pH 4–9.

Thus, researched thin-layer inorganic sorbents have high specificity with respect to caesium and strontium radionuclides and increased exchange capacity. It makes their application promising for rehabilitation of natural water bodies and low-level radioactive sewage waters treatment. Also additional researches are planned for capability check of using of sorbents as the main part of individual filters.

Y.G. Kutinov
Z.B. Chistova

PROCESSES OF GEOSPHERES INTERACTIONS ON THE AREAS OF FAULTS-CROSSING (GEOENVIRONMENT, HYDROSPHERE, BIOSPHERE, ATMOSPHERE)

Institute of Ecological Problems of the North, Ural branch of the Russian Academy of Science, Archangelsk, Russia

In 2001-2010 measurements of atmospheric pressure above fault-crossing were carried out, and the fact of constant “deficiency” of atmospheric pressure was established. These minima have received the working name - “static” and have difficult structure with increase

of values in the centre and downturn on periphery the numerous measurements which have been carried out in different years and the seasonal periods, have shown that the allocated minima are static and do not undergo seasonal changes.

The revealed fact of change of dynamics shot wave' geomagnetic variations at the moment of magnetic storms in fault-crossing and presence of zones of the increased conductivity allows to assume occurrence in tectonic structures induced magnetic-telluric currents and, as consequence, ionization of air above tectonic structure and units of faults. The original structure of overcast above fault-crossing speaks about change of electric conductivity of atmospheric air. And constantly observably pinkish shade can be interpreted as display of effect Cherincov' luminescence arising due to compression of rocks.

In space pictures of cyclones in northern hemisphere results of nuclear interaction of neutrons and high-energy protons with an ozone cloud of a planet as the separate petals twirled counter-clockwise are clearly visible. Getting in a nucleus of ozone, neutrons and high-energy protons translate it in the excited condition which is shown all over again as a silvery cloud, then in due course the cloud grows fat and, at last, becomes dark, having formed water. Water, in turn, drops out on a surface of the Earth as deposits - a rain, snow or hailstones. I.e., formation of a luminescence, difficult structure of overcast, other character of loss of deposits is possible. By us it is established, that in conditions of the European North frequency of loss of deposits and their quantity in the centre and on periphery of fault-crossing of tectonic dispositions which territorially coincide with stationary minima of atmospheric pressure for July - August essentially differ. Deposits in the centre of tectonic units dropped out much less often, and their quantity on 26 - is less than 38%.

In 2008 and 2009 by us were carried out on profile Arkhangelsk - Pinega for specification of dynamics of change of the contents of oxygen in near-ground layer of atmosphere on the area of fault-crossing. Received in 2008 and 2009 results speak, that, despite of practically full convergence of diagrams of atmospheric pressure, the picture of the contents of oxygen in 2009 differs from similar in 2008. The contents of oxygen depend from PT conditions and inflow of deep' gases. Values of atmospheric pressure during gauging were practically identical a temperature mode is characterized about zero values and has no significant distinctions. Thus, there is only an increase inflow deep' gases, first of all CO₂.

Our data testify to presence of influence of tectonic infringements on Environment due to occurrence induced currents, deep decontamination and change of structure atmospheric fields. The counter system "influence - response" is observed, i.e. not only change of a geomagnetic field and atmospheric pressure influence on is intense - deformed a condition of the geological Environment, but also the Environment influences sun-meteorological parameters. I.e., in area of tectonic units vertical through channels difficult geospheres interactions, fascinating lithosphere, hydrosphere, biosphere and an atmosphere are formed.

Researches is executed at financial support RFBR, the grant 08-05-99816 "Active processes in the environment, their monitoring and forecasting in the territory of Arkhangelsk region" and Programs DSE of the Russian Academy of Science #9 "Geospheres interactions", Project "Studies process of interaction geospheres in active geological structure in the North of Russian Plate".

I.V. Lantsova

**THE ORGANIZATION AND IMPLEMENTATION OF
ECOLOGICAL CONTROL AT ALL STAGES OF CONSTRUCTION
AND OPERATION OF INDUSTRIAL FACILITIES**

JSC "PNIIS", Moscow, Russia

The doubtless priority of economic problems existing all over the world over the ecological leads to that the last create potential threat for normal functioning of a society in this connection there is a necessity of toughening of ecological control at building and operation of industrial targets.

According to the joint venture 11-102-97 "Engineering-ecological researches for building" are provided following stages of carrying out of industrial ecological control (monitoring):

- Prebuilding (zero) monitoring;
- Monitoring in building (building monitoring);
- Monitoring in operation.

Prebuilding monitoring will be organized for the purpose of definition of an initial condition and the basic tendencies of change of components of environment prior to the beginning of building and revealing of components of environment, indicators and the characteristics needing supervision at the further stages of realization of the project.

Ecological control (monitoring) in building will be organized for the purpose of monitoring procedure behind all components of environment on which negative impact will be made during performance of civil work.

Main objective of industrial ecological monitoring in operation is control over a condition and pollution of components of environment in a zone of influence of projected objects by gathering of the measuring data, the integrated processing and the analysis of this data, distribution of results of monitoring between users and timely finishing of the monitoring information to officials.

Into problems ecological monitoring in operation enter:

- Control of levels of influence of maintained objects on various components of environment and conformity to the established maximum permissible standard loadings;
- Control of a condition of components of environment and its conformity to sanitary-and-hygienic and ecological specifications.

For realization of the specified problems creation of is constant-operating system PEM is provided.

According to the general methodological approach to monitoring the ecological monitoring system should include:

- Monitoring of sources of influence on environment;
- Monitoring of zones of direct influence of sources of anthropogenous influence on environment.

At division of system PEM on the basis of a controllable component of environment allocate following specialized subsystems:

- monitoring of atmospheric air;
- monitoring of bowels with subsystems entering into it:
 - Monitoring of the geological environment;
 - Monitoring of underground waters
- monitoring waste and a surface water;
- monitoring of a soil and vegetative cover;
- fauna monitoring;
- monitoring of physical influences;
- monitoring of radiating conditions.

The organization of supervision over separate components of environment includes ground reconnaissance of the site, allocation of the basic objects of supervision, working out of the program and the monitoring project with reference to actual conditions and its coordination with nature protection official bodies.

On all subsystems of monitoring the arrangement of points and frequency of supervision can vary considerably depending on properties of a component of environment, and also from territory natural-environmental conditions.

Roland Liesenberg

DEPOSIT OF HIGH TOXIC WASTE IN UNDERGROUND STORAGES AND UNDERGROUND REUTILISATIONS OF THE K+S AG

K+S Entsorgung GmbH, Kassel, Germany

K+S Entsorgung GmbH was founded in 1991, since when we have taken over all the sales functions relating to waste disposal activities. We offer our customers advisory services and the development of system solutions. With a staff of about 240 committed employees, we cover nearly every area of the waste disposal industry. Our team includes mining engineers, chemists, geologists, business experts and process engineers.

In providing our services we benefit from the long experience of the Group in the underground waste disposal business. Way back in 1972, with the underground waste

disposal plant of Herfa-Neurode, a long-term safe disposal scheme was implemented for the first time, which still sets the standard far beyond the borders of Germany. A range of patents in the field of process engineering vouch for the company's innovative strength and its competency.

Our membership of the K+S Group, which has a tradition of great expertise in chemical and geological fields, provides you with a great deal of security. We also have access to all the Group's disposal services and capacities, including logistics and infrastructure. This further extends not only our service range, but also enables us to operate particularly efficiently and economically. These are advantages from which you the client profit directly.

Customer proximity is indispensable to the quality of our work. With our branches in Italy and Switzerland and through our cooperation with experienced partners in other European countries, we can offer the assurance of expertise on the spot. And so that our working relationship runs smoothly within the processes, you will be assigned a permanent contact, who will accompany you every step of the way.

The types of waste are as diverse as the industries producing them, and we only offer a few examples here. We will be pleased to tell you in person where our other strengths lie and what we can do for you.

We can dispose of mineral waste and all combustion residues as produced in municipal solid waste incinerators and toxic waste incinerators or biomass heating and power plants. We can handle production residues stored on waste products from former industrial sites and waste from disused landfills or from oil industry plants in our facilities. And we can do so just as safely as we can deal with manufacturing waste from the chemical, metal and electrical industries, including solid residues from chemical processes, galvanizing process waste and metal hydroxides.

The toxicity of waste determines where and how it needs to be disposed of.

For almost every type of waste we have different specialized disposal sites with unrestricted disposal security.

Specially developed systems and processes permit sensible processing and reliable handling of materials. And special care is always guaranteed.

A.M. Lukina
O.I. Kopytenkova

ASSESSMENT OF ENVELOPE BUILDINGS NOISE INSULATION PROPERTIES

*Saint Petersburg State University of Railway Communications,
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Due to current economic development of cities transport infrastructure plays an important role. One of the biggest problems of urbanized areas is acoustic discomfort.

The main reason for noise pollution is ever increasing density and velocity of traffic currents. Test centre “Ecological safety and labour protection” has been doing full-scale investigations for four years. They have found out that in several districts of Saint Petersburg maximal and equivalent noise levels exceed permitted sanitary norms.

One of the most efficient and widely available means of protection of residential areas from traffic noise are sound baffles. They allow to reduce variations in noise levels in different city districts and to increase urban area efficiency by constructing residential and public buildings in places which would have been unsuitable for these purposes without sound baffles because of maximal and equivalent noise levels overshoot.

Baffles made of vertical walls with different lateral sections are considered as the most promising ones. They are put close to noise sources. Sound baffle efficiency is conditioned by location, height and material of baffle surface. The efficiency can be increased by optimizing the surface turned to noise source.

To substantiate choice of sound-suppressing materials we have analyzed and compared reports of the following independent organizations: Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.m.b.H Wien, TAS Schreiner GmbH BTI Bautechnisches Institut Linz, TAS Bauphysik GmbH Leonding, Magistrat der Stadt Wien Magistratabteilung 39-VFA Versuchs- und Forschungsanstalt der Stadt Wien, Staatliche akkreditierte physikalisch-technische Versuchsanstalt für Wärme- und Schalltechnik am Technologischen Gewerbemuseum Wien, test centre “Ecological safety and labour protection” of Saint Petersburg State university of communications. The analysis results are represented in the table below.

Table

Results of noise insulating properties analysis

Type of noise insulating construction	Surface material	Noise absorption	Air noise insulation
Composite panels	concrete	11dB	19-32 dB
Perforated metal sandwich-panels «Bongard» (Germany)	metal	7,3-16,4 dB	25-35 dB
Wood-concrete panels «Durisol» (Austria)	wood chips	8-19 dB	31-59 dB

The analysis has shown that the panels produced according to the technology of Austrian company Durisol have advantages over the rest of materials used for noise insulation.

N.N. Marfenin

THE BACKGROUND OF ENVIRONMENTAL EDUCATION IN CLASSICAL UNIVERSITIES IN RUSSIA

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Environmental education started to emerge in the classical universities of Russia in 1992, that is, 10–20 years later than in the countries of Western Europe and North America, even though all the main preconditions for its development already existed back in 1970. In was a common belief among the leading Soviet scientists that environmental and conservation specialists should be trained within the framework of traditional branches of science – biology, geography, chemistry, etc. – so that they became true experts in their particular field, instead of dilettantes.

It was not until the establishment of the USSR State Committee on Conservation in 1988 and the Ministry of Ecology and Natural Resources of Russia in 1991 that competent environmental experts came into demand, those capable to work in conservation committees and departments and, in particular, to take a systems approach to projects submitted for impact assessment.

The demise of the Soviet Union and its eventual collapse in 1992 coincided with the establishment of the first environmental departments and faculties in classical universities, like Kazan State University (1989), Peoples' Friendship University (1992), and the International Independent University of Environmental and Political Sciences (1992).

The first national educational standard for “Ecology and Nature Management” bachelors was adopted in 1994. That was the Russian equivalent for the field of knowledge known as “Environmental Science” in the USA and other countries. After that national standards were developed for five-year specialist programmes in “Ecology”, “Nature Management” and “Geocology”. The engineering branch of “Environmental Protection” was formed independently some years before that. Educational standards were also devised for “Bioecology” (as part of Biological Sciences) and “Environmental Engineering”, to cover the area of expertise dealing with land improvement and land regulation. The second and third generations of these standards are currently in effect.

Refresher courses and continuing training for specialists with higher education degrees have been in place since 1988, which reflected the needs of the newly formed State Committee (see above). The 1992 Federal Law «On the protection of the natural environment» required the heads of all enterprises involved in environmentally harmful activity to receive special training in ecology. According to the 1988 directive of the Ministry of the Higher and Special Education faculty members of higher education institutions were obliged to complete a short course in ecology and conservation as part of their regular professional enhancement training.

Finally, reduced environmental science courses were made compulsory for classical

university students of all majors, along with Mathematics and certain Humanities courses.

An “Ecology/Environmental Science” course is currently studied by the majority of higher education students in Russia. The course normally covers not only the basics of bioecology, but also demography, natural resource consumption, environmental pollution, environmental regulation and management, and other subjects.

Higher education of environmental professionals is divided into two large sectors: engineering sciences and natural sciences. Their curricula differ considerably, but also complement each other.

A.N. Medvedev

TECHNIQUE OF NATURAL ENVIRONMENT MONITORING DURING GEOLOGICAL EXPLORATION WORKS

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Natural environment monitoring during geological exploration works is one of compulsory conditions of obtaining a licence for the right to use subsurface mineral resources in Russia. However, there are few books on methods of such monitoring.

In order to improve informational background we have elaborated technique of natural environment monitoring on licensed places allocated for oil and gas exploration. The technique has been successfully applied in Central Ural region.

The technique is based on general methods of biospheric monitoring with regard for peculiarities of geological exploration works. We have defined stages, types, objects and volumes of survey as well as lists of indices to be controlled on the basis of estimated environmental impact types analysis.

Oil and gas exploration technology includes two successive stages which are very different by their environmental impact. At the first stage one does geophysical study of the place (gravimetric and seismic survey). At the second stage well drilling and well test is carried out.

Technique of licensed place pollution monitoring consists of three stages. The first stage is the period before commencement of works on the licensed place during which background levels of required indices are measured. The second stage is the period of geophysical research operations. The third stage is the period of well drilling and testing including well abandonment and disturbed land reclamation (in case of discovery of non commercial oil and gas content).

See below the tabular sample programme of environmental monitoring on licensed place during oil and gas exploration works.

Works type	Object	Measureings per year	Indices	Stages*		
Air monitoring	Place	2	List 1	+	+	-
	Drilling sites			-	-	+
River network monitoring	Principal rivers on the place	4	List 2	+	+	-
	Rivers close to drilling sites			-	-	+
Ground water monitoring	Wells and spring water on the place (if available)			+	+	-
	Observation wells (if available) on drilling sites			-	-	+
Soil monitoring	Place	1	List 3	+	+	-
	Drilling sites			-	-	+
Radiation monitoring	Place	1	**	+	-	-
	Waste pit	12		-	-	+
Drilling sludge testing	Waste pit	***	List 4	-	-	+

* Positive sign + and negative sign – indicate availability and absence correspondingly of the works type at a particular stage.

** Equivalent gamma radiation dose rate (EGRDR)

*** In case of identification of EGRDR anomalies

List 1: NO₂, NO, SO₂, CO.

List 2: colour, turbidity, odor, pH, Cl⁻, SO₄²⁻, HCO₃⁻, NH₄⁺, NO₂⁻, NO₃⁻, Ca, Mg, Na, K, Si, amount of ions, oil products, phenol, surface-active substances, Hg, Mn, Fe.

List 3: oil products, phenols, surface-active substances, Hg, Mn, Fe, pH.

List 4: efficient natural radionuclide specific activity

J.G. Mesheryakov
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DIE BAUSTOFFPRODUKTION MITTELS DER DIELEKTRISCHEN ERWÄRMUNG

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Die thermische Bearbeitung (der Dörrkringel, das Schmelzen u.a.) von verschiedenen Materialien mittels der Einwirkung des variablen elektromagnetischen Feldes einschließlich des Feldes von superhoher Frequenz (der UHF) wird unter industriellen Bedingungen beim Dörrkringel des Holzes, in der Plastik-, in der Keramikproduktion u.a. verwendet. Das Erwärmen von Dielektrika im variablen elektromagnetischen Feld ist durch die Stromerscheinung (der Absetzung und der Leitungsfähigkeit) bedingt. Es lässt zu, eine Erwärmung mit hoher Geschwindigkeit, gleichmäßig nach dem Umfang des Materials, sowie die lokale selektive Erwärmung zu verwirklichen.

Unter industriellen Bedingungen bleibt die Anwendung des Dielektrisch-elektromagnetischen Erwärmens wegen hohen Kosten für Umgestaltung des elektrischen Stromes der industriellen Frequenz in UHF sehr beschränkt.

In kristallische Struktur der festen Körper verfügen Atome und Gruppen von Atomen über eine bestimmte Frequenz von eigenen natürlichen Schwingungen, die von der Methode Infrarotspektroskopische Analyse (IKS) bestimmt sein kann. Bei Einwirkung des äußerlichen gesteuerten vibrierenden Systems (äußerlichen Konturen) tritt, falls die Schwingungsfrequenz des gesteuerten Systems mit der Frequenz von eigenen Atom- oder Atomgruppenschwingungen überein stimmt, in der Struktur des festen Körpers die Resonanzerscheinung.

Dabei erreicht die Amplitude der erzwungenen Schwingungen sein Maximum und wahrscheinlich eine Kristallzerstörung (einschließlich lokalen Zerstörung) oder eine Atom- oder Atomgruppenentfernung aus der Struktur. Das lokale Erwärmen und die Dissoziation, heftige Beschleunigung der Prozesse von Energieabsorption des äußerlichen Feldes erlauben den genannten Energieaufwendungen für Rohstoffbearbeitung wesentlich zu verringern und lassen der Dielektrischen Erwärmung zu, mit traditionellen Technologien zu konkurrieren.

Die Strombearbeitung der UHF von Resonanzfrequenz kann bei der Baustoffproduktion – die Rohstoff Dörrkringel und Dissoziation, Aufbauschung u.a. verwendet sein. Eine Anwendung dieser Technologie ist insbesondere bei der dispersen Industrieabfallbearbeitung (Phosphogips, Borogips u.a.) zweckmäßig, dabei verwirklichen sich der Dörrkringel und die Dehydratisierung in einer Anlage.

Unter labormässigen Bedingungen sind aus natürlichen Rohstoffen und Industrieabfällen die folgenden Baustoffe bekommen:

- der Gips- und der Anhydritbinder sind aus dem Gipsstein des Schedokski Vorkommens ($97\% \text{ CaSO}_4 \cdot 2 \text{ H}_2\text{O}$) bekommen. Der chemisch-verbundenen Wassersinhalt im

Rohstoff ist 19,9%. Der Gipsstein ist in einer Kugelmühle verflacht, deren spezifische Oberfläche 3000 cm²/g (die Methode der Luftdurchlässigkeit) beträgt, den Rest auf dem Sieb mit dem Netz Nr. 02 ist 1,6%. Die Dehydratisierung ist in einem labormässigen Induktor erzeugt, die Resonanzfrequenzen sind 650 cm⁻¹ und 1640 cm⁻¹.

Dank von 2-5 dauerndes Bearbeitung ist Bindegips G-3, A-1 entsprechend staatlichen Standarten (GOST) 125-79 bekommen. Der Inhalt des chemisch-verbundenen Wassers in Bindung – 5,1%. Das Bindemittel ist schnell trocken, was für Bindungen, die von der Schnelldehydratisierung des Rohstoffs bekommen sind, charakteristisch ist. Die Bindemittelablagerung innerhalb von 24 Stunden erhöht seine Marke bis zu G-4 – G-5 (Schrumpfung). Aus angereicherten Phosphogips des Kombinats "Ammophos" (Cherepowez, Gebiet Wologda, Russland) ist die Gipsbindung der Marken G-3 und G-4 vorbereitet und geprüft.

Unter labormässigen Bedingungen ist eine Aufbauschung von Vermiculitkonzentraten des Kovdorskis Vorkommens der Marke KBK-4 durchgeführt. Die Resonanzfrequenz, die nach den IR- Absorption Spektren bestimmt ist, bildet 2900 cm⁻¹. Die Bearbeitung ist in Laborinduktor innerhalb von 5s durchgeführt. Es ist einer Vermikulit mit Schüttdichte von 210 kg/m³ (Marke 200) bekommen. Der Aufbauschung Koeffizient änderte sich in den Grenzen von 7 bis zu 12.

Olga Mezinova

MODERN RUSSIAN ENVIRONMENTAL EDUCATION IN HISTORICAL CONTEXT OF THE MODERNIZATION PROCESS

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The environmental education system aimed at practical solution of environmental problems appeared in the 20th century. The formation of this system is connected with the foundation of the International Union for Conservation of Nature and Natural Resources (IUCN). There was spreading of environmental knowledge, preservation and regeneration of natural resources among its purposes. In 1950 the permanent Commission on Environmental Education was formed under the IUCN.

The second stage of the environmental education system development began in the mid-1970s: UNESCO and UNEP established the international environmental education program.

The third stage was the formation of formal (within educational institutions) and informal environmental education structures. The attention to the issues of environmental education noticeably increased in post-Soviet Russia. Law No. 2060 – 1 of Russian Soviet Federative Socialist Republic "On Environmental Protection" adopted on 19 December 1991 defined the necessity of the formation of universal, integrated and continuing environmental education and upbringing. The Russian Federal Law "On Education"

defined “love of nature upbringing” as one of the principles of the state educational policy. In the next few years the legal basis for universal environmental education system formation in the Russian Federation was developed. It also included corresponding constitutional provisions that established the right of citizens to a favorable environment (Article 2), their duty “to preserve nature and environment, take care of natural resources” (Article 58); the laws “On Environmental Protection” (1991), “On Education” (1992). In 1994 – 1995 the following government regulations on environmental education were adopted: “On Improvements of Environmental Public Education (No. 1208 dated 3 November 1994); “On the approval of the regulations on interagency environmental public education committee and its initial composition” (No. 91 dated 26 January 1995). In 1995 the federal target program development “Russian Public Environmental Education” began. It was supposed to finish in 2000. In 1997 the term of this program was prolonged to 2010.

