EURO
PÄISCHE
AKADEMIE
DER NATUR
WISSENSCHAFTEN
HANNOVER E.V.

EUROPÄISCHE WISSENSCHAFTLICHE GESELLSCHAFT

www.eu-eco.eu

EURO–ECO HANNOVER 2013 ◉ Programm Abstracts

euro-eco
hannover2013

Internationaler Kongress & Fachmesse

Ökologische, Technologische und Rechtliche
Aspekte der Lebensversorgung

Programm Abstracts

euro-eco hannover2013

28.— 29. NOVEMBER 2013

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

Vorbereitender Ausschuss:

Georg Tyminski (Germany)
Irma Berg (Germany)
Mattias Benke (Germany)
Kimam Segoo (South Korea)
Olena Kotsar (Ukraine)
Elena Zelinskaya (Russia)
Anto Raukas (Estonia)
Vsevolod Mymrin (Brasilia)

ISBN 978-3-00-032886-2

Herausgeber:
Europäische Wissenschaftliche Gesellschaft (EWG)
Dr. med. Georg Tyminski
Sutelstr. 50A
30659 Hannover
Deutschland
Tel. +49 (0)511 390 8088
Fax +49 (0)511 390 6454
www.euro-eco.eu
E-mail: info@eu-eco.eu
info@eanw.de

Inhalt

V.M. Abbasov
T.A. Mammadova
Kh.H. Kasamanli
Kh.R. Veliyev

THE STUDY OF THE EFFECT OF ADDITIONS OF INDIVIDUAL FATTY ACIDS IMIDAZOLINES ON ANTISTATIC PROPERTY OF DIESEL FUELS

Institute of Petrochemical Processes of Azerbaijan National Academy of Sciences named after Y.H.Mammadaliyev, Baku, Azerbaijan

As all kinds of fuels diesel fuels also have low electrical conductivity. In relation with this diesel fuels undergo electrostatic loading during transportation, mixing and other processes. These static electrical loads can lead to an explosion and fire when being at concentration capable of causing an air blast of diesel fuels having high density of electrostatic load. As a result of conducted research it has been proven that the fire threat is higher when working with diesel fuels undergone deep hydrogenation. The reason of this is a removal from diesel fuels of heteroatomic compounds (natural antistatics) providing electrical conductivity.

Nevertheless, there is a number of methods preventing electrification of fuels from which the application of antistatic additives plays more important role.

The review of the literature data has revealed that antistatic additives providing electrical conductivity of diesel fuels are organic compounds containing different functional groups (–CH, -OH, -Cl, -Br, $-NO_2$ və SO_3H).

In the present work the effect of aminoethyl imidazolines of stearic and linolenic acids synthesized with diethylenetriamine on antistatic property of diesel fuels has been studied. Thus, because of the presence of free $–NH_2$ groups along with a polar imidazoline group in this type of imidazolines, it is theoretically possible for them to increase the special electrical conductivity (SEC) of diesel fuels.

In order to study the influence of İm-I and İm-II imidazolines on lubricating properties of diesels, they have been added to the diesel fuel in certain concentration ratios (50-100 ppm) and the SEC of the diesel fuel has been measured.

It was obtained, the SEC of diesel fuel increases as the concentration of both imidazolines in it increases from 50 ppm to 100 ppm. At concentration of imidazolines equal to 100 ppm the diesel fuel meets requirements for antistatic property imposed on modern diesel fuels (SEC≥150 pS/m).

On the other hand, the comparison of the effect of İm-I and İm-II on antistatic property of diesel fuel shows that compared to İm-I the effect of İm-II on antistatic property of diesel fuel is slightly higher. This can be explained by the presence of three double bonds in İm-II in contrast to İm-I.

According to the results obtained it can be noted that the synthesized imidazolines can be applied to diesel fuels as antistatic additives.

A.S. Abubakarova
Z.T. Hadisova
E.A. Aleksandrova
B.E. Krasavtsev

SOLUTION OF ENVIRONMENTAL PROBLEMS BY MEANS OF EFFICIENT USE OF OIL AND VEGETABLE WAX

Grozny State Oil Technological University, Grozny, Russia
Kuban State Agrarian University, Krasnodar, Russia

One of the main environmental objectives in Russia is disposal of wax waste from industrial production of sunflower oil and development of ways of efficient use of oil and vegetable waxes. Vegetable waxes are complex compounds with the prevailing content of esters of higher fatty acids and high molecular aliphatic monoatomic (more rarely, diatomic) alcohols. Oil waxes and soft plastic waxes with the melting point of t_{mp} = 40-55°C – are compounds with the prevailing content of small-branched isoalkanes with naphthenic and aromatic hydrocarbons with long normal side chains; the content of n-alkanes in waxes is less than 50%. The content of vegetable waxes determines their physicochemical properties. The melting point of the known saturated wax ethers lies between 32 and 98°C. We have isolated wax with the dropping temperature of 81-82°C.

In their physical and chemical properties vegetable waxes are similar to oil and animal waxes. The similarity of physical and mechanical properties of vegetable waxes to those of solid oil hydrocarbons makes it possible to scientifically substantiate the possibility to use them during the production of special-purpose paraffin-wax blends. At the moment, solid hydrocarbons produced from oil (paraffin waxes, ceresin waxes, petrolatums, waxes and others) are widely used both in the pure state and in the form of paraffin wax blend, i.e. paraffin wax mixtures with various additives. It can be explained by the unique physiochemical properties of paraffin waxes: they are solid at room temperature and melt easily when being slightly heated (t_{tm} = 50–70°C), have low values of density and specific heat, viscosity, water vapour permeability, high fusion heat, and are characterised by the presence of the phase transition when solid. In regard to their chemical properties, they are stable and inert substances, that is why they have no chemical reaction with many materials and chemical agents, with which they may contact, and do not solve them when solid, either. For this reason, the useful life of these products reaches 15-30 years, with numerous (600-1200 times) heating and cooling cycles and no significant changes in their chemical composition and main properties. Their molecular weight is M = 350 – 420, the stability of structure at 25°C is 2–20 kg/cm^2, the volume shrinkage during cooling from the beginning of crystallization to 20°C reaches 17–19%. They do not destroy the processed materials and protect them from corrosion.

It is recommended to use the following additives which modify the paraffin wax structure: ceresin waxes (microcrystalline waxes), vegetable, animal and mineral waxes, polymers and copolymers, oxygen, chlorine and other derivatives of n-alkanes, and surfactants. Ceresin waxes are compounds of high molecular isoalkanes with n-alkanes and oil and aromatic hydrocarbons, which have long alkyl chains. Their melting points

are t_{mp} = 65–80°C. They break the paraffin wax structure and, therefore, reduce its water, vapour and gas permeability, increase its melting point and the plasticity of its structure. Modern oil-processing industry produces a limited number of ceresin waxes, in particular with the melting point over 70°C, which reduces the possibility of their use as plasticizers when creating high-melting paraffin blends. In this regard, a promising direction in the utilization of high-melting vegetable waxes is the substitution of ceresin waxes by vegetable waxes in paraffin-ceresin blends: casting alloys in dispensable patterns in mechanical engineering, slip casting for electrotechnical industry, in the production of planting stocks for fruit and grape crops.

M.M. Akhmedov
N.M. Kasumova
A.A. Ibragimov
A.I. Agaev
R.G. Gamidov
Kh.V. Allakhverdieva

UTILIZATION OF SULPHUR-CONTAINING GASES DURING THE CLAUS PROCESS WITH THE HELP OF METAL-ZEOLITE CATALYST

Institute of Chemical Problems named after M.F. Nagiev of the Azerbaijani Academy of Sciences, Baku, Azerbaijani

Environmental pollution issues are very pressing for the human race. For this reason it is necessary to pay great attention to processes facilitating environmental protection. It is known that a large amount of sulphur-containing gases are created during industrial processing of nonferrous metal sulphurous ores. These gases are then used as raw materials in order to obtain element sulphur.

Toughening of environmental standards has increased requirements to the efficiency of all processes in metallurgical plants. The key role in the solution of this problem belongs to the process of obtaining element sulphur from hydrogen sulphide, the latter being an essential part of basically any processing plant. For example, it is used in the Claus process.

For this reason, an urgent task is to develop new more efficient and available catalysts for the process mentioned above. These catalysts would increase the extraction degree of element sulphur from gases.

We carried out systematic research in order to find efficient catalysts on the basis of natural zeolites promoted by some transition elements (Co, Ni, Fe, Cr) in order to obtain sulphur at catalyst stages of the Claus process (at 250-400°C). On the basis of the obtained experimental data we chose and thoroughly examined the activity of the most low-price and available iron-clinoptilolite catalyst.

We found optimal technological process parameters for the iron-clinoptilolite catalyse: temperature of 250-400°C, volume velocity of the gas mixture 500-1000 h^{-1}; ratio of initial reagents $CO+H_2+H_2S+COS/\ SO_2$ = 1.8-2.4 at the first stage; H_2S/SO_2 =2.0-2.2 at the second stage. Total sulphur output is – 93-95%.

It has been shown that in comparison to industrial aluminium oxide and aluminium

cement catalysts, iron-clinoptilolite catalyst has a high catalytic activity in regard to the reactions between carbon monoxide, hydrogen and sulphur dioxide at the hot stage of the Claus process (at 400-450°C), which contributes to the increase of the sulphur output and a decrease in the consumption of the reducing agent in the beginning of the process.

M.M. Akhmedov
A.A. Geidarov
B.S Veliev
N.V. Yusifova
G.A. Kadyrova
S.R. Salimova

VANADIUM EXTRACTION FROM ASH RESIDUE OF FUEL OIL COMBUSTION

Institute of Chemical Problems named after M.F. Nagiev of the Azerbaijani Academy of Sciences, Baku, Azerbaijani

Ash residue from thermal power plants is one of the most widespread waste of modern civilization. Ash residue of fuel oil combustion occupies large areas of land, pollutes, water ponds and soil.

At the same time, ash residue is a potential technogenic raw material for extracting some valuable ingredients, such as vanadium, nickel and others.

In this report we discuss the possibility of extracting vanadium from ash residue of fuel oil combustion. By means of physicochemical analysis methods we were able to determine that ash residue is a multicomponent system in its chemical and phase composition. Vanadium is situated in them in form of spinel compounds which do not dissolve in water, alkali or acid. Preliminary experiments showed that when treating ash with water, the main part of vanadium stays in the insoluble residue. It was determined that during water leaching (solid to liquid ration 1:10) only 0.7-2.24% vanadium passes into the solution.

In order to extract all vanadium from the ash residue, the latter previously underwent thermal oxidative treatment with and without alkaline additives (Na_2CO_3,$CaCO_3$). By means of laboratory experiments it was determined that the most favourable conditions to extract water-soluble compounds is keeping 15 % of soda in the furnace feed, the firing temperature being 800°C. In this case, the vanadium extraction in the form of water solubles lies between 78-84%, and between 94-97% in the form of acid solubles.

We also analysed Gibbs energy change depending on temperature during the interaction of V_2O_5 in the ash residue composition with its other components.

By means of chemical and physicochemical analysis methods (XFA, DTA) we determined the change of phase after receiving a thermal-oxidative material. Furthermore, we examined the kinetics of its solution in acids and alkalis (H_2SO_4,NaOH). We also determined the optimal conditions of the process.

We also examined vanadium sedimentation from solutions and in the form of sparingly soluble compounds with the help of hydrolytic methods. We determined factors, e.g. acidity, temperature, vanadium concentration, transition speed and others, which

influence vanadium sedimentation from solutions. It was shown that mixing speeds up sedimentation, particularly at the end of the process with a low vanadium concentration in the solution.

Based on the experiments and the data obtained from them, we suggested a principal process plan.

E.V. Akhverdova

ECONOMICAL ASPECTS OF THE ECOLOGICAL POLICY IN LIPETSK REGION

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

Preservation of cultural and natural heritage is a global task of modern civilization. The ecology of culture is aimed at the stability of the "nature-society" system. Mankind has already come to understanding that joint measures should be necessarily adopted to solve ecological problems. The manifestation of this is to be found in the united actions of all kinds of institutions and the people on the international, national and local levels in matters of keeping our planet alive. In this connection Russia declared 2013 to be the year of the protection of the environment.

Lipetsk Region is located in the central part of the European territory of Russia and has a high potential of resources, science and technology, as well as the developed infrastructure.

Natural, geographical, political conditions, qualified personnel taken as a whole make Lipetsk Region, according to the estimates of local and foreign experts, an economically attractive territory.

The basis of the regional industry comprises 75 large and middle-sized enterprises belonging to ferrous metallurgy, machine-building, electro-energy, food, chemical, light industry and construction materials industry. The leading place is occupied by the products of ferrous metallurgy and machine building amounting to 74,7 % and 14,1% respectively in the total production output.

According to the results of the ecological rating of 2012 that had involved 85 Russian cities Lipetsk occupied the 34th place. The rating-list was compiled by the Ministry of Natural Resources and Ecology of the Russian Federation that had followed the instruction of the President of Russia regarding the development of methods assessing the quality of the environment in the cities and towns and the organization of the assessment procedure in large cities. The figures make the leaders of the region pay much attention to the issues of financing ecological programmes.

The realization of nature protection programmes in Lipetsk Region can be treated as an effective instrument of the state policy in the field of preservation of the environment. To finance the measures of the programmes there were allocated: 2010 – 24, 8 million rubles,

2011 – 33, 2 million rubles from the regional budget,

2012 – 80, 7 million rubles including 52, 9 million rubles from the regional budget.

The administration of the region treats the problems of ecology with great attention. There are 4 target ecological programmes functioning simultaneously on the territory of Lipetsk Region. They have been worked out to preserve the environment, to ensure the provision with mineral resources, to treat waste products and modernize the system of subsoil management of the region. The total amount of the funds to carry out the above projects has made within 9 months, 2013 109 million rubles allocated from the budgets of all levels. Besides, 148 million rubles including 72, 3 million rubles from the regional budget have been allocated for the needs of forestry.

In 2010 did continue the work on the realization of the regional programmes passed previously under the title "The Protection of the Environment in Lipetsk Region in 2009-2012" and of the regional target programme "The Development and Use of Mineral Resources in 2009-2012". Apart from this, they worked out in 2010 and passed at the beginning of 2011 the regional complex programme "Treatment of Waste Products on the Territory of Lipetsk Region in 2011-2013". Thanks to the measures taken by the regional leaders the ecological situation shows stability within the permissible norms, the main pointers considered, such as the state of atmospheric air, water resources, treatment of production and consumption wastes, wild life preserving territories under special protection, realization of nature protection measures, the state ecological control.

V.A. Androkhanov

EVALUATION METHOD OF REMEDIATION EFFICIENCY IN SIBERIA

Institute of Soil Science and Agricultural Chemistry, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia

At the moment, a transformation of natural landscapes and, in some cases, their complete destruction take place due to the constant expansion of anthropogenic influence on them. It leads to a formation of new anthropogenically transformed soils with unstable properties and function modes which, when occupying large areas of completely destroyed landscapes, form the so-called technogenic landscapes. In order to reduce the negative impact of technogenic landscapes and to restore damaged soils, there are soil remediation programmes worldwide. These programmes have been developed to restore previously existing arable lands and, if necessary, to make the damaged territories suitable for economic purposes again.

Until very recently, remediation problems have not been paid enough attention to in Siberia, which led to the formation of a great number of technogenically damaged territories. It is also connected to the fact that the applied mining techniques of mineral

resources, particularly open-cut methods, do not foresee preservation of natural resources of revegetation to the sufficient extent, and change the natural landscape in such a way that it is almost impossible to restore previously existing arable lands with their biological and ecological potential. Nevertheless, mining companies must perform a complex of remediation activities.

As a rule, remediation programmes are carried out in two steps. The mine engineering step is devoted to the formation of the relief and root-inhabited layer on the remediated parts of land. The biological step deals with the creation of the vegetation cover. Until recently, the efficiency of remediation programmes was evaluated according to biological parameters, mainly according to the plant biomass. In doing so, there were often situations in which in the first years after remediation there was a considerable biomass growth. After 3-5 years, however, there was degradation of the created phytocenoses and a significant worsening of the environmental situation on the remediated lands. It was also determined that only the restoration of the vegetation cover on the technogenically damaged lands did not give any long-term effect and did not make it possible to significantly decrease a negative influence of the technogenic landscapes on the environment.

In the laboratory of the soil remediation of the Institute of Soil Science and Agricultural Chemistry of the Siberian Branch of the Russian Academy of Sciences, based on the research work of many years, we developed a method by means of which it is possible to objectively evaluate the efficiency of remediation activities. The method is based on the soil and environment parameters obtained during the examination of the remediated land areas in comparison to the parameters of the natural soil prevailing in the area of remediation. The majority of evaluation methods is based on the qualitative parameters. In order to obtain quantitative parameters, it is necessary to use methods of soil classification. By comparing qualities of localities of natural and remediated soils it is possible to evaluate the differences and determine perspectives of the self-recovery of the system.

When using this approach already at the project stage of remediation, by means of various technological solutions it is possible to set a certain level of soil and environmental efficiency of remediation which is easily checked after the works have been carried out. At the same time, at the project stage of remediation, the application of the developed method makes possible to suggest a spectrum of techniques with various soil and environmental efficiency. At that, there can be quite a great number of technological solutions. The customer then has a possibility to choose the most economically and environmentally sound remediation technique of the specific technogenic object. The application of this method makes possible to significantly decrease costs for carrying out preproject research and increase efficiency of remediation activities.

S.D. Aronbaev

INNOVATIVE SOLUTIONS OF SOME ENVIRONMENTAL PROBLEMS OF URANIUM INDUSTRY

Scientific experimental Laboratory "Environmental Systems and Devices" (ES&D), Samarkand State University named after Alisher Navoi, Samarkand, Uzbekistan;
E-mail: diron51@mail.ru

In this article we considered environmental problems in mining and processing of uranium ores associated with changes in the landscape, pollution, and accumulation of large amounts of liquid waste containing uranium and its decay products, and the need for conservation of depleted uranium mines.

On the basis of laboratory experiment and experience in reconstruction of industrial zones we offer a number of innovative technical solutions to reduce the environmental risks of enterprises of a nuclear cycle

Thus, in addition to creation of plantations on the mine of wild gourd Cucurbita foetidissima, able to accumulate in their biomass and other radionuclides ecotoxicants, and to strengthen the mobile and the most prone to wind erosion of the surface layer of dumps, we propose a bio-sorptional technology using microorganisms.

We studied the sorption and analytical ability of the cell walls of yeast Saccharomyces cerevisiae - waste brewing for ions of heavy metals and radionuclides. This biomass of sedimentary yeast has been prepared, which includes washing with distilled water, autoclaving, centrifugation, vacuum drying and grinding. The influence of pH, concentration of ions initial U (VI), the activation time, temperature, dose sorbent complete sorption of uranium. The process was described by the Langmuir and Freundlich equations.

These studies provide the right to consider the cell walls of the yeast S. cerevisiae promising material for biosorbents of heavy metals and radionuclides.

However, to obtain "complete sorbent" need to create bioindustry for processing of waste, cleaning, modifications of yeast to improve the sorption and performance biosorbents.

This is troublesome, time-consuming and expensive procedure that requires certain investments. This is what is holding back the commercialization of bio-sorptional technologies.

We propose to inject into the waste uranium mine wastewater breweries containing sedimentary yeast.

In this case, breweries and similar biotechnological production relieve the problem of disposal of bulk waste, the cost of additional wastewater treatment, reduction of penalty payments for discharges of hazardous wastes in the sewer line.

Mine Group also benefits: improved radiological situation in the region is the

concentration (albeit with an efficiency lower than that shown in the laboratory experiment) of uranium and its decay products, heavy metals and other toxicants

After some time, the yeast biosorbent, rich uranium and other heavy metal ions can be evacuated and disposed of, for example, burning, and uranium in the form of salts go for further processing. Ash content of yeast biomass does not exceed 18-22 %.

Thus, the proposed idea is not only utilitarian, but also strategic, high economic background translation of "waste - into revenue.

O.V. Astafieva
S.E. Deryagina
A.N. Medvedev

TO A QUESTION ON RECYCLING OF COPPER MINING WASTES IN THE URALS

Institute of Industrial Ecology, Ural Branch of Russian Academy of Sciences, Yekaterinburg, Russia

To date, the lack of local ore for steel plants is the main factor limiting the development of the Urals copper industry. The maximum possible amount of copper mining in the Urals in the present does not exceed 240,000 tons per year (T.N. Krivko, G.V. Petrov, A.N. Glushkov, J.N. Koshevoy, G.N. Borozdina. Ural Geological Expedition, http://ugse.ru/index.php/component/content/article/44-2010-11-09-10-06-29/108-2010-11-13-08-39-02.html, 14.06.2013).

According to forecasts of scientists and leaders of the mining industry, most of the Ural copper deposits will be worked out in the coming years. In 25 years the copper production could decline in 1.5 - 3 times. The extraction of copper ores from depths of 500 - 120 m will lead to a substantial increase in capital and operating costs and may reduce the competitiveness of the Ural copper on the world market.

The main direction of maintaining and expanding the resource base of copper metallurgy in the Urals is the search for new fields within existing ore districts, as well as in neighboring areas. But, decision of this task requires a lot of time and large investments.

In this regard, finding of alternative ores sources for the copper industry is a very relevant .

In particular, the wastes from mining and enrichment of copper ore (poor ore, waste rocks, tailings) may be considered as a perspective source of raw copper for metallurgical enterprises of the Urals.

V.G. Batiy
M.A. Khazhmuradov
S.S. Kireev
V.P. Melnichenko
A.A. Sizov
E.A. Schmieman

ENSURING THE RADIOECOLOGICAL SAFETY DURING LONG-TERM STORAGE OF SEALED SOURCES IN UKRAINE

Institute for Safety Problems of nuclear power plants, National Academy of Sciences, Chernobyl, Ukraine
National Science Center Kharkov Institute of Physics and Technology, Kharkiv, Ukraine
The State specialized enterprise «Centralized enterprise for the management of radioactive waste», Chernobyl, Ukraine
Battelle Memorial Institute, Richland, WA, US

Final engineering design is underway for a centralized storage facility for spent sources of ionizing radiation, which will be constructed in the Chernobyl exclusion zone. The facility is designed for receiving, identification, sorting, handling, packaging, certification and subsequent separate storage (up to 50 years) of alpha, beta, gamma and neutron sealed spent sources of ionizing radiation before their transfer in the future for burial. The storage is located at the radioactive waste management complex "Vector" in the Chernobyl 10-kilometer exclusion zone and area of unconditional (obligatory) resettlement. The project work is financed by donor technical assistance from the Department of Energy and Climate Change, UK.

The sources can be classified as low-, medium- or high-level radioactive waste. Individual source activity can reach 10^{13} Bq or more, and the maximum possible dose rate at a distance of 100 cm from an unshielded source is less than 14,000 R/h (^{60}Co). The design capacity of the facility is about 270 thousand sources, which will be stored in a conditioned form. These sources will have a total activity of about $5{,}4 \cdot 10^{15}$. In addition, 15 Radioisotope Thermionic Generators (RTG) with a total activity about $3 \cdot 10^{16}$ will be accepted for storage without recycling.

Extraction from the protective container, certification and conditioning of gamma, neutron and high-energy beta - sources will be held in hot cells, alpha and low-energy beta sources - in the glove box. Below the hot cells, transport gallery is situated along which the containers can be delivered to the site of acceptance, into the temporary storage space, in one of the three hot cells and to the storage area using an automated lift truck.

To prevent the release of radioactive substances during storage all the sources will be placed in sealed capsules after the certification. Gamma - and high-energy beta sources will be transported to the storage area using a special automated handling complex and placed in a cell in the concrete floor of a depth of about 1 m. From above the capsule will be covered with a protective cap. The most intense sources will be placed in a special cell with additional lead protection.

Capsules with neutron sources will be stored in protective containers of ZK-420 and ZK-230N2 type in the pit, lined with borated polyethylene (5% boron). From above the

pit is covered by plates. Capsules with alpha and low-energy beta sources will be stored in collecting container KS-004A in a special pit. RTGs will be stored in a special area, fenced shields. If necessary (for inspection, preparation for disposal, etc.) any capsule can be extracted and directed to the hot chamber or a glove box. The storage building will be equipped with efficient ventilation systems with filters HEPA, radiation control, and physical protection. Thus, when these technical solutions the necessary level of security and safety during storage of spent radiation sources will be provided.

O.V. Bednova
V.A. Kuznetsov

ENVIRONMENTAL INDICATORS OF FOREST ECOSYSTEMS IN URBAN AREAS

Department of Ecology and Forest Protection, Moscow State Forest University, Moscow, Russia
UNESCO Chair of Green Chemistry for Sustainable Development, D. Mendeleyev University of Chemical Technology of Russia, Moscow, Russia

In the city is very difficult to ensure a balance between preserving stability and recreational use of a natural area. Functional zoning of urban protected areas contributes to the solution of this problem, but its actual implementation often causes conflicts between the developers and executors of the projects for recreational improvement of territory on one side and a bio-ecologists and even the local population on the other side. To avoid such complications establishing and management of urban protected areas have to accompanied by conducting comprehensive environmental monitoring. For convolution of diverse environmental information it is necessary to develop an integral indicators which we can use to assess the state of the biotic and abiotic components of ecosystems and visualize the environmental situation in the territories. And we offer the following system of collecting and processing information about the urban forest ecosystems.