Thus the environmental education in Russia has been in permanent progress. The significance of this development was secured by the Ecological Doctrine of the Russian Federation. At the same time the practical solution of this problem doesn't go beyond the historic opportunities. It was clearly demonstrated by Russia's experience in 1990s-2000s. So the lack of organizational and methodological support of the environmental education on the federal level in 1990s led to extensive development and implementation of its regional component. During the “Sovereignty Parade” it caused isolation from the federal component and sometimes contradicted the Constitution of the Russian Federation. There is a notable fact that that the formation of the environmental education system within preschool institutions began later than that in the institutes of higher education and it failed to comply with the logic of the educational process. Environmental problems have comprehensive character therefore their statement and solution is possible only in consideration of the historical context.

R.A. Mkhitarov

DER UNIVERSELLE SORBENT (SORBTIONSMITTEL) „GIGASORB“: EIGENSCHAFTEN UND ANWENDUNGSGEBIETE

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Probleme der Reinigung der industriell erzeugten und regenbedingten Abwässer sind für alle Metropolen der Welt aktuell. In Russland mit ihren Schneewintern ist in den letzten Jahren eine neue Art von Abwässern entstanden: Die Schneemassen, die von den städtischen Straßen gesammelt, geschmolzen, gereinigt und in ein Wasserbecken oder in den Kollektor abgelassen werden. In den meisten Fällen beinhalten die städtischen

Abwässerreinigungskomplexe die Kläranlagen, die Sandfänger, die Floratoren und im Endstadium – die Filter, die mit der aktivierten Kohle ausgestattet sind. Die aktivierte Kohle (AK) verfügt über das breite Spektrum von Sorptionsfähigkeiten, jedoch ist ihre Regeneration ökonomisch nicht sinnvoll. Um die Haltbarkeit der Kohlenfilter zu verlängern, werden vor diesen die Sorbentefilter platziert. Diese bestehen aus polymeren nicht gewebten Materialien. Am effektivsten erwies sich dabei der vielfach regenerierbare Sorbentefilter Megassorb (SM). Bei der Anwendung des Sorbentefilters Megassorb (SM) ist die Betriebsdauer der Kohlenfilter um vielfaches gestiegen. Dieser Sorbentefilter ist selbständig in der Lage, die Abwässer von den Erdölprodukten und den abgewogenen Teilchen bis zu einer Konzentration von jeweils 0,05 ml/l und 0,1 ml/l zu reinigen. Er ist jedoch nicht in der Lage, die im Wasser aufgelösten Salze der Schwermetalle und Anionen der Säuren aufzuhalten.

Die Idee der Vereinigung der Eigenschaften von AK und SM in einem Material wurde mittels des Auftragens und der Befestigung der Nanoteilchen des Kohlenstoffes auf den polymeren Fasern realisiert. Im Ergebnis entstand der neue Sorbent mit dem Namen GIGASORB (SG), in dem die breite Sorptionsfähigkeiten des AK bei vielen Klassen der gefährlichen Stoffe, einerseits, und die Fähigkeit des SM zur vielfachen Regeneration andererseits, erfolgreich kombiniert wurden. Zwar stieg die Sorptionsfähigkeit des neuen Filters (SG) bei Erdöl und Erdölprodukten nur unwesentlich, jedoch ist die Sorptionsgeschwindigkeit bei SG im Vergleich zum SM um das Doppelte gestiegen. Der neue Filter erwiesen als geeignet, viele Klassen der Stoffe wie der AK zu sorbieren, jedoch ohne Senkung der Regenerationsfähigkeit (500 Zyklen "Sorption – Regeneration"). Außerdem erlangte der SG die absolute Schwimmfähigkeit, die zeitlich nicht beschränkt ist. Diese Fähigkeit erlaubt einen wirksamen Einsatz auf den freien Wasserflächen. Wobei der SG in Form von Balkensperren, Matten, Kissen und Servietten verwenden werden kann. Die Balkensperren aus SG können gleichzeitig zwei Funktionen erfüllen: Den Erdölfleck zu lokalisieren und gleichzeitig zu sorbieren. Dies führt dazu, dass die Liquidatoreneinheiten keine Erdölsammler (Skimmer) einsetzen müssen. Es lässt sich das reine Erdöl von der Wasseroberfläche einsammeln und nicht wie früher das gefährliche und schwer trennbare Erdölwassergemisch.

In allen Versuchstestreihen gelang es dem SG alle Tests (Abwässerreinigung, Liquidation von Ölhavarien sowohl auf dem Festland, als auch auf den Wasserflächen) erfolgreich zu bestehen. Für die Produktion von SG wurden technische Bedingungen registriert. Als Ergebnis der Tests wurde von den staatlichen Behörden ein Zertifikat erteilt. Dieses bestätigt die absolute hygienische Sicherheit und die Sorptionsfähigkeit bei schädlichen Stoffen aus den Abwässern. Das Material und die Technologie der Herstellung sind mit den Patenten der Russischen Föderation Nr. 2356623 und Nr. 68888920 geschützt. Als Ergebnis des allrussischen Wettbewerbes in Jahr 2008 gewann diese Erfindung in der Kategorie "Ökologie" den ersten Preis. Auf der Ausstellung in Chicago (2009) und auf den spezialisierten Ausstellungen in Moskau (2008 - 2010) erweckte SG das aktive und dauerhafte Interesse den einheimischen und ausländischen Fachspezialisten.

Vsévolod Mymrin

ECONOMICAL USE OF INDUSTRIAL RESIDUES FOR GENERATION OF NEW PRODUCTS

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It suits here to emphasize that, for us, leftovers and wastes are not taken as garbage or disposable materials, but as raw materials of high value

For 40 years Prof. Mymrin has worked in the field of study of reuse of industrial residues as raw materials in order to help enterprises which are facing environmental problems. He has developed methods (compositions and technologies) for manufacturing of materials such as: ceramic, glass-ceramic, refractory, concrete, plasters, thermal/acoustic insulators, bases for roads, airports and of municipal and industrial landfills, cores of dams and new varieties of fuels having high calorific value. The developed methods allow the collection of spilled oil with recovery of grounds, the cleaning of oil layer in tank-ships and of other petroleum materials.

Objectives of the researches:

1. To help the enterprises to face environmental problems.
2. To use as much quantity of industrial residues as possible.
3. To study the possibility of tying heavy metals to the process of industrial residues usage.
4. To develop new materials (mainly those for construction) which are favorable to the Environment and usable in the economical sense with sufficient properties.
5. To investigate physical-chemical processes of new materials structure formation in order to increase its most valuable properties.

Now we can use the following industrial residues as raw materials:

- I. Iron and steel residues:
- II. Wastes of Machine Construction:
- III. Municipal wastes:
- IV. Residues of the Construction and Demolition:
- V. Residues of Production and reuse of paper, cardboard and cellulose:
- VI. Residues of Mining and Preparation:
- VII. Wastes from Petrochemical Industries;
- VIII. Energetic Residues:
- IX. Chemical industry wastes:
- X. Agricultural wastes:

Based on this knowledge we can develop uses for other residues and wastes.

All developed products contain much less amount of lixiviation of heavy metals than the Brazilian and international rules standards. A very low cost of raw materials (industrial

residues), ensuring a high economical effect of production of these materials.

6. To develop new or to adapt current technologies of new material production in the level of pilot plants.

The greatest benefits

Environmental

1. Complete liquidation of landfills of industrial residues for the use of wastes as raw material;

2. Chemical connection of all heavy metals in the developed materials up to level of lixiviation and solubilization, according to the demands of Brazilian and international standard regulation.

Economical

1. Significant reduction of the payments of taxes and environmental fines.

2. A very low cost of raw materials (industrial residues) ensuring a low cost of materials produced and high economical effect.

3. Possibility of price decrease of materials in the market.

Social

1. For the production of new materials developed, it's necessary to create a new chain of enterprises with generation of new job openings.

2. Cleaning of industrial landfills increases the quality of life of the population of industrial areas.

Educative

1. To prepare new generation of Brazilian scientists to continue inquiries and to work in the enterprises in the field of industrial residues with the benefits pointed out above.

3. To increase the level of environmental education of the population through courses, lectures, classrooms and other forms of dissemination of practical knowledge in the field of sanitary and environmental engineering.

4. To prepare and to execute the education of students with subjects of Advanced Topics "Materials of Industrial Residues" in the level of Master's and Doctorate degrees on basis of researches and of international scientific and technological literature.

T.A. Nedobuh
M.V. Streletskaya
A.S. Kutergin

CONCENTRATION AS A STAGE OF DETERMINATION OF URANIUM AND THORIUM ISOTOPES IN NATURAL WATER SAMPLES

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Natural radionuclides are the source radioactive contamination of natural waters as the result both natural migration and anthropogenic dissipation by working of enterprises of nuclear fuel cycle, metallurgical, chemical and mining plants (that is not usually related

to radiation-dangerous works). As the rule methods of determination of the isotopic composition of elements in natural substances differ from methods of determination of the total quantities of elements because of their high complexity and laboriousness. Exacting accuracy and sensitivity demands are made to them because as a rule isotopic ratio variations are slight and contents of determined elements are little. When methods of isotopic content determination are realized we have to exercise processes of chemical separation and/or concentration; that is connected with low content of uranium and thorium and necessity of purification for preparing of high quality source for - spectrometry.

Methods of sorption concentration using inorganic sorbents based on titanium hydroxide and also coprecipitation with iron and zirconium hydroxides were researched for concentration of uranium and thorium from different natural waters. Every suggested method has its advantages and disadvantages. The peak value of distribution coefficient is reached in coprecipitation because the extraction of radionuclides occurs simultaneously with formation of hydroxide which has maximal sorption activity. The disadvantage of coprecipitation is the necessity of treatment of large volumes of water that causes considerable difficulties with quantitative coprecipitation and filtration of the sediment. The proposed method of uranium and thorium coprecipitation with iron (III) and zirconium hydroxides and with following extraction of the sediment on the cellulose under dynamic condition allows to treat of large volumes of water and to save of advantages of coprecipitation connected with full implementation of sorption capacity of freshly made hydroxide.

The dependences of efficiencies of sorption of U and Th by sorbents based on titanium hydroxide, efficiency of colloids formation (using the ultrafiltration method) and efficiencies of coprecipitation with iron and zirconium hydroxides on pH were studied for determination of the best conditions of concentration. The dependence of efficiency of coprecipitation on pH is the bulb function for uranium and the classic sigmoid curve for thorium; this dependences correlate with percentages of colloids of uranium and thorium obtained by ultrafiltration method. The dependences of distribution coefficients of U and Th in sorption on pH are explicit bulb functions. The peak values of distribution coefficients under $\text{pH} = 6 - 7.5$ for uranium and under $\text{pH} = 3 - 6$ for thorium were observed. Decrease of efficiency of uranium sorption under increase of pH is connected with the formation of carbonate complexes of uranyl; in case of thorium it is probably connected formation of pseudocolloids.

Distribution coefficients of U and Th were $10^3 - 10^5$ mL/g for sorption by inorganic sorbent based on titanium hydroxide (T-5) and up to 10^6 mL/g for coprecipitation with iron and zirconium hydroxides.

Subsequent extraction of U and Th was realized under conditions of frontal chromatography and recirculation. The alkaline-treated cellulose was used in columns for extraction of hydroxides on which uranium and thorium were concentrated after coprecipitation. Distribution coefficients as of U as of Th at the rate of $n \cdot 10^6$ mL/g

were realized when coprecipitation with hydroxides and subsequent extraction by alkaline-treated cellulose was combined. The combination of advantages of coprecipitation and dynamic process was success due to this method.

Thus, the following optimal conditions of concentration stage of determination of uranium and thorium isotopes in natural water samples were determined: pH of the solution, ratio of solution volume and sorbent weight, flow rate, number of filter cycles (for recirculation), concentration of iron or zirconium for coprecipitation. Chemical yield of uranium and thorium was not less than 90% under these optimal conditions.

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M.D. Diarov
Z.Zh. Nurgaliyeva
I.S. Samatova
Zh.U. Bakeshova

SCIENTIFIC BASIS FOR EFFICIENT PREVENTION AND ELIMINATION OF DISASTROUS OIL-AND-GAS EMISSIONS IN KAZAKHSTAN SECTOR OF THE CASPIAN SEA

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Comparing emissions of petroleum fluids during emergencies in the Mexican Gulf and on the Tengiz field (the latter took place in 1985) we can see that 9138 tons of petroleum were discharged in average in the Mexican Gulf while on the Tengiz field 8548 tons were discharged. Weight of emissions in both regions are almost equal.

Currently gigantic sub-salt high-sulfur oil-and-gas shelf deposits in Kazakhstan part of the Caspian sea are being mined and the scope of the works is unprecedented for oil industry of Kazakhstan. Analysis shows that emergencies happen in places where earth crust containing huge oil deposits is characterized with tectonic activity.

According to geophysical research data, oil deposits Kashagan, Kayran, Aktoty, Korolevskoye and Tengizskoye are located in one and the same complicated zone, 160 m long and 40 km wide. These oil fields are a "powder-barrel" with abnormally high pressure, temperature and content of hydrogen sulfides.

It should be noted that Kashagan is a unique deposit in the shallow zone of the Caspian sea northern part rich in bioresources and nutritive resources, moreover, located on migration routes of fishes and birds. Our research shows that in this region biomass quantity per unit of area is approximately 1,5-2 times higher than in the rest of the sea. Only 0,94% of total volume of the sea characterized with ecological hyperfragility belongs to Kazakhstan and the total area of the Kazakhstan part makes up 27,73% of the sea (i.e. 398 000 sq.m), average depth is 6,2 m. If one discharges a ton of petroleum in a unit of volume in different parts of the sea, level of lethal concentration is reached here much faster. That is why the sea must be treated with care, its bioresources must be preserved and mass diseases and poisoning of nature must be prevented in the future.

At the same time, uniqueness of the Caspian sea, being the largest in the world habitat of sturgeons, makes its problems global and Caspian sea biodiversity preservation

becomes a concern of the whole world community.

Despite unique bioresources and riskiness of wide-area oil production in the region, big countries such as USA, UK, France, Italy, Russia, China and Kazakhstan itself are interested in long-term field development on the Caspian sea shelf.

If our government, in particular Ministry for Environmental Protection, doesn't organize an independent working team of Russian scientists and western companies specialists in complex monitoring, sooner or later (may be even next year) disastrous oil-and-gas discharges will happen in Kazakhstan area of the Caspian sea. To eliminate them will take at least two months.

Later on, the cycle "well boring, production + disastrous oil-and-gas discharges + elimination + production" are going to repeat. After each cycle toxicity level of sea water will get higher and more dangerous.

Alla Oderova
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INTEGRATED ASSESSMENT OF MOSCOW CITY ECOLOGY

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The area of our study is Moscow-city, one of the most polluted megacity in the world. Toxic substances penetrate into a human body through respiratory way, water, soil and plants.

The project shows water polluting factors: chloroform (as a result of chlorination), sanitary-chemical water parameters; air and city soils polluting factors: NO+NO₂; NH₄, suspended solids, elements such as lead, cadmium, zinc, copper, mercury; mineral oil and so on. All these factors were compared with the data on illnesses generalized for the city districts: children congenital anomalies, illnesses of digestive and blood circulation system, endocrine and urinogenital system, and respiratory organs. The choice of illnesses for our analysis was limited by the available medical data. The spatial distribution of the specified factors within Moscow area was analyzed by GIS technology, and general dependencies were found and confirmed by the known medical research. Data of convergence estimation method has been developed. Additionally some other important coincidences have been revealed and therefore require their medical investigation. In terms of minimization of adverse factors influencing human health, there should be applied up-to-date methods of drinking water quality improvement. Finally, it needs to be noticed that given analysis has confirmed the thesis that pollution in a greater degree affects the health of children and teenagers than adults.

A. Ozerskiy

ALUMINA AS A SOURCE OF ENVIRONMENTAL CHEMICAL POLLUTION IN RUSSIA

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The production of primary aluminium is one of the activities of blue chip companies of home industry providing Russia's modern economic well-being. By these companies the production process is declared to be one of the most safety for people and environments. Nevertheless there is an influence for environments both by aluminium and other metallurgical productions.

Alumina (Al_2O_3) is the raw material for producing primary aluminium. While smelting of aluminium one should use about two tons of alumina; 0,5 ton of carbon anodes; 0,03 ton of aluminium fluoride AlF_3 ; 0,0015 ton of cryolite Na_3AlF_6 for getting one ton of metal. As a result of smelting aluminium from 0,3 to 0,8 tons of complicated chemical and mineral composition wastes are formed. They are transported into slime reservoirs by hydraulic way. This wastes were found to consist of C (12...85%), F (13...32%), Al (11...33%), Na (3...17%), Fe (0,4...3%), S (0,05...2,5%), Si (0,05...0,5%) and other elements. The emission of wastes pollutes air, rivers, and ground waters.

Alumina is surely the main source of chemical contamination of environments because it forms the largest part in smelting of aluminium. We analyzed four industrial alumina samples produced at the four plants from different ores. The first sample was produced at Achinsk Alumina Combine from nepheline syenite, the second sample was produced at Bogoslovski Aluminium Plant from Ural bauxite, the third sample was produced at Nikolayevski Alumina Plant (Ukraine) from Guinea bauxites, and the fourth sample was produced at Pavlodarski Aluminium Plant (Kazakhstan) from Turgay bauxite.

Chemical elements in all samples were analyzed with chemical and ICP MS methods. Analyses showed that there are from 0,6 to 0,7% of toxic trace elements in industrial alumina (table).

Table. Concentration's Ranks of Chemical Elements in Alumina

Concentration's Ranks, ppm	Chemical Elements
1 000 000 – 10 000	Al
10 000 – 1 000	Na
1 000 – 100	C; Ca; S; K; Rb; Si; F
100 – 10	Mg; P; Zn; Zr; Ti; Ga; B; As; Ce; Mo; Mn; V; Sr
10 – 1	Cr; Li; Ni; Be; Cu; Sn
<1	Hg

The concentrations of approximately 10 elements exceed their Clarke values (or the average values of a chemical elements in the Earth's crust). Such dangerous elements as Mo, As, Be, Hg, S are characterized by especially active accumulation in alumina. The highest

concentrations of toxic elements are found in alumina from Paleozoic bauxites while the minimum ones are observed in alumina from young Cenozoic ores and from nepheline syenite. Thus, alumina can provide a chemical pollution of environments.

The aluminium production in Russia is not sufficiently supplied with home mineral resources, and about 60% of alumina is imported. And toxic elements are imported together with alumina of course. After alumina processing (aluminium smelting) many toxic trace elements are left in Russia in the form of wastes that pollute home environment. We consider that annually it is about 25-30 thousands metric tons of toxic elements.

V.P. Panov
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PHYSICOCHEMISTRY AND TECHNIQUES OF INDUSTRIAL WASTES NEUTRALIZATION

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Constant increase in amount of chemical reagents, metals and oil products used in various industries results in increase in technogenic wastes, including liquid and solid wastes with high levels of toxic substances. Thus, neutralization of these accumulated toxic substances is of great importance in the engineering protection of environment.

Development of physico-chemical basis of ecological and technological transformation of toxic pollutants of emissions and effluents is of great importance for the resource saving, circulating water supply systems as well as utilization of spent process liquors that contain residual reagents of a variety of industries.

Essentially new methods of waste neutralization have been developed by our research group, those are: neutralization of spent tanning baths with further recycling; cycling of regeneration solutions of water preparation in power engineering, pulp and paper industry resulting in a great decrease in chlorides discharge; removal of heavy metals from activated sludge and bed silts with further usage of the sludges in agriculture and landscape keeping. These questions are of current importance both in Russian and abroad enterprises.

The novelty of these technologies is in simultaneous arrangement of technological processes and regimes of discharge of wastes from the enterprise, environmental requirements, energy-chemical conversion of pollutants and economical feasibility of the usage of a power and material resources of internal or external streams.

For extensive wastewater purification, the usage of synergetic techniques is very promising, that is, photo-catalytic and catalytic methods induced by oxidants, flotation and cavitation. Energy and chemical transformation of pollutants allows decomposition of aggregative-stable water-oil emulsions that present in effluents after washing of details and wheel pairs in railway depots.

Advantages of polymer fibrous materials allowed development of low-temperature catalysts for neutralization of both industrial effluents and emissions from sulphur-

containing compounds and organic substances and also for recycling of exhaust technological solutions in manufacturing of paper, leather and viscose fibre. A series of knitted (woven) contact packings and elements were developed using same polymer fibrous materials for intensification of heat and mass transfer processes in column apparatus.

Methods of suspended solids removal from exhaust solutions in the leather industry have been developed by our research group. The developed methods do not effect the pH of treated water and include further energo-chemical destruction of organic substances which allows re-use of chromium tanning bath with no precipitation and pollution of water with chromium salts.

On the basis of investigation of physico-chemical processes of reverse accumulation of heavy metals by microorganisms, a technique of neutralization of pulps, sludges and bad silts have been developed. Generation of local concentration regions and acidity of medium of interphase boundary allows exchange of heavy metals of silts and sludges by calcium (magnesium) with further transfer of colloid or complex compounds of heavy metals to aqueous phase. The resultant solid phase can be further composted.

V.V. Parhomenko
O.A. Kulichenko

ABOUT MONITORING BEHIND WATER SUPPLY SOURCES

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Water is one of the major factors of environment on what health and sanitary living conditions of the population appreciably depend. Increase of reliability and quality of water supply of the population potable water is one of prime social problems. Maintenance with potable water of the population in Krasnodar region is made priority through the centralized systems of water supply.

In Krasnodar region for economic-drinking water supply mainly are used deep-well waters. Except underground waters, as a water supply source, the rivers Kuban and Urup are used, that makes 11 % from all quantity of submitted water to the consumer.

Fresh underground waters of a southern part of the Azovo-Kuban artesian pool differ remarkable drinking qualities. By results of researches of water quality of pool as a whole, the highest indicators of discrepancy have territories of northern zone of the region where water on natural qualities doesn't meet the requirements of the sanitary legislation and can't be applied to drinking needs without corresponding water preparation. Activators of pathogenic, conditional-pathogenic flora and parasitic diseases in the given water sources are not revealed. On radiological researches all tests answer hygienic specifications.

Quality of water in the river Kuban according to long-term supervision doesn't correspond to specifications. The river Urup as the water supply source is unstable and doesn't guarantee constant quality of water because of seasonal fluctuations of a water level and uniform water selection. The basic sources of pollution of the rivers Urup and Kuban are:

- Transboundary carrying over of polluting substances from the sources located in upper courses of the rivers and their inflows (organic substances, hydrocarbons, zinc, copper);
- Substandard work of municipal treatment facilities of the water drain, inefficient work of local treatment facilities of the water drain of various objects;
- Storm drains from settlement territories and the agricultural objects located in coastal zones.

At the Black Sea coast of Krasnodar region the basic source of economic-drinking water supply are the underground waters dated to channel adjournment of river valleys, running into Black sea. A distinctive feature of formation of underground waters in coast valleys – close interrelation of their accumulation from dropping out deposits that leads to deficiency of water in absence of rains and to microbic pollution of water sources.

Thus, the most reliable in the sanitary relation are fresh underground waters of the Azovo-Kuban artesian pool.

With a view of development and modernization of water supply systems in region, work on program realization «Maintenance of the population of Krasnodar region with potable water for 1999-2010» is spent, in which questions of monitoring of water supply sources quality are reflected.

I.P. Ponomarenko

MEASURES ON IMPROVEMENT OF THE ENVIRONMENTAL CONDITION IN THE ZONE OF THE OLYMPIC OBJECTS

Open Company «New Ecological Company», Krasnodar, Russia

Open Company «New Ecological Company» exists 25 years, is engaged in workings out of all kinds of projects on ecology and actively participates in carrying out of nature protection actions on the Olympic objects in Sochi (drawing up Preservation of the environment to the building project has undressed Modernization of Cargo court yard of Sochi, Adler, at arrangement of water security zones and coastal protective a floor of water objects, designing of maximum-permissible dumps).

The important factor of preservation Black Sea kumji is its artificial reproduction which is carried out on the river Mzymta. Expansion and modernization of Adler experimental fish-breeding factory can be one of ways of increase in volumes of artificial reproduction kimji (mzympta's populations).

Influence on atmospheric air. The basic climate factors of area of realization of the Program are: solar radiation, circulation of atmosphere and character of a spreading surface. Difficult physic-geographical conditions, a variety of landscapes, influence of Black sea and high ridges makes considerable changes to the general carrying over of air weights in width direction.

For decrease in emissions of polluting substances in atmospheric air the complex of actions is carried out: transfer of city boiler-houses from coal and black oil on gas fuel;

equipment introduction on catching, recycling, to neutralization of emissions of harmful (polluting) substances in atmospheric air, to reduction or an exception of such emissions; introduction of low-waste and technologies without waste at storage and transfers of building cargoes with a view of decrease in level of pollution of atmospheric air; control over observance of requirements on an exception of application as coolants for ice objects ozone destroying substances; equipment of objects of building by monitoring systems of observance of specifications and maximum-permissible emissions (MPE) in atmospheric air; complex reconstruction and building of transport knots and outcomes with a view of optimization of a mode of transport system; control over quality of gasoline and other kinds of fuel; creation of the new areas of green plantings and green zones around city building.

Besides, restriction on the noise influence which level should be not above 0,8 maximum-permissible values is provided. The same requirements should be provided and on influence on a condition of impurity of atmospheric air by harmful chemical substances.

The situation with wastes. The current state of places of placing of firm wastes and their neutralization is one of the sharpest and actual problems of a city-resort Sochi.

The program provides a complex of necessary actions for creation of answering modern requirements of objects on gathering, accumulation, safe time storage and recycling of a waste out of a zone mountain climatic resort, and also action for sanitation and recultivation (closing) of existing dumps.

Influence on the geological environment for prevention of pollution of underground waters on all platforms of a sediment, repair and technics refueling will be provided a water-proof concrete or asphalt covering, and platforms will be equipped by special devices for the prompt reaction – liquidations of emergency leaks and gathering of polluting substances. Water selection in strict conformity with the calculated look-ahead operational resources is provided not to cause an exhaustion of stocks of drinking sources.

The program provides system engineering of complex ecological monitoring with a view of maintenance of control of an ecological state of environment of the Sochi national park, and adjoining territories, in the course of building of sports and other objects and after their input in action, including land and satellite supervision.

Natural complexes on which the Olympic objects will be placed, are unique, therefore the estimation, the analysis and management of ecological risks at planning and building of the Olympic objects are a necessary condition of a nature protection policy.

I.P. Ponomarenko
E.P. Filimonova

MONITORING OF ECOLOGICAL SAFETY OF PLACES OF A LONGER STAY

Open Company «New Ecological Company» Krasnodar, Russia

Nowadays abnormal zones are already enough studied, that with them to be considered and take into account them both at town-planning, and at a construction of various

technological objects, including transport highways, i.e. ways of movement of surface, water, air transport. And for this purpose the information on these factors should be more accessible. Trellised grids of the Earth of various usages represent field formations of certain structure in the form of power lines, strips, planes, stains, power knots (E. Hartmana, Z. Vitmana, M. Karri, Albert, Z. Stalchinsky, Sanders's grid, Katamohina-Gorchakova-Makarova, a stain of channels Artushkova, etc.). In their formation besides difficult interaction and numerous geophysical factors (the piezoelectric phenomena, the magnetic-hydrodynamic phenomena, breaks, emptiness, etc.) the anthropogenic factors created by the person (techno pathogenic, biopathogenic) take part, and space radiation, forming, as a whole, the most complicated dynamic field structure.

As well are known the most typical external signs on which it is possible to define such zones. As it was found out, for certain abnormal zones gravity change is characteristic; air structure; conductivity of soil; deviations of a magnetic field of the earth are possible; micro flora is changed, there can be pathogenic microbes, viruses, fungi, a mold; can be changed and the vegetation, grows mosses, a mold, lichens more, certain kinds of colors, trees can grow, as a rule, defective curves, weak etc. Person, and even technical constructions, badly enough transfer such places.

Now influence of abnormal radiations on health of people is conventional, and is considered as one of ecological risk factors and occurrence of diseases. Thus occurrence of functional infringements depends on variety of conditions (duration of stay in this zone, a kind of a source of radiations, the constitution of the person, etc.).

With other things being equal in such zones the person necessarily has infringements at functional level; being shown by undue fatigability, difficulty of falling asleep, irritability, feeling of internal anxiety, spasms in feet etc. Use of objective medical methods of research shift of acid-base balance, increase in speed of subsidence of red cells allow to find out thus, sladzh-phenomenon occurrences in micro vessels, change of functional indicators of the vegetative nervous system testifying to pressure adaptable regulatory mechanisms.

As a whole this problem for inhabitants of the Earth is serious enough; as even if to take only our country under the available data on the average approximately about 30% of the population lives or works in adverse zones. And it, naturally, reduces possibilities and vital resources of our population.

The person should secure itself against their adverse effect. But, data available today about GPZ are individual and isolated, therefore a practical problem of our research and practical work of steel: methods of GPZ detection and working out of methods of neutralization of their adverse effect on health of the person at various design stages of habitation, and also in already existing habitation.

In a current two years, experts of Public corporation «New ecological company» in one of micro districts of a city of Krasnodar studied the confirmed data of oncological disease of the population and communication with the place of residence. The conclusion has appeared stunning: 85% of patients lived in 5 houses (in micro district more than 60 high-rise buildings). Studying conclusions of some known foreign and native researchers

(D. Koop, ZH. B.Mar-Kondes, P. Navraki, K. Bahler, V.P. Kaznacheev, A.P. Dubrov, V.A. Tsibko, A.R. Pavlenko, P. Freluh, V.T. Prokhorov, etc.) that more than 50% from total number registered cancer, cardiovascular and articulate diseases are connected with a finding of people in geopathogenic zones (GPZ). It has pushed on creation in firm of division which is engaged in inspection.

In our work we use various techniques and the various equipment, and as tools for a biolocation (a framework, a pendulum, a compass) and the indicator of geophysical anomalies IGA-1 (the Ufa aviation factory, Open Company "Light-2", today Open Company «PRELSI IMPEKS»). This device represents a high-sensitivity selective measuring instrument of an electromagnetic field. As target parameter of the device the integral of phase shift on analyzed frequency is used. It is intended for measurement of an electromagnetic component of a geomagnetic field of the Earth in a range 5-10 KGZ, sensitivity from units to hundreds pikovolt.

Device IGA-1 allows fixing also electromagnetic "AURA" of the person on distance to one meter from a body and its distortion connected with pathological displays in an organism. With its help it is possible to find sources of water, a burial place, metal and nonmetallic subjects on depth to 20 m. For study of our experts we invited experts and personally the inventor and the developer of the indicator Kravchenko Yuri Pavlovicha and today we support contacts on practical and research work.

The firm spends:

- Ecological examination of premises (office, apartment, a cottage) or the ground area, basic indicators of a microhabitat of object of the real estate including check, capable negatively to affect health of the person. Examination can include both a standard set of measurements, and the complex of measurements developed on request of the customer.

- The Account and neutralization of geopathogenic zones in available buildings.

- Develops the individual ecological passport at will of the customer which consists of three blocks characterizing ecological conditions of microdistrict, ground area, houses with farmland or a domestic site and it direct premises. The ecological passport of habitation reflects environmental problems of surveyed object:

- Natural: presence of geopathogenic zones, underground gases (radon, etc.), presence of underground waters, objects, etc.;

- Technogenic: the TV, the computer.

In the passport all researches established gepathogenic of a zone are brought, specific proposals on protection against them are developed and consultations on acquisition of protection frames are given. At selection of protection frames we consider the data of all methods of research. The protection frame is established under instrument control. After protection frame installation it is regularly spent (1 time in 6 months) control of efficiency of its protective properties.

For the purpose of propagation of ecological knowledge, within a year in several printing editions of Krasnodar the firm conducts a weekly heading devoted to questions of ecological safety of the person «WE LOVE AND PROTECT OUR HOUSE-KUBAN».

The increasing number of people in the modern world starts to care about their health. And as we live in a century of high technologies and technical progress, interest to a question on influence of geopathogenic factors on health of the person grows. Realization of strategy of health protection of the healthy person is reached by creation of the healthy and safe ecological environment of the house and on work.

L.V. Popova

EXPERIENCE OF ADAPTING THE METHODS OF EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) IN HIGHER PROFESSIONAL ENVIRONMENTAL EDUCATION

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The 2005 UNECE Strategy for Education for Sustainable Development (ESD) and the Bonn Declaration (UNESCO World Conference on ESD, April 2009) indicate the need for restructuring the education system, which should contribute to the development of critical and creative thinking skills among the wide population. ESD is a special form of interdisciplinary learning, covering virtually all subject areas of the natural sciences, humanities and engineering sciences. Such wide coverage should be delivered not only by means of examining and finding solutions for environmental problems, but also through the use of new educational technologies involving problem-based research and creative learning activities.

The traditional form of organising the learning process in higher educational institutions in our country is a combination of lectures and seminars, based on simple transfer of knowledge (the information reproduction method). However, professional higher environmental education requires the use of other teaching forms and methods, as its primary objective is to develop the students' creative capacity that will help them to solve complex problems in their professional field. How can this be achieved?

Years of experience with students of environmental majors show that students should be introduced into the basics of professional competence starting with the first year of study. This includes adjusting teaching methods in individual disciplines and defining research objectives. One way to do this is by increasing the share of time allocated for students' self-study and by making all assignments individual, thus increasing each student's personal responsibility.

The most successful forms of instruction in environmental education include:

- Problem-based lectures;
- Seminars based on the use of various methods and approaches (small group work, group discussion with decision-making, case study examination, debates, work with visual aids, video and audio recordings, etc.);
- Laboratory-based practical assignments;
- Field trips (nature sites, museums, businesses, municipal bodies, etc.);

- Learning games, including role playing and simulations;
- Shared projects;
- Peer education (or mutual help).

Many forms of learning can be interactive, but that means educators need to make sufficient effort in developing detailed plans for each learning session and in combining different methods during these sessions. Most importantly, during the sessions students should be encouraged to speak their minds, to ask questions, and to look for answers. The ability to formulate a question is the first step towards understanding the problem. The task of the teacher is to place each student in such an environment that will stimulate him/her to reason, compare and draw conclusions. The best way to do this is by searching for practical solutions in the learning process, i.e. looking at situations that can be encountered in real life.

Education for sustainable development offers a chance to revise the established traditions in education, including its forms and methods, and allows for improving the quality of the learning process. This implies not just a transition to a “subject – subject” relationship between educators and students, but a change towards cogeneration of a learning environment that offers new opportunities for each individual.

A.D. Potapov
E.B. Schubina

DIE INGENIEUR-ÖKOLOGISCHEN FORSCHUNGEN FÜR DEN BAU AUFGRUND DER ÖKOLOGISCHEN KRITERIEN

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Die ingenieurmäßigen Forschungen für den Bau stellen eine Art der Bautätigkeit dar, die das komplexe Studium der natürlichen und technogenen Bedingungen des Territoriums der Bauobjekte gewährleistet. Dazu gehört auch die Zusammenstellung der Prognosen der Wechselwirkungen dieser Objekte mit der Umwelt, die Begründung ihres ingenieurmäßigen Schutzes und der sicheren Lebensumstände der Bevölkerung. Diese Tätigkeitsart wird von den normativen Dokumenten reglementiert, deren Erfüllung einen obligatorischen Charakter hat.

Zum Bestand der ingenieurmäßigen Forschungen für den Bau gehören folgende ihrer Hauptarten: Die ingenieurs-geodätische, ingenieurs-geologische, ingenieurs-hydrometeorologischen, ingenieurs-ökologischen Forschungen, der Erforschung der Bodenbaustoffe und der Quellen der Wasserversorgung (unterirdische Wasserquellen).

Die Ingenieur-ökologischen Forschungen sollen das komplexe Studium der natürlichen und technogenen Bedingungen des Territoriums, ihrer wirtschaftlichen Nutzung in der sozialen Sphäre gewährleisten. Die Organisation der Veranstaltungen für den Erhalt sozial-ökonomischer, historischen, kulturellen, ethnischen und anderer Interessen der lokalen Bevölkerung, gehört zu weiteren Zielen.

Die geltenden normativen Dokumente sind auf Grund von den Experteneinschätzungen gebildet und befinden sich zurzeit im Stadium der Überarbeitung. Von den Autoren wird die Ausführung der ingenieurs-ökologischen Forschungen auf Grund von den ökologischen Kriterien vorgeschlagen. In der Tabelle wird das Beispiel einer solchen Herangehensweise vorgeführt.

Nr.	Die Gruppe der Kriterien	Das Kriterium	Das Ziel
1.1	Die Verschmutzung	Die Verhinderung der Verschmutzung während der Durchführung der Bauarbeiten	Die Senkung des Niveaus der Verschmutzung während der Arbeiten auf Kosten von der Verhinderung der Bodenerosion, Sedimentation in den Wasserströmen und die Bildung des abgewogenen Staubes.
2.1	Die Auswahl des Grundstücks	Das Grundstück befindet sich außerhalb des Territoriums kommunaler bzw. industrieller Nutzungsart	Die Absage für die Bauarbeiten auf den unpassenden Grundstücken und die Verminderung der ökologischen Einwirkung auf das Grundstück
2.2		Das unberührte Grundstück gehört nicht zu den landwirtschaftlichen Ländereien, war kein öffentlicher Park, kein Wald, keine Wiese oder Erholungszone. Das Grundstück befindet sich nicht auf dem Territorium der Denkmäler. Befindet sich außerhalb des 1. Gürtels der Zone des sanitären Schutzes der Wasserquellen und der Wasserleitungen.	Die Verkleinerung der ökologischen Einwirkung, die mit der Lage des Grundstücks verbunden ist, die Erhaltung der grünen Zonen, der Schutz der Naturschätze und des Kulturmediums der natürlichen Arten.
2.3		Das Grundstück befindet sich nicht auf dem Territorium, das für bedrohten Tierarten jeder Art speziell bestimmt ist, die in die entsprechenden Verzeichnisse eingetragen sind	Der Schutz der Naturschätze und des bedrohten Tierarten
2.4		Das Grundstück befindet sich weiter, als 30 m von den versumpften oder stark befeuchteten Grundstücken	Die minimale Drohung der Überschwemmung des Grundstücks und der Verschmutzung der Wasserquellen

Nr.	Die Gruppe der Kriterien	Das Kriterium	Das Ziel
2.5		Das Grundstück befindet sich weiter, als 15 m von den Wasserobjekten	Die minimale Drohung der Überschwemmung des Grundstücks und der Verschmutzung der Wasserquellen
2.6		Das Territorium des Grundstücks befindet sich höher als hohe Aue des Flusses, die einmal pro hundert Jahre überschwemmt wird.	Die minimale Drohung der Überschwemmung des Grundstücks und der Verschmutzung der Wasserquellen
2.7		Das Grundstück auf dem ökologisch verschmutzten Territorium, das eine Rekultivierung erfordert	Die Rehabilitation der betroffenen Grundstücke, deren Entwicklung von der ökologischen Verschmutzung, mit dem Ziel, der Verringerung der Belastung
3.1	Die Dichte der Bebauung und das Vorhandensein der grundlegenden Dienstleistungen	Die Projektdokumentation nimmt den Plan der Bebauung des Bezirkes (existierend und perspektivisch) auf	Das Informieren der Bürger: die Realisierung ihres Rechtes, das Projekt der Bebauung des Bezirkes zu kennen
3.2		Das Gebäude wurde auf dem geeigneten Territorium gebaut, das ein Jahr vor dem Baubeginn mit den existierenden Kommunikationen der allgemeinen Benutzung (die Elektrizitätsversorgung, die Wasserversorgung und die Kanalisation, das Gas, Strassen) versorgt wurde.	Der Bau in den Stadtbezirken mit der schon existierenden Infrastruktur, die Erhaltung der grünen Zonen, der Schutz der Naturschätze und der bedrohten Tier- und Pflanzenarten.

Nr.	Die Gruppe der Kriterien	Das Kriterium	Das Ziel
3.3		<p>Die Optimierung der sozialen Infrastruktur.</p> <p>Das Gebäude wird gebaut oder wird auf dem Grundstück rekonstruiert, das, schon früher bebaut war. Von den Dienstleistungseinrichtungen sollen zehn grundlegende Dienstleistungen erbracht werden Diese sollen von dem Gebäude zu Fuß erreichbar sein. Solche Institutionen sind unter anderem: 1) die Bank; 2) die Kirche; 3) Lebensmittelgeschäft; 4) Kindergarten; 5) die chemische Reinigung; 6) die Feuerwehr; 7) Schönheitssalon; 8) Haushaltswarengeschäft; 9) die Wäscherei; 10) die Bibliothek; 11) Klinik/ Stomatologie; 12) Altenheim; 13) Park; 14) die Apotheke; 15) die Post; 16) das Restaurant; 17) die Schule; 18) Supermarkt; 19) das Kino; 20) das lokale öffentliche Zentrum; 21) Fitness-Zentrum; 22) das Museum</p>	<p>Der Bau in den Stadtbezirken mit der schon existierenden Infrastruktur, die Erhaltung der grünen Zonen, der Schutz der Naturschätze und der bedrohten Tier- und Pflanzenarten</p>
3.4		<p>Das Gebäude ist in der Zone der Unterbringung der Handelsunternehmen oder innerhalb 1 km von der Zone der Unterbringung der Handelsunternehmen aufgebaut.</p>	<p>Der Bau in den Stadtbezirken mit der schon existierenden Infrastruktur</p>

S.Prihodiko
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CONCEPTUAL ASPECTS OF THE DEVELOPMENT OF INFORMATION-TELECOMMUNICATION ENVIRONMENT OF THE SYSTEM OF LIFE SUPPORT REGION (ON THE EXAMPLE OF DONBASS)

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Donbass is the largest industrial region of the Ukraine, and in ditto time it has the most disadvantage in ecological attitude. Need of the creation of modern information-telecommunication environment appeared for decision of the problems of the system of life support of the region with possibility of the granting the broad spectrum of the services for the population, business-structures and state management.

The Project "4D Donbass" is a multi-layered model, and Geodonbass is one of the layers. The purpose of the studies of this layer is a possibility of the forecasting of stability of regional natural-industrial system, development and introduction of regional analytical geo-information systems with the database of total monitoring of man-caused and ecological safety of Donetsk region, granting to information for support of the taking the optimum management decisions managing subject.

Within the framework of this layer, a mathematical model is offered, describing behaviour of the mountain array at influence on it mass power. The conditions on parameters of the problem are found under which possible geotectonic breach becomes possible. The considered mathematical model of the mountain array may be considered as universal one. At corresponding geometric parameters and marginal conditions, this model may be used at study of dynamics of rock bed in any area of the Earth.

The tasks of Geodonbass layer are as follows:

- development of the methods of the forecast of dynamics of gradient of tension in layered structure of the rock bed;
- development of the methods of the forecast of dynamics of water and gas balance in rock bed;
- development of the technical decisions for reduction of the negative influence of geodynamic processes on social objects.
- creation of physical model of a layered structure of the rock bed, including solid filtration and physical and chemical features of the layer;
- creation of electronic geophysical model of rock bed of the region;
- creation of regional analytical geoinformation systems in 3D-format with connection to European information network within the framework of Potsdam conferences on the problems of the observation forgeomegnetic field of the Earth 2002.