Information about the biotic components is generalized by means of two integrated indicators. The first is the index of the tree stand state. It reflects the vitality of the tree stand through stake trees of different status categories and gives an idea of the biological productivity and environmental assimilative capacity of forest plot. The second is the index of structural diversity. It indicates how well has been preserved the structure of key forest habitats in the surveyed plot. And it is very important ... It is virtually impossible to identify the absolute diversity of species in ecosystems and to assess its deviation from the natural rate. But it is possible to use a method of relative valuation. For example, a diversity of key habitats in forest ecosystems indirectly reflects the diversity of species ("diversity generates diversity"). The index of structural diversity is constructed on

the basis of the Brillion's index, which is one of the universal indicators of diversity in information theory. As an elements of diversity may be considered the different types of key habitats in forest ecosystems. In the urban forest the elements of structural diversity are gradually lost due to recreational impact, at the same time decreases the participation of typical forest species in community. Between the values of the index and the level of recreational digression has been found a highly significant correlation (empirical coefficient of determination is 0,864).

It is important to resolve the two issues. First is how to rank the values of biotic indexes. Second is how to combine them with the abiotic parameters in the general environmental assessment. As the abiotic parameters of the environment have been chosen the equivalent noise level and the level of air pollution with nitrogen dioxide (in the future it is planned to increase the number of physicochemical parameters under consideration, by the inclusion of the dose rate of ionizing electromagnetic radiation and of the integral levels of the air pollution (to be determined by the method of dry deposition). For optimization of multicriteria assessment was used the method of desirability functions (Harrington's functions). We have developed the system for evaluating the deviations of environmental indicators values from the environmental standards using a scale of Harrington.

This approach is demonstrated in the example of an isolated forest in the western part of Moscow (Troekurovsky forest). A comprehensive assessment of the forest ecosystem state has shown that, according to the Harrington's scale, the state of individual fragments and the forest ecosystem as a whole can be described as «satisfactory». But, despite the very high values of biodiversity indicators («good», «very good»), for a portion of the territory the levels of acoustic discomfort and air pollution are obviously elevated. The individual and generalized environmental indicators will make it possible to visualize the results of the assessment using GIS- technologies. In this case, the process of decision making might become more efficient.

A.A. Belyachenko

SAVING OF BIODIVERSITY AND COMPONENTS OF ENVIRONMENT OF SPECIALLY PROTECTED NATURAL AREA "FEDERAL NATURAL RESERVE "SARATOVSKI"

Saratov State Technical University, Saratov, Russia
National Park "Khvalinskiy", Khvalinsk, Saratov Region, Russia

Federal Natural Reserve (FNR) "Saratovski" (Saratov region, Russia) was attached to the National Park (NP) " Khvalinskiy" in 2011, april. The area of Reserve is 440 sq. km., and it's locality is of very specific, as well as birds', mammals' population and plant

communities. We focus on the brief characteristic of this area in this paper.

The Reserve was founded in 1984 for the protection of Great Bustard (Otis tarda, L) and some other species of birds, plants and animals listed in the Red Book. Reserve is located in the Saratov region, Fedorovski district. There are three Basic Ornithological Territories (BOT) not far from the vicinities of the Reserve. They are very important for Great Bustard population reproduction and migration. One of them is located about 10 km to the west from boundary of the Reserve, and it's area is 330 sq. km; the second one is located about 10 km to the north from Reserve, and it's area of about 50 sq. km; the third one is located about 10 km to the south from Reserve, and it's area of about 250 sq. km.

The territory of FNR "Saratovski" has unique combination of different landscapes and habitats. It is the reason of high biodiversity of the area. There are some important characteristics of the territory, affecting its biodiversity. Among them:

1. A huge part of the Reserve territory situated in the origin. There is a network of major steppe gullies with temporary watercourses and many ponds, because of low differences in absolute height of territory and large water-catchment areas.
2. Landscape heterogeneity increases because of the large number of settlements. In this case biodiversity enriches substantially.
3. The watershed of Yeruslan and Maliy Usen' Rivers passes through the Reserve territory. Its' absolute height is about of 100 m. This territory of a good overview particularly favorable for the mating of large birds, for example, Great Bustard.
4. Typical forest animals' and birds' existence on the Reserve territory is due to the large territory of many forest strips.

Different habitats on the Reserve territory are divided by us into several groups. The first group consists of fields of winter and spring wheat, sunflower, soybean and fields without crops (deposits) of different age. The second group consists of temporary ponds. They are formed in the dammed steppe gullies. The existence of the pond in the gully and the degree of its' filling is depending on the spring and early summer weather, winter snow cover and the intensity of spring snow melting. The third group consists of floodplain habitats: the Yeruslan river has distinct valley between Semyonovka and Nikolaevka villages. The fourth group consists of forest strips. They have different trees and shrubs species compound, age and structural complexity. The last group consists of anthropogenic landscapes.

The large number of species of plants and animals presence, specific location of objects (ponds and forest belts) with high biodiversity, the habitat link of some birds make Reserve "Saratovski" suitable for organization of sightseeing activities and the summer schools in the "field ecology", and some other specific activities, such as birdwatchering. The uniqueness of the area, its importance for environment protection and saving of biodiversity are also not in doubt.

T.V. Bobra
A.I. Lychak

NEW APPROACHES TO THE ENVIRONMENTAL ANALYSIS AND FORECAST OF ANTHROPOGENIC LANDSCAPE TRANSFORMATION IN THE CRIMEAN PENINSULA (UKRAINE)

V.I. Vernadsky Taurida National University, Autonomous Republic of Crimea, Ukraine;
e-mail: tvbobra@mail.ru, lychak1@rambler.ru

The current stage of development of the geographic shell is characterized by a high degree of its anthropogenic changes. Almost all of the natural landscape systems are in some stage of anthropogenic transformation. There is widespread deviation of modern landscapes from the natural norm of their condition.

One of the most important indicators of anthropogenic transformation of landscapes is the formation of anthropogenic ecotones.

The authors consider formation of anthropogenic ecotones (anthropogenic ecotonization) as a process of splitting, fragmentation of relatively homogeneous landscapes and the emergence of multiple transitional spatial structures of anthropogenic origin.

The purpose of this study was to identify and map the spatial structure of modern landscapes of the Crimea and to assess their geoecotonization, anthropogenic transformation.

To achieve this purpose the following tasks were solved:

1. Identification of land-use patterns and creation of cartographic model of modern territory use in the Crimea;
2. Creation of the original map of contemporary landscapes of the Crimea;
3. Expert assessment of the influence of anthropogenic factors on the landscapes;
4. Development of cartographic models of natural and anthropogenic ecotones;
5. Estimation and prediction of anthropogenic transformation of landscapes of the Crimea.

To solve these tasks methods of Space Image Decoding, GIS modeling of the area using the information gradients approach and SWAT – modeling were used.

The study of the landscape spatial structure of the Crimea resulted in the following mapping models constructed for the first time: modern landscapes of Crimea; anthropogenic geoecotonization; assessment of the environmental situation and forecast of its changes.

V.A. Burkovskaya

PSYCHOECOLOGY IN THE CIVILIZATION OF TECHNOCRATS

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

Psychoecology is a new scientific branch researching the interaction of man as a carrier of information and the information medium that surrounds him. The given field of knowledge is organically related to biology, medicine, sociology, psycho-linguistics, semiotics.

The tasks of psychology as a science are manifold: studying the impact of information on the subconsciousness of an individual, analyzing the possibilities of measuring psychic phenomena and controlling them, forecasting the behavior and the state of a man placed in the conditions of the information medium, developing innovations pertaining to methods of psycho-semantic diagnostics and psycho-correction of the personality traits of a particular individual.

The socioeconomic, technological, social and cultural conditions of the information society contribute to the increase of the level of anxiety, permanent stress, social aggression, deformation of the individual's psyche to a certain degree. To meet these challenges of modern society it would be necessary to develop the instruments of research of psychic phenomena to be able to influence them with the purpose of preserving and restoring health.

The instruments of a psychoecologist are closely connected with semantics – a science dealing with the relationship between signs or sign systems and that what they represent. Any symbol is informative, giving rise to associative links by the perceiver and as a result acquiring different semantic characteristics which are of different significance to each individual.

The situation does not look exactly similar if some information comes into the sphere of unconsciousness when no control is available, and no instance of will is possible. In that case the symbol becomes an information weapon, a psychoecological threat, a non-sanctioned means of psychic influence.

The inner world of a person representing a psychosemantic system can be modified through suggestion, persuasion, explanation and teaching effectively used in psychotherapy.

Psychocorrection with the use of computer devices can be a one-act procedure (intensive), audiovisual or acoustic. Apart from the medical purposes acoustic psychocorrection may be applied in social and pedagogical practice.

I.V. Burkovsky

THE CONTEMPORARY STATE AND PERSPECTIVES OF THE DEVELOPMENT OF LEGISLATION IN RELATION TO THE PROTECTION OF HEALTH IN THE RUSSIAN FEDERATION

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

The medical activities of nowadays are connected to a high degree with the legal regulation of numerous public relations established in the sphere of health protection: these relations are regulated by the rules differing in legal force and representing different branches of law. One of the tendencies of contemporary Russian legislation consists in developing packets of rules (masses) which embrace a certain sphere of public relations including health care services.

If in the Soviet period the relations pertaining to the protection of health used to be administered for the most part on the level of subacts, today's regulation in the sphere involves more than 2 dozens of acts and a few thousands of subacts considering only the federal level.

There is no further sense, one could assume, in passing laws to be applied in case of certain diseases. There is no necessity either in passing laws that add details to the laws already available and regulating related branches.

The contribution to the legislative activities in the field of health protection in the constituent entities of the Russian Federation has become noticeable. According to some statistical data by 5th February 2009 there had been passed in 67 entities of the Russian Federation 86 laws in the sphere of care for citizens' health, which constitutes the basis of the regional legislation. Significant is the subject matter of the laws passed in the constituent entities of the Russian Federation. The number of the laws dealing with the budgets of the territorial funds of obligatory medical insurance is prevailing.

1st January 2012 there came into force the federal law "On the grounds of the protection of health of the citizens in the Russian Federation" directed first of all at changing the legislative basis of the Health Service of the RF and envisaging a wide range of innovations. One of the advantages of the new law is the introduction of a "definition-notion" apparatus. Another innovation consists in establishing priorities while rendering medical help which appeal to the interests of patients and protection of children's health as well as determining preventive measures in the sphere of health protection. Quite a timely and topical issue is the duty of citizens in matters of health protection.

The next stage of the development of the Russian legislation in the sphere of health protection is to be devoted to the creation of a renewed, of general system (system incorporating) act; as such suggested by lawyers is the Medicine Code of the RF. It should systemize among other things collision rules, accreditation, the order of using medical

norms, ranging of medical treatment institutions, general duties of patients, the order of efficient and flexible ways of dealing with disputes between the patients and medical services, the order of compiling medical documents and their circulating

V.D. Burkovsky

THE ECOLOGICAL POLICY OF LIPETSK ON A REGIONAL LEVEL

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

The appearance of global problems never known before and connected with the threat of ecological disaster was caused by the activities of the man of the industrial epoch. At present the problems being neglected can aggravate the situation. In this connection the ecological direction of the state policy of Russia acquires particular significance on both a federal level and a regional one.

Of great and urgent importance in the given context is the state programme of Lipetsk Region "The Protection of the Environment, Reproduction and Rational Use of Natural Resources" which was signed by the leader of executive power Oleg Korolyev shortly before the beginning of 2013 declared the year of the protection of the environment in Russia. The programme embraces the period of 2013-2020 in which it is supposed to realize the outlined measures.

Lipetsk Region has a lot of potential in the field of natural resources, well-developed infrastructure and economic opportunities, all this opening good perspectives. High growth rates in most branches of economy predetermine, however, the increase of anthropogenic influence on the environment. Due to great industrial load the region belongs to the territories with high ecological tension holding the "leading" positions among the subjects of the Central Federal District considering such an index as the total volume of pollution substances emitted into atmospheric air (344, 9 thousand tons in 2011). The problems of purification of sewage have not been solved to the full either. Waste products of industry and consumption also exert a negative influence on the environment.

Within 8 years to come, in accordance with the above document Lipetsk Region will have to undertake a number of measures to stabilize and improve the quality of the environment and living conditions of the people, to reproduce and use natural resources in a rational way, to create a system of recycling waste products of industry and consumption. Four regional programmes for the protection of the environment and subsoil management as well as two subprogrammes will be targeted at achieving these and other goals.

The regional budget is supposed to allocate financial resources for the amount of

1,8 million rubles. The realization of the state programme is to decrease the volume of pollutants being emitted into the air, to solve the problems of waste products of industry and consumption, to restore and ecologically rehabilitate a number of water objects, and ensure the safety of those hydrotechnical facilities which need it. Particular attention is drawn in the state programme to ecological education and development of the ecological constituent in higher and secondary vocational education.

N.V. Butusova

PROBLEMS OF RUSSIA'S TRANSITION TO SUSTAINABLE DEVELOPMENT

Voronezh State University, Voronezh, Russia

It is known that the results of fundamental scientific researches carried out in the last decades of the last century all over the world proved that the resources of spontaneous development of the humanity as a whole and of every separate state separately had been exhausted. In international documents, a new strategy of the civilisation development was called sustainable development. According to international legal instruments, sustainable development is meant to reflect a new paradigm of human development and interrelations between humans, society and nature. It is also meant to guarantee a transition from spontaneous development and utilitarian approach towards the environment to a scientifically sound and purposefully biospheric and environmental approach, which means a regulated, purposefully harmonious human development in union with nature, based on universal values.

The terms "sustainable development" and "sustainable development strategy" are often used in Russian official documents. At the same time, as a rule, the attention is not paid to the main condition of the sustainable development and its main goal, i.e. preserving biosphere as a natural base for all kinds of life on earth. In spite of environmental law and "Fundamentals of state policy in the area of ecological development in the Russian Federation in the period up to 2030", their fundamental statements stay on paper in real life. According to recommendations obtained from various UN conferences, Russia and other states should develop a national sustainable development strategy. In Russia, a series of intermediary documents were adopted. However, since 2004 the work at the state sustainable development strategy and the project of a federal law "About State Policy in the Area of Transition of the Russian Federation towards Sustainable Development" was stopped. Unfortunately, this example only confirms a sad conclusion that the Russian government does not always realize economic, political, cultural and other potentials of Russia and its people. Moreover, sometimes it is inadequate to the objective necessities of the social development. Until now, which was evidently showed at the United Nations Conference on Sustainable Development Rio+20, Russia remains

being dependent from its natural resources. Unlike many other states, Russia did not make any real steps towards the transition to "green economics" or other directions within the sustainable development. In our opinion, one of the reasons for it is the absence of a national sustainable development ideology.

We think that a national sustainable development ideology is a conceptual, scientifically sound system of views and ideas which determines a strategy of the qualitatively new (in harmony with nature) development model of the society and the state. It is directed towards the implementation of humanistic values and ideas in real life and prevention of threats to the development of the modern civilisation while ensuring that Russia's national interests are observed at the same time. A sustainable development ideology is meant to unravel tasks which both the state and the society have to face and to determine their mutual responsibility before the present and future generations.

A transition towards sustainable development is impossible without an active participation of the civil society. In this regard, we are happy to register an increased activity of environmental NGOs and movements in Russia, which, among other things, protest against irresponsible actions of the authorities which could potentially lead to unforeseeable environmental consequences.

N.I. Danilov
V.Ju. Baldin
E.E. Rossel

SYSTEM DER SCHULUNG UND QUALIFIZIERUNG VON FACHLEUTEN FÜR ENERGIEEINSPARUNG: REGIONALE ERFAHRUNGEN

Uraler Föderale Elzin-Universität (UrFU), Ekaterinburg, Russland

Ein Bildungssystem auf dem Gebiet der Energieeinsparung ist in der Region Ural entwickelt, aufgebaut und schon mehrere Jahre tätig. Akuter Bedarf daran wurde in der Verordnung des Gouverneurs des Swerdlowsker Gebiets E.E. Rossel „Über Ausbildung von Fachleuten in Energieeinsparung für Einrichtungen des Swerdlowsker Gebiets" vom Februar 1999 zum Ausdruck gebracht. In Übereinstimmung damit wurden in der Uraler staatlichen technischen Universität (heute UrFU) im Jahre 1999 der Lehrstuhl „Energieeinsparung" und Regionales Ausbildungszentrum für Schulung und Zertifizierung von Fachleuten auf dem Gebiet der Energieeinsparung gebildet.

In der Zwischenzeit wurden Ausbildungsprogramme entwickelt und eingeführt, und folgende Lehrbücher herausgegeben:

- für jüngere Schul- und Vorschulkinder – „Energieeinsparung für Anfänger",
- für Schüler von allgemeinbidenden Schulen, Gymnasien, Lyzeen, Berufs- und Fachschulen – „Einführung in die Energieeinsparung", „Ressourcen- und Energienutzung",

- für Studenten von technischen, baukünstlerischen, baulichen und pädagogischen Berufshochschulen – „Grundlagen der Energieeinsparung“, “Energieaudit und Energieeinsparung“, „Kleinenergiewirtschaft“, „Energieeinsparende Technologien“, „Theoretische Grundlagen der Energie- und Ressourceneinsparung“, „Informationstechnologien und Leitungssysteme in der Ressourceneinsparung“ u.a.,
- für Schulung und Qualifizierung von Fachleuten der Betriebe und Einrichtungen verschiedener Spezialisierung – Programme der komplexen Vorzertifikationsschulung und Vermittlung von Kenntnissen und Fertigkeiten auf dem Gebiet der Energieeinsparung, Erhöhung der energetischen Effizienz und Energieuntersuchungen verschiedener Niveaus.

Mehr als 2000 Studenten besuchen heute jährlich Vorlesungen und praktische Lehrveranstaltungen zu dieser Problematik im Lehrstuhl „Energieeinsparung“. Die Lehrveranstaltungen werden auf dem „Energieeffizienzsgelände“ der UrFU durchgeführt, wo auf reellen Systemen der Energiewirtschaft die Möglichkeiten der besten verfügbaren Technologien der Energieeffizienzerhöhung untersucht werden.

In der Zeit von 2000-2013 hat der Lehrstuhl über 120 Lehr- und Handbücher, darunter: 45 Lehrmittel, 25 methodischen Entwicklungsarbeiten, über 50 Handbücher, Monographien, Enzyklopedien veröffentlicht. Zusammen mit dem „Institut für Energieeinsparung“ wurde 2008 das vollständigste Lehrbuch „Grundlagen der Energieeinsparung“ mit einem Umfang von mehr als 38 Druckbögen und in einer Auflage von mehr als 3000 Exemplaren herausgegeben. In der Zeit von 2009 bis 2013 wurden aktualisierte Fassungen dieses Lehrbuches herausgegeben.

Die Ergebnisse von Forschungsarbeiten in dieser Zeit wurden in mehr als 1000 wissenschaftlichen Studien veröffentlicht. Vier Dissertationen wurden verteidigt. Die Studien des Lehrstuhls fanden vielseitige Verwendung bei Vorbereitung von Dokumenten der Regierung des Swerdlowsker Gebiets für Energieeinsparung und Erhöhung der Energieeffizienz, sowie bei Erarbeitung von Gesetzgebungsakten der Russischen Föderation, Empfehlungen der Internationalen Finanzkorporation IFC (2010) und Berichten der UNO (2009-2010).

Ab 2012 werden zusammen mit dem Lehrstuhl „Atomkraftwerke und regenerative Energiequellen“ Master mit erweitertem Unterricht in Energieeinsparung und Erhöhung der Energieeffizienz ausgebildet. Mit Berücksichtigung dieser Erfahrungen wurde Entwurf des Bildungsstandards der UrFU „Energieeinsparung und Erhöhung der Energieeffizienz in der Industrie und in der Haushaltssphäre”, der nach dessen Bestätigung durch den Senat im Dezember 2012 als Grundlage für Entwicklung und Realisation von wichtigsten Bildungsprogrammen für Ausbildung von hochqualifizierten Fachkräften mit Master-Ausbildung für verschiedene Wirtschaftssphären der Region und des Russlands dient.

O.A. Diachuk
A.G. Melnikov
G.V. Melnikov

BIOSENSOR FOR POLYCYCLIC AROMATIC HYDROCARBONS DETERMINATION

Saratov State Technical University, Saratov, Russia

Development of biosensors is one of the defining trends of modern science development. The main difference of biosensor technologies from traditional instrumental analytical methods is their focus on constructing the biosensor allowing to conduct a rapid analysis with a simplified sample preparation.. Biosensors have the distinctive feature: their receptors whose form an analytical signal are biological components. Most biosensors are focused on the analysis of biological fluids (e.g. blood). Particular attention is paid to the creation of luminescence biosensors.

The work is devoted to the development of biosensor on the base of complex of protein – dye – polycyclic aromatic hydrocarbons (PAHs) for quantitative determination of PAHs in aqueous media. Presence of PAHs in human serum albumin was determined by quenching of energy donor phosphorescence which takes place as a result of triplet-triplet energy transfer between probes bound to proteins.

The proposed sensor relates to sensors based on supramolecular cellular structures. These sensors are used for the study of biochemical processes, for example to confirm the mechanism of the pollutants toxic effect. This is an optical sensor. Analytical signal is phosphorescence of luminescent probe eosin bound by non-covalent bonds with proteins. The biosensor is designed to detect PAHs toxicants.

The relevance of PAHs detection is determined by the fact that they exhibit carcinogenic and mutagenic properties. In protein molecules PAHs penetrates at the stage of human serum albumin synthesis by hepatocytes during the microsomal oxidation. At this stage formation of carcinogenic protein and PAHs adducts is possible. Application of protein - PAHs complex to determine the PAHs concentration in blood is known. Studies of the interaction of PAHs with proteins are important for the development of cancer early diagnosis methods and non-invasive methods of treatment.

We have created sensor based on a complex of HSA-eosin-anthracene. PAH anthracene is introduced into the protein by dissolving in phosphate buffer (pH 7.4) containing HSA. PAH binding to protein takes place as a result of hydrophobic interactions. Determination of PAHs is carried out by the triplet-triplet (T-T) energy transfer between probes bound to proteins. Decrease in the intensity of the phosphorescence of donor - eosin carries information about the diffusion quenching of donor triplet states as a result of the T-T energy transfer.

Experimentally observed process of T-T energy transfer indicates that eosin and anthracene are localized in the protein globule. Therefore an effect of concentrating in proteins appears. Biosensor has a selectivity of PAHs determining in proteins because energy transfer occurs only at a certain ratio donor and acceptor triplet energy states.

Thus, the results of scientific and technical studies show the availability of energy transfer in the PAHs determination in proteins. This sensor can be used for PAHs determination in aquatic environments in ecology and medicine.

E.A. Domogatskaja

SYSTEMANSATZ BEI DER STEUERUNG DER INNOVATIVEN PROZESSE IM UNTERNEHMEN

Staatliches Institut für Wirtschaft und Handel, Orjol, Russland

Das komplexe und umfangreiche Problem der Steuerung der innovativen Prozesse lässt sich durch den Systemansatz zu betrachten. Der Systemansatz ist mit der Vorstellung über Ziele, Kriterien der Systemeffizienz und mögliche Strategien, die im Vergleich zu den zurzeit schon existierenden Strategien mehr perspektiv sind, verbunden.

Für das Steuerungssystem der innovativen Prozesse gilt die Reaktionszeit, d.h. die Verzögerungszeit, als ein kritischer Parameter. Um gut zu funktionieren, muss dieses System über die Struktur verfügen, die schnell auf schwache Signale reagiert, und fähig ist, möglichst früh die Gefahr der möglichen negativen Veränderungen zu bewerten. Es ist ganz offenbar, dass die Verlängerung der Reaktionszeit, d.h. die Unvollkommenheit des laufenden Monitorings und der Einschätzung der Eingangsinformationen die Effizienz dieses Systems stark herabsetzen. Es sieht so aus, dass der sogenannte «Effekt der superkleinen Konzentrationen» für ein beliebiges System charakteristisch ist. In letzter Zeit beachteten viele Gelehrte ein ungewöhnliches Verhalten verschiedener treffender Faktoren, für die die Abhängigkeit "Dosis-Effekt" charakteristisch ist.

Dieser Effekt erscheint in den unterschiedlichsten Systemen, auch in den wirtschaftlichen, d.h. er gehört zur Klasse systemumfassender Phänomene, deren Berücksichtigung eine radikale Veränderung der existierenden Einstellungen zu den Schlüsselbegriffen auf dem Gebiet der Steuerungsprozesse vermuten, mindestens ist es nötig, sie zu präzisieren und zu konkretisieren. Es ist auch offensichtlich, dass das solche Begriffe wie «Systemkrise» und «Systemeigenschaften» auch angeht.