Geodonbass layer is the basic one. The rest of the layers aimed at decision of the social

problems, ecological problems, problems of national and international tourism, problems of regional and state management completely depend on the dynamics of stability.

The results of the studies of the separate layers to models are integrated in united regional database, which will be used in forecasting of stability of whole regional natural-industrial system. The results of the forecast can be broadly used in coal industry, transport facilities, oil and gas pipe line, ecology, housing-public facilities, city building, forecasting of emergency situation.

Anto Raukas

ENVIRONMENTAL PROBLEMS IN ESTONIAN OIL SHALE INDUSTRY

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Sustainability is based not only on natural resources and environmental restrictions, but also on the social problems, spiritual traditions and ethnic values. In the solution of economical and environmental problems we should take into consideration that Estonian oil shale industry is concentrated in the north-eastern Estonia with mainly nonestonian population. Oil shale industry gives the everyday work for 15-20% of the local people and therefore the problem has a great social and political importance.

In Estonia technologies of oil shale mining and consuming have been continuously developed during more than 80 years. In March 2006 one billion tonnes of oil shale had been produced in the Republic. In 1980s about two-thirds of the world's oil shale output came from Estonia.

Mining activities have a direct influence on groundwater quality and is accompanied by the lowering of the water-level in surrounding lakes. Oil shale processing has a complicated impact on the landscapes, on their ecological state and matter cycling. As a result of power generation some 200 000 tonnes of fly-ash are emitted into the atmosphere annually. Great problems are related to the ash fields of thermal power plants and semi-coke hills of oil shale processing enterprises rich in phenols and other hazardous substances. The amount of pitch residues of oil shale industry is estimated at 78 000 and 60 000 tonnes in the semi-coke hills of Kohtla-Järve and Kiviõli, respectively.

As the mining of oil shale and its use as a raw material in the oil and chemical industry and power engineering will cause serious environmental problems, regulations in oil shale industry were necessary. In the government was decided that the sustainability in the utilization of oil shale in Estonia must be based on the reforms of instruments and institutions, which include technical, administrative, economic and environmental measures. New technologies should have higher thermal efficiencies and produce much less atmospheric emissions and wastes. In 2008 a State Development Plan of Oil Shale

utilization for 2007-2015 has been accepted in the Parliament. In the compilation of state plan all counties, towns and parishes of North-East Estonia, nine big enterprises, 14 scientific institutions and 16 NGO-s participated in the discussions. As oil shale is not renewable resource according to state development plan its excavation has been limited up to 20 million tonnes per year. More advanced methods of mining were recommended. In 2006 highly selective extraction was started, using milling cutter surface miner from the German Company Wirtgen. Surface miner breaks, crushes and loads material in one operation.

Analyses in the compiling of state development plan showed that the negative aspects of oil shale energy could be most significantly reduced by transition from pulverized combustion technology to circulating-fluidized-bed combustion technology. After installation of two 215MW units with new boilers in Narva plants, the emission of carbon dioxide, nitrogen and sulphur compounds has been reduced substantially.

In the coming years all environmental parameters in Estonian oil shale industry will be in harmony with the requirements of EU directives. One of the most important environmental policy goals is to promote and stimulate environmental awareness of the population.

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THE DISPOSAL OF OIL AND FAT INDUSTRY WASTES BY THE YEAST *YARROWIA LIPOLYTICA* LIPASE

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The common method of waste oil industry is at their disposal to landfills, which negatively impacts on the environment. Effective method of waste disposal will reduce the technological impact on the environment, as well as involve them in the production cycle as secondary material resources.

Methods of disposal of waste using the technology of living systems are promising from an environmental and economic point of view. It is known that effective destructor of fats are lipolytic enzymes. We used the yeast *Yarrowia lipolytica* from the collection of industrial microbial cultures State research Institute of Genetics and Selection of Industrial Microorganisms (Moscow), synthesizing highly active lipase. We have established the possibility of replacing expensive olive oil in a nutrient medium for refining waste vegetable oils and fats, thus reducing costs for the biosynthesis of lipase by approximately 20-25%.

The acetone precipitated enzyme lipase G10h were used for enzymatic hydrolysis of hydrogenation of vegetable oils waste in the inverse emulsion. The maximum degree of degradation triacylglycerides was observed at pH 6,5, the water content in the reaction medium to 0.20 ml per gramm of fat, the temperature of 34-35 °C and an enzyme dosage of 10 units per g of fat. It was established that an additional payment of calcium oxide in

an amount of 0.1 g per g of fat increases the yield of fatty acids in the process of hydrolysis to 25-30%.

Studying the dynamics of enzymatic hydrolysis of fat contained in the waste showed that the yield of fatty acids reached a maximum after 48 h. Then the reaction mixture were formed only carboxylates of calcium while reducing the concentration of free fatty acids. Analysis of the hydrolysates by TLC showed that the concentration triacylglycerides reaches a minimum value of 72 hours of hydrolysis, the concentration of by-products - and mono- and diacylglycerides remained virtually unchanged throughout the hydrolysis process.

The resulting mixtures containing product triacylglycerides (7-10%), monoacylglycerides (5-6%) and diacylglycerides (4-6%), fatty acids (8-12%) and their calcium salts (22-25%), and mineral components (the rest) was tested in the production of rubber. Introduction of an experienced product in rubber mixtures based on rubbers for general and special-purpose improved the range of technological, vulcanization characteristics of rubber compounds and the physical and mechanical properties of vulcanizates.

So, recycling of waste oil and fat industry by enzymatic hydrolysis triacylglycerides would, firstly, reduce the technological impact on the environment, and secondly, to involve the oily waste in the production cycle as a processing aid for rubber compounds, while improving production efficiency.

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VERHINDERUNG VON VERSCHMUTZUNG DER INNEREN WASSEROBJEKTE BEI AUSNUTZUNG DER SCHIFFE

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Das Ausnutzung der Schiffe und energetischen Schiffsanlagen (ESA) so wie die Existenz anderer Technogenen Objekten wird mit Umweltverschmutzung charakterisiert. Einem von der Hauptfaktoren der Umweltverschmutzung bei Ausnutzung der Schiffen und ihrer energetischen Anlagen ist die Verschmutzung mit Erdölprodukten, die in die Wasserumgebung mit erdöhlaltiges Bilgenwasser oder Bilge, wie es noch benennen kann, zu Wasser geraten können.

Es gibt zwei Hauptrichtungen um das Problem zu lösen, und damit die Verschmutzung von Wasserumgebung mit erdöhlaltigen Bilgenwassern zu verhindern. Diese Richtlinien vorsehen, der Wassersreinigung mit Hilfe von technischen Schiffsmitteln so wie mit technischen Mitteln außer Schiffs zu organisieren.

Bestimmte Erfahrungen für Erschaffung und Ausnutzung von den Schiffsanlagen für Bilgenwasserreinigung sind bereits gesammelt. Jedoch treffen sich in der Praxis solche

Anlage, die benötigter Bilgenwasserreinigung von Erdölprodukten nicht erledigen.

Für viele Fälle, vor allem auf den inneren Wasserstraßen, ist meist es sinnvoll gewesen, eine erdöhlhaltige Bilgenwasserreinigung mit der Hilfe technischen Mitteln außer Schiffs zu organisieren. Insgesamt soll eine Technologie der Überarbeitung erdöhlhaltiges Bilgenwasser außer der Hauptreinigungoperation noch die Ansammlung-, der vorübergehenden Aufbewahrung- (die Speicherung) und der Beförderung von Bilgenwasser vorsehen.

Die schon existierende Erfahrung der Nutzung von der Reinigungsmitteln außer Schiffs zeigt, dass diese Mitteln eine solche Reinigungsstufe garantieren, die für die Schwimreinigungstationen als Wassertransportobjekten bestimmt ist, und die mit den genug traditionellen und approbierten Methoden der Reinigung gewährleistet wird.

Jedoch existiert noch eine Meinung zu dem Problem der Anwendung von der technischen Naturschutzmitteln außer Schiffs. Die wirksame Anwendung dieser Mitteln wird mit der Optimierung des Komplexes von technischen Mittel sowie der Optimierung ihrer Nutzung gewährleistet. Erstes bedeutet, dass für jedes Bereich des Weges eigene Gruppe von Reinigungsmitteln außer Schiffs existieren kann. Zweites bedeutet, dass die Unterbringung dieser Mittel als eine Optimization Aufgabe betrachten muss, deren Lösung zulässt, die Naturschutzziele mit den kleinsten Wirtschaftsaufwändungen zu gewährleisten.

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THE MICROFILTRATION METHOD OF BIOWASTES EXTRACTION FROM BREWERY WASTE WATERS

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Now days the resource saving and environmental problems, are more actual than ever especially in the brewing industry, which is characterized by a large content of liquid and solid wastes, where the suspension of the residual yeasts is about 2% of the volume of the produced beer. The slurry is deposited in a cone of cylinder-conical tanks, during fermentation and alter-fermentation processes and a larger part of this substance is not subjected to further processing. The concentrate of brewer's yeasts is a source of bioorganic-organic compounds characterized by the values of biochemical oxygen demand (BOD) comparable with the pollution of petrochemical industries. But the brewing industry wastes under investigation are a rich source of vitamins, amino acids, proteins, mineral substances, which can be used as a feed additive in the manufacture of medicines and veterinary medicine, product and in the food industry as well as a valuable nutritional additive. It should be also noted that the residual brewer's yeast contain about 50% of the beer, which can be recovered and returned to production line a set of measures for the brewing industry wastes utilization will enable us not only to reduce man-made pressures on the environment, but also to obtain additional quantities of final product (beer) and

but also a complex of biologically active compounds as well

The membrane filtration is one of the most effective methods for extracting high-molecular bioorganic compounds from aqueous systems. One of such technologies is cross – flow filtration, which allows filtering the liquid high-level suspensions to a filtrate sterile a rate. Significant advantage of this type of filtration is a conservation of integral structure of recuperated from the wastes yeast cells and high quality products manufactured from them.

A unique pilot unit to run the process of micro-filtration separation of food media in a centrifugal continuous is mode has been designed by our group. The main block of the pilot plant is a module consisting of a tubular ceramic membrane filters. The operating principle of this pilot unit is-to pump the fluid flow under excess pressure along the membrane surface. The dynamic force of the moving fluid flow brings back settled on the membrane suspension particles in the liquid under filtration and the filtration occurs due to a high rate of flow and seeping of the liquid through the pores inside the membrane due - to different pressure in the intertube space of the membrane, suspension and filtrate. Part of the liquid (permeate) seeps through the membrane and is thus filtered, and the other part of the liquid (retentate), is taken in the circulation tank, and then its recycling cycle is repeated until it achieves the required dry matter content.

Thus, the original design of the membrane filtration apparatus makes a continuous process, quite possible with a self-cleaning filter element. This is a single-stage filtration process that does not require any additional auxiliary materials, in fully automatic mode with a programmed result and the possibility of using membrane filters from different manufacturers. Consequently, the application of this method will improve the ecological-situation in the company affected zone and can make additional profits due to the brewer's yeast concentrate and separated beer, which can be returned to production line.

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AGRICULTURE AND PROTECTION OF THE ENVIRONMENT

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The manufacturing of dairy products usually pollutes the environment because water and air are used in the processing of raw mild materials. Dairy enterprises degrade the ecological situation in spite of the fact that they do not directly produce or use toxic substances.

Russian standards for water consumption and water allotment allow four to five tons of wa-ter per one ton of the raw feed stock, depending upon the kind of production. Water supplied for technological needs must meet the requirements for drinkable water. Moreover, 75-80% of water which is not part of the finished product should be discharged into the environment. In the case of dairy products manufacturing, the most polluted part of the waste water is formed during washing of technological equipment. This water contains the remains of the raw dairy material and the proc-essing of intermediate and finished products;

thus it is an aqueous colloidal system of high-molecular organic compounds.

High values of chemical and biological consumption of oxygen (CCO and BCO) can be predicted for the oxidation of the organic components in milk because lipids, proteins, carbohydrates, and organic acids have a complex chemical structure. The values of these parameters for different kinds of raw dairy / foodstuff are presented in Table 1.

Product	Dry substances	Fat	Protein	Lactose	CEO	BCO
	%	%	%	%	10-3 g/kg	10-3 g/kg
Whole milk	11.5-12.5	3.0-4.0	3.0-4.0	4.8	192.9-218.6	135.5-156.2
Non-fat milk	8.3-8.5	0.02-0.06	3.0-4.0	4.7-4.9	112.0-119.3	72.4-69.1
Buttermilk*	7.7-8.0	0.4-0.9	2.8-3.0	4.0-4.5	104.5-111.9	72.4-75.1
Whey	6.0-6.2	0.1-0.2	1.0	4.5-4.7	72.0-77.0	51.7-55.9
Cream	40.4-43.0	33.0-35.0	2.0	3.0	871.0-936.5	695.0-747.0

There are different systems designed for separating butterfat from the sewage water; the obtained product can be used only for technical purposes. The non-fat water-milk mixture is a protein-carbohydrate colloidal system with an extremely high value of BCO.

Soil fertilizers are produced under aerobic and anaerobic fermentation of organic substances from the rinse water but this does not seem a rational solution of the problem.

Fine cleaning of water can be obtained by electrofloat coagulation in a combination with re-agent coagulation. The fat and protein sediment formed in these processes is used for fodder and technical purposes. The extent of fat extraction is 93% with a reduction of CCO of 80%. Non-reagent electrochemical coagulation in a discharge allows up to 86.8% extraction of protein and 85% extraction of fat.

The filtrate, the solution passed through the semipermeable membrane, is a limpid colorless liquid with a mass% content of 0.0023 lipids; 0.06 protein; and 0.50 lactose. Concentration of the proteins and lipids in the filtrate indicates a high efficiency of ultra-filtration. CCO is reduced by 90-95%. Relatively high values of CCO for the filtrate, 700-800 mg/kg, are due to the presence of lactose that is not detained by the ultra-filtration membrane. During subsequent processing of the ultra-filtrate by reverse osmosis, the CCO of water is reduced up to 2-6 mg / kg while the standard for drinkable water is 15 mg / kg. Ultra-filtrate cleaned by reverse osmosis method is fed into a closed water rotation of the process. Concentrate containing 4-5 mass% lactose is processed by known lactose-obtaining technology. The combination of reverse osmosis and ultra-filtration provides an efficient and highly-productive processing of water-milky systems. In the experiments it was established that the reverse-osmosis treatment without preliminary ultra-filtration results in the rapid contamination of membranes and a decrease in the rate of filtration.

T.Z. Rysbekov

ENVIRONMENTAL MONITORING OF ABNORMAL ECOSYSTEMS OF THE WEST KAZAKHSTAN OBLAST

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Production of mineral resources leads to a damage of the soil and vegetable cover of natural ecosystems (NE) and of natural-technical geosystems (NTG).

The imminent threat of the global ecological crisis in the XXI century conditioned the necessity of making analysis and discussion about the role and importance of the ecological basic components which form the biosphere (soil, vegetation, fauna, microorganisms etc.) in the present and future of humankind.

The most important components of biosphere are soil and its fertility, because more than 98% of all food, including 87% of protein food, people receives by means of agricultural soil usage.

Considering the role and importance of the condition of natural ecosystems in XXI century, it is necessary to remember that the total area of fertile soil on the Earth numbers only 12%, and other ecosystems require the heavy expenses for melioration.

During the history of civilization, man has already spoilt two milliard hectares of fertile soil. Annually the world agriculture loses 15 million hectares of fertile soil, half of this loss caused by construction, transport and other needs, and half is a result of degradation and desertification.

Lands for crops per capita are decreasing and according to the scientific prediction in 2050 croplands are going to amount 0.07 hectare per head, thus people may come to the shortage of agricultural land.

The scientists of the West Kazakhstan State University carry out regular ecological monitoring of topsoil vegetation, and fauna of the territory of the West Kazakhstan Oblast (1957–2009).

Long-term monitoring permitted to compile ecological and geological map of West Kazakhstan Oblast on a scale of 1:300000. In this altered version, we marked modifications of ecological condition of soil and vegetative cover. In order to assess the conditions of natural and disturbed ecosystems we divided the area into transects – zones with the different degree of anthropogenic influence on the environment:

transect I – background;

transect II – zones of weak anthropogenic influence;

transect III – zones of average anthropogenic influence;

transect IV – zones of strong anthropogenic influence;

transect V – zones of very strong anthropogenic influence with devastated soil and vegetative cover.

There was investigated the productive-destructive process, i.e. the inventory of geophilous phytomass (G), underground phytomass – alive roots (R), dynamics of leavings

(L) – dead cast plant organs, not fallen dead plants (D), and quantity of dead underground phytoogenous vestiges (V).

All this data gives an opportunity to observe the increase of biomass for a certain period (month, season, and year) and quantity of mort mass subjected to mineralization and humification.

In areas of the strong anthropogenic factor (Karachaganak Oil Gas Condensate Field), this calculation follows out monthly. The interpretation of the state of vegetation, the chemical analysis of soil and vegetative samples inform about the ecological condition of topsoil, vegetation and fauna of each contour selected on the ecological and geobotanical map of KOGCF on a scale of 1:25000 S=104000 hectares. According to the basic indicators of ecological condition, we developed the legend with the detailed cadastral characteristic of each contour (216 soil and vegetative contours).

By the results of the carried out researches the scientists of WKSU have drawn up the revegetation project considering anthropogenic influence, natural conditions, and the use of a fertile stratum (FS).

At the present stage, it is necessary to create a new approach to improve the condition of natural ecosystems and natural-technical geosystems based on preservation of ecological balance, self-restoration character of basic functional processes for each landscape.

Conclusions

1. The environmental influence assessment of the contours selected on the geobotanical map of Karachaganak Oil Gas Condensate Field and boarding territory was made by drawing up of ecological scales according to geobotanical, soil and anthropogenic indicators.

2. According to results of the environmental influence assessment the major part of the industrial area of Karachaganak Oil Gas Condensate Field and boarding territory is in risk condition – 61,9%, in critical condition – 18,7%, in disastrous condition – 9,8%, in catastrophic condition – 4,7% and in normal condition – 4,9%.

3. The technical plan of revegetation was developed.

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STATE OF WATER RESOURCES IN LUGANSK REGION

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Lugansk region has not enough water resources. Water availability of territory and population of region by common water resources in 1.65 times and local in 2 times lower than the average in Ukraine. Per one inhabitant in the region, depending on dryness of year, is from 0.16 to 0.5 thousand m³/year (compare with 1.01 thousand m³/year on the average in the State).

The main surface source of fresh water on the territory of region is the Seversky Donets river - transboundary water object and Mius river. Territory of rivers' basins within the

Lugansk region has great anthropogenic pressure.

Providing water population of region in required volume become complicated because of poor water quality in water objects. By chemical and bacterial contamination of water most of them were classified as polluted (4 class of quality).

There is a steady tendency of declining water diversion and using of fresh water in Lugansk area during the last decade.

Using of water in recycling systems and re-consistent water supply is 2.550 million m³; saving fresh water - 95%. The most intensive use of water is in the Lugansk city and Lysychansk-Rubizhansk industrial region, the most intensive pollution of surface water takes place in Sverdlovsk-Rovenkivsk and Krasnolutsk-Antratsitovsk industrial regions, and also in Lysychansk-Rubizhansk region and Lugansk city.

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DIE GESUNDHEITLICHEN FOLGEN DES TSCHERNOBYLUNFALLS IN OFFIZIELLER DARSTELLUNG: ÖKONOMIE GEGEN ÖKOLOGIE

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Der Super-GAU im Block IV der Kernkraftwerke von Tschernobyl Ende April 1986 führte zu einer radioaktiven Verseuchung auch weit entfernter Landstriche auf der nördlichen Halbkugel. Zur international maßgeblichen Institution in der Folgenabschätzung wurde das Strahlenschutzkomitee der Vereinten Nationen UNSCEAR – United Nations Scientific Committee on the Effects of Atomic Radiation. Dieses Komitee - und in seinem Gefolge die UNO-Organisationen WHO (Weltgesundheit) und IAEA (Atomenergie) sowie die EU-Kommission – haben die Folgen der Bestrahlung für die Gesundheit der betroffenen Bevölkerungen als außerordentlich gering eingeschätzt. Die Vorgehensweise von UNSCEAR ist dabei wie folgt: man ermittelt zuerst eine mittlere Strahlendosis der Bevölkerung für verschieden weit entfernte Zonen in Europa und Vorderasien und berechnet dann die zu erwartenden Krebserkrankungen bei den Bestrahlten und die genetischen Defekte bei ihren Nachkommen. Für diese Abschätzung benutzt man Daten über den Dosis-Wirkungszusammenhang von den Überlebenden der Atombombenabwürfe auf Hiroshima und Nagasaki. Es lässt sich leicht zeigen, dass die abgeschätzten Dosen viel zu klein sind. Zahlreiche Wissenschaftler aus osteuropäischen Ländern haben sogenannte „Biologische“ Dosimetrien vorgenommen, bei denen sich anhand sichtbarer Chromosomenveränderungen im Blut der Bestrahlten viel höhere Strahlenbelastungen zeigen. Dadurch erklären sich auch die vielen Befunde über Erkrankungsraten nach Tschernobyl, die weit oberhalb der UNSCEAR-Angaben liegen. Die Leugnung und Verharmlosung von Strahlenschäden durch die Kerntechnik hat eine lange Tradition in westlichen und östlichen Industrienationen.

Peter Schweigert

**HOCHWASSERSCHUTZ
BODENBEARBEITUNG**

DURCH

REDUZIERTE

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Wirtschaftliche Produktion strebt die optimale Intensität der eingesetzten Produktionsfaktoren an. Der technische Fortschritt hat in der Landwirtschaft zu einer Intensivierung der Produktion geführt. Es ist deshalb sinnvoll zu überprüfen, ob dadurch die optimale Intensität des landwirtschaftlichen Produktionsmitteleinsatzes überschritten wurde. Bei der einzelbetriebliche Optimierung muss auch die Auswirkung der Produktion auf die Umwelt beachtet werden. Es ist Ziel dieses Beitrages, unter diesen Aspekten die Intensität der ackerbaulichen Bodenbearbeitung zu beurteilen.

Durch Bearbeitung wird der Boden gelockert, Unkraut sowie Schaderreger beseitigt und dadurch die Wachstum der Kulturpflanzen gefördert. Jedoch wird dabei auch das natürliche Gefüge des Bodens negativ beeinflusst. So kommt es zu einer Verdichtung des Bodens unterhalb des Bearbeitungshorizontes. Durch das verminderte Porenvolumen wird die Wasserleitfähigkeit und somit die Sickerwasserbildung verringert. Weiterhin sinkt im bearbeiteten Boden die Aggregatstabilität. An der Bodenoberfläche kommt es deshalb bei Starkregen zur Verschlämmung, die die Infiltration vermindert. Die Folge dieser Veränderungen ist verstärkter Oberflächenabfluss und dadurch eine Erhöhung von Hochwasserscheiteln. Es hat sich gezeigt, dass durch reduzierte Bodenbearbeitung der Scheitelabfluss und somit Schäden durch Hochwasser gemindert werden können. Auch einzelbetrieblich kann besonders durch verringerte Kosten der Bodenbearbeitung der Gewinn gesteigert werden. Deshalb sollte der bereits zu beobachtende Trend hin zur reduzierten Bodenbearbeitung weiter gefördert werden.

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**EFFECTS OF COMPOSTED SEWAGE SLUDGE ON MICROBIAL
PROCESSES AND COMMUNITY STRUCTURES**

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Among the different measures proposed for maintenance or increase of organic matter content in soil organic input on arable land is suggested. Land application of products from organic waste, such as composts is gaining importance all over Europe. This is because such products are often considered beneficial for the soil and at the same time the problem of organic waste streams is alleviated, resulting in environmentally acceptable way of recycling waste materials. It is considered a viable alternative to the landfill or incineration as a disposal method.

Organic amendments activate the autochthonous microorganisms of the soil, and

indirectly stimulate the biogeochemical cycles therein, and they provide various minerals (N, P and S) essential for plant nutrition. However amendments not only influence soil fertility directly, but can also affect the composition and activity of soil microorganisms. Soil microorganisms, mainly bacteria and fungi, end their extracellular enzymes, mostly of microbial origin are responsible for the biological transformation that make nutrients available to plants and for sustaining soil function. Since soil microbial communities play a critical role in the recovery of a soil from the disturbance, measurements of the characteristics of microbial community provide invaluable information for soil quality and for a sustainable management of agriculture soils.

A seven years study to investigate the effects of differently treated sewage sludge additions on microbial community structure and microbial processes was carried out in a grey forest soil in the nursery forest. Three types of municipal sewage sludge of the city of Kazan (Tatarstan, Russia) (i.e., anaerobically digested, composted and untreated) were added to field plots of a grey forest soil (Haplic Greyzem) and planted to pine (*Pinus sylvestris*).

Soil respiration, microbial biomass, N_2 -fixation and enzymatic activities were measured as indicators of soil microbial processes. The microbial community structure was evaluated using PCR-SSCP approach.

Sewage sludge application in grey forest soil resulted in the increase of metals content in soil and in pine seedlings grown on the amended soil but its concentrations did not reach the current limits of Russia.

The investigation showed that the preliminary sludge treatment can be of key importance for the effect observed. The maximum beneficial effects were found for composted sludge. Addition of the compost to the grey forest soil at different rates (30-175 Mg/ha) improved the organic matter content. The beneficial effects of sewage sludge compost amendment were exhibited in the increase of microbial biomass and respiration. However the N_2 -fixation activity of soil was inhibited by the highest rate of compost. It was proved that microbial parameters appear to be the indicators of the effects of sewage sludge in the monitoring of the agricultural soil. Compost application can have impacts on the composition of microbial communities. A new approach for revealing of most efficient system of soil management based on the mathematical modeling of the data obtained for microbial communities was presented.

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THE FERROCYANIDE SORBENT FOR EXTRACTION OF CAESIUM RADIONUCLIDES FROM VARIOUS TYPES OF LIQUID RADIOACTIVE WASTES

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The ferrocyanide sorbent "T-55" for extraction of Cs-137 from aqueous media was developed by radiochemistry and applied ecology chair of UrFU. Granulated Hydrated

titanium dioxide “Termoxide-5” was proposed as the carrier due to its extended surface, High mechanical, chemical and radiation stability. A thin layer of mixed nickel – potassium ferrocyanide able to extract of caesium from solutions was precipitated to this carrier. Sorption properties of this sorbent in dependence of acidity and saltiness of solutions were studied in this work.

The dependence of distribution coefficient of caesium on pH of solution was studied (fig. 1a). As it was shown there is no any decrease of distribution coefficient of caesium over pH interval from 1 to 10.

The extraction of caesium from nitrate solutions with High acidity and saltiness is actual problem because considerable quantities of HNO_3 and NaNO_3 usually present in High-level liquid radioactive wastes after irradiated nuclear fuel processing. The dependence of distribution coefficient of caesium on concentration of HNO_3 is shown on fig. 1b. When the acidity of solution increases the distribution coefficient of caesium smoothly decreases from $3.8 \cdot 10^4$ mL/g (neutral solutions) to $3.7 \cdot 10^3$ mL/g for 3 M HNO_3 and remains stable under further increase of acidity. This allows using T-55 sorbent for extraction of caesium from solutions with concentration of HNO_3 up to 7 mol/L.

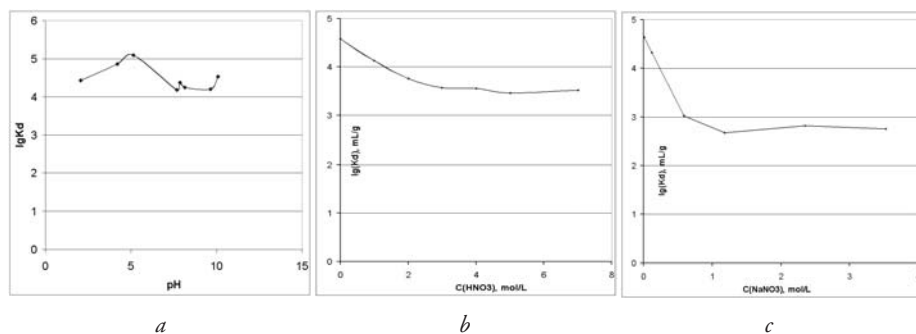


Fig. 1. Dependences of distribution coefficient of caesium on pH of solution (a), concentration of HNO_3 (b), concentration of NaNO_3 (c).

The dependence of distribution coefficient of caesium on concentration of NaNO_3 is shown on fig. 1c. The influence of sodium nitrate is not important until concentration of NaNO_3 is 10 g/L. When concentration of NaNO_3 is Higher sorption of caesium appears depressed. Though 20% of Cs-137 is extracted from solutions contained up to 300 g/L NaNO_3 .

Alkaline solutions show the strongest negative influence on caesium sorption. It was shown that the destroying of nickel – potassium ferrocyanide phase happens during one day in a solution containing 0.01 mol/L NaOH; when concentration of NaOH is 0.1 M and more the destroying of phase occurs during one hour. The presence of NaOH with concentration less than 0.002 M in solution has no influence on sorption of caesium.

Thus, T-55 sorbent can be efficiently used for extraction of caesium radionuclides from high level acidic (up to 7 M HNO_3), saltiness (up to 10 g/L NaNO_3) and alkaline (up to 0,002 M NaOH) liquid radioactive wastes.

Galina Sergeeva

THE SIGNIFICANCE OF PUBLIC PARTICIPATION IN ENVIRONMENTAL ENHANCEMENT IN RUSSIA

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The environmental conditions immediately concern the interests of the whole Russian population. That is why an important direction of public life democratization and environmental enhancement is formed by civic participation in ecological movements, in the development and implementation process of the state environmental policy, in the realization of different environmental protection measures.

Public ecological monitoring plays an important role in all this. It may include:

- 1) Environmental information acquisition and facilitation of public reaction measures;
- 2) Public environmental examination;
- 3) Ecological information publishing;
- 4) Holding public environmental events;
- 5) Direction of appeals and applications concerning infringement of the laws, improper execution of environmental protection obligations by officials or those, who conduct nature management.
- 6) Development and implementation of suggestions to improve the work of corresponding state structures;
- 7) Participation in ecologically significant decision-making concerning adoption of environmental normative acts, design and construction of facilities making influence on the environment, etc.

However, the practical formation of the public ecological monitoring system faces a number of difficulties, such as:

- 1) Weakness of the legal basis. Although above mentioned civic rights are more or less reflected in laws, they are not regulated in by-laws. In this situation representatives of the state structures refer to the fact that the state doesn't have to regulate the public ecological monitoring system because it has no right to intervene in activities of public associations.
- 2) Almost total absence of people willing to conduct ecological monitoring. It can be explained by the loss of prestige of public work, which can also cause negative retaliatory actions of state structures and business corporations against public supervisors.
- 3) Low professional level of public monitoring, legal incompetence of public supervisors.

4) Lack of financial basis of the public ecological monitoring.

The analysis of typical obstacles for public ecological monitoring development revealed that the state can play an important role in their overcoming. If the state funds the activity of political parties (their participation in elections etc.), supports sustaining losses corporations, why can't it form a financial basis for the public ecological monitoring? If it secures the safety of the officials, why doesn't it bear responsibility for safety, life and health of public supervisors?

Ecological organizations pursue not private but public goals, so the direct duty of the state is to facilitate their activity in every possible way.

Pavel Shchinnikov
Valentina Muhina

THE INFLUENCE OF THERMAL POWER STATIONS ON THE ENVIRONMENT, SOCIAL INFRASTRUCTURE AND PUBLIC HEALTH

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This report shows us some specifics of ecological effect of TPS, it has a social character and deals with a sphere of human relationships. These problems are reduction of emissions and their effect to health condition.

The topic is: the emission of TPS cover large area. This area is the city with developed social infrastructure and it has a large population. Such emissions cause buildings and constructions aging and other objects and they lead to population's aggravation. It depends on surface concentration of hazardous substances and results into numerous health problems and corresponding visits to hospitals. So it requires an additional financing.

This table shows us the comparative analysis of different energy resources.

Emission source, MW	Fuel	Location	Z_{cozum} , m. \$/year	Z_{health} , m. \$/year
TPS-320	Coal – 70% Oil – 30%	Downtown	3,0	65,0
TPS -320	Coal	side of the city	1,86	17,2
TPS -350	Coal – 70% Gas – 30%	Leeward side of the city	2,0	19,0
TPS -480	Gas	Downtown	0,112	2,9
TPS -1000	Coal – 70% Gas – 30%	Leeward side of the city	5,0	36,0
TPS -1000	Coal – 70% Oil – 10% Gas – 20%	Leeward side of the city	3,5	30,0

Emission source, MW	Fuel	Location	$Z_{\text{cocium'}}$ m. \$/year	$Z_{\text{health'}}$ m. \$/year
TPS -1000	Lignites – 70% Oil – 30%	Leeward side of the city	3,8	32,0
Boiler $Q_T=300$	Gas	Leeward side of the city	0,002	0,011
Boiler $Q_T=300$	Oil – 50% Gas – 50%	Leeward side of the city	0,003	0,272
Boiler $Q_T=400$	Gas	Leeward side of the city	0,008	0,043
Boiler $Q_T=600$	Oil – 50% Gas – 50%	Leeward side of the city	0,017	0,132

S. Sheina
L. Nikulshina

ENVIRONMENTAL ASPECTS OF A PLANNING SYSTEM FOR DISTRIBUTION EDUCATIONAL FACILITIES IN CITIES

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One of the most topical problems faced by municipalities of Russian Federation is the efficient distribution of new educational facilities taking into account among others requirements the choosing of ecologically friendly urban areas. This issue has gained in importance due to creation of ecologically favourable environment at educational facilities as the children spent the half of the day in schools and kinder gardens. To solute this problem we need to use new technologies for more operational territorial distribution planning of educational facilities and data retrieval of the existing environmental condition, sanitary and microclimate condition.

At the Urban planning and Community development department of the Rostov State University of Civil Engineering specialists developed methodology of the city reconstruction sites estimation to distribute educational facilities using GIS-technologies. GIS-technologies give an opportunity to make the analysis of the educational facilities data, density and structure of population, its distribution on the territory of the city and zones of ecological risk, which are result of summarized estimation of contamination from different sources.

While defining the most optimal variant of using city territories in a process of the planed reconstruction we are faced with the aim of choosing the estimation criteria of these territories from the point of view of educational facilities distribution. The description of each aim includes the components (factors) solution and the system of aims description. In our case we deal with the classic optimizational aim of choosing the best combination of variables (estimation factors) at the maximum of the estimation function. Solving this aim we are to carry out some interconnected actions, they are:

1. Separation of the city territory into sites.
2. Developing the list of estimation factors, which have influence on the priority placement of educational facilities.
3. Choosing and giving the desirability coefficient of estimation factors for areas of educational facilities' placement.
4. Calculation of each estimation factor coefficient for educational facilities' placement.
5. Calculation of the mentioned site summary rating for educational facilities' placement.
6. Choosing one of the sites for construction of educational facility according the maximal meaning of the estimation factor summary rating.

Mathematics expression of the estimation function:

$$f(x) = A_1 + A_2 + A_3 + \dots + A_n = \sum_{i=1}^n A_i$$

where, A_i – is a rating estimation, depending on variable factors.

With the help of program complex ArcGIS ESRI by setting the desirability coefficients of the estimation factors, we got the electronic map of educational objects distribution on the territory of Rostov-on-Don. On the next step we made comprehensive assessment of environmental pollution in Rostov-on-Don. It included following factors: air pollution, the degree of soil pollution, dust load in the city, the degree of noise pollution, the level of groundwater and pollution. We made the zones of ecological risks and also developed the electronic program to determine necessary measures to decrease the ecological risk.

This methodology also helps us to determine the efficient place for construction of new places of educational facilities and after to decrease the ecological risk using the developed software, to determine demand in new building and reconstructing the existing educational complex objects in the city and gives an opportunity to optimize the use of the territory for different city functions on the basis of the present day educational objects plight and tendencies definition and the basic directions of long term educational objects system development to reach the standards.

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THE EFFECT OF ENVIRONMENTAL FACTORS ON THE VALUE OF REAL ESTATE

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The continuing increase of the level of physical pollution in residential areas leads to a growing negative effect of the environmental risk factors that predetermine the probability and the consequences of manifestation of such effects. The environment

protection doctrine of the Russian Federation presumes that any business activities are hazardous to the environment, therefore the environmental risk is never equal to zero within any built areas. This demonstrates the need for consideration and minimization of the environmental risk to provide for the environmental safety of the population.

The aggregate quality measure for real estate assets is their value, an important component of which is the level of contamination of the ambient territory. Understanding of the factors affecting the value of the real estate assets is a critical condition of the correct functioning of the market.

At the same time, the current Russian practice of formation of the market prices for real estate assets does not reflect the whole multitude of the parameters contributing to the process of price formation. The environment condition parameters are, as a rule, separated from the real estate, resulting in underestimation of the effect of the environmental factors on the price figures. Valuation of real estate is often performed with just a pretended reference to the environmental characteristics. At the same time, comparison of the market value of urban real estate and the local environment pollution levels shows that in an overwhelming number of cases these parameters are proportional: the higher price corresponds to the higher level of pollution.

A methodology of environmental risk control should become an effective environmental and economic toolbox for adjustment of assessments of the market value of real estate assets, with regard to the actual levels of physical and material pollution of the environment, and the location area. In this connection, improvement of such a methodology applicable to the theory and practice of valuation decision-making concerning real estate appears to be a pressing research and practical task with a significant development potential.

The use of the environmental and economic assessment for adjustment of the real estate value requires not only determination of the kinds, levels, and probabilities of manifestation of the various types of negative effect of the pollutants (the environmental risk factors) and their financial consequences, but also elaboration of a viable mechanism for control of such consequences, integrated into the real estate operations.

In addition, certain steps can be taken to improve the environment as a real estate quality factor contributing to its value, in particular, adoption of new business tools based on the use of information and computer technologies and mathematical models, and also proper regulation and improvement of the methods of assessment of economic liability for earlier environmental damage. Despite the existence of such tools, the problem remains to be solved in a scientific context.

The result of assessment should be determination of the value of the real estate in question. This value means money or monetary equivalent, which the buyer is ready to exchange for such real estate.

Considering the current market conditions of the real estate market, all real estate assets should be valued with regard to the environmental conditions in the area to be built.

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ECOLOGICAL ASPECTS OF ENERGY CONSERVATION PROGRAMMES

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The decision of questions of energy conservation automatically involves the decision of ecological problems. They cannot be solved without cardinal change of the relation to power resources, as to the most valuable product which defines well-being of any country and a condition of its economy.

The basic aspects of "Power strategy of Russia to 2020" are:

1. Maintenance of necessary level of energy and ranges of services, including housing-and-municipal, characterizing quality of life of the population;
2. Preservation of the environment.

The energy conservation and ecology are communicating vessels. At economy of energy resources improved ecological conditions by reason of the expense of decrease in volume of extraction, processing, storage and transportation of primary energy resources, and also emissions of harmful substances at their burning and storage in environment improve. Therefore energy saving up and ecological programs for available housing of all levels from the regional, municipal enterprise to level, should be are coordinated.

The essence of ecological requirements to power savings programs consists in available housing that the realized system of power savings should lead to the decision of one or several environmental problems (to pollution of atmospheric air, underground and a surface water, soils; to accumulation of dangerous and other waste; to an exhaustion or destruction of natural resources) and to decrease in an adverse effect on environment at the expense of output escalating (works, services), on the basis of a basic change technologies of its manufacture, etc.

In developing the programme of increasing energy efficiency in Rostov-on-Don took account of all ecological aspects.

The economic estimation of each action for power savings should be accompanied by an estimation of its influence on environment. Now this estimation is usually limited to the air pollution account, it is based on the data on indicators of emissions of such pollutants, as N₂, SO₂, flying ashes and slag.

The estimation of action for power savings is supplemented with an estimation of the effect reached at the expense of reduction of emission of polluting substances, the consumption of energy provided thanks to decrease on the basis of the information:

- about an environment condition where the power saving up project and planned actions for maintenance of demanded ecological norms will be carried out;
- about results of checks and estimations of an ecological situation;
- about offered control measures of a state of environment;
- about expected influence of the project of power savings on ecology;

- about obligations on preservation of the environment which should be executed in case of project realization.

Problem of the ecological analysis is the estimation of a potential damage to environment during realization of action and definition of the efforts necessary for softening or prevention of this damage.

The criterion of ecological efficiency of use of energy characterizes potential benefit which at reduction of consumed power resources or waters, arises in respect of decrease in negative influences on environment. The quantitative estimation of the given criterion depends on applied settlement techniques.

Besides in a combination to actions for reduction of power consumption use of renewed energy sources will help to lower dependence of a society on mineral fuel and, thereby, to reduce growth of emissions of polluting substances in surrounding environment. They constantly replenish with natural cycles of the earth and thanks to it represent an energy perennial spring.

It is necessary to underline once again that the decision of questions of power savings automatically involves the decision of problems ecological, economic, scientific and technical and social which face today a society.

I.L. Shubin

NOISE MONITORING IN CITIES

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Substantive provisions of the national standard draft "Acoustics. Noise monitoring of cities" are considered. The concept of environmental noise monitoring, its destination and a field of application are given. The operational and inlet Russian, International standards and the European directives used at realization of monitoring are listed. As the main noise indexes for the monitoring purposes rating levels are set, which are defined on the equivalent continuous and maximum A-weighted sound pressure levels separately for day-time, evening and night, and also composite whole-day rating levels during period day-evening-night. For rating of tonal sound and sounds with strong low-frequency content alongside with the indicated quantities will use also appropriate rating sound pressure levels in octave frequency bands in which the basic power of sound is concentrated. The expediency of selection evening-time period from day-time period is scored despite lacking the special demands to noise in the evening time in practice of sanitarian noise rating. For the purposes of noise estimation limit values of the entered noise indexes are fixed, comparison with which of actual or predicted values of noise indexes allows to reveal violations of noise demands and to allocate the noise sources, which are responsible for fixed violation. The concept of operating noise maps is entered and rules for noise mapping are described.

A.V. Shulgin

PUBLIC-PRIVATE PARTNERSHIP: RISKS AND RESPONSIBILITIES OF THE PARTIES

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From our point of view, public-private partnership describes a government service or private business venture which is funded and operated through a partnership of government and one or more private-sector companies.

Public-private partnership is a norm of a civilized market. Indeed, cooperation between the state as a major market participant and private-sector companies as a flexible innovative structure exists in all the market areas. Since the late 1980s onward, the institute of public-private partnership has been developing very fast. Public-private partnership has become widespread abroad, particularly – in Western Europe. In March 2005 the Council of Europe officially recommended that European countries should apply its mechanisms for infrastructure changes more extensively. This mechanism application enabled successful completion of such projects as the construction of the Channel Tunnel under the English Channel, Sydney Harbour Tunnel, Confederation Bridge in Canada, national airports in Hamburg and Warsaw, Central Park in New-York, several lines of the London underground.

In recent years there have been a significant number of attempts made to create models of public-private partnership - first and foremost, in those spheres where not only substantial investment is to be made but also organizational experience connected with the flexibility of commercial structures is required.

This flexibility is indispensable for infrastructure sectors provided that the cooperation between the state and business has been already established. Yet, this condition turns out to be insufficient. Risks of cooperation between a public-sector authority and private party are still too high and affect partnership. First of all, it concerns property relations: it is unclear which actions public-private partners should undertake when substantial investments have been made into the project closed due to the circumstances beyond their control.