Im Allgemeinen versteht man unter System eine Vereinigung beliebiger Elemente, die als zusammenhängend betrachtet werden, und ein gewünschtes Ziel verwirklichen. Anders gesagt, "das System" ist eine "Ganzheit", deren Elemente miteinander verbunden sind, um ein äußeres Ziel zu realisieren. Es ist selbstverständlich, dass das System die Beziehungen mit der übrigen Welt hat, aber sie sind nicht so wesentlich, d.h., das System verfügt über die Eigenschaft der relativen Autonomie. Diese universellen Charakteristika der Systeme, die von ihrem Wesen unabhängig sind, zeugen davon, dass es im Systemansatz gewisse Regeln und Gesetze existieren, die für die Mehrheit verschiedener Systeme allgemein sind. Als Nachteil solches Systemansatzes ist aber mangelnde Konkretheit, d.h. Fehlen einer eindeutigen "operationalen Definition", die in jedem konkreten Fall genau angibt, wo

ein System ist, und wo es noch keins gibt, und wie nützliche Systemklassifikationen und ihre Eigenschaften überhaupt sind. Daraus folgt, dass die Systemtheorie in Wirklichkeit keine sich herausgebildete Wissenschaft ist, die sich mit den noch nicht gelösten Steuerungsaufgaben und Entscheidungen beschäftigt.

Z.V. Dushkova

PHILOSOPHY OF SPACE ENVIRONMENT

Dushkova Publishing House, Moscow, Russia

All over the world, the modern science development shows a tendency to link together physical processes in the outer space and the events on the Earth. The mankind is threatened by a global environmental crisis not only in the form of different tsunamis and earthquakes but also in the form of solar flares, or intrusions of the so-called space aliens, one of which is the Chelyabinsk meteorite. This way, such a relatively new interdisciplinary direction in science as human ecology acquires the character of space anthropology.

In his time the Roman philosopher Cicero wrote that every person who wanted to live in harmony with nature had to start from the universe and its ways of regulation. Nowadays there are various opinions in regard to the role of philosophy in the solution of environmental problems; however, one thing is obvious: in the course of many thousand years the human consciousness formed a necessity to connect together the world of space and biological processes. At the dawn of the formation of philosophy many thinkers already thought about its environmental role. For example, Pythagoreans, who can be called forebears of the environmental philosophy, followed the rule that "forbade destroying any living being". Hegesians thought that "the advantage of the wise man did not as much lie in the choice of good, but rather in avoiding the evil", which is something that we should remember in our century, when there is a more large-scale space exploration. The great scientist and encyclopaedist V.I. Vernadsky shared the opinions of his predecessors and said that all creatures of the Earth were a creation of a complex space process, a necessary and natural part of the space mechanism, in which, as we know, there was no randomness.

The genius scientist A.L. Chizhevsky, founder of heliobiology and space anthropoecology, wrote in his book „ The Terrestrial Echo of Solar Storms" that we were used to have a rough and narrow antiphilisophical view on life as a result of random play of earth forces, which, of course, is wrong. Life, as we see, is much more a space being than it is the Earth's one. It is created by the influence of the creative space dynamics on the inert material of the Earth. The largest influence experienced by the physical and organic life on the Earth comes from radiations which come to the Earth from all sides of the Universe. They connect the outer parts of the Earth to the space environment, bring them closer together, and constantly interact with the Earth. That is why both the outer image of the Earth and the life on it are a result of the creative influence from space forces. And the outstanding geneticist of the 20th Jacques Monod, a Nobel Prize winner,

said that the largest vanity of all sciences is the right to open the connection between the humanity and the Universe. Thus, until this day, many causative interrelations between the change in the parameters of cosmophysical processes and various events on the Earth, e.g. wars, revolutions, mass hysterias, hallucinations etc., have already been discovered. Both Russian and foreign scientists have discovered coincidences between frequencies of electromagnetic radiations of several planets of the solar system and frequency rates of EEG of humans, which makes it possible to assume that there is a possibility of a resonant interrelation of planets with the human brain, which can lead to malfunction in the system "brain-environment".

This way, a philosophical view on issues related to space environment can help solve the problems created by space parameters, if the problem is defined correctly. First, by using the rich philosophical experience of our predecessors, it is possible to form a cosmic type of the world view. Second, it is possible to facilitate the practical orientation of humans towards new relationship with space by encouraging creating a system "brain – space environment". Third, by means of philosophy it is possible to carry out a theoretical analysis and develop a technique by connecting various approaches towards the problem related to the philosophy of space environment and evaluate processes which take place at the modern stage of the human development in the unified system of the universe.

N.O. Dzhakipbekova
G.Z. Turebekova
S.A. Sakibaeva
L.M. Sataeva

SYNTESIS OF BILOGYCALL ACTIVE COMPOUNDS FROM VEGETABLE RAW MATERIALS WITH ANTIOXIDANT PROPERTIES

South Kazakhstan State University named after M. Auezov, Shymkent, Kazakhstan

The Republic of Kazakhstan has little of its pharmaceutical industry. Almost 90% of medicines are imported from far and near abroad, on a national scale spent huge sums in foreign currency. Moreover, the quality of imported products do not always correspond to GOST or TU as there is no corresponding control on the part of customs services, and sanitary and epidemiological stations, because strict control of each batch of drugs is almost not possible because of the transparency of the border and smuggled goods flooding the market. Drugs made from plant material, are especially effective in the treatment of diseases caused by unfavorable environmental conditions (Baikonur Cosmodrome, the Semipalatinsk nuclear test site) and the high background radiation do not cause side effects when they are used and are not toxic than drugs obtained by synthesis . Perhaps that is why in recent years in developed countries such as America, Japan and the European Community for the basic components of drugs are natural products of plant and animal origin. In Kazakhstan, there are over 20,000 species of plants, 6,000 of them contain biologically

active substances. Of the six thousand six hundred species can be used as an intermediate product for the production of drugs, and from more than 500 species can be ready to receive drugs. But the existing technology of medicines are very complicated and many-stage, energy-intensive and costly process. In addition, the purity of the products is poor, so they are not competitive on the world market. In Shymkent chemical-pharmaceutical plant from plant material obtained by extraction of drugs: morphine, codeine, papaverine, etc., and related alkaloids are in the blade, as some of them exhibit the toxicity, while others are ineffective, and some do not possess physiological activity. To date, these side products are in warehouses unsold. But the structure of these alkaloids can get from them is already known or new biologically active compounds by modifying their structure, by introducing new functional groups-OH, - OCH_3,-OC_2H_5,-NO_2, etc.These biologically active agents are effective in the treatment of cancer and have antioxidant properties. To determine the molecular formula of compound chromatographically pure samples of the final products were subjected to qualitative and quantitative elemental analysis for carbon, hydrogen, nitrogen, bromine, according to the method. The molecular weight determined by cryoscopic method in glacial acetic acid. Belonging to a class of products com tions revealed the following way. The content of unsaturated C = C bonds was determined by micro-Gorbaha, carbonyl groups according to the method. Thin-layer chromatography on non-aluminum dioxide layer of II degree of activity (by Brockmann) was used for separation and to identify and quantify substances. Plates with a sorbent (200h80mm) were prepared according to. For the elution experiments have been used experimentally selected solvent system.

Results of the analysis carried out physico-chemical methods, are shown in Table .

Table. Results of the physico-chemical analysis of intermediate and end, products of electrooxidation of anabasine

No.	Substance	Molecular weight	Elemental composition of			IR	NMR
			c	H	N	COOH	COOH
1.	The substance-1 (disstruktsiya)						
	found	250,11	72,39	9,89	11,04	-	-
	calculated	250,42	72,18	10,21	11,26	-	-
2.	Substance-2 (anabazinovaya acid)						
	found	234,24	76,64	11,22	11,60	+	+
	calculated	234,68	76,92	11,11	11,21	-	-

The presence of the + sign. On the basis of physico-chemical analysis, IR, NMR spectroscopy revealed that the end product of electrooxidation anabasine yavlyaetsya anabazinovaya acid.

M.I. Farakhov
S.M. Kirichenko
D.A. Burmistrov
M.M. Farakhov

METHOD OF TREATMENT OF THERMALLY UNSTABLE WASTES BY MEANS OF EXPOSURE TO SUPERHEATED VAPOR

Engineering-Promotional Center "Inzhekhim", Kazan, Russia

Industrial wastes are often comprised of liquid and paste-like mixtures of high-molecular substances containing dissolved low-boiling precious organic compounds.

Conventional methods of separation of such mixtures such as vacuum distillation are not acceptable because even at a deep vacuum level required for recovery of low-boiling components, temperature of the separable product is overly high leading to its thermal destruction. This, in turn, leads to inevitable coking of fire tubes or other types of heating elements of the column bottom.

In Engineering-Promotional Center "Inzhekhim" located in Kazan, Russia, a technology for separation of such mixtures by means of superheated water vapor was developed which was successfully used for separation of such mixtures as well as very heavy crude oils.

The idea behind the separation method is following. The initial thermally unstable mixture is heated up only up to temperature way below temperature of its thermal destruction. Next, the mixture is fed to a contactor where a contact with a superheated water vapor takes place. The feed stream breaks into pieces in a specially designed centrifugal nozzle by a superheated water vapor having temperature and flow rate required to reach a high recovery rate of volatile components. During vaporization of the light part, temperature drops immediately preventing thermal destruction of the heavy part of the feed from happening.

The vapor stream representing a mixture of water vapor and low-boiling component vapors enters the column equipped with a dephlegmator used for separation of organics from water and fractionation into separate components. In case an organic part is not dissolvable in water, a condenser combined with a phase separator can be used.

Unevaporated components are removed from the lower part of the contactor.

Of special interest is a variant that utilizes the technology in the regime of thermal destruction of the feed provided that destruction products themselves are very valuable components.

Using this method, carried out was separation of wastes generated at production of phenol at JSC "Kazanorgsintez", namely, phenol resin with the initial composition comprised of cumil-phenol, dimethylphenylcarbinol, dimers of α-methyl sterene, mechanical admixtures, alkali and phenol. Phenol resin was heated to temperature not exceeding 150°C and exposed to superheated water vapor having temperature 400°C.

As a result of the interaction with superheated vapor, a liquid phase low-viscosity mass for the overhead product was obtained; chromatographic analysis of the product

determined presence of 38 wt.% of benzene, over 15 wt.% of acetophenone and 10 wt.% of phenol. The phenol quantity in the feed coincided with that in the products of destruction.

A black solidifying mass with no essential smell was withdrawn from the contactor through its lower part.

In both variants, utilization of the technology allows avoiding solid depositions on the heating elements of the unit and separating mixtures containing thermally unstable components. The developed pilot unit allows carrying-out test separations of mixtures of the Customer and obtaining data needed for designing an industrial plant. Specialists of Engineering-Promotional Center "Inzhekhim" are ready to perform the entire cycle of works starting from laboratory studies and ending with designing and manufacturing an industrial plant.

E.U. Fomina
S.A. Grigorenko

EFFECTIVE TECHNOLOGY TO PRODUCE THE ALUMINUM OXIDE FROM ASH WASTE OF THERMAL POWER STATIONS

Irkutsk State Technical University, Irkutsk, Russia

Products of coal combustion in complexity and multi-component material composition are technogenic deposits, which can be processed with the extraction of valuable components and use the final products.

Major problem of development of the given technogenic deposits is an absence of the perspective technologies allowing to process them in a complex and non-waste. The complex studying material structure and technological properties of fly ash of Coal-fueled Power Plant with use of currently available methods of research is required for creation of similar technologies.

Authors investigated ash waste of power plants of Irkutsk region to create the technology of their complex processing.

Granulometric size composition of ash waste is presented by particles less than 0,1 (51,84 - 80,55 %). The results of X-ray fluorescence and silicate analyses have shown high contents of aluminum oxide, oxide of silicon and iron. Diffractional X-ray phase analysis testified, that the basic rock-forming minerals are quartz and feldspar. Aluminosilicate hollow balls (microshperes) is noted, ferriferrous components are presented by magnetite.

For development of technology of ash waste processing it have been carried out the researches on their enrichment by magnetic, flotation and metallurgical methods. The offered technological scheme provides a removing at the beginning of process particles more than 1,25 mm. Further operation of wet magnetic separation for branch of ferriferrous components is provided. Tails of magnetic separation should be classified on

the size of-0,16+0 mm. Overflow is a raw material to obtain aluminum oxide, and sand of classification (-1,25+0,16 mm) arrives at coal flotation.

At carrying out of the subsequent researches tails of coal flotation and overflow have been directed for the further processing by a method of sintering of three-component burden.

The maximal extraction of aluminum oxide from ash waste is 83,7 – 87,1 % in a case of burden structure $CaO:SiO_2$ =2; $Na_2O:(Al_2O_3 + Fe_2O_3)$=1 at sintering within 1 hour at temperature 1200°C. For sintered material from experiences with the maximal extraction of aluminum oxide operations of desiliconization, carbonizing solutions and calcination have been lead to produce the metallurgical aluminum oxide.

In the conclusion it is possible to note, that introduction of the given scheme (technology) will allow to reduce significantly weight of stored ash waste that will lead to decrease in an ecological load in Baikal region.

A.A. Fomina
E.I. Tikhomirova

ACCUMULATION OF HEAVY METALS IN CATTAILS (TYPHA ANGUSTIFOLIA L.) FROM SHALLOW WATERS OF THE VOLGOGRAD RESERVOIR

Yuri Gagarin State Technical University of Saratov, Russia

The Volgograd Reservoir ecosystem is the last link in the Volga River cascade. For the half-century of its existence, it has accumulated plenty of materials of both natural and anthropogenic origin that are hard to mineralize. Higher aquatic plants are most common in the shallow waters of such reservoirs with slow water exchange. Their ability to accumulate substances in concentrations higher than baseline values makes the prospect of their use in the monitoring and control of the environment.

Therefore, the purpose of our research was finding the major patterns of heavy metal accumulation in cattails (Typha angustifolia L.) and revealing its role in self-purification processes of the Volgograd Reservoir.

We collected plant materials at the end of October 2010 and 2011 at the shallow sections of the Volgograd Reservoir near a large industrial site Saratov-Engels (upstream, near Generalskoye village and downstream, near Kvasnikovka village). Sampling and chemical analyses of samples representing sediments and plant materials was conducted in accordance with the Russian Federation Standards [GOST 51592-2000; GOST 26929-94] and with methods listed in the 2001 Agricultural Chemistry Handbook (V. Mineyev, ed.).

We discovered that distribution of heavy metal cations (Zn^{2+}, Cu^{2+}, Co^{2+}, Cd^{2+},) in plant organs followed the usual trend: rhizome > stalk > leaves > inflorescences. This pattern could be explained by the fact that rhizomes and stalks of T. angustifolia are

perennial, which accounts for their ability to accumulate chemicals for a number of years. Besides, the plant material was being collected at the end of vegetative periods, which could also affect the distribution of heavy metals.

When studying the accumulation of Zn^{2+} in T. angustifolia collected in the shallow section of Generalskoye, its average concentration was 1.82 ± 0.12 mg/kg. Bottom sediments of shallow-water site contained four times more zink compared with its average content in plants.

Our results have shown that the average Cu^{2+} content in collected in T. angustifolia by Kvasnikovka was nine times less that in plants near Generalskoye. Such striking difference was related to the low accumulation of copper by plant rhizome in the area of Kvasnikovka. Perhaps the results could be attributed to the high degree of overgrowing of shallow spots near Kvasnikovka. In bottom sediments collected in shallow waters near Generalskoye, we observed the maximum concentration of Cd^{2+} (three times as much as in plants).

The accumulation of Co^{2+} in the vegetative organs of T. angustifolia collected from Generalskoye and Kvasnikovka areas was approximately equal to its concentration in sediments (0.22 ± 0.01 mg/kg).

The results of our study suggested that T. angustifolia was not active accumulator of heavy metals. However, taking into account that its rhizome is good enough in accumulating chemical elements, we recommend using this plant for treatment and purification of water bodies from heavy metal pollution (such as copper, cadmium, and cobalt). Also, it is possible to remove cattail debris after the vegetative season for their subsequent incineration for ash used as a fertilizer. This recommendation solves two problems: the problem of cleaning waters from anthropogenic pollutants and soil enrichment with nutrients.

A.I. Galanova

ENVIRONMENTAL SECURITY OF THERMAL POWER PLANT IN EMERGENCY SITUATION

Novosibirsk State Technical University, Novosibirsk, Russia

Nowadays there is probability of a large-scale system emergency, because of power plant equipment ageing, lasting grid congestions, large power overflow, and unsatisfactory state of emergency control schemes. Frequency of system emergency in Russia is 0.8-1 per unit in year according to researching of 126 units. Disturbance in power supply damages consumers and losses can be more than cost of underprovided power. Besides, duration of blackout can be several tens of hours.

Consumers that had 3540 MW total capacity remained without electricity in Moscow blackout on 25.05.2005. In that time 13 power stations were shutdown and it lasted 30 hours. The emergency caused 1.7 billion rubles. The damage estimation is difficult problem. Nowadays system emergency damage is evaluated according to electricity

underproduction and emergency electricity costs that can be in some times more than usual cost.

However, system emergencies cause not only economic damage but social and ecological one. Public transport functioning is disrupted; traffic of electric suburban and long-distance trains is stopped as a result of outages. People get stuck in the subway tunnels and elevators. Traffic lights are turned off so the accident rate increases and traffic jams appear. Biddings stop on the stock exchanges. Functioning of hundreds social objects is disrupted.

Industrial consumers that were suddenly disconnected from the grid are forced to emergency stop their production, causing industrial accidents, unplanned releases of harmful emissions, such as transformer oil spill. Besides, as a result of system failure TPP equipment is stopped, and during the recovery boiler units is started unscheduled. This causes more launchers fuel consumption that increases emissions to the environment.

Separation of TPP on balanced load is applied to reduce the economic, environmental and social damage inflicted by the system crash. As a result, power system is divided into several parts operating asynchronously, and each power plant feeds only its end consumer. When you select the consumer the possible damage caused by its tripping and its capacity are taken into account. As a result, the most important consumers are supplied by electricity, and the power plants function.

If the emergency control schemes acts on thermal power plants disconnecting from the grid, then reducing of harmful emissions during the subsequent start of boilers is possible only by reducing time of recovery operation. It is possible if the power plants shutdown is prevented. For that power plant is transferred automatically to the auxiliary load. Such automatic can reduce the recovery time of TPP in 2-10 times, and reduce fuel starting consumption in 2-3 times.

Thus, recognizing the possibility of a blackout in the grid , it is necessary to provide the power station by special automatic device that could reduce the environmental, economic and social damages caused by the emergency.

Svetlana Garipova

GALVANIC WASTE WATER TREATMENT. MODERN DECISIONS IN GALVANIC WASTE WATER TREATMENT.

Russian-Dutch Cooperation «Samenviro», Samara, Russia

Galvanic production is still one of the most dangerous sources of contaminants for environment because of big amount of waste water which contain toxic components. That`s why ecological problems of galvanic production are still actual because of continuing environmental pollution with compounds of heavy metals.

There are some traditional methods of heavy metals removal from waste water and

galvanic waste water: agent method, ion exchange, reverse osmosis, electrocoagulation and galvanic coagulation, electroflotation, electrodialysis. Each of these methods has its own advantages and disadvantages but most of them can`t guarantee requirements concerning content of heavy metals in final effluent. Methods which can guarantee requirements of maximum permissible concentration are very prohibitive and inaccessible for most companies.

The most common method of galvanic waste water treatment is agent one because of its availability. But classical way of realisation agent method in galvanic waste water treatment is not actual any more. We have more and more rigid requirements to the content of heavy metals in final effluent discharged by plants and factories and it makes us to find new engineering decisions satisfactory for modern requirements of ecological safety and effectiveness.

Main aims of modernization or new construction of galvanic waste water treatment :

1. Inert materials which are stable to long influence of acids and alkali. For example, polymer materials.
2. Simple construction of treatment unit.
3. Expenses reduction for chemical agents, search of new and more effective chemicals for water treatment,
4. Unification of conditions for removal of different heavy metals from water: creation of definite condition when all (or most) heavy metals are removed from water,
5. Simple and reliable control of treatment process,
6. Sediment treatment for reduction of wastes volume.

Example of introduction of new decisions in chemical treatment is Galvanic waste water treatment plant of OAO «Tyazhmash» (Samara region), located in the galvanic workshop of the plant. During design and construction of this galvanic waste water treatment plant we took into account not only peculiarities of galvanic process of the plant (high amount of chromium and copper in washing water and in concentrated waste water), but also space limitation for treatment unit installation and necessity of washing water treatment and sediment dewatering.

During operation of galvanic workshop there are 2 types of waste water which don`t mix on the first stages: waste water with chromium and waste water from other processes without chromium.

Main units — storage tanks for concentrates, monoblock-reactor, settling tank made of polyethylene of low density which is stable to long effluence of acids and alkali and corrosion-proof.

The whole process of waste water treatment beginning from accumulation and neutralization till discharging to the sewage system has several stages of treatment: accumulation waste water with chromium and their neutralization , transference of hexavalent chromium into trivalent chromium, waste water mixing, treatment with complexing agent (heavy metal precipitation), treatment with flocculant (for bigger

formed flocs), settling, post treatment of suspended particles, sediment dewatering.

The main peculiarity of this treatment scheme is rejection of traditional agents removing heavy metals: lime, sodium sulfide and so on. Action of heavy metals complexing agent Metalsorb is based on cooperation of heavy metals ions which are present in waste water with dithiocarbamate groups, transplanted on the organic molecule.

Heavy metals transfer into insoluble condition with chelating agent Metalsorb in comparison with other methods of metal ion precipitation (for example, treatment with hydroxides and sodium sulfide) has some advantages:

- agent consumption is very low and its activity is very high;
- high effectiveness of waste water treatment;
- absence of necessity in dosage of excess amount of alkali till pH=9–9,5, complexation reaction with most metals is under pH= 6;
- no risk of transfer of settled metals back to solution with pH fluctuation.

Thanks to the following waste water treatment with flocculant we have high effectiveness of settling and also we prevent possible back transfer of heavy metals to effluent.

Effective agent treatment makes possible to reduce volume of waste water treatment plant, to simplify sediment dewatering.

Sediment dewatering of waste water treatment plant is done by decanter and reduces wastes volume comes to recovery in 4-5 times (average). Rejection of using filter press which is traditional in such processes because of necessity to reduce space for dewatering unit, costs for maintenance, reduction of clean water consumption for washing dewatering equipment.

Control for different reactions in monoblock is done with simple and reliable measuring devices(pH-meters, ORP-sensors). Galvanic waste water treatment plant is fully automized : waste water pumping, agents dosage,mixing and other activities are programmed.

Introduced galvanic waste water treatment plant is satisfied to all requirements qualified to design of galvanic waste water treatment plant. We can call it highly effective (heavy metals are absolutely absent at outlet of galvanic waste water treatment plant), compact, economical, simple in maintenance and operation.

R.A. Gasarov
V.N. Baltyan
V.G. Kantsedalov

ENVIRONMENTAL PROBLEMS DURING RECONSTRUCTION OF THERMAL POWER PLANTS IN THE SOUTH OF RUSSIA

Autonomous non-profit organization „The Northern Caucasus Academy of innovative technologies in education and science", Pyatigorsk, Russia

Thermal power plants in the south of Russia mainly operate on two types on organic fuel, gas and coal. Many power plants in the Rostov region use coal, thermal power plants in the Stavropol and Krasnodar regions operate on gas.

It is well known that coal thermal power plants have more evident pollution factors. However, burning gas also leads to many harmful emissions into the atmosphere, mainly due to deficient methods of combustion gas cleaning. For this reason, when updating generative power it is important to apply nature conservation techniques which lead to reduction of anthropogenic load on the environment. The environment of project in the area of technological re-equipment can conceptually be developed in the following directions:

- Combustion gas cleaning;
- Application of new methods of coal and gas firing;
- Achievement of waste-free techniques;
- Development of environmentally protective solutions for construction;
- Organisation of the monitoring system of the environment.

In addition, it is necessary to keep in mind that in its condition on 01.01.2013 the energy equipment in the south of Russia has used up its physical resources to more than 85%. This is the reason why it produces a considerable environmental stress not only in the area where the power plant is situated but also far beyond it.

The authors of this report suggest using new highly efficient methods of solid fuel firing in steam generator furnaces.

The use of conventional techniques of firing coal of low quality, particularly of low-reaction coal, faces considerable difficulties today. These difficulties are related both to purely technological and especially to environmental problems. The former are caused by the complexity of ensuring a stable firing process of inferior quality coal as well as power shortage of coal-pulverizing equipment. As a result of this, there was an increase in the gas and fuel oil consumption at coal-fired power plants and a considerable decrease of their available power.

The volume of the utilized bottom ash waste in the Russian national economy comprises nowadays only around 10 million tons, which makes up only 10% of the total amount of waste, which is extremely insufficient. It must be taken into consideration that one of the reasons for this situation is a discrepancy between the properties of the bottom ash waste of thermal power plants and requirements on the side of their potential consumers.