The existing legal framework adopted in Russia to enhance the development of public-private partnership appears to be insufficient. Discrepancies in the laws on the guarantees to carry out national projects provided by both the state and private-sector companies have not been overcome yet. For example, concessions - well-established forms of partnership - can be regarded as a form of indirect privatization. Thus, we are discussing amendments to the system of property relations. Such rights as the right to control asset usage, right to income, right to management, right to change capital costs of objects of the agreement and right to assign different types of rights to others have remained problematic.

Lawyers and consultants involved in the PPP projects develop rather a negative attitude towards partnership given the existing system of projects' approval and execution. At the same time, high-priority national projects require mutual efforts of the society. For instance, high-priority national project «Education» needs an efficiency assessment of work performed

by educational establishments concerning staff training for modern economy. Another project - «Affordable housing» - is in urgent need to have mortgage lending increased and building construction developed. The projects to do with the Housing and Public Utility are frequently cancelled since private business privatizes objects of housing and public sphere either directly or indirectly.

Moreover, according to the tradition of Western Europe an enterprise (joint stock company or limited liability company), which is privatized on the paper only is not considered to be a partnership, for there is no cooperation to create added value.

Thus, large and medium-sized projects carried out in the sphere of public-private partnership need to gradually acquire essential features of classical schemes concerning project financing, transfer the majority of commercial risks on a major investor, assume risks regarding building and exploitation by a single object, in our case – by the region, development of regional legislation in the sphere of cooperation with the private business sector.

Larisa Shulgina

THE PRINCIPLE OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

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The concept of sustainable development - as a category of management - was firstly employed in the end of the 20th century due to the necessity of dealing with the current global instability of economic and ecological systems. An overwhelming majority of scientists pointed out that humanity and nature need to exist in harmony. Among them was a famous Russian scientist V.V. Vernadskiy, who developed the concept of the noosphere in his theory of noosphere. The theory is characterized by the idea of the balance between the increased human activity, ecological aspect of this increase and revolutionary development of science and technology.

In the early 1970s American scientists J. Forrester and D. Meadows warned about exponential environmental disaster which could occur due to the high production intensity and consumption growth observed around the world. The necessity of rational control over transgenerational capital (capital belonging to all the generations including the future ones – as it is stated in the documents of the UN World Commission on Environment and Development) remains an acute problem which has been tackled by modern management.

For the first time the term “sustainable development” was used at the UN Conference on the Human Environment held in 1972. The Conference adopted a Declaration consisting of 26 Principles for the preservation and enhancement of the human environment and an Action Plan containing 109 recommendations for environmental action at the international level. As a result many countries issued policy documents recognizing a healthy environment as a basic human right.

What is ecologically sustainable development? It is fast-paced autonomous development not preventing human development in the future. Fast developing principles of the marketing made commercial structures aware of social and ethical marketing with the principle idea of damage compensation caused to the environment and people by manufacturing enterprises.

All the models of sustainable development are based on the concurrence between production and consumption, reduction of consumption to the rational level. That is why from the middle of the 20th century onward questions concerning efficient use of resources and preservation of environment have become so acute. Economic sustainability of systems varying from an enterprise to a national economy can be energetic, industrial, commercial, organizational, environmental, social, financing. All the types of sustainability are interconnected and irrevocably bound to the natural resources.

Economic development of a separate entity (for example, of an enterprise) and global economy appears to be a contradiction in the system. Environmental expenses of an economic growth of multinational corporations remain very high. There are a lot examples provided. The Exxon Valdez oil spill occurred in Prince William Sound, Alaska, on March 24, 1989, when the Exxon Valdez, an oil tanker spilled 260,000 to 750,000 barrels of crude oil. It is considered to be one of the most devastating human-caused environmental disasters. In 2005 during the hurricane in the Gulf of Mexico 30 million liters of oil spilled. Finally, 2010 saw the Gulf of Mexico disaster. The damage caused is estimated at \$5 billion. It will take centuries to improve the environmental situation in the region. Nowadays, it seems difficult to estimate environmental effects of business activity in Russia due to the fact that extended territories and obscure information cause external effects. Environment programs and research on sustainable development carried out by the specialists from all over the world enable us to assume that sustainable development is aimed at the coordinated work of commercial production and consumption systems providing vital processes that are necessary for present and future generations under the conditions of production and consumption optimization.

N.I. Sinitsyn
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ELECTROMAGNETIC RADIATION AND WATER STRUCTURIZATION AND THEIR SPECIAL ROLE IN ECOLOGY AND THE STATE OF LIVING ORGANISMS

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The special role in ecology and the state of living organisms of the electromagnetic radiation (EMR) and the aqueous medium with the account of a level of development of

up-to-date effecting is considered. Interacting singularities weakly intensive electromagnetic waves millimeter, megamega hertz and the infra-red bands with aqueous mediums and biocloths are explored. In the yielded bands there is the most intensive and vital characteristic electromagnetic radiation of biological installations. And it is necessary for considering at an assessment of a bionomics of a circumambient. Outcomes of the examinations which have allowed for the first time observationally to find transferrings of aqueous medium in a reticulated state at its contact with nana nonuniform by a surface of water-insoluble stuffs, including alive frames are resulted. The mechanism of structurization of aqueous medium is presented. Thus for the first time it is positioned, that to singularities of interacting of an aqueous medium with EMR including to appearance of biological effects in living organisms, result interactings EMR only with the reticulated aqueous medium. And, on certain frequencies. These frequencies depend on frame nana nonuniform surfaces of a stuff contacting to water. Water structurization in living cells is spotted by its intrinsic composition and a constitution. For the first time structurization of water by amino acids - nana structured substrates of a synthesis of proteins is experimentally found. The velocity and a time of structurization of aqueous layers from contact with nana structural stuffs is spotted. The possibility of infiltration EMR of the explored bands on major depths in living organisms for the account of structurization of aqueous medium in living cells is shown. For the first time the mechanism requirements and possibilities of biocompatibility of some substances are presented. The carried out examinations and the received outcomes are important for build-up of bottoms of new principles medical radio-electronic nana production engineering the future. They discover a path by a birth millimeter, megamega hertz nana structural the medicine, essentially new superearly, high-strung non-invasive diagnostic and highly effective therapy.

L.Yu. Slatinskaya

SICHERHEITSVORKEHRUNGEN EINES MENSCHEN GEGEN DEN EINFLUSS EINER AGGRESSIVEN ÖKOLOGIE

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Heute kann nicht einmal einen Menschen, der sich an die Prinzipien des gesunden Lebensstils hält, eine gefahrlose Existenz in der aggressiven Ökologie sichern. Es gibt kaum noch biologische angebaute Nahrungsmittel, unsere Haustiere wachsen durch Hormone, vom sauberen Wasser ist kaum noch was über, die Luft ist durch die Industrieemissionen und die Autoabgase verschmutzt. Eine sehr große Auswirkung haben technogenetische Faktoren und insbesondere

„Elektromagnetischer Smog“. Die offizielle Medizin zieht es vor synthetische Präparate zu verwenden, die zu einer großen Menge Komplikationen und Nebenwirkungen führen und trägt zur Akkumulation von exogenen Toxinen in menschlichen Organismen bei. Man

darf auch die sozialen Faktoren nicht vergessen, die mit dem negativen psychologischen und energetisch-informatischen Einfluss auf das Bewusstsein eines Menschen verbunden sind.

Alle die oben genannten aggressive Faktoren der Umwelt, mit denen der Mensch in direktem oder indirektem Kontakt ist: das sind exoökologische Einflüsse, welche zu endoökologischen Verletzungen der psychophysischen Charakteristik des Menschen, Verletzung seines eigenen Homöostages führen.

Trotz der Unterschiede, haben alle exoökologische Einflüsse ein physische Natur gemeinsam: das ist der Einfluss der elektromagnetischen Felder auf die Menschen. Der Mensch ist völlig abhängig von dem Einfluss der elektromagnetischen Felder.

Der persönliche Homöostage ist die dynamische Balance der elektromagnetischen Schwankungen im inneren des menschlichen Organismus (psychophysiologische Funktionen) und seiner Harmonie mit den elektromagnetischen Schwankungen der Umwelt (energetischen und informationellen).

Der Einfluss der aggressiven exoökologischen Faktoren führt zur Verschmutzung des flüssigen Umfeldes der interzellulären Raumes mit Toxinen, die die Quellen der pathologischen Strahlung ist, dass stört die natürlichen Frequenzen des Organismus. Als Ergebnis verschlechtert sich die Leitfähigkeit, verzerrt sich die Informationskomponente und es wird die energetisch-informatische Gesamtheit des Organismus gestört. Die Zellen fangen an im falschen Taktabschnitt der Frequenzen zu arbeiten, was zur ihrer Verletzung führt. Das ist der Anfang der exoökologischen Erkrankung.

In unserem Zentrum vereinen wir verschiedene Methoden der Naturapathie und der heutigen biophysischen Wellentechnologie. Das ist ein nichtinvasiver, drogenfreier und gefahrloser Weg sich vor aggressiver Ökologie zu schützen.

Persönliche Homöostage wird, mit dem Ziel der dynamischen Stabilität und mit der Auswahl der Nahrungsmittel energetisch ähnlich der konkreten Person, korrigiert. Das ist nur in dem Fall möglich, wenn die Nahrungsmittel und die Person ähnliche Parameter haben. Nur in diesem Fall werden die Prozesse der Selbst-Regulierung in Gang gesetzt. Die Selbst-Regulierung synchronisiert die elektromagnetischen Impulse im inneren des Organismus, dass führt zur dynamischen Stabilisierung ihrer natürlichen Funktionen.

Wenn eine Person jedoch ein Produkt zu sich nimmt, das eigene Charakteristiken hat, die sich von den eigenen unterscheiden, dann werden sie zu Ballasten. Wobei ihre Strahlung ein ständig vorhandener negativer Faktor ist.

So ist es möglich hingegen der allgemeinen Meinung, dass man sich vor aggressiven Faktoren nicht schützen kann, mit Hilfe von biophysischen Technologien und den Methoden der Naturapathie effektiv die störenden Faktoren zu bestimmen und zu beseitigen.

E.N. Sraubayev

MEDICOECOLOGICAL PROBLEMS OF THE REPUBLIC OF KAZAKHSTAN

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Kazakhstan is located on the border of two continents - Europe and Asia - and occupies area of 2724,9 thousand sq.km (1052,1 thousand sq.miles). Kazakhstan is the ninth biggest country of the world that is it is among ten biggest states. Total length of its frontiers equals 12,2 thousand km, including 600 km of frontier passing across the Caspian Sea. Kazakhstan borders upon Russia in the east, north and north-west (frontier 6467 km long), upon countries of Central Asia – Uzbekistan (frontier length 2300 km), Kyrgystan (frontier length 980 km) and Turkmenistan (frontier length 380 km) in the south and upon China in the south-east (frontier length 1460 km).

One of the most important medicoecological problems of Kazakhstan are 40-year nuclear weapon tests on the proving ground of Semipalatinsk which have caused irredeemable damage to people's health and environment and provoked growth of morbidity and mortality rates.

The whole territory of Semipalatinsk region and adjoining to the proving ground regions – Pavlodar region, East-Kazakhstan region and Karaganda region – are recognized as environmental disaster area. Currently, long-term fatal consequences of the nuclear weapon tests are showing up more and more and are inherited by next following generations.

A special meeting dedicated to the problem of the Aral Sea has been recently held in the European Parliament in Brussels within the bounds of chairmanship of Kazakhstan in Organization for Security and Cooperation in Europe. The meeting was organized by Struan Stevenson, representative for environmental protection of OSCE chairman.

As Konstantin Zhigalov, deputy Minister of Foreign Affairs of the Republic of Kazakhstan and special representative of OSCE chairman, said, "We are very glad that the subject was properly descanted upon in the European Parliament, and this is no coincidence. Kazakhstan and European Union as well as Central Asia collaborate actively in the field of environmental problems".

K. Zhigalov reminded that in 2007 the strategy of European Union in relation to the countries of Central Asia was approved. The strategy is focused upon environmental problems. Later Berlin water initiative was put forward and it is being rapidly developed. Italy attaches special importance to the subject and European Union pays a lot of attention to water problem and ecological situation in general. That is why S. Stevenson, a famous member of the European Parliament, who organized the above-mentioned special meeting, was commissioned representative of OSCE chairman.

One of the gravest problems is negative impact of missile carriers launched from the

spaceport “Baykonur” on the environment and people’s health which spreads along the launch lanes. Launching is done on the basis of joint research conducted by Russia and Kazakhstan.

Thus, ecological situation in Kazakhstan remains difficult. Semipalatinsk and Aral areas of ecological disaster, historical pollutions scattered all over the country, including radioactive ones, billions of tons of accumulated industrial and domestic wastes, above-standard pollution of water bodies and air in the cities – all these are ecological safety hazards relevant for Kazakhstan. The situation is being aggravated with technogeneous breakages risk due to increasing oil production on the shelf of the Caspian Sea, expansion of other minerals extraction, reconstruction of environment-damaging metallurgical and chemical productions.

Environmental problems of Kazakhstan are not just those of national scale, but of regional and global scales, too. That is why they claim attention of the whole world community.

The principal strategic document of the state environmental policy has become the new Concept of environmental safety for the period from 2004 till 2015 approved by N.A. Nazarbayev, the President of the Republic of Kazakhstan, which takes into account peculiarities of the contemporary level of development of the country and its long-term priorities.

Tatiana Strelnikova

ECOLOGICAL PROBLEMS OF THE CITY OF LIPETSK

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Cities create their own microclimates. As the vegetation is being forced out by pavements, roads and buildings, precipitation redistribution is changing. Under urban conditions most water streams down asphalt covering into rain sewers and the water reduces its evaporation. That is why the relative air humidity falls and the atmospheric temperature rises.

Currently there are 45 laboratories researching harmful atmospheric emissions in Lipetsk region (8 of them are in Lipetsk). The ways of struggle for clean air can be conventionally divided into active and passive. Passive ways secure relatively clean community air (for instant, in the places of public gathering), but they don’t prevent the cases of harmful atmospheric emissions. This is, mainly, the consideration of terrain characteristics during the placement of pollution sources, arrangement of sanitary protection zones, of high stacks etc.

Main air pollution sources of the Lipetsk urban area (where the total fall of harmful substances is 3 76 million 960 thousand tons) are ferrous metal industry (88.29 per cent), construction material industry (4.41 per cent), and power industry (0.88 per cent). There

are such enterprises as NLMK JSC (88.1 per cent), Lipetskement JSC (4.1 per cent), LIW “Svobodny Sokol” JSC (1.1 per cent) among them.

Vehicle air pollution emissions in Lipetsk average 80,040 tons.

High and powerful stacks give farther gas and dust emission range (correspondingly, their greater dispersion in the atmosphere), they also give an opportunity to reduce lower stacks (number). Besides, it is economically profitable. According to some specialists' assessments, the transition from the stack height of 25 meters to the height of 250 meters results 99 per cent of smoke cleaning. But the research shows that stack erection in populous areas requires careful approach, in some cases it is impossible, because the maximum emission concentration (often 5-10 times greater than the maximum permissible concentration of harmful emissions) is also observed at the distance of 6 – 8 kilometers from the emission source. Such stacks are constructed at large power plants with the daily emission of about 200 tons of dust, 600-700 tons of sulfur dioxide and 100-200 tons of nitric oxides. Lesion focuses of vegetation were found within a radius of 8 kilometers of such powerful emission sources.

Many meteorological factors influence on the community air of the city. Under normal conditions streams of warm air pick up particles of pollutants, when they rise from the ground. These particles get cold in high atmospheric layers and fall on the ground, but far from the emission source.

Air pollution intensifies during fogs; fog drops absorb harmful substances, and impurity concentration in the air increases, in addition oxides transit into acids. For instance, the result of emissions, produced by NLMK, is the dissolution of sulfur dioxide in fog drops and the formation of sulfuric acid drops. Similar reaction takes place during the rains. Winter fogs are most dangerous because they consist of frozen moisture with high sulfuric acid concentration near thermal power stations and boiler houses.

Urban area development in Lipetsk intensifies the processes that increase number of unusable lands. Negative processes of lithosphere become most evident during underground pipeline construction, under the impact of massive multi-storey buildings, heavyweight surface transport etc., it is most typical for sandy and clay loam of the city.

The specific problem of Lipetsk is so-called “psychological pollution” of the landscape. That is progressive aesthetic quality degradation of urban and suburban development, featureless structure and development, inadequate to the landscape, landscape obstruction because of reinforced concrete and other structures, expansion of waste lands etc.

Landscape protection against psychological pollution is possible only by means of painstaking work in the field, by the increasing of responsibility of the officials making decisions concerning the aesthetic look of the landscape, improving ecological culture of the population.

Measures taken to clean the community air enable to reduce the air pollution in the city of Lipetsk. However, the pollution will be significant for a long time as a result of industrial production growth and imperfection of atmospheric emissions purification technological processes. Besides, the prospective power consumption growth and existing

tendency to multi-storey buildings construction will lead to the growth of “thermal islands” in the city.

That is why planning and architectural methods that can contribute community air protection will never go out of date.

R.Sh. Sufiyonov

RAISING EFFICIENCY IN CHEMICAL DECONTAMINATION OF OIL-CONTAINING SOILS

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To render safe diverse oiled waste, in particular oiled soils, arising when the accident-related spillages of oil or its products occur, is one of actual problems in the environment protection. The waste of that kind are extremely harmful for the environment, so they should not be

utilized on the common landfills, but are liable to rendering safe on special industrial floors. There are following basic ways to render safe that waste: thermolysis, extraction, chemoprocessing, the same with preliminary oil extraction, bioprocessing, the same with preliminary oil extraction, spinning.

To estimate basic technologies of rendering safe in the plane «cost—quality» cluster analysis by single bond method was conducted using the application package STATISTICA. For efficiency estimating some features (parameters) were taken: capital spending, maintenance, environmental effect, time, regeneration of oil (oil products), recuperating the end product of rendering safe.

The results were presented as dendrograms with objects along the absciss axis and distance measures, for joining into clusters used, along the ordinate axis. The estimating of ways by selected features offered some difficulties by reason of the uncertainty and ambiguity inherent in the categories, so estimation values were selected both from literature data and hypothetically. Such estimating was conducted by each quality feature using 10-mark scale (1...10), thus, for instance, by the capital spending feature the thermolysis has the lowest mark in consequence of capital spending, considerable and one-time made, to buy and mount the reactor equipment. As burning the oil or its products in oiled slurries as a whole, by environmental efficiency this method was estimated with relatively high mark (9), but by oil (or its products) regeneration the mark was very low (1). Similarly were estimated other methods also.

Taking into account construction and technological features of processes in use, a comparison of diverse known ways to render safe displays: just chemoprocessing, namely absorbing oil or its products with the absorbent on the base of a natural inorganic material like limestone step-by-step transformed into the quicklime and slaked lime, is the most

universal; the process efficiency can be increased, if at first to recuperate as many oil products as possible. A systematic analysis of the problem using functional decomposition strategy onto a rise of the process efficiency oriented allows staying at two basic aspects.

The first is in consideration a possibility to use the exothermic liming energy for preliminary heating the oiled soils. This is especially actual in winter, when the oil-polluted soil to render safe it delivered looks as large oiled earth lumps and road building machinery is employed to crumble the lumps up. Tentatively done calculation demonstrate: when designing the special equipment it is possible to use exothermic process heat more efficiently, while now it is lost irretrievably. Thermodynamic parameters of rendering safe the oiled slurry were obtained in the lab. To provide the experiment purity specimens of «oiled slurries» were prepared as sand—oil mixes (the sifted river sand, well washed and dried, was in use) in proportions 98 : 2, 96 : 4, 92 : 8, 90 : 10 percentage, mass. The lab rotor blender, designed especially, was used for blending the specimens (with water preadded) and quick lime. It was ascertained: the temperature depends on oil and quick lime contents, the scattering of temperatures being from 100 °C up to 160 °C (maximum). The peak temperature have been obtained for the mix of oil with quick lime in proportion 10 : 40 percentage, mass.

At the same time in view of a need to provide high temperatures in the blender-reactor of the unit for particles sintering, the heat should be taken from the end product having been reacted. The second is in calculating hoppers of the unit for rendering safe the oiled soils, when properties of the latter are taken into account by the method having been developed already, as the fact is known: oil (or its products) in soils builds up their property to compact themselves under stresses in them arising during storage, transportation, proportioning and discharge from hoppers.

B.V. Testov

· DIE WIRKUNG DER RADIOAKTIVEN STRAHLUNG · AUF DEN MENSCHLICHEN ORGANISMUS UND · DIE EINSCHÄTZUNG DES ÖKOLOGISCHEN RISIKOS

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Die Einschätzung der ökologischen Risiken der radioaktiven Strahlung hängt stark von unserer Vorstellung über den Mechanismus der Einwirkung dieser Strahlung auf den biologischen Organismus ab. Heutzutage basiert diese Vorstellung vorzugsweise auf der ionisierenden Wirkung der Röntgen- und Gammastrahlung auf die Atome und Moleküle der Zellen des lebenden Organismus. Die Berechnungen zeigen uns jedoch, dass die für den Menschen tödliche Dosis von 10 gr nur 10^{-7} Atome, also 7 mg der Masse (gleichmäßig verteilt) eines durchschnittlichen Menschen, ionisieren (zerstören) kann. Eine solche Beschädigung kann keinen Tod eines Menschen verursachen. Gleichzeitig wissen wir

alle, dass ein längerer Aufenthalt eines hellhäutigen Menschen unter den Strahlen der Frühlingssonne unweigerlich zum Sonnenbrand führen wird. Die Hautzellen verbrennen und sterben ab, während die Kleidung und andere Gegenstände um uns herum fast kalt bleiben. Also erfolgt die Erwärmung der Hautoberfläche nicht mit Hilfe der Energie der Sonnenstrahlung, sondern mit der vom Menschen selbst erzeugten Energie.