The task solution in the field of the solid-fuel techniques is extremely complicated and costly. Therefore, in addition to developing special plans and gas purification equipment, there is a search for new techniques which would enable minimal emissions. Thereby it is important to provide the solid slag waste with the necessary properties. A promising method in this direction seems to be firing coal in the melt of its own slag balloted by oxygenated air.

This process is based on the autogenic method of sulfide minerals treatment applied in the nonferrous metallurgy, which enables processing of less conditioned raw material. In regard to the objectives of coal firing, firing coal (oxidation of coal) in the molten slag bubbled through an oxygen-containing gas (up to 27-40% O_2) makes it possible to process mining coal without fuel preparation. The autogenic method solves environmental

problems considerably when firing ash and high-sulphur fuel, ensuring, for example, utilization of up to 99% of mineral fuel components, a reduction in the sulphur dioxide emissions by means of binding sulphur in the melt and a frequent decrease in NO_x emissions. It is also a promising method for creating waste-free or low-waste thermal power stations operating on coal. There are no methods similar to coal firing in melt abroad. The major inventions in the area of autogenic method are patented in Russia.

N.E. Gelfond
E.V. Starkova
O.V. Shuvaeva

RESEARCH OF THE MACRO-MICROELEMENT STATUS AT CHILDREN OF THE WEST SIBERIAN REGION, POSSIBILITY OF CORRECTION BY CHANGE OF THE WATER-DRINKING MODE

Federal State Budgetary Institution "Scientific Institution of Clinical and Experimental Lymphology" of the Siberian Branch under the Russian Academy of Medical Sciences (FSBI "SICECL" SB RAMS), Novosibirsk, Russia
Nikolaev Institute of Inorganic Chemistry (NIIC SB RAS), Novosibirsk, Russia
Novosibirsk State University, Novosibirsk, Russia

Interrelation status of the human environment, in particular its chemical composition, with indicators of health and quality of life today is not in doubt. Chemical elements enter the human with drinking water, food, and by inhalation in the form of dust, thereby affecting the element status of the body. Disorders of the elements related to natural pollution, determined by the peculiarities of the local biogeochemical environment , such as the West Siberian region is characteristic of iodine - deficiency and high levels Fe, B and Mn in groundwater.

The most vulnerable segment of the population, which is characterized by disturbances in the metabolism of chemical elements are children. Microelements may lead to the development of many diseases - reduced immunity , delayed mental and physical development, susceptibility to infections , etc. in combination with a number of specific features , affect the health of children living in the West Siberian region (extreme temperature and light conditions , unbalanced diet on essential nutrients , etc.) , the quality of water as one of the main forms of migration of chemical elements is as an important factor in health, clean water can be one of the corrective factor of mineral metabolism.

The purpose of research - a comparative study use a multi-element analysis of hair state of metabolism macro, micronutrients in children living in the West Siberian region and to assess the possibility of correction of elemental balance by changing the water-drinking regimen.

Materials and methods.

The study was carried out on the basis of children's sanatorium. We examined 95 children (49 boys and 46 girls) between the ages of 12 and 15 years, suffering mainly of allergy: atopic dermatitis and atopic asthma. Two groups of children comparable for age, sex, duration of disease and the presence of comorbidities were formed: Group 1 (50 people) the main and 2 (45 people) control. In the study group on the background of the basic spa therapy in the rehabilitation scheme was included receiving clean water (drinking in the free mode on demand). Water content : total mineralization -100-200 mg / l chlorides <90 mg / l calcium - 25 - 50 mg / l , Sodium - ≥ 20 mg / l potassium - 2-20 mg / l; Mg - 5 - 10 mg / l total hardness - ≥ 2 mEq / l. The children came for the spa treatment from various regions of West Siberia (Novosibirsk and Novosibirsk region, Kemerovo, Novokuznetsk, Tyumen, Salekhard).Hair samples were obtained by haircutting 3-5 spots on the back of the head in a conventional hygienic condition. The weight of sample is 5 mg. A fence of hair made twice: at the moment of receiving the child and after the passage of sanatorium rehabilitation, which was - 24 days.

Results and discussion. Dynamics of distribution of macro-microelements in hair is studied on children, living in West-Siberian region, being treated in sanatoria and of correction by way of change of the drinking regime. It is revealed that for the majority of children the superfluous maintenance in hair of Fe, Mn and Cu. In some cases the high level of the maintenance in hair of Pb, B, Ag and Sn is revealed. The element status of patients taking low-mineralized potable water constantly authentic decrease up to norm in the maintenance of Fe, B and Sn is noted at 100 % of patients. The level of the maintenance of Ag was normalized at 87 %, Cu - at 60 %, Mn - at 50 % and Pb - at 85 % of examined children.

V.M. Gerasimov
K.V. Svalova

ENVIRONMENTAL ASSESSMENT OF THE EFFECTIVENESS OF FIBROUS POLYMERIC MATERIALS FOR INDUSTRIAL EFFLUENT TREATMENT

Transbaikalian State University, Chita, Russia

One of the environmental problems of the mining industry is considered to be an effluent treatment of high quality. Currently increasing requirements of environmental legislation keep industrial manufactures developing a range of environmental actions in order to reduce the chance of ecological risks.

So far the existing gravity, mechanical, physicochemical treatments of industrial wastes from polluting substances do not provide clean water in accord with the standards of maximum permissible concentration. Therefore, the improvement of the mechanical clean-up method in connection with multi-layer filters from polymeric fibrous material

is appeared not to be the only crucial task of the science, but also allows to improve the quality of water clearing to the required standards.

From amongst of great variety of filtering materials and due to their homogeneity and three-dimensionality structure, porosity, elasticity and resilience - webs are preferred. They are formed from synthetic fiber polymers by bonding and sealing fibers. Synthetic fibers during the manufacturing process form a porous structure of a polymer material. Therefore, in the process of filtering a liquid jet while passing through the fiber layer is divided into smaller ones, that move along multiple changing direction of the path, which leads to deposition of solid phase of industrial waste both inside the material and on its surface [Gerasimov V.M. The fibrous polymeric materials in geotechnology: monograph – Chita, 2010. – 207 p.].

To assess the effectiveness of these filter materials the industrial research has been carried out in one of the mining enterprises of the Transbaikalian region. For given purposes, the filter cassette has been designed and a combination of polymer fibrous materials is used in the function of a filter material [Svalova K.V. Experimental studies of particle retention of solids in the mechanical wastewater filtration using fibrous polymeric materials: paper – GIAB No. 6 – Moscow, 2013. - P.391-396]. Some indicators of effluent treatment are shown in the table 1.

The table 1– Performance indicators of effluent treatment

Defined data	Water samples for chemical analysis				Sanitary standard
	Waste water	Level 1 cleaning	Level 2 cleaning	Level 3 cleaning	
Nitrate, mg/l	71.1 + 10.6	24.7 + 9.7	23.1 + 3.4	22.0 + 3.4	<45 mg / l
Nitrites, mg/l	3.9 + 0.4	1.0 + 0.2	0.9 + 0.2	0.8 + 0.2	<3.3 mg / l
Ammonium Nitrogen, mg/l	1.7 + 0.1	0.24 + 0.03	0.21 + 0.04	0.18 + 0.04	<1.5 mg / l
Chlorides, mg/l	90.0 + 13.5	23.0 + 3.3	22.0 + 4.2	20.0 + 4.2	<350 mg / l
Phosphates, mg/l	3.6 + 0.6	1.3 + 0.4	1.0 + 0.02	0.9 + 0.02	<3.5 mg / l
COD, mg/l	29.0 + 5.7	14.0 + 3.0	10.8 + 4.4	10.0 + 4.4	<30 mg / l
Suspended substances, mg/l	3.5 + 0.6	1.6 + 0.5	0.5 + 0.3	0.4 + 0.3	<0.75 mg / l
Sulfates mg/l	50.0 + 5.5	11.8 + 1.2	6.8 + 2.3	6.0 + 2.3	<500 mg / l

Initial water did not correspond to the sanitary standards in terms of suspended substances by 78.5%, nitrate by 36.7%, 2.7% phosphate, nitrite by 15.4%, ammonium nitrogen by 11.8%. The third level of treatment showed the best results: the nitrate concentration decreased by 69% to 79.5% nitrite, ammonia nitrogen by 89.5%, 77.8% of chlorides, phosphates by 75%, COD by 65.5%, sulfate 88 % suspended solids by 88.6%. This sample corresponds to the sanitary standards.

Thus, the analysis of data suggests the possibility of an effective treatment of industrial effluents of mining companies by means of filtration systems with fibrous polymeric materials.

Amin Rauf kyzy Guseinova
Maya Yadigar kyzy Abdullaeva

UTILIZATION OF HEAVY GUM FROM THE PYROLYSIS PROCESS ENRICHED BY VAPOUR PREVIOUSLY PROCESSED BY THE MICROWAVE RADIATION

The Azerbaijani State Oil Academy, Baku, Azerbaijan

At present, the production of low olefins and aromatic hydrocarbons in the Azerbaijani Republic is organised at the ethylene plant EP-300 TPY (f ethylene). It is known that abroad there is a large number of plants with the output from 800 000 to 2 million TPY.

In 2010, the production volume of ethylene worldwide was 130 million tons. At the moment, production modernisation measures are taken in order to increase the output of the EP-300 to 380 000 TPY.

The work efficiency of ethylene plants is determined by the furnace parameters which act as the main unit - reactor. The modernization of furnace blocks on the Sumgait plant (ethylene and polyethylene) was carried out by installing combined equipment, in particular, according to the project of the company "Chepos" (Czech Republic). It is well known that one of the main parameters of the pyrolysis process is the time during which reaction products stay in the zone of high temperatures. In order to reduce secondary reactions which lead to a formation of coke deposits in the furnace pipes, the furnace receives superheated vapour. Usually vapour is put into the reactor in the amount of 10-15% in the fuel, but recently this parameter has been reaching 50%. The objective of this work is to study the influence of the vapour added to the furnace of the pyrolysis plant, with the vapour having been processed by the microwave radiation and, in comparison, without it having been processed by the microwave radiation.

The results of the research has shown that if the vapour has been previously processed by the microwave radiation and is then put to the pyrolysis furnace, it leads to an increase in the output of the pyrolysis gas and a decrease of the liquid yield, in particular, of heavy pyrolysis gum which has a positive influence on the duration of the furnace life by reducing coke formation in it. The advantage of the pyrolysis with the input of vapour with the latter being previously processed by the microwave radiation is the possibility to increase the pyrolysis temperature up to 840-850°C, which has a positive effect both on the output of the pyrolysis gas and the increase of the ethylene content in it. Furthermore, a reduction in the heavy gum output and the furnace coking makes possible to use heavier fractions or composite fuel as raw materials. This will expand the raw materials resources of the pyrolysis plant.

The heavy pyrolysis gum (sample I) received from the pyrolysis with the input of vapour previously processed by the microwave radiation is significantly different in its blend composition from the heavy pyrolysis gum (sample II) received from the pyrolysis with the input of vapour which has not been previously processed by the microwave radiation. Thus, the total amount of gums and asphaltenes in sample I is 26% and in sample II – 33.5%. The samples of the heavy gum underwent coking. The final results have shown that the coke received from sample I was in its structure identical to needle coke.

V. I. Ilyin

ON CERTAIN CONTRADICTIONS PECULIAR TO THE PROCESS OF DEVELOPMENT OF ADEQUATE ECOLOGICAL CONSCIOUSNESS IN RUSSIA

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

It is not the only time the researchers have pointed out that despite a lot of norms introduced by Russian legislators in the field of the protection of the environment, which are extremely tough when compared with those in the world much to one's regret they are often broken. The reasons of the given state of things are various; we shall deal with the problem of the constituent of Russian mentality with reference to ecology.

The most important reason is that authoritative methods of government used to prevail in prerevolutionary Russia and it is for almost seventy years in the 20th century that the country was headed by the people who followed the principle of solving any problems by means of power, including the problem of interaction of man and nature. Up to the present moment nobody has ever estimated the scope of damage caused to nature by collectivization in agriculture, raising the virgin land, the construction of hydro-technical plants disregarding biological and geographical factors. One can recall the projects of directing the natural stream of water in the rivers of Siberia to Kazakhstan and the Middle Asia, etc.

Vast territories and natural riches of Russia had contributed to maintaining an attitude of neglect towards ecological problems. The Russians were not conscious of them as global ones, the ones that threaten social beings and require taking some urgent measures.

Overtaking modernization in Russia had been carried out at speed, which brought about certain contradictions. Migration of millions of people from the country to towns and cities was creating tension and disagreement between the culture of country and towns folk involving their ecological consciousness as well. New, stricter requirements were put before the settlers in towns. And due to the fact that the entire process of adaptation was rather difficult the ecological requirements were perceived as something artificial, the

more so, as the consequences of neglecting these requirements did not seem evident at that time.

In the post-soviet period plenty of connotations connected with the next stage of modernization – the transition from socialism to market economy – added to this layer of Russian mentality. The period is characterized by the manifestations of psychology of capitalism at the stage of initial capitalization, a consuming attitude to nature being among them.

The general crisis of Russian society aggravated by the world economical crisis has limited the possibilities of allocating material resources for solving urgent ecological problems that are becoming worse and worse.

The present situation, however, should call for seeking an impulse to subject to certain corrections both mass consciousness and the state ecological policy.

M.S. Iskakova
Zh.A. Dzhakasheva

AN IMPACT OF ECOLOGICAL ENVIRONMENT ON HUMAN ORGANISM

Kazakh National Medical University, Almaty, Kazakhstan

Throughout his life, a person is interacting with the world around him, which can sometimes turn out to be not quite friendly.

We often attribute the causes of diseases to the environment. The sources of many illnesses are hidden in the objects around us, things and different materials. Actually allergic reaction to food, household chemicals, and various allergens (e.g. dandruff, dust, dust mites, mold, and pollen) are one of the hallmarks of the disease. Each person can manifest reaction to a substance, but the degree of sensitivity or susceptibility for all is different. Only one contact with an allergen can bring some people to have a serious disease.

People are well adaptive to any environment, but, of course, up to a certain limit. A person is subjected to a variety of environmental influences, during the life, and the reaction of the human body may also be different. The immune system reacts to the changes that are occurring in the world around us. What kind of immunity a person has, the same is the state of his health.

Doctors working in the field of environmental medicine are studying the effects of the environment on the body, the process of investigating the effect of various chemicals, food, aerosols and other drugs on humans. They were called doctors- ecologists. Recently there was a need to conduct research that would help to recognize the symptoms of diseases caused by allergens such as corn, wheat, milk, egg, etc.

In this complex work using the method of Herbert Rinkel. The conclusion of it is based on the fact that during four days people excluded from the diet offered food allergens. This

method helped to identify the causes of many diseases, such as asthma, arthritis, colitis, depression, anxiety, fatigue, hyperactivity.

In the 40s Theron Randolph, founder of medicine, solving the problems of health and exposure to the environment, has established a number of diseases, the cause of which, he believed, is a food allergy. He has developed special methods for the determination of food allergens in various diseases. These methods are used up to these days. In the 50s Randolph still has one of the main causes of disease - the human body's susceptibility to chemical substances in microscopic doses, such as pesticides, solvents, and car emmisions

O.Yu. Ivanova

THE ECOLOGICAL COMPETENCE AS AN INDISPENSIBLE CONSTITUENT OF PROFESSIONALISM OF A MODERN SPECIALIST

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

The problem of ecological education and ecological culture of the people in our country dates back to the stage of "socialist" development of society that gave rise to the change of moral customs, one could not but mention here a typically customers' attitude of man towards nature, the use of natural resources for the sake of satisfying urgent political and corporative demands.

One of the tasks of contemporary education is the realization of an approach based on the development of competences and the training of a specialist possessing ability, skills and knowledge that permit being competent in key and subject matters. This approach suggests the change of the economic paradigm "growth for the sake of growth" in favour of the ecological one – "growth for the sake of steady development". Such a paradigm is based on the axiom: "it is not the man who controls the processes and phenomena taking place in the natural environment, but it is the man's future that depends on the processes and phenomena moulding the environment for living".

Psychologists state that the role of human's abilities in the course of developing competences decreases with the years, and the role of motivation and aims setting on the basis of values and meanings becomes dominating.

Ecological culture in modern society is perceived as a specific form of general culture of a person. This can be seen clearly enough in the sphere of interaction of society and nature. Ecological culture serves as an index of not being indifferent to what is going on around, a safe guarantee against the use of the results of the anthropogenic activities that could be detrimental to the society and future generations. While speaking about the development of ecological culture one should stress the essential role of competent teachers of Ecology, educators, managers at all levels, political and spiritual leaders.

The problem of developing ecological competence requires further all-embracing research; one should perform it, however, before another stage of the development of the civilization, now in the form of governed socionatural evolution on the basis of public intellect and education comes (after A. I. Subetto).

Ecological security of the country and each of us are directly connected with the development of ecological competence of a modern specialist irrespective of the kind of his professional activities. In fact, the level of ecological competence of a specialist, of his ecological culture will determine eventually the present and the future of Russia and possibly of the entire civilization of mankind.

O.G. Ivashina

THE EDUCATIONAL ENVIRONMENT AND ITS ROLE IN THE DEVELOPMENT OF THE PERSONALITY OF AN INDIVIDUAL

Information Centre of Further Professional Training, Yelets, Lipetsk Region, Russia

At present the functional role of education in the conditions of the new economic order is changing: from the translator of knowledge and the generator of specific habits and skills the sphere of education is turning into an actual producer of knowledge and a creator of the main productive force – a highly intellectual and efficient employee.

The development and functioning of education is stipulated by all factors and conditions existing in the society: economic, social, cultural and others. At the same time the aim of education is the development of an individual while meeting the demands of the society he or she lives in, which is reflected in the links between education and culture.

Speaking of the values of education it is necessary to consider three "layers" of them: the value of education as a state value, as a social value and as a personal value.

In the course of his activities in the educational environment the individual changes it to achieve certain personal and social goals. In its turn the outer part of the environment changed by him and/or the other subjects exerts a return influence on the subject. Modern educational environment becomes the so-called participant of the development of a new world community. It is in the centre of problems related to the development of the personality of an individual and of different communities. The progress of the country is based to a greater degree on its progress in the sphere of education which provides as before the nation's advance.

According to the modern educational paradigm the main purpose of the system of education is the development of such a person's quality as integrity. The given paradigm is based on the principle of wholeness as a basic methodological principle of scientific cognition. "Whole" if each of its constituents is properly developed becomes greater

than their simple combination thus acquiring new quality. This statement is of special significance when speaking about the citizen's duties.

Thus, the educational environment belongs to the constant value which is relevant for the future, gives the basis for changes to come and determines the development of society on the way of progress or regress. There is no doubt that the educational environment properly organized creates various opportunities for the personal and professional development. These include a free choice while making a decision to enter the environment; a wide range of activities that could allow the individual to achieve the greatest progress, the utmost degree of self-expression; establishing dialogue relationship between the people of different age- and social groups; acquiring and experiencing different roles in a more emotional way; assimilating different media of the educational environment.

T.N. Jegorowa

MANAGEMENTENTSCHEIDUNG UNTER DEN BEDINGUNGEN UNVOLLSTÄNDIGER INFORMATIONEN

Staatliches Institut für Wirtschaft und Handel, Orjol, Russland

Es ist schwierig, eine menschliche Tätigkeit zu finden, in der man ganz genau und bestimmt zukünftige Ereignisse vorhersagen kann. Die Unbestimmtheit kann mit dem Eintritt der Ereignisse, der Zeit ihres Eintritts, den quantitativen Charakteristika der Ereignisse usw. verbunden sein. Trotz solcher Unbestimmtheit sind wir täglich gezwungen, Entschlüsse mit Risiko zu fassen, weil nicht nur die Lösungen selbst die Ergebnisse unserer Lösungen beeinflussen, sondern auch viele äußere Faktoren, die wir unter dem Begriff „Umweltzustand" zusammenschließen werden.

Man muss die Situation der vollen Unbestimmtheit vom Risiko unterscheiden. Unter dem Risiko versteht man die Situation, in der man nicht genau weiß, was geschehen wird, aber man stellt sich die Wahrscheinlichkeit jeder dieser Ausgänge vor. Die Unbestimmtheit bedeutet das Fehlen der Informationen über die wahrscheinlichen zukünftigen Ereignisse.

Um das Niveau der Unbestimmtheit zu senken, braucht man zusätzliche Informationen. Dabei entstehen die folgenden Fragen: erstens, wie viel diese Informationen kosten, zweitens, wie viel Zeit braucht man die Informationen zu bekommen, und drittens, ihre Glaubwürdigkeit. Deshalb muss man die Balance Genauigkeit/Zeit und Genauigkeit/Preis halten.

In den Managementaufgaben können einige Arten der Unbestimmtheit vorhanden sein. Die Effektivität der Suche nach den optimalen Lösungen hängt von den Methoden der Beschreibung und der Analyse der in der Aufgabe vorhandenen Unbestimmtheit wesentlich ab, wie adäquat diese Methoden die reale Situation widerspiegeln können. Wegen der begrifflichen und methodischen Schwierigkeiten gibt es aber zurzeit kein

einheitlicher methodologischer Ansatz für die Lösung der Aufgaben, die die Elemente der Unbestimmtheit enthalten. Trotzdem gibt es eine große Zahl der Methoden, die die Entscheidung unter der Berücksichtigung der Unbestimmtheit zu stellen und zu treffen ermöglichen. Bei der Anwendung dieser Methoden muss man beachten, dass sie als Empfehlungsmethoden betrachtet werden können, und die endgültige Entscheidung trifft immer der Mensch.

Es gibt die Methoden, mit deren Hilfe die Aufgaben des Systemmanagements bei der Unbestimmtheit auf ein determiniertes Management gebracht werden können. Der determinierte Ansatz ermöglicht es, die Regler zu konstruieren, die das standfeste Verhalten der dynamischen Systeme bei der Unbestimmtheit der Elemente der mathematischen Modelle gewährleisten, die durch die Unvollkommenheit der Modelle (Ungenauigkeit der Parameter) oder Fremdstörungen (Unbestimmtheit der Eingänge) verursacht sind. Wenn die Grenzen der Unbestimmtheit der Elemente vorhanden sind, verwenden die Regler diese Informationen bei der Anwendung der Rückkopplung. Beim Fehlen der Informationen über diese Grenzen werden anpassungsfähige Regler verwendet.

Makhira Idayat kyzy Khalilova
Yasin Khalaf ogly Khalilov
Mubariz Medzhid ogly Akhmedov

A STUDY OF ADSORPTION OF A WETTING AGENT ON PARTICLES OF CALCITE-CONTAINING ROCKS

Institute of chemical problems named after M.F. Nagiev of the Azerbaijani Academy of Sciences, Baku, Azerbaijan

It is known that hydrophobisation of powder-like materials takes place when a thin layer of wetting agents settles on the particle surface. In doing so, this layer has to stay on the surface during the period of storage and use of products in various industries.

It is known that by determining the ratio of physical and chemical adsorption of a surface-active agent it is possible to make a conclusion about the intensity of hydrophobisation and the hydrophobic shell structure.

The objective of the present work was to research the characteristics of the adsorptive interaction between the particles of calcite-containing rocks - limestone, marble and chalk - with the stearic acid. The choice has fallen on these rocks as objects of the research because, in spite of the identical chemical composition, they differ significantly in their microstructure and content of active centres on the surface of their particles. In order to study the powders of these rocks which passed through meshes No. 0045 (45 μm), the powders were processed by a defined wetting agent in the amount of 1% from the powder mass.

The ratio between the number of chemically and physically connected molecules was determined by means of stripping curves of the wetting agent taken from the particles of the rocks placed into an inert solvent.

We discovered that at temperatures up to 60°C the desorption changed only insignificantly, but in the temperature range 60–70°C, which corresponds to the melting point of synthetic fatty acids of C_{12}–C_{20} fraction, the desorption increased abruptly, reaching 49% in the case of chalk. If the temperature was further increased, the desorption remained the same, although the surface of particles had 0.51 weight parts from the initial amount of the wetting agent. Thus, from the total amount (1%) of the wetting agent, only 51% were chemically bound, and the remaining 49% were connected to the chalk surface by means of physical connections.

We also found that the chemisorption was the strongest in the case of chalk (51%), which was explained by a larger number of active centres than on the particle surface of other rocks. In the cases of limestone and marble, the content of chemisorptive molecules of the wetting agents was 42% and 38%, correspondingly.

This way, by means of the analysis of the research results it is possible to make the following conclusion. In spite of the identical chemical composition, the interaction character of the calcite-containing rocks with the stearic acid is different, which, in our opinion, is connected to the difference in the particle structure of these rocks and a different amount of active centres on their surface.

M.V. Khvorost
V.I. Dyakonow
K.V. Danova
V. V. Malysheva

ANALYSIS OF THE WAYS INCREASING THE ECOLOGICAL SAFETY OF HIGHWAY TERRITORIES

Kharkov National Academy of Municipal Economy, Kharkov, Ukraine

Solution of the problem how to increase highways safety level problem for the environment of large industrial cities is one of the main problem for modern megalopolises. Constant growth of the vehicles number leads to increase of ecological danger for residents, and worsens the quality of life near highways and renders the adverse effect on the people's health. The total environmental pollution, which is caused by means of transport vehicles in general view is divided into three types:

1. the dust and gas contamination of the air by dangerous substances, which are formed due to the movement of vehicles on the roads;
2. vibroacoustic pollution which consists in the harmful radiation of acoustic vibrations in the sound and infrasonic frequency ranges as well as in vibration;
3. the electromagnetic pollution caused by the contact system w.ith voltage of 600V urban electric transport, and 3 kV for supplying the trains with power.

Each of the transport means has the individual ecological pressure for environment, which is formed from the above-mentioned components. Value of the load depends on the characteristics of the vehicle and the characteristics of its movement on the city roads.

Compare of the values of emissions of main dangerous substance by means of transport

shows that the most harmful in terms of gas emissions is the road transport. The studies have shown that road transport in most large cities of Ukraine causes from 40 to 70 % of the total atmospheric pollution.

In connection with proved harm of chemical substances contained in discharge gas of motor vehicles for environment and people who work or live in homes that are located close to highways, there is an impelling need of development the organizational-technical measures which would prevent the formation and spread of harmful emissions into the atmospheric space. Analyzing the measures aimed to improve the condition of air environment near the transport highways, it can be concluded that by two criteria - gas contamination and traffic flow noise - they are contradictory. So, for example, as the average speed of vehicles movement in the stream directly affects on the equivalent noise level, it is reasonable to decrease this value in order to reduce the acoustic load levels. However, this, in turn, causes the increasing of gas contamination in this area of the transport route. Most of the measures that would be definitely effective in the aspect of air pollution and reducing the acoustic load (for example, tunnels) require significant investment. Creation of buffer zones that could protect dwelling zone from noise, dust and gas contamination of the traffic flows contradicts tendencies of compaction of urban development in cities and can not be implemented for the already formed architectural layout. Green plantations which are planted to protect buildings from dangerous and harmful factors of highways must be planted with width of more than 20 meters to obtain a significant effect, which is practically impossible in the cities with their deficit of area.

Thus, the most effective measures that would protect dwelling zones from the harmful effects of transport highway, is the implementation of local measures and means, which would allow to substantially improve the environmental pressure on the surroundings. Such measures include the installing Y-shaped protective screens, which allow not only reducing the acoustic load on highway territories, but also prevent the spread of dangerous substances, which are generated by vehicles.

N.Ya. Kirilenko

AUTOMATION OF A MICROCLIMATE SUPPORT SYSTEM

Moscow State Regional Social Humanitarian Institute, Kolomna, Russia

The development of pneumonic tools used for the automation of microclimate support processes which take place in a rough environment is an important task. It is particularly important when introducing resource-saving technology, the working substance of which being air.

In their parameters, fluidic diodes are practically the same as conventional diodes, which explains close attention to them, particularly when using them in automation for environmental parameters regulation.

The author suggests the following ways of increasing the efficiency of fluidic diodes with reverse flow discharge based on gas-dynamic phenomena which occur during a jet discharge:

- an increase of the reverse flow discharge by means of installing reverse flow elements in the cone, in the pipe before the cone, elements connecting the cone to the pipe of the fluidic diode with the increased turbulence;
- creation of appropriate conditions in order to capture the flow within the diode with the orientation of jet pipes;
- creation of conditions in order to discharge the reverse flow through the flank of the vortex diode.

An increase in the diodicity degree of a turbulent diode can also be achieved by making additional openings on the flank of the cone with radial lobes, by an advance jet swirl, using the effect of jet adhesion to the neighbouring surfaces.

Due to the jet transition caused by helical guide vanes situated on the inner surface of the cone, the riblet-structured jet has a wide aperture angle (up to 44°). Rotary vanes installed in the cone exit section create an even larger aperture angle of the exiting jet. It is possible to increase the aperture angle up to 58° by means of the adhering effect which occurs if the angle between the jet margin and the rotary vanes is no more than 7°.

An additional increase of the diodicity of the turbulence diode can be achieved by placing a circular cavity in the pipe before the cone. An exiting jet pulsates. The pulsation has an additional effect on the jet turbulence and the increase of the jet aperture angle. The flow instability source in the pipe with the circular cavity is the boundary layer with the inflexion point in the velocity profile. The larger the separation, the larger is the instability. The separated flows have their own oscillation frequency at which they get self-excited. The separated flows are stable on either side of this frequency. The self-excitation of oscillations takes place due to the feedback mechanism. The resonance occurs when one of the frequencies generated by the feedback mechanism is close to the oscillation frequency of the boundary layer. The regulation of the jet frequency is achieved by the change in the volume of the resonant circular cavity.

In order to reduce the flow slip before the receiver tube of the diode with the orientation of the jet pipes, the tube receives a bevelled cut, with the help of which it is possible to catch the majority of the direct air flow. The best conditions for this are observed when the intersection of tube axes is situated on the plane perpendicular to the axis of the receiver tube, the plane passing through the closest point of the bevelled cut. The diodicity regulation of the discharge is achieved by a change in the location of the bevelled cut.

An increase in the diodicity of the discharge of the vortex fluidic diode is achieved by the flank of the cylindrical combustion chamber with the formation of the slots oriented towards the spin nozzle. When the flow moves in the forward direction, the traverse slots receive exhaustion, in the result of which the atmospheric air is mixed with the inlet air in the cylindrical chamber, which leads to an increase of the direct discharge. In the

reverse direction, a part of the flow is discharged into the atmosphere through the slots. The resistance in the reverse direction is significantly larger than that in the forward direction. The regulation of the diodicity degree is achieved by a change in the width of the traverse slots.

A.E. Kondratiev

AFTERPURIFICATION OF SEWAGE FROM GALVANIC PRODUCTION BY USING THE CATALYTIC FILTERING BATCH "KAOS"

"Ecocentre" Ltd., Velikiye Luki, Russia

It is well known that the technogenic influence on the environment increases with the industrial growth. A special part in this process is given to the use of water resources of the planet and the pollution of water bodies by various harmful substances, among which heavy metals and their compounds are characterised not only by their general abundance but also by high toxicity, mutagenicity and the ability to accumulate in living organisms.

Industries using galvanic technological processes are among the ones being particularly dangerous for the environment. In spite of various water treatment facilities installed on production sites, the discharge of heavy metals into sewage is considerably high. The situation is aggravated by the fact that heavy metals are not only contained in industrial sewage but often also in surface flows from industrial sites.

Generally all industries which use electrochemical production have local treatment facilities for industrial sewage. However, the majority of these facilities are not able to guarantee efficient purification of sewage in order for it to correspond to the required standards. A reagent is most commonly used for the purification of sewage from heavy metal ions. The main steps of this purification method are described here. Sewage is put into a reactor with a reagent for increasing the pH level of sewage. During this process, there is an exchange reaction in which heavy metal ions combine with hydroxyl groups, form insoluble hydroxides and become a sediment.

An example of an exchange reaction:

$$FeCl_3 + 3NaOH = Fe(OH)_3\downarrow + 3NaCl$$

The ionic-molecular equation of this reaction is:

$$Fe^{3+} + 3Cl^- + 3Na^+ + 3OH^- = Fe(OH)_3\downarrow + 3Na^+ + 3Cl^-$$

Thus, the main point of the reaction comes to the interaction between the ions Fe^{3+} and OH^-, as a result of which a sediment of ferric hydroxide (III) $Fe(OH)_3$ is formed.

The reagent purification method of sewage from heavy metal salts makes possible to remove the major mass of heavy metals polluting the sewage, but it does not allow reaching the required quality of purification. What complicates the situation is the fact that each metal has its own range of pH values in which the exchange reaction with the formation

of the insoluble hydroxide takes place. If this pH value is exceeded, the settlement starts to dissolve again.

Various sorbents and ionite resins are used for advanced purification. However, sorbents are ineffective, and the main disadvantage of afterpurification by using ionite resins is their selectivity, i.e. each metal requires the use of a certain resin.

Our afterpurification method of sewage by means of a catalytic settlement (KAO) enables removing all metals in sewage in one run through the filter. In doing so, a vertical filter is filled by a special granulated alkalescent batch (KAOS). The sewage pH value is increased when passing through it. In every pH range a certain metal turns into settlement and stays on the KAOS granules. In this case, the batch acts as a catalyst and is not consumed. The formed hydroxides are not absorbed by the batch; they only settle on it. The regeneration of the batch KAOS is achieved by the reverse water current in order to remove the settlement from it without the batch being taken out of the filter.

This method is efficient, easy-to-work and safe. The costs for its application are significantly lower than those for other methods.

A.E. Konkabaeva
R.T. Bodeeva
G.M. Tykezhanova
B.M. Bakisheva
E. Seitov

ADAPTATION OF RESPIRATORY SYSTEM OF THE ORGANISM IN CONDITIONS OF AIR POLLUTION CAUSED BY SUPERPOISONS

E.A. Buketov Karaganda State University, Karaganda, Kazakhstan

Concentration of industrial complexes, enterprises of heat and power engineering, coal, building industry on the city territory causes permanent high level threat of air pollution and the occurrence of chronic bronchopulmonary diseases. As a result in the environment concentration of some toxic heavy metals especially lead, antimony, cadmium disastrously grows, this leads to increase of frequency of allergy, bronchopulmonary pathology, disease of gastrointestinal tract, inhibition of enzymatic activity, disruption of mental and physical development of young people. In view of aforesaid, in our opinion, the study of the characteristics of adaptation of respiratory system of people residing in various industrial regions with active enterprises of heavy industry is relevant.

We examined young people from three industrial regions of Central Kazakhstan: Temirtau, Balkhash and Zhezkazgan. The examined contingent consisted of 60 practically healthy people at the age of 19–22 years, with no bad habits, from one social group. Proper values and indicators of people residing in region without industrial objects served as control. The study of external respiratory function (ERF) was carried out on a portable microprocessor-based automatic spirograph NSC - 21/01 - «R - D» (Russia) with computer processing of the results.

The study of respiratory lung function with spirograph revealed a significant decrease

of indicators: VC, FVC, FEV1, PEF, FEF 25-50% in comparison with the expected proper values, and control ($P \leq 0,05$) among residents of all three examined industrial regions.

The obtained results are evidence of low rate of air flows and reduce of their volumes among young practically healthy people. Decreasing VC and FVC reduces the organism's ability to adapt to the implementation of physical activity and reflects the low reserve capacity of the organism. The worst results were received from Temirtau residents. Distribution of indicators by gender was also ambiguous; they were lower at men from Temirtau and Zhezkazgan than at women, and at men from Balkhash - higher.

Significant decrease in the rate of air flows and their volumes from the expected values may be caused by the increased resistance in the airways and the reduced elastic traction of lung tissue. According to the numerous studies, lasting impact of substances polluting atmosphere air to the airway epithelium leads to the development of airway inflammation and remodeling, since it is the first barrier to inhalable particles and allergens. Damage of the epithelium under allergic or other airway inflammation plays a key role and increases the sensitivity of nerve endings of the airway lumen, which contributes to a reflectory mechanisms leading to an increased release of acetylcholine. Acetylcholine of neuronal origin in the airway epithelium may cause cell reactions associated with the reconstruction of the airway wall, including thickening of the smooth musculature wall (J. Metzen, F. Bittinger at al., 2003). In particular, the relationship between the thickness of the reticular basal membrane and forced expiratory volume in the first second was clarified, the thinner membrane, the lower forced expiratory volume in 1 second.

Conducted functional studies of the respiratory system allowed to determine level of stress and reserve capacities of the system. In addition, they can serve as indicators for monitoring the environment and air pollution.

N. Kopteva
O. Ulanova
P.W. Graeber

ENTWICKLUNG VON DEPONIEGASPROGNOSE FÜR SIEDLUNGSDEPONIEN DER BAIKALREGION (RUSSLAND)

Lehrstuhl für Rohstoffaufbereitung und Umweltschutz, Technische Universität Irkutsk, Irkutsk, Russland
Lehrgebiet für Systemanalyse, Institut für Abfallwirtschaft und Altlasten, Technische Universität Dresden, Pirna, Deutschland

In den letzten Jahrzehnten Deponiebetreiben und Nachsorge stellen in Russland ein großes Problem dar. Die vorhandenen Verwaltungsregeln von Deponierung von Siedlungsabfällen kommen hauptsächlich von der Zeit der Sowjetunion und entsprechen den internationalen und europäischen Standards nicht.

Die Baikalregion liegt im Zentralteil Russlands und grenzt an die Mongolei und China.

Zur Region gehört der Baikalsee, welcher 23.000 km^3 Süßwasser in Trinkwasserqualität aufweist und 1996 als UNESCO Weltnaturerbe anerkannt wurde. Zusammen mit Siedlungsabfällen sind die Industriebetriebe die Hauptlieferanten umfangreicher Abfallmengen und zudem Ursache für zahlreiche Altablagerungen sowie flächenhafter Bodenkontaminationen und starke Emissionen.

Laut Experten des Föderalen Dienstes für die Überwachung Russlands (Irkutsk Abteilung) ungefähr 56 Millionen Tonnen Abfall war im Jahr 2011 auf der Deponie des Gebiets von Irkutsk begraben. Es zeigt, dass auf dem Territorium der Region Irkutsk etwa 900 Deponien gibt es, die eine Fläche von 4105 ha besteht. 2,5 % der gesamten Abfälle bildet sich in dieser Region von Russland. Eine der ältesten Deponien im hauptstädtischen Gebiet Irkutsk ist die städtische Deponie Irkutsk, die seit 1963 arbeitet. Die jährlichen Emissionen tragen erhöhte Konzentrationen von Treibhausgasen in der Atmosphäre bei. Der Zustand der Deponie erfordert eine detaillierte Risikobewertung, die Planung von Sammlung für die Sicherung der Deponie durch unkontrollierte Sickerwasser und Gas, als auch der Prognose der Kontamination und der Entwicklung der wissenschaftlichen Lösungen für die ökologische Situation zu verbessern.

Im Rahmen des Forschungsprojekts „Entwicklung des Biogasverwertungssystems auf den Deponien der Baikalregion" wurde an der TU Irkutsk das Potenzial von Deponiegas aus Mülldeponien prognostisiert. Die Berechnung von Emissionen aus der Deponien wurde mit drei Deponiegas Prognosemodelle Modellen durchgeführt: Gas Prognosemodell nach Tabasaran/Rettenberger, "Modell LandGEM" (EPA) und "Ukraine Deponiegas Model". Alle drei Modelle werden für Deponiegas Prognose in Europa, den USA, der Ukraine und Russland verwendet. Parallel im Labormaßstab wurde Lysimeteruntersuchungen mit Deponieabfällen durchgeführt.

Die Ergebnisse der Berechnung der Deponie-Emissionen haben gezeigt, dass die Deponien in Irkutsk ein bedeutendes Potenzial. Der maximale Gesamtbetrag von Deponiegas wurde von Deponiegas Prognosemodelle von Tabasaran-Retenberger produziert – 90,631 Mio. m^3/Jahr. Die minimale Gesamtbetrag wurde von LandGEM Model (USA) vorhergesagt – 22,393 Mio. m^3/Jahr. Die Periode einer vollständigen Vergärung von organischen Abfällen ist 45,86 Jahre und die spezifischen Biogasausbeuten - 4,55 kg/t Abfall/Jahr.

Die Wirksamkeit von Deponiegasnutzung zur Energiegewinnung sein das Potential Deponiegas und anderen Faktoren abhängig. Die Deponiegasnutzung ist nur wirksam für die gleichzeitige Beobachtung von einigen Kriterien: Vol.-% Methan in Deponiegas, Insgesamt Deponiegas Potenzial, Minimaler Gehalt von Deponiegas, Dauer des Managements, Energieverbraucher. Im Forschungsprojekt auf der Grundlage der Ergebnisse der Deponiegasprognose für vier Deponien Baikalregion wurden die Kriterien der Durchführbarkeit der Deponiegasverwertung zum Energiebedarf berechnet. Damit erfüllen nur zwei Deponien Angarsk und Irkutsk diese Kriterien für eine effektive Biogasesverwertung zur Energieerzeugung. Für die Deponien Baikalsk und Markovo ist die Biogasverbrennung mittels Fackelsysteme vorzusehen.

Im Rahmen der Studie an der TU Dresden ist die Verwendung von Simulationsmodellen PCSiWaPro ® eingeplant, das in 2002 darin Dresden entwickelt war. Das Programm war für die Modellierung der Prozesse von Sickerwasser in den Deponiekörper, für die Projektierung des Systems der oberflächlichen Verdichtung, für den Einbau des Entwässerungssystems (Kapillarsperre) entwickelt. Das Forschungsprogramm PCSiWaPro ® werden unter der sibirischen Klima und meteorologischen Bedingungen adaptieren.

Es wird die technische Handbuch entwickelt, um das potenzielle Risiko den Deponien, die bestehenden Planung umweltverträglichen Betrieb der Deponie und ihrer späteren Schließung und Nachsorge zu bewerten.

I.M. Korobova

ENVIRONMENTAL PROBLEMS AND THEIR SOLUTIONS

Autonomous non-profit organization „The Northern Caucasus Academy of innovative technologies in education and science", Pyatigorsk, Russia

The environmental situation in Russia today, as well as all over the world, can be characterised as close to critical. Among environmental problems, it is possible to single out the following:

- thousands plant and animal species have been destroyed and are being destroyed;
- forests have been significantly destroyed;
- the available reserve of mineral resources is decreasing very fast;
- the world ocean does not only suffer from the destruction of living organisms; it also seizes to be the regulator of natural processes;
- the atmosphere in many places is polluted up to maximum permissible concentrations and there is shortage of clean air;
- the ozone layer, which protects every living being from the space radiation, is partly destroyed.

Which measures have to be taken in order to solve the environmental problems? First of all, it is necessary to move away from the exploitative technocratic approach to nature and to look for harmony with it. In order to do so, it is necessary to take a whole range of purposeful measures for the environmentalization of industry, e.g. nature-conservative technology, obligatory environmental assessment of new projects and creation of waste-free technologies of the closed cycle.

Another measure, the aim of which is to improve the relations between men and nature, is a rational self-limitation in the consumption of natural resources, particularly that of energy resources (oil, coal) which are utmost important for the human life. According to the calculations of international experts, if we proceed from the modern consumption level, the coal resources will be sufficient for 430 more years, the oil and

natural gas resources for 35 and 50 years, correspondingly. The time limit, especially that for oil, is not that large. In this regard, it is necessary to make rational structural changes in the world energy balance and shift it towards the use of nuclear power. Moreover, it is necessary to look for new, efficient, safe and harmless energy sources, including space energy. However, a perceptible effect from all the mentioned and other measures can only be achieved if all countries unite their efforts in order to save nature.

At present, interstate instruments for cooperation are coming on a qualitatively whole new level. There are international conventions on environmental protection, various combined developments and programmes are carried out. There is a significant increase in the activity of environmental NGOs. However, it is necessary to admit that due to a very different level of the social and political development of different states, international cooperation in the environmental field is quite far from perfect.

Another direction for the solution of the environmental problem, which can be the most important solution in future, is the formation of environmental consciousness in the society, understanding that nature is another living being which cannot be dominated without doing it and people harm. Environmental education and upbringing in the society have to be organised on a national level and be implemented from early age.

A threat to human beings to disappear as species has to make each and every one of us to reconsider our values and actions. Our destiny only depends from us and it depends from us now. That is why we need to unite the efforts of every man and woman on earth to avoid the danger for all the living on earth.

Elena Kotsar
Julia Antykova
Bronislav Kotsinski

ENVIRONMENTAL, TECHNOLOGICAL AND ECONOMIC ASPECTS OF DEVELOPING AND CONSTRUCTING OBJECTS WITH CONDITIONING SYSTEMS FOR RETURN WATERS FOR TECHNICAL PURPOSES AND PRODUCTION OF COMPOST IN ORDER TO IMPROVE SOIL FERTILITY

LLC „UniLOS-U", Kiev, Ukraine

The solution for the problem of preservation of environment and life-sustaining conditions for the mankind is largely determined by the state of water resources, the main of which are fresh water and fertile soil. The present work gives an overview of environmental approaches for taking optimal engineering solutions in the field of developing and constructing facilities and systems of water economy which belong to water consumption objects - industrial and agricultural companies as well as municipal service sector.

Water supply and water disposal are inseparably connected by means of a hydroecological reservoir of fresh waters (rivers, lakes, reservoirs, ground waters). Fresh water is taken from

natural reservoirs for drinking and technical purposes. These natural reservoirs also receive return waters which already changed their state (natural properties and qualities) during the process of economic use, contact to raw materials or anthropogenically stressed natural environment.

During the purification of return waters discharged into surface reservoirs or underground hydroecological reservoirs, the main objective is to reduce the concentration of controlled contaminants in order for return waters to correspond to standards. The cost of return water purification lies between 0.5 to 2.0 euros per square meter of return waters. As a rule, sewage treatment facilities use mechanical and aerobic biological treatment which require large territories, energy resources and do not guarantee a complete restoration of the full biological value of the treated return waters. When return waters are discharged, only 20 quality parameters are controlled; however, the list of contaminants which can be present in return waters has more than five thousand items.

A practical way of solving the problem of natural water resources protection from depletion and pollution is the development and implementation of separate water supply systems - one for fresh water and another for technical water - and using conditioned return waters in the systems of technical water supply. The quality of return waters is guaranteed by using methods, processes and equipment which give them qualities satisfying the consumer. A repeated use of return waters for technical purposes makes possible to save fresh water and not to discharge return waters into natural water bodies at all or only discharge return waters purified up to the required standards in much smaller quantities. When conditioning return waters for technical purposes, the methods and facilities for their treatment are much simpler and cheaper than those for their discharge into water bodies. The conditioning is directed towards qualities and properties of return waters which would guarantee the specifications (sanitary and hygienic safety and properties) required for a certain technological process. In most cases, in order to obtain return waters of the required quality, it is sufficient to remove suspended matter and pollutants of colloidal dispersion, stabilize and disinfect them (to treat them by using physical and chemical methods), which is by 35-60% cheaper than their treatment for the discharge into natural reservoirs. In comparison to water treatment facilities for the discharge of return waters into natural reservoirs, the saving of industrial areas for the construction of return water facilities for technical purposes is 55-70%. The cost of return water conditioning for technical purposes lies between 0.3-1.5 euros. Furthermore, the return water conditioning for technical purposes meets the requirements of natural water resources preservation - fresh water and fertile soils - and saving them from depletion and pollution.

By means of conditioning the return water sludge which forms during the treatment of polluted water with the help of the biotechnology (composting), it is possible to use the obtained biocompost in order to increase the soil fertility and improve its structural and mechanical properties. The return water conditioning facilities with the later use of the sludge as compost are successfully implemented in the Ukraine.

E.Yu. Kozlyakevich
A.L. Podolsky
E.I. Tikhomirova

ECOLOGICAL MONITORING OF SOIL CONTAMINATION WITHIN NATURAL PROTECTED AREA ADJACENT TO A BIG CITY

Yuri Gagarin State University, Saratov, Russia

One of the major environmental problems of urban environment is protecting green zones (city parks, etc.). Arboreal vegetation provides comfort to city residents, regulates (to a certain extent) gas composition and purity of urban air and climatic characteristics of urban areas, reduces noise factor, and also serves as a source of esthetic perception.

Polluting substances may accumulate in ecosystems for a long time, and one of places of their accumulation is represented by soils. Therefore, determination of soils ecological condition is an important component of complex monitoring of environment quality in urban and suburban recreational areas. Our study was aimed at determining an effect of proximity of sampled soils from the city limits on the accumulation levels of heavy metals.

With this goal in mind, we grouped all 134 forest management sections of the Kumysnaya Polyana Natural Protected Area into three zones: nearby (directly at the city limits), medium (at a greater distance from the city) and remote (the most distant from the boundaries of Saratov). Using a computer program generating random numbers, we selected eight forest management sections within each zone.

Each of those forest management sections was sampled at five sampling locations. In 2012, in each of 120 sampling locations, we collected 200 cm^3 of soil for subsequent analyses. Soil samples from five locations of each forest management section were thoroughly mixed, and soil extracts were prepared. Values of concentration of heavy metal cations (cadmium, copper and lead) were determined by using standard potentiometric techniques. Then, the results of analyses on each contaminant were averaged for each proximity zone. The obtained data was treated by statistical analyses. The results of our research are presented in the following table:

Soil acidity and the content of heavy metals within Kumysnaya Polyana Natural Protected Area

Zone / Concentration, mg/kg of soil	pH	Cd^{2+}	Pb^{2+}	Cu^{2+}
Nearby	7,11 ± 0,11	0,0216 ± 0,0088	3,55 ± 0,41	0,0491 ± 0,0138
Medium	7,18 ± 0,07	0,0008 ± 0,0001	1,43 ± 0,09	0,0026 ± 0,0003
Remote	7,27 ± 0,13	0,0006 ± 0,0002	0,52 ± 0,07	0,0008 ± 0,0001
The probability of no difference among the zones: P	0,599	0,011	<0,001	<0,001

Thus, we discovered highly significant distinctions in heavy metal concentrations in soils depending on proximity to the city limits. The greatest concentration of investigated soil

pollutants were found in a zone adjacent to the city whereas the smallest one was characteristic to the remote zone. Therefore, proximity of a natural forested area to a large industrial city bears considerable threat for suburban ecosystems. Despite the long-term protected status of this territory, the exact sources of suburban soil pollution may be difficult to establish. In this regard, the important result of our pilot study was confirmation that ecosystems of the Kumysnaya Polyana Natural Protected Area contain considerable concentrations of pollutants due to accumulative capability of soils.