Wenn ein Mensch schrittweise die Sonnenstrahlen genießt, so entsteht die Bräunung, die die Haut vor der zerstörerischen Einwirkung der Sonne schützt. Unter der Einwirkung der Ultraviolettstrahlen produziert die Haut das Pigment Melanin. Das Melanin seinerseits erlaubt es den ultravioletten Strahlen nicht, durch die Haut durchzudringen. Deshalb sind die Bewohner der südlichen Länder wesentlich dunkelhäutiger, und Afrika, wo die Insolation sehr stark ist, die Heimat der Schwarzafrikaner ist. Röntgen- und Gammastrahlung verfügt über wesentlich mehr Energiestärke und dringt daher leichter durch die Hautoberfläche in die Zellen des Organismus durch. Bei der Wechselwirkung mit den Atomen und den Molekülen der Zellen verlieren die Photonen dieser Strahlung die Energie und verwandeln sich in die Photonen der ultravioletten Strahlung. Diese Photonen der ultravioletten Strahlung führen letztendlich die Temperaturerhöhung der Zellen des Organismus herbei.

Die Untersuchungen ergaben, dass die tödliche Strahlendosis einem Tierkörper nur soviel Energie weiterleitet, dass diese Energie eine Körpertemperaturerhöhung um nur $0,002^{\circ}\text{C}$ verursacht. Die Auswertung der Fachliteratur und unsere Experimente haben gezeigt, dass Röntgen- und Gammastrahlung sogar in Dosen, die Tausend Mal geringer sind, als die tödlichen, zur einer Erhöhung der Körpertemperatur bei Tieren und Menschen um $1-2^{\circ}\text{C}$, führt. Das bedeutet, dass bei der Bestrahlung mit Röntgen- und Gammastrahlen es zu einer Störung der metabolischen Reaktionen kommt, die Zellenwärmeproduktion heftig ansteigt und die Temperatur im Organismus der Tiere sich um 5°C erhöhen kann. Somit stellen nicht die molekularen und atomaren Beschädigungen die Grundlage für die Strahlungsbeschädigungen bei der Einwirkung der radioaktiven Strahlung dar, sondern die Erhöhung der Wärmeproduktion und die Störung der metabolischen Reaktionen im Organismus. Es wird nun klar, warum die Hyperthermie bei der Bestrahlung den Effekt der Strahlungsbeschädigung immer verstärkt, und die Hypothermie ihn schwächt. Es ist eine bekannte Tatsache, dass niedrige Organismen (z.B. Bakterien, Wasserpflanzen), die aus den selben Atomen bestehen, wie die höheren Organismen, 10 Tausend Mal resistenter auf ionisierende Strahlung reagieren, als Tiere und Menschen. Dies ist verständlich, wenn man berücksichtigt, dass die Intensität des Metabolismus bei den Warmblutern wesentlich höher ist, und sie über eine Art Wärmeisolationsdecke verfügen, die die Ableitung der Wärme in die Außenwelt erschwert.

Bei den Tieren, die sich in den Gebieten mit hohem Strahlungsniveau befanden, konnten wir einen im Vergleich zur Kontrolle verringerten Sauerstoffkonsum registrieren.

Diese Feldmessergebnisse konnten wir auch bei den Laborversuchen bestätigen, indem wir die Labormäuse in die Nähe der radioaktiven Strahlungsquelle gebracht haben. Bei den Feldbeobachtungen registrierten wir die sich verändernde Reaktion der Tiere auf

die ständige Bestrahlung durch die Messung der Rektaltemperatur. Die Messergebnisse beweisen die physiologischen Reaktionen der Tiere auf die dauerhafte Bestrahlung. Danach entwickelt sich die Anpassung der Tiere auf die dauerhafte Bestrahlung innerhalb von 3-5 Tagen. Wenn radioaktive Stoffe in den Organismus jedoch mit der Nahrung geraten, so entsteht die Anpassung etwa nach einem halben Jahr. Nach einem halben Jahr passen sich die Tiere und die Pflanzen der dauerhaften radioaktiven Verseuchung des Territoriums an und weisen keine schädliche Einwirkung mehr von der Bestrahlung. Deshalb ist die Rehabilitierung des Territoriums ein halbes Jahr nach einer radioaktiven Katastrophe faktisch sinnlos.

Iryna Ustinova

MANAGEMENT OF TERRITORIAL DEVELOPMENT IN THE CONTEXT OF SUSTAINABILITY

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Searching for the solution to the problems of environmental safety is associated nowadays with the answering the question of sustainable development. There are two points of view on "stability" at present: "economic and environmental". It is a consequence of the current state of science, where the change of the paradigm mentality is happening. The ecological crisis of the depletion of the planet's resources forces to refuse from the quantitatively oriented economic paradigm, which is based on the striving to increase the level of consumption by as many people as possible. It will change to environmental quantitatively oriented paradigm, which emanates from the necessity to ensure the human survival in the environmental conditions, influenced by human's activity. Such state of social sciences at the beginning of the XXI century, reminds the situation in physics at the beginning of the XX century, when it changed its conceptual framework and the classical physics was supplemented with quantum physics.

Biosphere doctrine is certainly a basis of ecological world outlook. This theory is developed from the ecosystem self-regulation concept. According to the concept each territory has certain demographic capacity. The reserve of the territory ("underpopulation") determines the growth and its exhaustion (overpopulation) causes the reduction. The notions "demographic explosion", "environmental crisis", "depopulation" and "multitude stabilization" represent different stages of the "Population-Environment"-ecosystem development. State of ecological equilibrium of this system can be described by means of the proportion 1:1 (quantity to capacity). Studies have shown that the mentioned regularity determines also the development of urban areas as urban ecological systems. In this aspect the development of territories becomes purposeful and predictable and, therefore, controlled process with the set-up parameters of the goal, which means sustained

development in the range of the equilibrium. This regularity is also characteristic for the so-called “demographic transition” phenomenon, which humanity now experiences.

The “better” criterion is missing in the development of ecosystem, as it is in any oscillatory process. There is only rhythm of the state-to-state transition, more or less tension, speed and potential; means energy of development. As is known, there are two “great formulas” for the determination of energy in physics. The first is Einstein’s formula. The second is Planck’s formula. The resorting to the physics is not incidental here. The growth dynamics of the quantity on the early stages of the eco- and demcosystem development is similar to the energy growth as in the physical law $E = mC^2$. Development stage of the ecological balance and after the completion of demographic transition, is similar to the energy growth as in the physical law $E = hv$.

Analogy between population growth and a body weight in physics of relativism is confirmed by the phenomenological theory of Kapitsa. According to this theory the population growth has the explosive and hyperbolic nature. “Escalation because of the speed” occurs in the theory of relativity. “Escalation because of the time” occurs in the phenomenological theory. Conformity between the relativistic and quantum mechanics, and the transition to quantum knowledge occurs under the condition when the continuity of a system’s change is determined by the quantum conditions. In the case of population growth it occurs when the time of the system’s change becomes commensurable to the human time. Ratio 1:1 obtains timelike dimensions and the characteristic of synchronicity. In conditions of “time compression” the self-similarity of development is broken, and the demographic system obtains unsteady state.

And, yet, there is hope. It is generally known, that a new look at a World changes it?!

Based on the above, the national strategies of ecological safety, balanced and sustainable development should be developed with consideration of the natural potential of the region growth of “young ecological ages”, which have the demographic capacity. Such territories were identified for Ukraine in the course of the research of opportunities, directions and parameters of its sustainable development.

O.V. Vilchinskaya

ENVIRONMENTAL PROBLEMS OF THE AZOV-BLACK SEA COAST OF KRASNODAR REGION

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In the vast complex of the environment and environmental management is becoming increasingly important problems of preservation of the natural properties of each component of the environment.

The Krasnodar region is one of the most developed regions of the southern federal district. Enormous impact on the economy of the region has a favourable geographical position, high resource and personnel potential.

Location near the Azov and black seas, the landscape diversity, high density routes contribute to the development of many branches of industry and agriculture, as well as recreational use.

The industrial production of Krasnodar region is around 850 large and medium-sized and over 3,5 thousands of small businesses.

Environmental problems municipalities of Azov-Black Sea coast of Krasnodar region have specifics and typical characteristics. Based on prevailing environmental conditions, a list of priority environmental problems, classified by the level risks to human health and ecosystems in this list included [1,2]: pollution environment emissions of harmful substances into the atmosphere from mobile sources (motor vehicles); pollution of industrial and household waste; pollution of water bodies insufficiently treated industrial, household wastewater, as well as stormwater runoff; pollution oil and oil products; soil degradation (degumifikaciâ, exhaustion, waterlogging, erosion). contamination by pesticides soil water objects; heavy soil pollution metals, oils; pollution of surface waters (rivers and seas); depletion of fish stocks; degradation of the small rivers; d egradaciâ natural territories, including specially protected; high recreation and degradation of coastal zones.

State ecological control is exercised by the territorial authorities within rosprirodnadzor's environmental mandate and the Department for emergency situations and State ecological control administration of Krasnodar region. Dividing objects control is based on agreements between these bodies. Any systemic approaches to these Publisher objects control currently doesn't exist as far a challenge to develop methodologies for classification on the level of impact on the environment.

The establishment and operation of environmental monitoring unified State in the territory of Krasnodar region is necessary to conduct comprehensive integrated assessment of the environmental situation, definition of negative trends in the changes and making effective management decisions related to environmental protection and environmental management, environmental safety. The establishment of such a system is the main factor of ensuring environmental sustainability and sustainable ecological and economic development of the territory.

Increase in anthropogenic pressures, particularly in the coastal marine ecosystem, the increasing rate of pollution, poor environmental management identifies the need to develop science-based environmental management system concept condition of Krasnodar region and its information.

M. Virčavs
S. Više

QUALITY OF DRINKING WATER FROM PRIVATE WELLS: ASSESSMENT OF CHEMICAL COMPOSITION IN NĀCA MUNICIPALITY, LATVIA

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In Latvia harmlessness and quality requirements of drinking water are set in the Republic of Latvia Cabinet Regulation No 235 "Mandatory Harmlessness and Quality Requirements for Drinking Water, and the Procedures for Monitoring and Control thereof" (adopted 29 April 2003). These legal norms were developed from Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption. Nevertheless the mentioned legal acts are not applied to drinking water obtained from an individual supply providing less than 10m³/day as an average or serving fewer than 50 persons, unless the water is supplied as part of a commercial or public activity.

Therefore the emphasis of the present study was put on the assessment of drinking water quality obtained from the private wells determining chemical parameters as indicators and those comparing with the maximum permissible values (MPV) set in the Regulation No 235 for the centralized drinking water supply. The study was carried out in Nāca municipality (the centralized drinking water supply is provided only for 26% of inhabitants) that is located in SW of Latvia between the Baltic Sea and partly the Lake Liepāja.

The obtained data show the following.

- The observed concentrations exceed harmlessness requirements set in the Regulation No 235 for total Fe (71%), NH₄⁺ (56%), PO₄³⁻ (31%), and Cl⁻ (2%) as well as values of water color (96%), total hardness (11%), and pH (2%). It characterizes anthropogenic impact on drinking water quality from private wells particularly from dug wells that have low protection against contamination by pollutant chemicals e.g. sewage and fertilizers. Therefore the tendency of development of individual drinking water supply in Latvia rural areas is to replace the dug wells with driven or drilled wells. Besides, high concentrations of total Fe testify background level that is higher not only in the studied area but also in all Latvia (more than MPV=0.2mg/l). NO₂⁻, NO₃⁻, and SO₄²⁻ ion concentrations and conductivity are less than those MPV.

- Statistical assessment at significance level of $\alpha=0.05$ testifies the differences of quality of drinking water obtained from dug and bore-holes (driven and drilled wells). Higher concentrations of NO₂⁻, NO₃⁻, PO₄³⁻, and Si and values of color were observed in dug wells. The value of pH was observed higher in bore-holes. Negligible differences (significance level $\alpha=0.05$) of chemical parameter concentrations and values in drinking water of dug wells and bore-holes were observed for NH₄⁺, Cl⁻, SO₄²⁻, Ca₂⁺, HCO₃⁻, total Fe, conductivity, and total hardness.

- Statistical analysis shows various distributions of chemical parameters in drinking water:

a) Cl^- , Si, HCO_3^- and total hardness succeed normal distribution that specifies background level,

b) NH_4^+ , Ca^{2+} , SO_4^{2-} , and conductivity succeed logarithmic normal distribution that characterizes anthropogenic source in the case of NH_4^+ and natural irregular distribution for others,

c) NO_2^- , NO_3^- , PO_4^{3-} , and total Fe succeed exponential distribution that proclaims significant impact of NO_2^- , NO_3^- and PO_4^{3-} as well as distinction of total Fe distribution in different sampling sites,

d) for the present distribution of pH and water color is not clear.

The carried out assessment shows moderate quality of drinking water obtained from the private dug wells in N ca municipality.

M. Virčavs

ENVIRONMENTAL MANAGEMENT – THE CORE FOR ENVIRONMENTAL SCIENCE EDUCATION

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Environmental management is defined as the planned and systematic implementation of environmental strategies and targets set by state or by any organization. It comprises measures and instruments for environmental impacts reduction as well as to maintain conditioned equilibrium between environment and economics development. The scope of environmental management is to reach sustainable development that includes integration of environmental, social and economic concerns now and in the future under the capacity of the environment.

In the institutions of higher educations learning of environmental science involves wide spectrum of environmental lecture courses e.g. environmental chemistry, environmental technologies, environmental legislation, environmental ethics and others. They adduce knowledge in the separate environmental subject that could cause specialized conception of environmental science. Environmental management imbues the following functions

- to consolidate all subjects of environmental science,
- to inculcate environmental consciousness,
- to teach unitary appreciation of environment that includes nature and two kind relations: between nature and man, and relations in society,
- to consider the principles of environmental protection: the “polluter pays”, precautionary, prevention, and assessment principles,
- to provide for economics transformation in accordance to the capacity of environment
- to encourage development and introduction of best available technologies including environmentally friendly energy consumption.

In the learning of environmental management the emphasis is put on comprehension of

soft and hard environmental management.

The soft environmental management (SEM) has a priority of economy and environmental protection is its subdivision. The SEM seeks to find a compromise between sustainable development of environmental protection and economy. It inevitably causes a gap of lawless actions in order to solve primarily economical problems that have precedence towards environment. Thereby the SEM causes weak environmental control and creates conditions for imminent environmental violation. The SEM does not cause conditions for economical transformation in accordance to the capacity of environment. The position of SEM turns off equilibrium between economics and environment into tendency of the last degradation that causes new environmental problems.

The hard environmental management (HEM) postulates a priority of environment but economics is a subdivision of the environment and has to be only developed under capability of ecosystems. The HEM is achievable strongly considering environmental legislation as well as to institute new procedures for comprehensive environmental control and their implementation in national and international levels. Environmental legal norms perform the frame for economical development. The HEM consolidates environmental protection and economics as an unitary system towards sustainable development considering all principles of environmental protection with the further economics transformation. The realization of the HEM sets strong observance of the precautionary principle that appears in the case of scientific uncertainty and indetermination of intended activity that could significantly and negatively affect the environment including human health. The problem is mainly focused on choice during decision making process – to refuse intended activity until scientific verification is obtained or intended activity has to be completely forbidden in spite of economical profitability. The HEM causes real attainment and maintenance of conditioned equilibrium stage between economics and environmental protection.

The above summary of environmental management functions and the conception of the HEM characterize environmental management as the core in the learning of environmental science and education of the new generation towards approaches to sustainable development.

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AIR POLLUTION IN LUGANSK REGION

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Air pollution, including products of waste heap burning, causes a heavy damage to the environment. By atmospheric emission sizes of pollutants, Lugansk region has a third place after the Donetsk and Dnepropetrovsk regions.

Growth over the past five years the sizes of pollutant emissions largely caused by increasing sizes of the main industrial products, the restoration of work of many objects in

conditions of deterioration of the main fund, imperfections in manufacturing processes, inadequate providing by treatment facilities for capture pollutants.
Level of air pollution by notion of air pollution index (API) in the table 1.

Table 1

Level of air pollution	
Cities (notion API)	Pollutants that define a high level of air pollution
Alchevsk (7,2)	Dust
Lysychansk (13,98)	Formaldehyde
Lugansk (4,39)	Formaldehyde
Rubizhne (13,89)	Formaldehyde
Severodonetsk (13,32)	Formaldehyde

V.V. Voloshchenko
M.V. Voloshchenko
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**ACTUALITY OF ECOLOGICAL SAFETY OF FOODSTUFFS AND
RAW MATERIALS**

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Ecological purity of foodstuffs means their safety for human health. To this issue microbiological, chemical and radiation innocence are included as constitutive elements. In addition to the above, ecological safety of foodstuffs and raw materials also naturally combines their nutrient, energetic and biological value because a foodstuff consumption that does not meet the main demands of contemporary science of nutrition, quite often leads to very dangerous consequences.

Foodstuff safety problem on the whole includes rather wide range of aspects which are actively discussed in the world`s press (including scientific and popular journals) in the last decades. Nowadays investigations in this field are carried out in a large scale in connection with ecological situation deterioration, however quite often have no systems approach. Most of the published results touch narrow issues and as a rule elucidate some one aspect of the problem. It should also be pointed out some fundamental works in the field of foodstuff ecology in which an attempt of complex interpretation of contemporary state of ecological investigations of food products and manufacturing has been made.

Pollution of the atmosphere, water basins and soil by chemical compounds has a negative influence on foodstuffs as well. In the last decades the issue of profound concern is an application of mineral fertilizers and pesticides, which are often used in unreasonably high concentrations for increasing of agriculture productivity. In livestock farming some veterinary preparations and animal growth stimulators show such a negative effect. These

compounds inevitably enter raw materials and products, migrating along the food chain and depressing the human organism, especially in childhood and old age.

Chemical substances are extremely dangerous because of their stability and ability to bioaccumulation. In that situation there may be certain cases of formation of more toxic compounds in the human organism or foodstuff from less toxic predecessors. No one should also forget about such insidious distant effects as genotoxicity, embryotoxicity, mutagenesis, cancerogenesis and others which become apparent often via a long period of time after the toxicant entering. Specialists in the field of foodstuff ecology consider as quite possible a chemical origin of different diseases, which spread in the world steadily grows, and which lead to lethal consequences (e.g. cancerous growth). With this factor increase of child-birth with inherited defects and pathologies is also connected with.

Alien compounds, called xenobiotics, enter the human organism to a greater extent with water and foodstuffs. That is why special attention of the state and public bodies in the sphere of control should be paid to analysis of such substances as xenobiotics in food products and drinking water. Means of struggling with contaminants have to include both preventive and prophylactic measures. This was the reason for developed countries to create a strong normative base in the field of food raw material and product safety. Newest achievements in medicine, toxicology, chemistry have a goal to accelerate performing analyses for innocence of those chemical substances which are potentially dangerous both from well-known and new actively progressing on the market.

It should be also noted that recommendations and standard acts regarding to ecological purity of foodstuffs must not have an absolute character, and must consider a people specificity in the region, traditions of nourishment, realities of food manufacturing. Nevertheless the crucial issue in this problem is a care about nation's health. Achievements in a certain country should be reasonably combined with a foreign experience, and first of all of the advanced countries – recognized leaders that guarantee a safety nutrition.

Ecological safety of foodstuffs is impossible without taking into account microbiological and radiation factors, negative influence of nutrient disbalance, presence of natural toxicants in raw materials, peculiarities of biological, technological and culinary transformation of food ingredients and some other important issues, though from human health risk point of view those constituent aspects are not equal, and it is commonly recognized that dangers of microbiological character prevail over the rest. Nevertheless, in a century of total "chemization" of food manufacturing we should pay thorough attention to chemical safety of foodstuffs and food production. Attitude towards the problem to be solved may be expressed by such means:

- wide propaganda of ecological, sanitary and hygienic information among the population;
- competent explanation by mass media of basic knowledge concerning rational nutrition, culinary conversion of ingredients of food raw materials and products;
- tight interactions between applied and fundamental investigations in the field of foodstuff manufacturing and storage;

- high and constant attention of specialists and public organizations to aspects of food ecology, and their involvement in improvement of legislation in that field;
- implementation of best practice results of food raw material and food product control in the market economy;
- creating a law base which promotes an interest of manufacturers to produce innocent and qualitative foodstuffs;
- wide implementation of scientific creations in the field of rational, therapeutical and prophylactic nutrition;
- improvement of the state system control over a level of innocence of food raw materials and products;
- development and implementation of highly sensitive and express methods of toxicant determination, including toxicants of chemical pollution;
- thorough investigation of biological, technological and culinary transformations of chemical compounds in foodstuffs as well as possible mechanisms of human organism adaptation to such alterations.

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FEATURES OF ANALYTICAL METHODS OF THE ANALYSIS OF VARIOUS POLLUTING SUBSTANCES IN OBJECTS OF SURROUNDING ENVIRONMENT

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Rapid development of the industry and increase in number of motor transport in cities inevitably lead to air pollution, waters, soil and, as consequence, to deterioration of conditions of residing of the population. In this connection the importance of laboratories with a representative complex of analytical methods of the analysis which main activity is the control and regulation of quantity of acting polluting substances over objects of a surrounding environment annually increases.

In the report opportunities of a lot of modern analytical methods of the chemical analysis applied at the control of a wide spectrum of pollution in objects of an environment are considered, and also results of numerous researches of a condition of air, water and soil which recently test influence of industrial and motor transportation emissions more and more are presented.

In work it is especially emphasized, that laboratory analytical methods of the analysis are irreplaceable at the control of polluting substances over emissions of the industrial enterprises, especially what related with high-temperature processes: factories on processing industrial and household waste, the enterprises of power system and metallurgy.

The big attention is given to methods and means of the control «the cores» polluting

substances in air to which the weighed substances, hydrocarbons concern oxide and dioxide nitrogen, monoxide carbon, dioxide the sulfurs, dust, carbohydrates, phenol, formaldehyde.