P.V. Krivoshapkin
I.V. Mishakov
A.A. Vedyagin
V.I. Mikhailov

SYNTHESIS OF FILAMENTOUS CERAMIC MATERIALS USING MACRO- AND NANOSTRUCTURED CARBON TEMPLATES

Institute of chemistry of Komi Scientific center, Ural Branch of RAS, Syktyvkar, Russia
Boreskov Institute of Catalysis, Siberian Branch of RAS, Novosibirsk, Russia
Novosibirsk State Technical University, Novosibirsk, Russia
E-mail: mishakov@catalysis.ru

The enhanced interest to micro- and nanofibrous forms of ceramics is conditioned by their wide range of application. The most perspective applications are currently the fields where ceramic fibers are used as a catalyst carrier or raw material for production of mixed catalysts and reinforcing elements of ceramic and polymer materials as well as a drying agent in various chemical and petrochemical production processes. There are a number of documented techniques for production of the micro- and nanoscale ceramic fibers. Among their key disadvantages are the high energy consumption and low length/diameter ratio of fiber.

In our research we have applied the sol-gel method as a route to prepare the ceramic fibers. The selected technique is based on fundamental regularities related to formation of colloid systems and well known as a common way to prepare the nanoscale particles and fibers as structural elements of nanomaterials. This approach makes it possible to obtain very small particles varying from a few units to tens of nanometers in size.

This work demonstrates a rather simple and versatile method for the preparation of ceramic micro- and nanofibers based on impregnation of different burnable precursors (cellulose, carbon fibers) served as a template material. The synthesized ceramic materials have been found to have well-ordered filamentous structure (microfibers and microtubes) and possess thermal properties suitable for applications in refractory ceramic membrane materials.

This work was supported by the Russian Foundation for Basic Research (grant No. 13-03-90729).

Lyudmila Krupskaya
Valentina Zvereva

PRIORITIES IN ECOLOGICAL SAFETY CONTROL OF MINERAL PROCESSING WASTE IN FAR EASTERN FEDERAL DISTRICT (FEFD), RUSSIA

Pacific National University, Far East Forestry Research Institute, Khabarovsk, Russia
Far Eastern Federal University, Far Eastern Geological Institute of Far Eastern Branch of RAS, Vladivostok, Russia

It is well known that for mining industry development in FEFD the productive lands are withdrawn mainly from the forest resources. Great volumes of mining wastes are accumulated and stored in tailing dumps. Economic activity in the 20th century seriously caused damage to ecosystems. The operational impact on the environment in mining has menacing proportions not only in Russia, but also in FEFD. In accordance with the Principles of National Policy in Ecological Development of Russian Federation until 2030 one of its main tasks is the restoration of the disturbed environmental systems. Its aim is environment impact decrease and liquidation of the ecological damage, connected with past economic and another activity in the 20th century, mining complex including. Generalization of the literary sources for assessment of ecosystems state and population health in the zone of mineral by-products processing indicates that this problem is urgent in FEFD.

The tailing dumps with toxic wastes located near mining settlements are of a serious concern, as there is no technology of their recultivation. The study of this problem shows that the negative impact on the environment reached the level exceeding the restorating natural forces. Exceeding of MPC of arsenic, copper and other heavy metal (HM) ions by 4 - 8 times in the snow cover was revealed, the samples were selected at a distance of 1.5 km from the tailing dump. High concentrations of the gross HM forms in soil- plant cover were revealed for arsenic, zinc, copper, cobalt, lead, exceeding MPC by 2-19 times. For example, the total contamination index in soils of this region was 149. Structure and functioning of microbiocenoses are disrupted. The hazard index in view of HM impact on human respiratory organs proved to be 77 on the average for FEFD for the suspended material, sulfur and copper dioxide.

In reference with the above, the authors consider it necessary to outline the priorities in providing ecological safety of mineral processing toxic wastes in FEFD. They are increase of research for the problem of soil fertility recreation of disturbed lands, development of the regional Program of Land Recultivation and Technology, improvement of legislation, creation of the Fund for Recultivation and in future the State Fund of Retainment Fees. We do not know and nobody knows, what occurs on the concrete disturbed lands with tailings dumps containing toxic wastes. Therefore in the near future it is necessary to make an inventory and ranking of the disturbed territories due to their ecological state and to

organize scientific testing areas for development of advanced studies and technologies of reproduction of the lands disturbed by tailing dumps. Formation of the Fund for Recultivation in FEFD will make it possible to accomplish scientific and technical tasks to solve the problem of environmental safety of technogenic objects and liquidate the ecological damage of mining caused by its past activity in the 20th century, in accordance with the Federal Targeted Program until 2025. The report presents the results of experiment for creation of the method of tailing dumps toxic wastes recultivation using innovation approach. Its novelty is confirmed by RF Patent (2013) (authors: Krupskaya L.T., Zvereva V.P. and others).

Valery Kurochkin

TECHNOLOGY OF REDUCING THE GREENHOUSE GAS EMISSIONS IN THE STORAGE AND PROCESSING OF MANURE AT THE LIVESTOCK AND POULTRY FARMS

OOO ECBIT, Kiev, Ukraine

The cattle manure emits very strong greenhouse gases - methane (CH_4) and nitrous oxide (N_2O) and ammonia (NH_3). According to the Intergovernmental Panel on Climate Change (IPCC), nitric oxide increases the greenhouse effect in 310 times, and methane – in 21 times, more than carbon dioxide, which is considered the main reason of this effect.

To solve this problem, a technology that inhibits the activity of microorganisms producing methane, nitrous oxide and ammonia, liquefied manure and creates good conditions for the microorganisms in the hamate binding nitrogen compounds is submitted. This technology leads to the following results :

1. Improving animal welfare and reduce production costs

It is no secret high cost of production. For example, in Ukraine and Russia, the production cost of 1 kg of meat is 1.2 - 1.3 Euro. This cost is not higher than 1 Euro in Denmark, a country with an incomparably higher price for energy, food and labor costs. Increased feed consumption, heavy losses and power-consuming production falls in production costs. The cost reduction problem must be solved in complex: first of all - through an upgrade of the premises and the introduction of new technologies of maintenance and care of the animals, good hygienic conditions, proper manure removal from the premises.

2. Good and reliable solution of the complicated environmental problem.

Intensive livestock industry generates a number of unavoidable environmental problems. One of them is the removal and disposal of manure in large volume. One of the problems in the handling of the liquid manure in numerous farms in Ukraine is uncontrollable waste of water, which increases the amount of the liquid manure in the 3 -

5 times as compared with Denmark. Reducing the consumption of water, along with the reduction of the emission of harmful gases will lead to reduce requirements to the size and productivity of sewage treatment plants and manure storages.

3. Reducing the fertilizers in plant growing

The problem of the livestock is closely related to problems in plant growing and vice versa. There is the high cost of cultivation of cereal crops and low quality of animal feed in Ukraine. One of the reasons is an incorrect use of the substance properties of the manure. Farms are usually consider the animal manure as waste which is unsuitable for further use with the benefit. For example, the annual pig farm waste of 100,000 pigs contains 800 tons of nitrogen, 400 tons of potassium, 350 tons of phosphorus. According to the research institutions in Ukraine, the annual amount of liquid manure reached 30 million tons. At the same time, agricultural companies are spending huge amounts on the purchase of fertilizers.

A.G. Laptev
T.M. Farakhov
O.G. Dudarovskaya

PURIFICATION OF LIQUIDS BY THE EXTRACTION METHOD IN CROSS-FLOW STATIC MIXERS

Kazan State Power Engineering University, Kazan, Russia

Industrial waste effluents of enterprises represent systems in which chemical compositions are quite complex. Although there exist numerous methods of treatment of waste effluents, at present time the question of elaborate development of the most efficient cleaning method involving removal of admixtures up to the minimum concentration at the lowest possible expenses remains unsolved.

Among all the existing cleaning methods, liquid extraction has several advantages with respect to the other processes, namely: high process kinetics, usability at high initial concentrations of the recoverable component, low operating temperature (normally, the process is accomplished at the room temperature), high mass transfer rate between the contacting phases, ability of regeneration of the consumed reactants, ability of full mechanization and automation of the process.

The extraction process in the liquid-liquid system is accomplished in continuous flow columns or horizontal mixers-sediment tanks under mechanical agitation.

We propose to use static mixers with no mechanical agitation devices so that mixing is carried out through chaotic reorientation of the streams to achieve enhancement of the process efficiency with respect to efficiency achieved via conventional mixers. Static mixer's greatest advantages include exclusive reliability, ease of installation, compactness, allowing to incorporate them into existing process lines bearing the minimum expenses.

There exist numerous designs of static mixers such as those with screw elements, intermediate compartments, plate-type and crimped elements, etc. For enhancement of the interface surface area between mixture components, cross-flow packed-type mixers

filled with random packings can be used. Modern packings having shapes essentially differing from spheres help excitation of intensive turbulence in the flow core resulting in enhancement of the process efficiency.

Reliable calculation of mixing and mass transfer efficiency is a key to process flow improvement. Approach for evaluation of efficiency of packed-type static mixers based on the boundary layer models, theory of turbulent migration of particles and flow structure models is utilized.

Using the derived expressions, calculations are carried out for turbulent viscosity coefficient inside the packing, disperse phase transfer coefficient, shear stress, dynamic velocity, number of transfer units, mixing and mass transfer efficiency of static mixers filled with the random packings "Inzhekhim" and the Raschig rings. The obtained results indicate the packing "Inzhekhim" ensures greater mass transfer efficiency by 15-20% than the Raschig rings.

Static mixers equipped with the packing "Inzhekhim" are highly efficient and meet all the technical specifications of the industrial enterprises.

The proposed static mixers were installed at several enterprises including unit B-3p at JSC "Tobolsk-Neftekhim", MTBE unit at the gasoline plant of JSC "TAIF-NK", unit for removal of methanol from TAME at the gasoline plant of JSC "TAIF-NK".

A.G. Laptev
M.I. Farakhov
M.M. Basharov

MODELING, DESIGNING AND IMPLEMENTATION OF APPARATUSES FOR SEPARATION OF GASEOUS AND LIQUID MIXTURES

Kazan State Power Engineering University, Kazan, Russia
Engineering Promotional Center "Inzhekhim", Kazan, Russia

The report contains descriptions of various approaches and mathematical models used to represent processes of mixture separations at enterprises of the fuel and energy complex. For constructing the mathematical models, conservation laws and the boundary layer theory are considered. Solutions to the scale-up problem from a laboratory mock-up to industrial equipment are given. The carried-out calculations allowed designing apparatuses for removal of disperse phase and harmful admixtures from gases and liquids. Specifics of the apparatuses are in presence of several contact zones and high separation efficiency. The contact zones include random packing elements "Inzhekhim" as well as some vortical elements.

The random packing "Inzhekhim" represents a state-of-the-art alternative to Pall rings, Raschig rings and other similar packings. At the same bed depth, it ensures a greater throughput, smaller hydraulic resistance and higher quality of mixture separation. Both random and structured packings have roughness elements to enhance mass transfer

coefficient in the liquid phase. The packings "Inzhekhim" are easy to manufacture and install into the column.

One of the examples of modernization of mass transfer columns is a gas separation unit used during ethylene production at the block of removal of CO_2 from pyrogas by means of aqueous solution of alkali. Replacement of the Raschig rings with the new packing "Inzhekhim-2000" resulted in the decrease of hydraulic resistance by a factor of three to four and essential enhancement of chemisorption efficiency. Reduced were energy consumption for feeding the pyrogas, alkali consumption and losses of commercially valuable ethylene related to excess in CO_2. Payback period for the new packing is two months.

In addition, this packing has been successfully used in columns destined for fractionation of ethanol amines and ethylene glycols. Particularly, at the unit of fractionation of ethanol amines energy consumption was reduced almost by a factor of two due to the increase of distillation efficiency and optimization of reflux ratios in columns.

Besides, the packing "Inzhekhim" has been installed into a thermal deaerator at Kazanskaya TEC-3. The work resulted in the increase of efficiency of removal of dissolved oxygen from water by a factor of two with respect to the jet-type deaerator having been used before the modernization.

E.A. Lapteva
A.G. Laptev

ACCOUNTING FOR SCALE-UP IN CALCULATING EFFICIENCY OF INDUSTRIAL APPARATUSES

Kazan State Power Engineering University, Kazan, Russia

The method of coupled physical and mathematical modeling is destined to aid transition from mathematical description of the processes investigated at a contact device mockup to industrial apparatuses. It is well-known that denial to follow all intermediate stages of investigations is the optimal way of designing industrial apparatuses in which financial expenses, time of development and implementation are reduced.

The method is based on representation of a physical process in the industrial apparatus through a set of elementary phenomena possessing hierarchy of scales. This enables studying the phenomena in the mockup, performing scale-up and determining all model parameters by the variational method that utilizes the local potential in which the conservation laws must be met.

The system analysis aids formulating the principle of existence of hierarchy of phenomena in the industrial apparatus. Using the principle, phenomena of different scales can be considered separately from each other; interaction between them is accounted for afterwards. The approach simplifies development of mathematical models for complex chemical plants.

Investigation and description of the sought fields within an individual region of the working zone of the apparatus can be conducted independently from the remaining regions without using the actual apparatus by means of replacing the region with its physical model. The experiments aim to establish appropriate basis functions to describe fields with given accuracy. Some possible perturbations related to construction and operation of the apparatus provided their values are in an allowable range do not change the structure of the basis functions changing only the basis function parameters when scale-up to the industrial apparatus is needed. Searching for correct values of the basis function parameters for the physical fields for perturbations related to construction and operation of the industrial apparatus is accomplished through satisfying the laws of momentum, mass and energy conservation. Solution to the problem is obtained by the variational method in which boundary conditions of different kinds are satisfied. The variational method is related to constructing and minimization of a functional resulting in the so-called Euler-Lagrange equations which coincide with the laws of conservation of mass, momentum and energy.

Mathematical description of the individual region involves a structure of a basis function only for the case of perturbations related to construction and operation under which deviation of the function value from the exact solution of the balance equations does not exceed given error. If in the field of perturbations the perturbations magnitude exceeds an allowable error, the basis function structure is not preserved. In this case for achieving the correct process description, another basis function must be chosen; the basis function parameters must provide the minimum value of the functional and, consequently, lead to meeting the above conservation laws.

Thus, the method of coupled physical and mathematical modeling allows determining distributions of fields of velocity, concentrations and temperatures in the working zones of industrial apparatuses with the known accuracy through utilization of basis functions of the elementary regions obtained through mockup models.

D.F. Leontiev

APPARENT BIOTIC AND ANTROPOGENIC FACTORS INFLUENCING THE ECOSYSTEM OF THE BOREAL FORESTS

Irkutsk State Academy of Agriculture, Molodezny settlement, Irkutsk region, Russia

Environmental policy should guarantee the preservation of ecosystems and biological diversity within them. At the same time, it is not possible to eliminate the economic use of these territories. It is only possible to compromise if the occurring discrepancies are timely settled to the maximum.

Boreal forests with the territory of 1.2 billion ha comprise the largest biome of the planet. The area of this biome makes up approx. one third of all the forests in the world. They contain from 10 to 17 % of global carbon reserves (www.Sohrani-Mir.ru). Only

12% of the world boreal forests are under protection; approx. 30 % are involved into the economic use. Industrial harvesting and extraction of minerals, above all that of oil, gas and coal, are carried out. More than a half of the world industrial wood is taken from the boreal forests (www.priroda.su). Russia has at least two thirds of the boreal forests, the main part of them situated in Siberia. Russia also has the largest reserve of the boreal forests – 60%, Canada has half as many, and the rest is distributed among all other countries (www.geoglobus.ru).

According to the force of the differently directed influence of the biotic factors on the boreal forests, the first places belong to: a) insect pests – needle- and leaf-eating insect pests, which stimulate the damage caused by stem insect pests and parasitic fungi; b) birds – nutcracker (Nucifraga caryocatactes), exceptionally important for reforestation of cedar pine forests and forests with some cedar pines; c) mammals – beavers (Castor), which largely change the habitat, and elks (Alces), which can also change the habitat.

On the territory of Siberia, there are 20 million ha affected by the Siberian moth outbreaks (Gninenko, 2003). This is the result of the Siberian moth's (Dendrolimus superans sibiricus) influence on the boreal forests in the last quarter of the 20th century. A negative influence is also produced by other representatives of lepidopterous insects (Lepidoptera).

Factors which have a strong influence on the ecosystem of the boreal forests also include forest fires, which contribute to the worsening of the forest sanitary state, e.g. formation of stem insect pests areas and damage caused by fungi. The majority of forest fires is caused by people. For this reason, they can be treated as a transitional link towards anthropogenic factors. Above all, it is the industrial harvesting. Russia takes the leading place both in the number of forest fires and in the volume of industrial harvesting (www.Sohrani-Mir.ru). If we evaluate the effect of these factors on the example of Cis-Baikal (Irkutsk region), then the industrial harvesting and the average total amount of low, upper and underground fires are equal in their territory and comprise 160-180 thousands ha annually. In the period of the extensive industrial forest exploitation of the region, since 1961, the area of the industrial harvesting and forest fires has made up nearly 15 million ha. For the same period, the wood phytomass during the transportation from the territory has comprised no less than 3.0 billion m^3. The contribution of the use of other biological resources in volume and weight is only of a small significance.

The ecosystem is also influenced by the condensate recovery in Kovykta and the pipeline transport of oil and gas as well as the construction of the Baikal-Amur-Mainline. External plants of this kind influence the migration possibilities of hoofed animals. In particular, pipelines and railways are an insurmountable obstacle for the taiga reindeer (Rangier tarandus), which has been mentioned in many observations. It led to a catastrophic decrease in its number in several districts of the region. This process already began in the 1950s and 1960s with the construction of the "Taishet-Ust-Kut" part of the Baikal-Amur-Mainline, which crossed the Angara Range and the watershed of the rivers Ilim and Lena, across which these animals made their autumn migrations in the southern

direction. The same effect was observed during the construction of another part of the railway, further towards the Amur, in the 1970s and 1980s, because the migration courses were also crossed by the mainline.

Yu.Yu. Lobachev
A.L. Podolsky

SMALL RIVER VALLEYS AS REFUGES FOR AVIFAUNA: THE CASE-STUDY OF CHARDYM RIVER (THE SARATOV REGION, RUSSIA)

Yuri Gagarin State Technical University of Saratov, Russia

We studied the avifauna of Chardym River valley in its upper, middle and lower flow from November 2012 to August 2013. This Volga River tributary hosts the variety of landscapes including flood-plain forests built mainly by willows, silver and black poplars, and aspens; open habitats with reed beds and dense shrub thickets formed by various willows, Russian olives, rosebushes, etc.; and adjacent patches of agricultural fields and wild steppe (feather grass, fescue, and various grasses and herbs). Variable-strip line transect censuses were conducted in early morning hours during the winter, spring migration, breeding, and post-breeding periods at a total distance of 143.2 km. The results are summarized in Table 1.

Table 1. Annual dynamics of avifauna densities (individuals/km^2) in the Chardym River valley.

Species Groups (number of species)	Winter Densities	Pre-nesting Densities	Breeding Densities	Post-breeding Densities
Water birds (17)	11.96	50.50	60.41	144.14
Raptors (13)	3.13	15.76	17.76	51.56
Other non-passerines (17)	42.54	126.91	73.43	162.10
Titmice (4)	340.15	95.00	59.19	1003.11
Finches (9)	1055.77	792.73	236.10	830.57
Other passerines (56)	339.89	1035.71	1030.83	1714.82
Total (116)	1793.44	2116.61	1477.72	3906.30

The total of 116 bird species was detected in the area with cumulative densities at their minimum during the breeding period (96 species) and the maximum in post-breeding season (72 species). Various finches and titmice dominated bird communities all year round accounting for 65-86% of the cumulative abundance. In addition to those, Bank Swallow, Nightingale, Bluethroat, four Old World Warbler species and Yellowhammer were dominant breeding species.

Our results showed that the bird community of Chardym River valley included a

number of rare and endangered species. Of those, six are enlisted in the Red Data Book of the Saratov Region (2006): Honey Buzzard and Levant Sparrowhawk nesting in the area, White-Tailed Eagle found throughout the entire year except breeding season, wintering Middle Spotted Woodpecker, and Great Gray Shrike occurring late in winter and early in the spring. Sixteen other species are on the Annotated List of Species of Special Concern (2006). These include: Rough-Legged Buzzard and Graylag Goose occurring at spring migration, Marsh Tit detected in winter and post-breeding periods; and also Quail, Turtle Dove, Black Kite, Sparrowhawk, Goshawk, Common Buzzard, Kestrel, Red-Footed Falcon, Red-Backed Shrike, Starling, and Harriers (Montagu's, Northern and Western Marsh) breeding in various localities of the Chardym River valley.

Another unconventional species we found in the area is Syrian Woodpecker wintering and breeding in semi-open river valleys with scattered large willows and black poplars. Among the mammals of particular interest due to their inclusion in the regional Red Data Book or Annotated List, the presence of European mink, ermine, forest marten and badger in the study area (established either by direct observations, or by encountered footprints or excrements) should be noted.

Hence, we conclude on the special importance of the study area as a refuge for bird and mammal communities during all seasons of the annual cycle. It is therefore necessary to prevent further anthropogenic disturbance of the natural landscapes of the Chardym River valley and its tributaries and provide comprehensive water quality protection measures. These measures are crucial for maintaining the diversity and abundance of breeding and migrating birds of the Saratov Region as a whole.

V.G. Logachev
S.I. Shitikova

WOODS FIRE FIGHTING IN HARDLY ACESSIBLE REGIONS OF THE RUSSIAN FEDERATION

Tyumen State Oil and Gas University, Tyumen, Russia

Annually fires cause damage to the forestry of Russia worth 3-7 billion rubles, depreciating sometimes more than 200 million cubic meters of wood.

Woods fires are one of the most frequent phenomena, accompanied by high emissions of soot, smoke, and carbon dioxide (from 3 to 150 million tons per year) to the atmosphere. Moreover there is their rapid increase every 6-7 years. For the last decade a problem of woods fire fighting acquired a special importance due to a high environmental degradation.

The damage caused by fires is not only economic, but very much environmental – i.e. death of animals, shrink of the earth green zone, climate change, soil erosion, high atmosphere pollution (from 80 to 100 tons of smoke particles and 10 – 12 tons of mixture of such gases as carbon dioxide, oxides of sulfur and nitrogen). During the woods fire fighting fluorine-containing surface-active agents (SAA) are widely used, capable of causing serious damage to the environment, including irreversible animal genetic changes, the Earth's ozone

screen destruction.

The surface detection methods, used nowadays, are not effective, which affects the time of a fire detection and the time of their extinguishing initiation.

The fire fighting technical means as an airplane, helicopters can not be used in heavy weather. Delivery of mobile robots to the fire area is a complicated issue.

The use of fire-fighting paratroopers is related to a danger of their placement inside the fire areas and their death.

Thus, development and use of new fire-fighting methods and technical means, free of the above mentioned drawbacks, is highly essential.

The report considered the means of increasing the immediacy of delivering fire suppressants to the fire area with the use of speed carriers with subsequent accurate fire suppressants delivery to the fire seat. The method can be used for fighting the woods, steppe, and other fires, including the fires, initiated in the remote areas.

Besides, the technology enables to carry out the fire extinguishing procedure without personnel, normally participating during the fire fighting.

The indicated technical outcome is reached by means of satellite navigation systems and innovation devices.

In the center of the fire fighting process management monitoring of the current satellite information concerning the condition after the fire suppressants application is carried out, as well as the use of additional application, if necessary.

The innovation technical solution will give an opportunity to carry out fire extinguishing at any objects, with the help of the stated means on the territory of complicated relief, enables to extinguish any fires (ground fires, crown fires), as well as extinguishing revived burning areas, besides:

- the necessity to use personnel within the fire area is excluded;
- a short time and high accuracy of determining the fire position with the help of using the GLONASS system;
- higher efficiency of using fire suppressants by means of self-guiding delivery means according to signals of infra-red sensors.

D.V. Lozovoy

ENVIRONMENTAL CONTROL ON THE BAIKAL NATURAL TERRITORY

Research and Development Biological Institute of the Irkutsk State University, Irkutsk, Russia

The Baikal natural territory is a territory which comprises Lake Baikal, water protection zone close to the lake, its water-shed area within the territory of the Russian Federation, specially protected natural territories close to the lake as well as the territory stretching up to 200 km to the west and north-west of the lake. The total area of the Baikal natural territory

is 386 158 km^2, including the area of water of the lake of 31 500 km^2, a part of the Republic of Buryatia of 201 422 km^2, a part of the Irkutsk region of 97 628 km^2 and a part of the Chita region of 55 608 km^2. The area of the world natural heritage UNESCO is 89 000 km^2, including Lake Baikal (31 500 km^2), specially protected natural territories (25 200 km^2) and other territories (32 300 km^2). In its size, the Baikal natural territory exceeds the total area of all forest reserves and national parks in Russia, which is 317 000 km^2.

The Baikal natural territory is divided into the following environmental zones:

- central zone, including Lake Baikal with islands, water protection zone close to the lake and the specially protected natural territories;
- buffer zone, situated outside the central zone and including the water-shed area of Lake Baikal on the territory of the Russian Federation;
- zone of the atmospheric effect – territory, situated outside the water-shed area of the lake on the territory of the Russian Federation, stretching up to 200 km to the west and north-west to the lake, with economic entities having a negative influence on the unique ecological system of Lake Baikal.

The variety of contaminants, their sources of origin and transport to the Baikal natural territory is very large. On the territory there are numerous companies which extract and process mineral resources, fuel and energy sector industries, transport, construction, machine engineering, metal-working, chemical, medical, food, light and woodworking industries. At present, there are 623 companies on the Baikal natural territory which have to be environmentally controlled. 195 companies are situated in the central environmental zone, 316 in the buffer zone and 112 in the zone of the atmospheric effect.

The environmental control on the Baikal natural territory is carried out by an authorized federal executive body (federal environmental control) and executive bodies of the Republic of Buryatia, Trans-Baikal Territory and the Irkutsk region (regional environmental control) in order determined by the law of the Russian Federation and the law of the mentioned constituent entities of the Russian Federation. The environmental control is carried out in the area of rational use and conservation of natural resources, waste treatment, functioning of the specially protected natural territories, air protection, protection of water, forest, geological and land objects. The environmental control is permanently exercised, all offences against the environment are registered and offenders are administratively or criminally liable.

O.V. Lysikova

THE VOLGA RIVER AS CULTURAL AND AESTHETIC TOPOS OF TOURISM

Saratov State Technical University named after Yuri Gagarin, Saratov Russia

Modern tourism reflects historically determined and anthropologically endless multiplicity of ways to construct own local experience and identity. Modern practices of

tourism mean thoughtful and constructive message of organization of the whole travel. Currently, "an intent look of a tourist" becomes a universal notion. Analysis of modern sociological theories allows determining the concept of post-tourist and co-tourist and classifying practices of consumption of characteristics, symbols and destinations, which become more and more unified. In the age of global instability, the role of cultural heritage in the process of creationing images of national identity becomes the sphere of augmented research interest. In the focus of this interest there are the following matters: tourists' participation in the processes of globalization and cultural exchange, consumption and construction of cultural identities by means of tourism practices, production and construction of images and symbols of "one's own" and "other" cultures.

V.O. Klyuchevsky studied Russian history and unique national identity and singled out three elements, which had influenced the genesis of Russian soul. They were forest, steppe and river. According to this historian, Russian soul is close to a river with its smooth stream and cyclic recurrence of spring floods, which teaches an order and gives a feeling of peace. When in the end of the XIX century steamship tourism appeared, the river acquired the main role in articulation of new aesthetic principles. The following representations of Volga in tourist guide-books, films about journeys and visual mass media became attempts to coordinate a tourist's look that was able to appreciate the beauty of the scenery with adopted concept of Russian nature, which addressed its its moderate picturesqueness.

Panoramic landscapes and anthropogenic elements of Volga scenery are reflected in the art works of Russian painters of the second half of the XIX century. Artists took river trips by boats and motor ships, moved from one Volga town to another, made drafts, sketches and studies. Travels and artistic studies resulted in creating unique authentic landscapes showing the smallest details of the Volga scenery. In 1838, N.G. Chernetsov and his brother took a trip down the Volga River and created the panorama of its banks. In 1860's, A.P. Bogolyubov was travelling down the Volga River for a long time. Thanks to traveling together, I.E. Repin and F.A. Vasiliev produced drawings and canvases, among which the most colorful was "The view of the Volga. River Barges". "Barge haulers near the Volga. River" created by I.E. Repin after his travel through Volga towns showed that the 29-year-old painter was able to raise the genre of landscape of the epic level. The picture was sent to the World exhibition in Vienna where the audience and the experts unanimously recognized it to be the best piece at the Russian section of the exhibition. In 1887-1890, I.I. Levitan used to take trips to the Volga River during which he created the canvases "Evening. Golden reach of the river" (1889), "Refreshing breeze. Volga" (1895). In 1888 A.E. Arkchipov and his friends from Moscow school of Art, Sculpture and Architecture took off to a travel down the Volga River where he got the plot of his picture "the Volga River", which depicts emotional experience of the character by means of landscape painting. In 1900, Saratov artists P.S. Utkin and P.V. Kuznetsov started travelling by a boat down the Volga River from Simbirsk to Saratov. The beauty and uniqueness of the Volga scenery was depicted in the canvases by such painters as G. Soroka, A.K. Savrasov, L.L. Kamnev, F.A. Vasiliev, M.K. Klodt, V.E. Borisov-Mousatov, N.N. Doubovskoy,

A.I. Savinov, J. Weber. Travelling down the Volga River becomes a sacral way for artists finding an existential sense of their lives.

Thus, river trips and observing the Volga scenery are impulse for artistic activity. Painters come to understanding their need in spatial mobility along the Volga River, they become travelers themselves. The largest European and Russian river is a spatial object regularly recalled in academic and artistic discourses, which is also scenery and a place of observation for many generations of local residents and tourists. In a sense, the Volga River serves as a highlight of the national identity. It symbolizes historical succession of cultural heritage. It is a cultural and esthetic topos of tourism filled with personal images as a result of trips, places visited and artistic images.

A.A. Makarova
E.I. Tikhomirova
A.L. Podolsky
Z.A. Simonova

DESIGNING STUDENT SELF-STUDY IN THE COURSE OF TEACHING GENERAL PROFESSIONAL AND SPECIAL DISCIPLINES

Yuri Gagarin State Technical University of Saratov, Russia

We define design as a set of technologies used for organizing student self-study. It is crucial to develop a comprehensive model of organizing student self-study for special and general professional disciplines since they are responsible for shaping professional competences. Unfortunately, traditional forms of student self-study do not shape professional competences properly. From our standpoint, the most successful educational technology of extracurricular and creative independent work of the students studying these subjects is the project development.

Project-based curriculum is designed as a sequence of thematically linked projects and implements the principle of continuity and progressive complexity of the studied material. This approach is based on existing curriculum and the distribution of courses to be taken during each year of a four-year cycle. The project structure presumes subdividing a four-year meta-project into four structural components: the freshman project, sophomore project, junior project, and senior project. Each year's project is comprised of subprojects completed at each taken course. As a result, senior year students have all materials necessary for writing their interdisciplinary graduation projects ready by the spring term of the last year of study at the university. Summarizing the data from four years of study, students are able to complete their graduation projects without the aid of a tutor.

Let us consider the particular case-study of a project approach implemented at the Department of Ecology at Yuri Gagarin State Technical University of Saratov, Russia, for students majoring in applied ecology. The meta-project title is "The Analysis of Ecological Conditions in an Area". At their freshman year, students take the following courses taught by the Department of Ecology faculty: Geography, Geology, Natural Resource Management, General Ecology, Aquatic Science, Atmospheric Science, and Landscape Science. An

approximate topic of the generalized first-year-project is “Landscape Zoning of an Area”. Choice of areas is defined by research interests of the department faculty.

Under this freshman project, the following sample subprojects can be implemented within each particular freshman-year discipline:

1. Geology: “Geological Structure and Deposits of an Area”, “Geological History of an Area”, “Quaternary Geological History of an Area”;
2. Natural Resource Management: “Protected Natural Areas”, “Biological Resources of an Area”, “Water Resources of an Area”;
3. Aquatic Science: “Aquatic Regime of Water Bodies of an Area”, “Calculation of Water Content in the Snow Cover of an Area”;
4. Atmospheric Science: “ Climatic Study of an Area”, “Precipitation Regime of an Area”, “Adverse Weather Conditions and Their Frequency of Occurrence in an Area”;
5. General Ecology: “Population Dynamics of Living Organisms in an Area”, “The Problems of Introduced Alien Species in an Area”;
6. Geography and Landscape Science: “Landscape Zoning of an Area”, “Demographic Patterns of an Area”, “Geographical Fields of an Area and Their Characteristics”, “Core Structures of Landscapes in an Area”, “Industrial Network of an Area”, etc.

Similarly, annual projects are being developed for the sophomore, junior and senior years of study. Thus, at the time of writing their graduation project reports, students working on their meta-projects have all necessary materials acquired in the course of a four-year study cycle. During their last semester in school, they have only to put together all the materials in their graduation project reports.

The described approach is universal as it can be used for meta-projects of various topics. We therefore believe that student self-study organized in accordance with the reviewed algorithm would contribute to the preparation of competent specialists capable of solving professional problems independently.

T.A. Mammadova
N.V. Hasankhanova
X.Sh. Teyubov
E.N. Askerova
T.S. Latifova
V.M. Abbasov

OBTAINING C2-C4 OLEFINS IN THE PROCESS OF DEEP CATALYTIC CRACKING OF VACUUM GASOIL MIXTURE COTTONSEED OIL BY USING NATIVE HALLOYSITE

Y.H.Mammadaliyev Institute of Petrochemical Processes. ANAS, Baku, Azerbaijan
E-mail: mamedova.tarana@rambler.ru

Triglyceride based vegetable oils or animal fats have the potential to be a suitable source of fuel or hydrocarbons under the right processing conditions. These materials can be pyrolyzed to produce hydrocarbon rich liquid fuels and may have the potential to supplant a fraction of petroleum based distillates and petrochemicals, including a low molecular weight olefins.

As catalysts for deep catalytic cracking a mixture of vacuum gas oil (90%) with triglycerides of cottonseed (10%) were used industrial catalysts Omnikat-210P (I), Tseokar -600 (II), as well as mixtures thereof with the nanotube of hallosite clay (I A), (IIA).

Halloysite is made of tubular particles with hollow inner pores extending along its length. Its elemental composition is as follows: 34.9% Al_2O_3, 49.9% SiO_2, 0.5% Fe_2O_3, 0.1% TiO_2 and14.6% loss on ignition. Tubes are formed by multilayer roll of SiO_4 tetrahedrons and $AlO_2(OH)_4$ octahedrons so that silica comprises the external wall chemistry, while the alumina inner pore surface. Length of the tubes vary at 0.5 -2.0 micron range, external diameter at 50 – 100 nm and inner lumen diameter at 10-15 nm range. It has a specific surface area of 25.6 m^2/g and pore volume 0.08 cm^3/g, of which 99.2% correspond to the mesopore space. The different chemical structure of the outer layer and the inner sides of halloysite nanotubes attached of halloysites unique properties that do not exist in other nanotubes.

Hydrocarbon composition of gases produced during thermo-chemical conversion of mixture of vacuum gas oil with cottonseed is shown in table below.

Hydrocarbon gases, % wt ., inc.	Catalysts			
	I	Ia	II	IIa
	Temperature, 600°C			
ethylene	12,4	12,8	14,0	14,3
propylene	13,6	14,0	15,4	16,0
Σ butylenes	4,5	4,6	4,6	5,6
The total content of the olefin-containing gas, % wt	30,5	31,4	34,0	35,9
	Temperature, 650°C			
ethylene	17,6	18,1	18,0	18,5
propylene	12,05	12,5	13,15	14,0
Σ butylenes	7,65	7,90	7,05	6,8
The total content of the olefin-containing gas, % wt	37,3	38,5	38,2	39,3

As seen from these results, both the investigated basic catalysts showed approximately equal activity on the yield of ethylene and propylene. It showed slightly higher activity catalyst Tseokar-600.

Adding 10% halloysite to the base catalyst allows to increase the overall yield of olefin-containing gas at 0,9-1,9 % and 1,1-1.3 wt% and and reduce the formation of coke on the base catalyst at 2.8-3.6% by weight at 600 and 650°C respectively.

A.B. Mamonova

THE ISSUES DEALING WITH THE STRENGTHENING OF ECOLOGICAL SECURITY OF THE SOCIETY

Joint Stock Company "Novolipetsk Steel Plant", Lipetsk, Russia

Apart from the issues of steady development, much attention is currently paid to the strategy of environmental safety with regard to human activities. To ensure environmentally secure activities there must be required certain ecological norms to assess both the "limits of homeostasis", in terms of the structure and functioning of ecosystems, and the permissible level of anthropogenic pressure at which ecosystems are within the limits of homeostasis. The development of such standards is an extremely difficult problem which, in some cases, finds practically no solution.

One of the instruments to improve the environmental safety of the society is eco-labeling, which is aimed at developing the market and promoting the manufacture of products with improved ecological characteristics. To assess the quality of the product performance from an ecological point of view one should consider and determine the degree of its impact on the environment throughout the life cycle: from the raw material extraction to the stage of final disposal of the product.

The certification of products as to their conformity with international ecological standards is becoming increasingly important in the world economy. Exports from the countries pursuing the effective environmental policy tend to increase greatly. Governments of developed countries are actively supporting eco-production, as it contributes to the strengthening of the domestic market and an increase in the exports, helping in this way to solve economic and environmental problems. At present, 32 countries in the world use the standards adopted for the production of environmentally friendly products, 9 are engaged in introducing them, 15 are in the process of developing such standards.

Russia is still far from acting on the market of environmentally friendly products. And the main factor hindering the development of this market in our country is the absence of national standards for such products. The absence of a clear definition regarding the concept of an "eco-friendly product" and unsanctioned labeling on a large scale cause the very idea to be discredited with the consumers.

And yet, though in a sluggish way, eco-labeling is coming on the Russian market, the process being particularly active in capital cities. For instance, the system of voluntary ecological labeling of food products was introduced in 2004.

Following the above, it is the countries with the most stringent environmental standards that have turned out to be the most competitive in 21th century. Ecological labeling along with its purely informative function is becoming a means of advertizing and competition contributing at the same time to the guaranteeing of ecological security to the society. For that reason, ecological labeling aimed at improving ecological safety should take the right place among the priorities of the national economy.

E.V. Martynova
S.G. Sheina

ENVIRONMENTAL ASPECTS OF PROGRAMME REALISATION OF ENERGY SAVING IN THE HOUSING STOCK IN ROSTOV-ON-DON

Rostov-on-Don State University of Civil Engineering, Rostov-on-Don, Russia

The solution of energy-saving issues automatically leads to the solution of environmental problems our society faces today. One of the priorities worldwide is the solution of the problem closely connected to the energy efficiency issues, i.e. a decrease of the greenhouse gases emissions. The main part in the formation of the greenhouse effect is played by carbon dioxide CO_2,- gas with the direct greenhouse effect.

A weighty contribution to the reduction of the carbon dioxide content in the air can be made by energy efficiency measures in the housing stock which is responsible for approx. 30% of the greenhouse gases emissions in Russia. Energy efficiency measures must be supplemented by the assessment of the environmental effect.

A standard approach to the calculation of carbon dioxide emissions formed during combustion of organic fuel is the multiplication of the fuel volume by the emission coefficient for the given type of fuel:

$$ER_{CO2} = A \cdot k_{CARBON} \cdot NCV \cdot OXID \cdot 44/12$$

with A - fuel volume in tons;

k_{carbon}- emission coefficient for carbon in C/GJ;

NCV - net calorific value in GJ;

OXID - fraction coefficient of the oxidized carbon for the given type of fuel;

44/12 - conversion of carbon into CO_2.

In Rostov-on-Don, we developed a programme in order to increase energy efficiency in the housing stock. We analysed the structure of the housing stock in Rostov-on-Don and determined the potential heat savings from implementing a complex of energy-saving measures. These saving made up 1 047 580 Gcal, which is equivalent to 102 203 tons of oil with average combustion heat of oil being 10250 kcal/kg.

Guidelines for national greenhouse gas inventories developed by the Intergovernmental Panel on Climate Change (IPCC) determine coefficients for the calculation of greenhouse gas emissions into the atmosphere when combusting 1 ton of oil (k_{carbon} = 0.02 C/GJ, NCV = 41.868 GJ/t, OXID = 0.99). This way, by means of energy saving in the housing stock of Rostov-on-Don, the following emission of greenhouse gases can be prevented:

$$ER_{CO2} = 102203 \cdot 0.02 \cdot 41.868 \cdot 0.99 \cdot 44/12 = 310658$$

tons of - CO_2 equivalent.

According to the Kyoto protocol, one of the market mechanisms of reducing emissions

of greenhouse gases into the atmosphere is emissions trading. According to the data on the agreement between Russia and Japan from January 2011 about emissions trading and greenhouse gases within the framework of common projects, 290 000 tons of greenhouse gas emissions were valued at 13.8 $. Therefore, the economical effect from the implementation of the energy-saving programme for Rostov-on-Don is 4 287 077 $ or 150 047 685 rubles, with the exchange rate of dollar to rouble being 1 to 35.

This way, the realisation of energy-saving programmes in the housing stock does not only contribute to the solution of energy efficiency problems but can also make a weighty contribution to the improvement of the environmental situation and the reduction of greenhouse gas emissions.

A.R. Maskova
M.S. Klyavlin
E.G. Muchametzyanova
G.K. Aminova
G.G. Yagafarova

INVESTIGATION OF THE PROCESS OF PURIFICATION OF EXHAUST GASES FROM ISOBUTYRALDEHYDE IN THE PRODUCTION OF ISOBUTYRIC ACID

FSBEI HPE "Ufa State Petroleum Technological University", Ufa, Russia

One of the main tasks of socio-economic development of the society in our days is supplying of environmental safety of planned and existing facilities. First of all, the problem of ecologization of production processes relates to the petrochemical industry.

Petrochemical (organic) synthesis, which is based on a production of chemical products from raw hydrocarbons has become in our days one of the largest and fast-growing sectors of the national economy and has taken an important place in the economy of all countries with developed chemical industry.

In the development of the petrochemical industry one of the most important place is occupied by production of isobutyric acid (IBA), which is widely used for obtaining of high isomeric monocarboxylic acids, preservatives, chemical crop protection agents and other.

Stringent requirements of ecological and economic character dictate the necessity of development of IBA production's technology, which provide high intensification of the process and its safety.

Nowadays preferred way of IBA synthesis is the oxidation of aldehyde due to the development of the cheap isobutyraldehyde from olefins and synthesis gas obtainment. The IBA is not produced in Russia, although there is great raw material resources base. It is connected with absence of modern ecologically friendly ways of synthesis.

In this connection, the development of absorbents which provide the safe running of the process by reducing of the isobutyraldehyde content in the effluent gases during the production of isobutyric acid, is actual problem.

For the purpose of environmental safety of IBA production providing, we investigated the process of purification of exhaust gases from aldehyde by using of polypropylene polyamines (PPPA). PPPA were chosen as an absorbent due to the techno-economic reasoning, it is the availability in sufficient quantities of raw materials in the production and the possibility of utilization of used absorbents for synthesis of corrosion inhibitors. Composition of exhaust gases before and after treatment was determined by chromatographic methods. Purification of vapor-gas mixture was carried out at a speed of oxidizing gas current 10, 15 and 20 l/h.

As it follows from the presented data, using of polypropylene polyamines in the quality of absorbent, provides an efficient purification of effluent gases from the isobutyraldehyde. The degree of purification of aldehyde at a speed of the steam-gas mixture speed 10-15A/h reaches 99-100%. For supplying of extensive purification of exhaust gases from harmful contaminants in case of further increasing of vapor-gas mixture speed, it is necessary to increase the time of contact of the exhaust gases with absorbent material. With the reduction of isobutyraldehyde concentration in the vapor-gas mixture and wit the increasing of time of the exhaust gases with absorbent contact, degree of purification increases.

On the base of the received data, new, environmentally-friendly and low-waste technology of IBA synthesis was suggested. The process of liquid-phase oxidation of isobutyraldehyde is carried in a continuous process in reactor column with using of Panchenkov's nozzle in the presence of a catalyst - a mixture of cobalt acetates, manganese bromide and cobalt.

For the suggested technology we made a calculation of prevented damage from emissions of polluting substances in atmospheric air by well-known technique. On the base of calculation is established that the value of prevented damage from implementation of the proposed technology, in case of average volume of production isobutyric acid 60 tons/year is 156,5 thousand rubles/year.

Performed investigations allow to conclude, that developed technology of obtaining performed investigations is environmentally safe, because effluent gases of the process is quantitatively absorbed by proposed polypropylene polyamines.

E.A. Mazlova

THE SYSTEMS OF PROVISION OF ENVIRONMENTAL SECURITY IN OIL WASTE PROJECT MANAGEMENT

Gubkin State University of Oil and Gas, Foundation "National Environmental Management and Cleaner Production Center for oil and gas industry", Moscow, Russia

The existing national problems of oil waste prosessing, disposal and emplacement which are formed in oil production, transportation and processing, as well as wastes of used-up oil products are shown at the slide

For overcoming the problems connected with cumulative damage for environment from a numerous of old waste storages it is necessary to solve the represented problems.

Regardless of the fact that federal public authorities are apply force to implementation of integrated approach to oil waste disposal in the regions of intensive oil production, the field work are carried out inefficiently owing to above mentioned reasons

Firstly for passing the existing problems, it is necessary to create and implement information exchange between the main related parties

Nextly it is important to organize the cooperation between these stakeholders as public authorities and enterprises – the key waste producers, as well as companies which are provided oil processing services.

The Foundation «National Environmental management and cleaner production center for oil and gas industries" which was founded under the Gubkin State University of oil and gas, and Department of Industrial Ecology is participated in solving the said problems and cooperate both with public authorities and industry's representatives.

One of directions of our work is a promotion of advanced, ready for used standard design solutions to industry

Jointly with our partners from different industry's areas and with federal authorities it is created not only a system of statistical recording of produced oil wastes, but also of its classification, balanced collection and technological processing

The another direction of work – creating and implementing of organizational and process model of handling of drilling hydrocarbon wastes, starting form research of waste's properties, conditions of its formation and collection, technologies of processing and finished to training for personnel. The developed by our team projects of oil waste's hadling which were produced as a result of accident oil spills, are included the steps of oil waste excavation from contaminated areas, transporting to the place of treatment, application of special unit rendered possible of separation of oil products from solid body to soft levels, and finally reclamation works at contaminated sites.

The experience of carrying out of such works at the areas of oil waste's permanent production allowed to create a project of consolidated regional complex on oil waste processing

As far as waste processing technologies are commercially viable only with output of product form wastes, we offer to create such integrated models of waste processing where it is possible to produce whether petrols, or construction materials for various application.

The technologies officially accepted with our Center are ones for production of construction mixes for road filling, asphalt concrete, fuel bricks.

To solve the objectives of elaboration and implementation of regional oil waste management system we are armed with certain facilities placed both at the Gubkin State University and our partners in the Federal States.

Among the technological research and designing, cooperation with federal authorities,

we carry out the organization and methodological works. Our main efforts focused on promotion of innovative technologies, designing and implementation of standard equipment, organizing and performing of academic projects.

The expert and analytical cooperation is carried out with all interested parties – with public and private organizations, research institutes, and independent non-profit organizations.

Our principal goals are to achieve the certain results of solving the problems of waste management at the federal and regional levels.

A.N. Medvedev
A.P. Sergeev

SYSTEMIC ENVIRONMENTAL STUDIES: METHODOLOGY AND SOME OUTCOMES

Institute of Industrial Ecology, Ural Branch of Russian Academy of Sciences, Yekaterinburg, Russia

The main line of activity of Institute of Industrial Ecology of Ural Branch of Russian Academy of Sciences (IIE UB RAS) is a systemic study of anthropogenic impact on the environment and of reverse influence of the modified environment on man. The task is solved in terms of risk and foresees the complex research at three hierarchical levels: Environmental assessment, Risk assessment and Risk management.

Environmental assessment - Complex study of environmental pollution including terrain surveying with collection of samples for chemical analysis and straight measurements of some environmental parameters. The Environmental assessment is the biggest stage of the work and involves the following set of research: Study the air pollution from stationary sources and motor transport; Study the snow cover pollution; Study the drinking water pollution; Study the soil pollution; Study the radiation factors.

Next stage is Risk assessment. The outcomes of the environmental assessment are used for determination of significance level of all studied factors on the basis of the methodology for assessing the risk of sickness rate due to pollution of air, drinking water and soil.

Children attending preschool institutions are selected as a group of risk for assessment of the possible impact of environmental pollution on population health, because they are the most sensitive to all unfavorable external factors.