It is marked also, that now has ripened necessity of updating of the list of the substances which are a subject the obligatory control over objects of the surrounding environment in large cities and the industrial centers since the substances concerning to proof organic pollutants began to deserve special attention, to hotbed gases (dioxide carbon, methane) and so forth In particular, for an estimation of a condition of atmospheric air the list should include the substances recommended by the World organization of public health services: ozone, aerosol particles in the size less than 10 microns, connections of heavy metals, polycentric aromatic carbohydrates

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ADSORPTION AND COLLOIDAL-CHEMICAL CHARACTERISTICS OF NATURAL BENTONITE AND SOME MONOCATION SUBSTITUTED FORMS AT THERMAL TREATMENT

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In the literature the data on change of colloidal-chemical characteristics of clay minerals both at thermal treatment and sorption of dyes from water solution with various concentration, practically lack. In the present work an effect of thermal treatment and change of pH medium at different concentrations of methylene blue (MB) on colloidal-chemical properties of Dash-Salakhly (DB) and its some monocation substituted forms has been studied. In the work on a case of DB bentonite and its some monocation substituted forms there were summarized the experimental results on a change of colloidal-chemical characteristics in the indicated specimens occurred at thermal treatment till 600°C. The results of the effect of colloidal-chemical properties obtained at sorption of MB from water solutions on the sorbents under study are cited. Sorption of MB on DB and its investigated monocation substituted forms have been studied in static conditions by the method of verbal concentrations. In the method of the verbal concentrations the definite hinge of bentonite samples (0,5 g) calculating on absolutely dry substance, was placed into the retort with volume (V=50 ml) of MB solution of various concentration correspondingly. the results of experimental studies show that thermally treated at 200°C DB and its Na, K, Ba, Al and Fe(III) forms manifest the maximum sorption capacity on MB in comparison with the specimens, thermally treated at temperatures of 105 and 400°C .

The increased adsorption capacity by MB at the temperature 200°C of the modified samples, for Al-DB – 102,3 mg/g, for Fe(III)-DB – 104,8 mg/g is connected with that with increase of the charge and ion radius of exchange cations dispersity and hydration

of the modified monocation forms decreases and the forces of electrostatic attraction between two- and free charge exchange cations and a molecule of one charge cation active dye increases. But the original bentonite in the consequence of polycation and great hydration properties of exchange cations is less accessible to substitution for MB cations and possesses low adsorption capacity.

At increasing temperature of activity (400°C) there is formed the tough crystalline structure and mechanical durability of the samples as a result of what the samples lose their ability of swelling. And it makes difficult penetration of molecules of MB into interplane space of the sorbents and leads to decrease of adsorption capacity on dye.

Na- and K-forms of bentonite behave other wise on MB by their sorption relations. With the increase of temperature till 400°C their adsorption activity on MB increases and then falls what is connected with decrease of their colloidal fractions. As the experimental results show the lesser colloidal fractions and deposit volume in bentonite dispersions the greater is adsorption activity on MB. It is established that at increase of treatment temperature of bentonite samples lessening colloidal fractions takes place. Thus, for instance, the content of colloidal fraction of original bentonite with an increase of treatment temperature decreases considerably less in comparison with its monocation forms what is related not to nature and charge of exchange cations, but also to polycation property of original bentonite. Diminution of the content of colloidal fractions of bentonite specimens at transit from a low temperature (105°C) to the highest ones (200, 400 and 600°C) may be explained by a change of partially crystalline structure and mechanical durability. It is established that an effect of sorption purification of sewage from cation dyes also depends on the conditions of formation of the dyes. In addition, their chemical nature influences essentially on a value of sorption of the dyes as well.

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DEVELOPMENT OF A SERIES OF ENERGY-EFFICIENT EQUIPMENT FOR ELIMINATION OF AIR POLLUTION

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Axial-flow fans find a wide application in the equipment of dust catching and pneumatic transport, in mechanisms for cooling machines and their units, in appliance cooling, in system units of personal computers, in compressors of refrigerating plants, in ventilation networks and air-conditioning, in means of transport and hovercrafts, for screen airfoil boats and ram wing machines, in airship movers and so on.

The majority of axial-flow fans all over the world are produced with a ring guide casing simultaneously protective in which chamber axially symmetric is located an impeller made of two and more blades.

Now in Russia and in the State Technical University of Orel it has been established

that all known axial-flow fans produced with a protective ring casing function energy-wise ineffective.

Thus, at patent researches it has been established that the closest engineering solution may be the axial-flow fan (Cooler) type A65061-002, 020223P, for computers of model Pentium – 4 “Intel” destined for cooling this microprocessor. The shortcoming of such a structure in the known axial-flow fan consists in that during rotation of its impeller all seven concave blades with rectilinear front and rear edges with their effective areas tilted at a sharp angle to the plane of rotation push a certain volume of air grasp with the front edges along and round the axis of rotation thus creating swirling air flow which moves at high speed along the axis of rotation and at the same time from under every blade some part of air swirled shift radially at the expense of the created centrifugal force and strike at high speed against a statically motionless inner cylindrical casing wall. At such a blow against the inner casing wall the whole mass of a radial flow as if bifurcated. And at the same time its one part turns towards the motion of the main axial flow, and the other part of this radial flow turns against the main axial flow and hence creates a breaking effect slowing down that kinetic energy which it obtained at the action of centrifugal force at the radial motion of air flow from the bush to the cylindrical casing wall. The above mentioned breaking effect contributes to the increase of energy consumption at the propeller rotation and on the whole, to axial fan efficiency.

In the test run carried out in OrelSTU with the fan type BH-2 of the Soviet production proved that the application of the impeller with blades of new design allows power consumption reducing in the mentioned axial fan by 1.27%.

This technical invention allowed obtaining a patent for an invention (Patent of Russia 2232920).

In a new invention this shortcoming is excluded due to that end trailing edges of all propeller blades are bent towards the work surfaces at an angle of ninety degrees keeping an annular gap size between an inner cylindrical surface of a guide casing and perimeters of clinches of each blade and the height of bent trailing edges of all blades with respect to their work surfaces is the same and makes a definite size.

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ENVIRONMENTAL RISK MANAGEMENT OF SEAPORTS CONSTRUCTION

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The role of maritime transport in contemporary Russia increases inevitably and will increase in foreseeable future. The total cargo turn-over of Russian terminals has already exceeded the cargo turn-over of the Soviet Union and continues linearly increasing. The

intensity of national port construction increases correspondingly. In addition, the volume of dredging and formation of new territories increases exponentially as well.

At the same time, it is essential to preserve the marine ecosystems being used, to ensure the ecological safety of port construction. These two interrelated issues must be resolved systematically and in strategic integration. Such objective can't be achieved within the framework of the current environment-oriented regulatory and methodical base. In particular, one of its principal disadvantages is that only the simplified scenario of ecologically destructive developments is under consideration traditionally. Some conventional, the only possible value of the man-triggered damage is estimated as if determined by the impact. What actually happens is that the ecologically destructive developments cannot be strictly determined and are of probabilistic nature. Therefore, the active elaboration and implementation of methodology and methods of the environmental risk quantity analysis is essential in order to forecast and minimize the environmental implication of the developing system of maritime transport on the whole and its individual elements in particular. The assessment of the man impact on the ecological environment must have probabilistic and cost character: both the possibility of realization of negative consequences and the degree of their gravity shall be taken into account.

The most adequate approach of environmental hazard estimation seems to be the quantitative probabilistic and cost approach, already universally accepted for estimation of technological hazards. With that, the value of man-triggered environmental risk (R), resulting from an ecologically destructive development, is interpreted as the mathematical expectation of environmental damage (U):

$$R = p \times U \quad (1)$$

where p - probability of developments leading to the endamagement U .

When the extraction and quantity analysis of various scenarios of ecologically destructive developments are possible, their tree may be built. The probability and complete values of damage to the impact recipients in cost terms (U) must be taken into account for every possible alternative event (or scenario - sequence of events). The probability of realization of each i independent scenario of ecologically destructive events from n of potentially possible scenarios (p_i) is determined multiplicatively:

$$p_i = \prod_{j=1}^k p_{ij} \quad (2)$$

where p_{ij} - probability of the i scenario at every alternative situation of further event development giving k of variants.

The expected damage R in cost terms is determined as the sum of mathematical expectation of the damage from realization of alternative scenarios of ecologically destructive developments, according to the equation:

$$R = \sum_{i=1}^n R_i = \sum_{i=1}^n (U_i \times p_i) = \sum_{i=1}^n \left(U_i \times \prod_{j=1}^k p_{ij} \right) \quad (3)$$

where: n - number of analyzed alternative scenarios of ecologically destructive developments caused by the object impact; R_i - probable environmental damage from the i scenario realization in cost terms; U_i - complete values of environmental damage in physical terms.

As an example of using such approach in engineering of ports may serve the Preliminary Assessment of the Environmental Impact of the Avantports of the Big Port of Saint-Petersburg performed by the “Eco-Express-Service” LTD in 2008. According to the design specifications there were considered two alternatives of allocation of the Avantports. In the both cases the Avantport system will take much territory; its certain objects cover the southern part of the Protective structures complex, the coastal strip on the east and in the other alternative on the west of the Protective structures complex, southern part of the Kotlin island.

An overall comparative assessment of the expected impact of the Avantport system on the environment has been carried out concerning the both comparable alternatives of port allocation with the elements of risk-analysis. It was carried out simulation of rolling of water for different alternatives of possible hydrometeorological conditions in the period of conducting the construction operations taking into consideration the probability of the each of them. Accordingly, based on the results of analysis of these alternative scenarios of environmentally hazardous developments the resulting assessment of the damage to the components of the aquatic environment has been carried out through an equation (3). The results of the overall comparative assessment of the environmental risk with regard to the said alternatives of allocation allowed to recommend reasonably the second alternative with partial removal of the objects to the west of the Protective structures complex. It will allow to preserve the group of planned wildlife sanctuaries between the “Bronka” port and the City of Lomonosov, and at the same time not to fall outside the limits of the admissible impact on the Special Protected Natural Areas such as the wildlife sanctuary “Lebyazhie”.

Therefore, the suggested approach of estimation and regulation of the environmental risk connected with the port construction demonstrates distinct advantages as compared to the traditional “one-scenario” estimation. The calculation of so-called unique value, determined by the impact of future damage is changed for the tree analysis of possible ecologically destructive developments with due account for the probability and cost of consequences of each scenario. This method is more adequate, realistic and enables to reach quantitatively reasonable project and management decisions.

Along with the risk assessment of projected activities, the mapping of environmental risk spacial distribution in cost terms is also possible within the framework of this method. Involving several alternative design solutions, it is reasonable to determine the total values of environmental risk of the object construction and operation for each of them. The

preferred solution is the one associated with: the least environmental risk; the more prevented environmental risk (which may be estimated as the difference of risk values in compared situations); and the least costs of risk aversion.

Vadim Chekalin

PROBLEMS OF DEVELOPMENT OF HEAT SUPPLY SYSTEM IN A CITY (ON AN EXAMPLE OF ST.-PETERSBURG)

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The energy supply complex of St.-Petersburg has no analogs not only in cities of Russia, but also in world town-planning practice. Building of the historical center of St.-Petersburg formed by centuries has defined many features of a heat supply of the city representing now all spectrum of ways and schemes of maintenance by heat of consumers, based on burning of organic fuel and transfer of heat in the form of hot water and steam.

Functioning of system of a heat supply of St.-Petersburg is based now on the General scheme of a heat supply. Proceeding from historically developed features of a heat supply of various districts of the city, in Petersburg it is possible to allocate 15 heat supply areas, 7 of which are suburban.

The basic lines of existing system of a heat supply of St.-Petersburg concern:

- High level of centralization of a heat supply with a considerable share in structure of heat generation of such sources of a heat supply. The given circumstance possesses a number of advantages, among which decrease in the working costs connected with thermal energy generation, possibility of use of various reserve kinds of fuel and the combined generation of thermal and electric energy. However thus more considerable losses of heat at its transportation (in comparison with the decentralized heat supply) also take place.
- Considerable degree of central heating, i.e. joint development electric and thermal energy – over 45%. Such way of co-production electric and thermal energy is more favorable in comparison with separate development, both on fuel consumption, and on other operational indicators. It is necessary to notice that central heating brings the greatest effect basically on large sources of the centralized heat supply (thermal power station) that also speaks well for the last.
- Primary use of natural gas as a principal view of fuel for thermal power station and city boiler-houses up to 95%. The given circumstance in a combination to high level of centralization of sources of a heat supply favors concerning good ecological conditions in a city. Thus as reserve fuel for thermal power station and the majority of boiler-houses top internal black oil serves
- Mainly (an order of 80%) the open two-trumpet scheme of a heat supply allowing simultaneously supplying consumers by heat and hot water. Simplicity of the given scheme and rather small specific capital expenses for a construction of thermal networks have allowed

the given scheme to be widely adopted in a city. However use of the open scheme has as a number of lacks among which it is possible to allocate considerable oxygen corrosion of thermal networks, the high expenses connected with preparation and storage of water on sources of a heat supply, and as the restrictions imposed on regulation of thermal loading.

- Presence of a considerable quantity of local sources of a heat supply of rather small productivity, the out-of-date types equipped with coppers and possessing low technical and economic indicators.

These are common features of system of a heat supply of St.-Petersburg, however, it is necessary to notice that systems of a heat supply of various districts of the city possess the specific features and scenarios of their development as can be various.

Now the general established capacity of sources of heat of St.-Petersburg makes an order of 27100 GKal/h, of them thermal power station about 11800 GKal/h, industrial thermal power stations - 2000 GKal/h, boiler in the property of St.-Petersburg - 9300 GKal/h, departmental boiler - 4000 GKal/h. The total connected thermal loading makes 19840 GKal/h.

The basic suppliers of thermal energy for heating, ventilation and hot water supply of objects of available housing, socially-business objects and industrial zones are: Open Society «G -1» thermal power station (47% of total warm generation), boiler-houses of the state enterprise «Fuel and energy complex of St.-Petersburg» and Joint-Stock Company «Petersburg thermal energy» (43%), thermal power station of the industrial enterprises, Joint-Stock Company «Lenteplosnab» boiler-houses (5%) and departmental boiler-houses (4%).

The basic consumers of thermal energy of St.-Petersburg are the housing organizations (heating and hot water supply of municipal available housing) and the population of not municipal available housing.

Now in St.-Petersburg stable growth of available housing, both in absolute calculation, and counting on one person is observed. Rate of industrial growth of St.-Petersburg as a whole above the all-Russian. These factors provide constant growth of loading on system of a heat supply of a city. The next years preservation of the given tendency is predicted both official services, and the majority of independent analysts.

Besides shortage of the generating capacities necessary for maintenance by thermal energy of new consumers, in St.-Petersburg are available and other problem places in the field of the centralized heat supply on which it is necessary to pay attention. Among them, it is possible to allocate the following:

1. High deterioration of the capital equipment of the heat supply companies;
2. Insufficient investments into heat supply sphere;
3. High power consumption by manufacture and thermal energy consumption;
4. Low management efficiency in the given sphere.

All listed lacks conduct to degradation of sphere of power supply of a city and consequently there is an imperative need of working out of the basic directions of development of system of the centralized heat supply.

In modern Russian conditions it is necessary to create the uniform power company, it is easier to large company to operate and develop system of a heat supply of a big city. For the decision of problems of power of a city working out of the Target program of development of systems of a heat supply of St.-Petersburg is expedient.

Thus, main objectives of development of a heat supply of a city are an increase of efficiency at generation and transportation of thermal energy and improvement of management by system of the centralized heat supply. The given directions should be supported by following actions - decrease in the cost price of thermal energy, decrease in requirement for thermal energy consumption, perfection of organizational, standard and legal base, working out of new approaches to demand management and development of market relations in sphere of power of a big city.

Maria Lyubarskaya

THE ROLE OF THE PROJECT «CLINWASTE» IN PERFECTION OF CLINICAL WASTE MANAGEMENT IN NORTH-WEST RUSSIA AND LATVIA

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Health care services create the impact on the environment at different stages: contaminants from waste of health care institutions entering the environment in the course of their time storage and during transportation in case of emergencies, and also if they come on dumps and ranges. Hazardous substances can contaminate environment and to make it harmful to the person.

Health care waste in most cases contains in the structure of originators the infectious diseases, harmful and hazardous chemical substances. Owing to possible contamination of almost all elements of environment — waters, air, soil, they can make appreciable impact on population health.

At the stages of time storage of clinical waste in territories of health care institutions and their transportation to the places of utilization and final disposal the ground and surface waters can be contaminated. The great attention in connection with ubiquitous deterioration of water in water supply sources now is given to a problem of contamination of superficial sewage. As it is known, the superficial drain from territories of cities can be at the bottom of essential contamination of water in reservoirs. The applied system of mechanical purification, unfortunately, does not solve completely questions on safe dump of storm sewage in reservoirs, and in a number of cities they are dumped and at all without purification. Still there is unresolved a problem of purification of a superficial drain from chemical and bacterial contamination.

Health care waste is a specific group of a waste, epidemiological and which environmental danger is caused, first, by their degree of contamination of biological agents that demands

the special control at the stages of their handling.

Among a flows of health care waste especially hazardous make to 15% (from them potentially infected – up to 10%, chemical/pharmaceutical, acute subjects, radioactive – up to 5%), the others - the general not infected waste which leave as household and do not demand special cautions.

For now for territories of the Russian Federation it has been saved up more than 3,5 million tons of a health care waste, from them more than 2 million tons (60%) – a harmless waste, 1,2 million tons (35%) - a hazardous (risky) waste, more than 100 thousand tons (5%) – extremely hazardous and radioactive waste.

The modern sanitary-and-epidemiologic condition of public health care institutions is in many respects defined by the accepted rules of health care waste handling. Now in the Russian Federation more than 90 thousand of health care institutions. The analysis of their sanitary condition has shown that only 34,5% from their general quantity correspond to hygienic requirements and sanitary-and-epidemiologic rules.

Serious problem is shortage and absence in territory of the Russian Federation in health care institutions of the equipments for a decontamination and thermal destruction of a health care waste.

In the Russian Federation the problem of legislative and technological maintenance of health care waste handling till now is not solved at realization of the customs procedures, the forged pharmaceutical preparations.

The current situation is aggravated with absence in the Russian Federation economically effective is standard-legal, institutional and organizational conditions in the field of health care waste management. There is no uniform compounded policy between the federal enforcement authorities which are carrying out activity in the field of health care waste management.

The problem of health care waste extremely acutely costs not only in Russia, but also worldwide. So, the Basel convention has allocated 45 kinds of the hazardous waste which list opens a health care waste. According to the Basel convention a health care waste of hospitals, other health care institutions and pharmaceutical producers are defined as hazardous without an exception.

Recently their quantity has the proof tendency to augmentation and change of morphological structure of a waste that is bound to wide use of modern polymeric materials for manufacture of disposable products of medical appointment. The special attention is deserved by the infected waste which creates potential danger of program of infectious diseases as in inside establishments where they are formed, and out of him. In view of catastrophic level of augmentation of quantity of a HIV-infected and prompt development of epidemic of a tuberculosis, the problem adequate and safe handling of a health care waste is represented extremely important and actual for our country. Improving situation of clinical (health care) waste collection and treatment will lead to reduction of hazardous substances in environment.

Saint-Petersburg State University of Engineering and Economics (ENGECON) was

the lead partner of the project «Material Exchange – Exchange of secondary raw materials between North-West Russia and South-East Finland», which was successfully executed in 2007-2008. The main objective of the project was to develop the environmental line of business by creating new means for cross-border exchange of environmental services, technologies and materials. Within the limits of the given project the question of health care waste handling was not considered, but importance of this kind of waste was realized.

Therefore the idea of the project «ClinWASTE - Perfection of clinical waste management in North-West Russia and Latvia» was created. The analytical background of the ClinWASTE project will be carrying out by Saint-Petersburg State University of Engineering and Economics and Riga Technical University. The partners of the ClinWASTE project also will be health care institutions from Saint-Petersburg and Latvia which have experience in perfection of clinical waste handling system and want to exchange their knowledge and practical means through creating cross-border net in this field. The final beneficiaries of the project will be the administrations and population of cities in North-West Russia and Latvia, especially Saint-Petersburg, Riga and Rezekne.

The overall objective of the ClinWASTE project will be reduction of negative impact of clinical waste on environment and quality of human's life in the regions of Latvia and Northwest Russia. The specific objective of the project will be development of the cross-border cooperation in clinical waste management perfection between Latvia and Northwest Russia by means of introduction of the best practice of European countries in the field of clinical waste collection and treatment and creating mercury free hospitals strategy.

The main activities of the ClinWASTE project will be:

- analysis of the existing scheme of clinical waste handling in Saint-Petersburg;
- research on legal requirements for clinical waste handling in Russia and comparing it with EU directives;
- using of information gained at UNDP&GEF project «Demonstrating and Promoting Best Techniques for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury»;
- comparison of technologies: used and BAT - Russia, EU countries;
- feasibility report on the project of introduction of BAT of the collecting and treatment of a clinical waste;
- realization of pilot project on implementation of BAT.

The target groups of the ClinWASTE project will be personnel of health care institutions, Health Care and Environmental Departments of city Administration, medical scientific research institutes, medical schools and universities, manufacturers and sellers of health care production.

The activities of the ClinWASTE project correspond to the targets defined by the EC policies on reduction of global contaminants that impact the environment and public health, protection of the health of patients, health-care workers and communities:

- improve the recycling (including labeling) practices, minimizing the mixing of hazardous waste in hospitals and move Latvian and Russian community to recycling society

by evaluating reuse of disinfected health care waste and applying the ecodesign concepts to new cost effective products;

- improves the registry and control scheme of health care waste generation, reuse, treatment and final disposal;
- improves the responsibility of the society for waste management in the health care sector;
- promotes the non-incineration technologies of the health care waste;
- managing existing amounts of mercury used in health care sector and move it to cost-effective non-mercury supplies, promote the regional actions on mercury management;
- increase the labor safety of health care workers.