The risk assessment is fulfilled in accordance with the Guidance on “Health Risk Assessment from Environmental Chemicals” (Russian Ministry of Health 2004) and is based on the methodology, developed by the United States Environmental Protection Agency for health risk assessment due to chemical pollution.

And the last stage is Risk management. Risk management foresees the analyses of all obtained information, the setting of priorities and elaboration the proposals, which may be used by municipal authorities in decision making aimed at reducing of anthropogenic impact on the environment and the population.

The described methodology of systematic environmental research was used by IIE UB RAS in many cities of Russia, such as Kamensk-Uralsky, Tula, Lipetsk, Orsk, Karabash and others. In 2006-2010, the regional Project named "Appraisal of Environmental situation in Yamal - Nenets Autonomous District" (YNAD) was implemented. Some outcomes of data processing for cities of Salekhard and Noyabrsk are presented below.

The study showed that motor transport was the main source of air pollution and population exposure in these cities. Pollutant concentrations in atmospheric air in the vicinity of highways and intersections were the follows: about 3 MPC (maximum permissible concentration) for carbon monoxide, and from 4 to 6 MPC for group of summation the nitrogen dioxide and sulfur.

The level of drinking water pollution was not high in the absolute values. Only such substances as silicon, iron and phenol were found in water samples in concentrations of about 1.5 MPC. Concentrations of other pollutants were greatly below the MPC (in 2-10 times).

Soil pollution was negligible. For instance, in city of Noyabrsk the concentrations of most elements in soil were greatly below MPC (in 5-10 times).

Calculated risk values to child health due to pollution of drinking water and soil corresponded to "Acceptable risk level" on the classification of the World Health Organization. Such risk level does not require the urgent measures adoption for its reduction. The carcinogenic risk from exposure to air pollutants corresponded to the "Middle risk level" (from 1.5*10-4 to 7*10-4). The maximum impact levels were observed for children in preschool institutions, located in close vicinity to roads and intersections with the most intense traffic. Based on the results obtained some practical measures were proposed for reduction the motor transport impact on children's health.

The paper is prepared under support of the research project "Arctic" # 12-2-4-002 of Ural Branch of Russian Academy of Sciences.

O.V. Mezinova

THE STUDY OF LOCAL LORE WITH REGARD TO ECOLOGY IN ELETS: THE PAST AND THE PRESENT

Yelets State University, Yelets, Lipetsk Region, Russia

The work dealing with study of local lore has, as a matter of fact, plenty of aspects and is characterized by diversity representing historical, geographical, economic studies, etc.

Ecological local lore study as a separate branch of regional research is now in the process of development; the idea of addressing oneself, however, to the study of the environment of the local territory is not a new one, which is confirmed by a rich palette of traditions in regional studies.

Since the very beginning of the appearance of the study of local lore as a separate branch of research (i.e. from the middle of 18th century) considerable attention in the process of

getting to know the land has been drawn to its natural and geographical characteristics. One could find the given subject-matter in the enquiries sent to localities by the famous scientists of 18th century M.V. Lomonosov, G.F. Miller, V.N. Tatischev, the members of Free Economic Society; the documents had become the basis for an extra description of gubernias (provinces) and uyezds (districts). Some brief information concerning the geographical situation, landscape, plants and animals of Elets land is contained in the works by the students of local lore of 19th-20th centuries I.I. Isayev, M.A. Stachovitsch, F.F. Rudnev and others.

The essential section of ecological local lore studies is the research of the economic activities of the population of the region, traditional occupations of local folk, the season character of trades, agricultural and industrial work, links between the economic activities of the people and the environment, between certain aspects of economic life. The Yelets researchers of local lore in both the second half of 19th century (N.A. Ridinger, A. Voskresensky) and 20th century (V.P. Gorlov, S.S. Labuzov and others) touch the above range of issues.

A separate field of ecological local lore studies is the analysis of the changes in the environment of the region under the influence of various factors, in the first place of those of the anthropogenic character. In this connection great importance should be attached to the study of nature of the land in respect of history, with the use of the details delivered by the contemporaries about the relief of the locality, water constructions, flora and fauna. The literature dealing with local lore studies gives information of this kind; it is necessary for objective assessment of the ecological state of the region, the character of the changes that have taken place and the dynamic flow of the processes in the environment.

The results of researches in the field of local lore studies contribute to increasing the scope of the activities for the protection of nature, educating the people in matters of ecology and involving them into the work on the creation and protection of the environment free of danger.

E.V. Milanova
A.S. Zaytsev

ENERGY EFFICIENCY MUNICIPAL POLICY IN RUSSIA

Faculty of Geography, Moscow State University, Moscow, Russia
Fund for Sustainable Development, Moscow, Russia

Russian economy is characterized by high energy consumption (2-3 times higher than the average world index). Due to outdated distribution and consumption systems direct losses of electric power and heat energy are estimated as 15% and 50% accordingly. Besides Russia have the serious commitments to deal with climate change and global warming problems and their potential essential stress further aggravating environmental, economic and social issues, especially observable at the local level.

Municipal energy sector is responsible for over 30% of the total energy consumption

in the country. This means that it becomes one of the key GHG sources in CO_2 balance. Extremely inefficient local energy production, distribution and consumption based on outdated technologies provide great opportunities for significant emissions reduction through introducing relatively low-cost and simple energy-saving activities at municipal level.

Development of energy efficiency (EE) policies at municipal level and green energy sources usage were analyzed for different economy sectors as well as the problems of social infrastructure modernization: municipal boilers reconstruction, usage of wood waste in municipal heating systems, improving buildings insulation, usage of alternate non-combustion energy sources (solar batteries, wind parks, geothermal sources), installing heat regulating devices and applying higher energy efficiency standards to newly constructed facilities, equipping social infrastructure facilities with less energy consuming electric appliances.

All EE activities are region-specific considering large geographic coverage, diversity of climatic conditions and energy sources availability in Russia. This geographic factor must be seriously considered before evaluating EE and GHG emissions reduction policies in local energy efficiency programs.

Baikal region (Irkutskaya Oblast and Republic of Buryatia) was considered as the model study area because of its huge world natural significance. The results of ecologically-sound energy saving projects implemented in this region and devoted to rational use of energy resources and improving people well-being are presented. One of EE projects priorities implemented in municipal communities of Baikal region is usage of biomass (wood waste) and installation of gas heat-generators instead of coal ones, ovens and electric heaters. Such projects are helping to improve environmental situation by reducing local high-ash coal consumption and GHG emissions reduction with simultaneous decrease of territory littering by wood waste.

In Republic of Buryatia and Irkutskaya Oblast with annual number of sunshine hours up to 2500 the solar batteries and collectors (green alternate energy sources) were widely installed. Other projects were devoted to installation of energy and heat metering that allowed to reduce heat energy and hot water consumption by more than 20%, to decrease people expenditures and to establish optimal temperature regime and comfortable conditions in the housing sector.

The major benefit of energy sector modernization at the local level is the potential of reinvestment of EE savings into social infrastructure improvement and converting municipal budgets into profitable ones what gives an opportunity of further local community sustainable development. Besides that locally implemented energy efficiency projects lead to significant GHG reductions and could help to solve a set of serious socio-economic and environmental problems.

The mainstream of the future energy efficiency strategy at the municipal level should be oriented to investment strategies development (including international investors), policy reforms at national and municipal levels, legal support for reinvestment of energy

efficiency savings for further local development, and upgrading technical, managerial and institutional capacity of municipalities.

O.L. Mischin

ASPEKTE DER ENERGIEEINSPARUNG UND DES UMWELTSCHUTZES IN DER GASTRANSPORTFIRMA

Gazprom transgaz Jekaterinburg GmbH, Jekaterinburg, Russland

Der Erdgastransport wird durch großen Energieverbrauch gekennzeichnet. Beim Naturgastransport durch die Gasfernleitung wird unvermeidlich eine Mehrarbeit ausgeführt, die sich in nichtumkehrbare thermodynamische Verluste bei Reduzierung in der Gasverteilungsstation (GVS) verwandelt.

Durch die Produktion vom verflüssigten Erdgas unter Nutzung des Druckgefälles zwischen der Gasfernleitung und der Gasverteilungsleitung der Gasverteilungsstation kann man die Mehrarbeit in eine Nutzarbeit verwandeln.

Als Belastung der Entspannungsturbine dient gewöhnlich ein Verdichter, und ein Teil der Arbeit wird für Erwärmung vom Schmieröl verwendet, auf die Welle der Entspannungsturbine kann man einen elektrischen Generator für Stromerzeugung montieren. Statistische Durchschnittsgasverteilungsstation kann etwa 900 kW elektrischer Energie erzeugen.

Somit stellt die Produktion vom verflüssigten Erdgas ein Verfahren für Erhöhung der Energieeffizienz des Gastransportsystems im Großen und Ganzen dar, weil der in der Gasverteilungsstation erzeugte Strom einen Teil der verbrauchten Elektroenergie ersetzt. Entsprechend wird der Bedarf an der Erzeugung des Stromes im Energienetz bzw. die CO_2-Emission reduziert.

Die gleichmäßigen Erdgaslieferungen führen auch zu Reduzierung des Energieverbrauchs und des Spitzenbedarfs. Die maximalen Schadstoffemissionen werden um 1,8 Mal bzw. im Jahresdurchschnitt um 6 % verringert.

Querschnitte von Fernleitungen können durch die gleichmäßigen Erdgaslieferungen verringert werden, und eine glatte Beschichtung verringert den Stahl-und Materialbedarf von Fernleitungen, Arbeitsaufwand (bzw. den Energiebedarf) bei der Wartung von Gasfernleitungen, was auch zur Senkung von Schadstoffemissionen und anthropogenen Einwirkung insgesamt führt.

Bei der Produktion vom Dimethylester kann man die Emissionen von Gasverdichteranlagen verwerten, in der Zukunft kann ein CO_2-Kreislauf gesichert werden.

Somit kann eine komplexe Verfahrensweise bei der Erhöhung der Energieeffizienz und Modernisierung des Gastransportsystems die ökologische Situation weltweit verbessern. Außerdem entsteht ein billiger Energieträger – DME (da er durch Verwertung von Schadstoffemissionen und unter Einsatz von Ausrüstungen auf der Gasfernleitung erzeugt wird), der in verschiedenen Wirtschaftsbereichen verwendet werden kann.

Olga Morina
Victor Tishchenko

CHARACTERISTICS OF CLIMATE DYNAMICS IN AMUR RIVER REGION

Pacific National University, Khabarovsk, Russia

In the territory under study the zones of stable temperatures, rising and lowering of heat availability are observed against the background of global warming in the northern hemisphere. While the soil temperature variation is not always synchronous with the air temperature variation, and soil temperature amplitude is higher than in the air.

Dynamics factor charts from 60 weather stations drawn in MS Excel were analyzed on a trend line. The principal methodological point taken for the temperatures variation study is a differentiated approach, considering average monthly, average summer (May-October), and average winter (January- April and November-December of the current year) temperatures. The experience has shown that the dynamics of average annual temperatures could indicate relatively stable environment, while seasonal, and even more monthly dynamics, reveals a clear trend of temperature increase or decrease. A smooth horizontal bar of the trend line was taken for the stable state, deviations in either direction within 0.3° C inclusive were considered as small increases or decreases. In other cases, the temperature changes were reflected as warming when a curve rose, or cooling when it goes down.

In the territory under study temperature conditions lowering occurred in February, August - November, but the maximum cooling is observed in October and not in November as in the European part. In November, the zones of warming, cooling and stable ones are distributed almost evenly. The following zones are pointed out by air temperature: warming and weak warming – the coast of the Sea of Okhotsk, the Tatar Strait, Southern agricultural regions, a western part of Khabarovskiy Krai and three northern administrative districts. A zone of heat availability decrease is a major part of the Uda river, western slopes of the Sikhote Alin. Lack of trends of temperature increase or decrease during long-term observations is observed as "spots" within the territory with the expressed rise or fall trend. A warming prevailing period includes the months of the first half-year.

Stable increase of soil heat availability from 1.6 m depth was observed in almost all periods in the southern parts of Khabarovskiy Krai and in the coastal areas along the Tatar Strait. The trend vector of stable reduction of soil heat availability for the great majority of depths and periods (with formation of seasonal and annual trends) is noted in the northern and north-western regions.

Besides, a type of the forest floor plays a significant role in soil heat distribution. So, despite the increase of air temperature in the northern areas by almost 2° C during 40 years, the thawing depth has decreased in many areas. One of the most obvious explanations of this fact is connected with vegetation, which can both enhance or mitigate the direct impact of warming on the seasonally thawed layer, and in some cases even change the nature of these changes. It is considered that soil temperature repeats the air temperature, overlooking the fact that the soil is a complex four-phase system. During a year at the border of soil

horizons transition the heat and moisture movement is continuously occurring.

Zoning was done on the basis of air temperature dynamics. 8 subzones and 35 areas with differently directed climate tendency were singled out totally.

M.V. Mozhevikina

ENVIRONMENTAL INVESTMENT PROJECTS IN HOUSING AND PUBLIC UTILITIES SECTOR

EKSTU of D.Serikbayev, Ust-Kamenogorsk, Kazakhstan

Housing and public utilities services (PUS) are extremely inefficient from an environmental point of view. For example, in Kazakhstan about 30% of the heating energy is produced by small-scale boilers with a capacity of less than 100 Gcal/h. These heating sources are characterized by an efficiency ratio of about 60%, and high specific fuel consumption, which leads to excessive consumption of 645,300 tons of fuel per year, which is equal to 1.75 billion tenge, as well as to additional emissions into the environment. In 39 cities and towns in general there are no water treatment facilities, therefore wastewater is discharged without purification. Further more, out of the total amount of wastewater going through purification only 64% meets the regulatory requirements; while other 36% of poorly treated wastewater is discharged directly to the filtration fields. According to the Ministry of Environmental Protection of Kazakhstan currently up to 50% of the wastewater discharges from 43 large industrial enterprises do not meet the environmental requirements, which means that the concentration of harmful substances in the wastewater discharges into the system exceeds the accepted limit. The problem of waste from production and consumption is also one of the most pressing socio-economic and environmental challenges of our times.

The above mentioned statistics do not fully convey the true extent of environmental problems in the urban areas, as monitoring and environmental management in Kazakhstan is currently carried out mainly on the basis of declared information by companies and organizations, while the actual impact on the environment in the vast majority of cases is much more drastic than the numbers declared.

From an economic point of view all environmental events and projects can be divided into two categories: pure cost and payback. The pure cost category includes projects of nature preservation and social purposes (tree planting, bioremediation, environmental education). Environmental impact of such projects under the existing legislation cannot be expressed in economic terms. The “payback” projects are aimed at maximizing the ratio of “environmental benefits to economic costs”. Environmental benefit of these projects is expressed in value terms, due to the current economic conditions. The main problems related to the low investment to the public utilities infrastructure are:

1. unreliable creditworthiness of public utilities companies;
2. absence of collateral for utilities infrastructure project loans;

3. lack of credit history of potential borrowers, allowing to assess the credit risks;
4. undeveloped methodological framework of risk assessment of investments in utilities infrastructure;
5. lack of long-term funding of banks required to provide long-term loans.

Indicated existing financing problems of environmental investment projects in the field of public utilities infrastructure in the Republic of Kazakhstan require comprehensive solutions. There is an urgent need of creating a system of financing projects of such type. For this purpose, it is crucial to create a specialized structure that will carry the burden of some of the risks associated with the financing of such projects, and help solve the problems of the short-term resource base of commercial banks. It is also necessary to develop special collateral schemes for protecting loans issued to utility companies, and procedures for target grant funding of projects that cannot be paid back due to the low paying ability of consumers.

Therefore, housing and public utilities sector is a complex and dynamically growing diversified production system, which directly affects the quality and the level of everyday life. Development of methodology for environmental investment projects in housing and public utilities sector is able to solve the above-mentioned urban environmental problems, preserve the natural environment of cities and towns, and help improve the quality of life of the population.

L.A. Nikolaeva

ENERGIESPARENDE TECHNOLOGIEN VON WASSERSCHLAMMBESEITIGUNG IN DEN THERMALEN KRAFTWERKEN

FGBOU "Kazan State Power Engineering University", Kazan, Russland

Die Welttenzdenz bei der Entwicklung der energiesparenden Technologien ist heutzutage die Lösung des Problems der Entsorgung von Industrieabfällen mit dem Ziel des Umweltschutzes und der Erhöhung der Produktionseffiktivität. Man sucht aktiv neue Wege der Reduzierung der Abfallbeseitigung, besondere Aufmerksamkeit gilt den abfallarme Produktionsverfahren und Recycling.

Immer mehr Anwendung finden heute in den Wärmekraftwerken in Rußland umweltfreundliche, abflusslose Technologien. Die Hauptrichtungen bei der Sicherung der ökologischen Sicherheit sind wesentlicher Rückgang der Abwassermenge in den thermalen Kraftwerken, Verwertung von Abfallprodukten mit ihrer Rückkehr in den technologischen Zyklus des Kraftwerkes und die Wiederverwendung von Wasser.

Im Prozess der Wärme- und Stromerzeugung in thermalen Kraftwerken entstehen schädliche Abfälle. Wasserschlamm ist ein Produkt von Kalkentkarbonisierung und Koagulisierung auf der Stufe der Wasseraufbereitung. Schlammbeseitigung ist eine

vorrangige Aufgabe in den Kraftwerken. Traditionell deponiert man diese Abfallprodukte im Laufe von Jahrzehnten in den Halden, was mit einer Reihe von wirtschaftlichen und ökologischen Problemen verbunden ist.

Nationale und internationale Erfahrungen zeigen, dass der Schlamm aus den Klärbecken ein wertvoller Rohstoff für viele Industriebranchen sein kann.

Die Autoren schlagen vor, den getrockneten Schlamm als Sorbens bei der biochemischen Reinigung von Abwasser in den Industriebetrieben, von erdölverschmutztem Wasser, von Gasemissionen in thermalen Kraftwerken zu nutzen.

Bei der biochemischen Reinigung wurde der Schlamm in den Belebungsbecken dosiert. Die optimale Schlammdosis wurde festgestellt, sie beträgt 600 mg/dm^3. Das hilft, die Konzentration von Phosphaten im Klärwasser um 72%, von Ammoniakstickstoff um 94%, von BSB 5 um 58% und von COD um 91% zu reduzieren. Es wurde das Verfahren der Beseitigung von Gemisch aus Belebtschlamm und Schlamm durch Verbrennung mit möglicher Regeneration der zusätzlichen Wärme vorgeschlagen. Bei der Reinigung der Abwässer von den Erdölprodukten wird Schlamm als Filterbett in den Sorptionsfiltern verwendet. Die Konzentration von Ölprodukten im Filtrat beträgt 0,03mg/dm 3. Für die Reinigung von Kraftwerksgasemissionen wird vorgeschlagen, den Adsorber mit Schlamm zu füllen. Reinigungseffizienz beträgt 98-99%.

Die oben genannten Verfahren helfen bei der Lösung des Problems der Beseitigung von festen Abfallprodukten, von Schlamm und verbessert somit die Qualität der Abwasserreinigung.

G.K. Parfenova
O.Y. Tilinina

WATER CONSUMPTION SYSTEM AS A FORMATION FACTOR FOR WATER QUALITY

National Research Tomsk State University, Tomsk, Russia

Halation and leakage flux characteristics - their composition, concentration degree, detection of contamination sources of water bodies - make up the main part of theoretical conclusions about the migration of chemical elements in the biosphere. Methodological development of these conclusions is largely based on the evaluation of the structure and transformation of dynamics of the hydrochemical parameters of water quality.

A diverse basin hydrochemical structure was formed as a result of the complex development history and differentiation of technogenesis. The existing basin differentiation of hydrochemical parameters is largely determined by the water consumption system. Wastewater disposal and water use are constituents of the general water consumption system. The specifics of the existing water consumption system in the river basins of urbanized territories are the base for the assessment of the anthropogenic differentiation for the formation of hydrochemical water quality parameters. The characterisation of the water consumption system includes a consequent examination of water use according to the types

of economic activities. According to the amount of irrevocable water losses, which are 10 % for industry, 10% for the needs of urban population, 60% for irrigation, and 70% for rural water supply, wastewater disposal is controlled by the water use for certain economic purposes and the corresponding amount of irrevocable water losses. The volume ratio of wastewater to water use characterises the specifics of the existing water consumption system in the basin. Calculation values of this ratio in percent can vary greatly. For example, in the basins with the predominantly developed agriculture, this value is approx. 4%, because the water use for irrigation and rural water supply are accompanied by significant water losses. In mine field areas, the ratio of the wastewater volume to the water consumption volume reaches 500 % and more. The excess of the wastewater volume in comparison to the water consumption is explained by the additional pumping of mine waters. The existing water consumption and wastewater disposal system determine conditions of functional and technogenic direction of the natural water transformation of many years.

The formation and transformation of the chemical composition of water under technogenic conditions reveals itself, first of all, in considerable amplitudes of hydrochemical water quality parameters both annually and in the long term. This reflects the main peculiarity of the interaction between industrial and agricultural wastewaters with natural waters: an abrupt change of the conditions of their formations and, therefore, a versatile manifestation and interchangeability of water quality parameters determine the methodological orientation in the research directed to detect interconnections with the functional organisation of natural and technical systems.

V.A. Peristy
A.I. Vezentsev
L.F. Peristaya

SOME PROBLEMS OF ENVIRONMENTAL CHEMISTRY AND THEIR SOLUTIONS

Belgorod State National Research University, Belgorod, Russia

It is known that the increasing amount of CO_2 emissions of anthropogenic character leads to a disruption of the thermal balance of the Earth and is one of the reasons for the greenhouse effect. In our opinion, the future solution of the greenhouse effect problem consists in the return to the natural cycle of the element carbon in nature accompanied by the scientifically sound creative activity of the humanity. Creation of green planting with high photosynthetic properties will enable to utilize carbon dioxide by turning it into organic substances. This vegetative wood pulp will be both an energy source and a raw material for chemical industry. This man-made vegetation will also improve the climate and the look of the Earth. To solve this problem, it is necessary for the leading world powers to integrate.

However, it is necessary to save the environment today. For example, in the Belgorod region, in addition to a huge amount of CO_2 emissions, there are more than 6.5 tons of waste - citrogypsum - situated on the territory of the private corporation “Citrobel”. In the

laboratory of chemical technology of the Belgorod State National Research University we developed the technological fundamentals of the combined treatment process of citrogypsum and CO_2 emissions, at the end of which we obtain 2 useful chemical products, ammonium sulphate and nanostructural component fertilizer and calcium carbonate filler.

Feather waste from poultry factories in Belgorod also require utilization and treatment. In the laboratory of chemical technology we created a treatment technology which consists in the thermohydrolytic fission of keratic structures of the feather waste with the presence of inorganic bases. By adding to the obtained hydrolisate a minimal amount of sulphated polyglycol alkylphenol ethers and non-saturated aliphatic sulphonates, it is possible to successfully use such a low-cost composition as a foaming agent for foam-concrete structures.

A reduction of the environmental risk can be achieved by creating safe future technologies. Such approaches towards the environment of the future already exist. It is known that sulfonation and sulfation of organic substances is connected to the presence of gas emissions containing toxic SO_3 and SO_2. In order to neutralise them, it is necessary to use bulky and costly gas purification systems. We have developed a direct-flow many-step technology and an equipment design of the sulfonation process of organic substances by a gaseous SO_3. With this simple technology, the formed gas emissions are of no environmental danger and costly purification facilities are not needed at all. The only necessary thing is a light afterpurification with the help of filters from polyvinylchloride material and mylar felt.

V.A. Peristy
A.I. Vezentsev
L.F. Peristaya
V.D. Bukhanov
G.V. Frolov

ENVIRONMENTAL ASPECTS OF THE CLAY USE IN INDUSTRIAL AND AGRICULTURAL PRODUCTION

Belgorod State National Research University, Belgorod, Russia

In the course of the last 10 years the scientists from the Chair of General Chemistry of the Belgorod State National Research University have been carrying out an active research in the development of efficient sorbents on the base of native montmorillonite clays in the region in order to purify natural and industrial waters.

Experimental sorbents obtained by means of enrichment and modification of the natural clay (its acidic, alkaline and salt treatment) are not worse, and, in some cases, are even better than the traditionally applied sorbents such as charcoal and activated charcoal for the purification of water from heavy metal ions (lead, cadmium, copper, chrome, iron etc.), oil products and fats.

The suggested technological solutions of the implementation of the sorbents mentioned above have been successfully tested in municipal and industrial water treatment facilities.

We also obtained encouraging results in the purification of water from radionuclides Caesium-137 and Strontium-90, the content of which has been monitored on the

radiologically contaminated territories after the Chernobyl disaster of 1986. The half-life of Strontium-90 is 29 years, that of Ceasium-137 – 30 years.

Another direction of our work was the use of clay in agriculture. Sorbents obtained on the basis of modified montmorillonite clays showed high activity in the prevention and treatment of intestinal infections of chicken and pigs.

The use of modified montmorillonite clays in the ration of livestock enables obtaining ecologically clean products of animal origin which can be later used for baby or diabetic food.

A combined prescription of the unified natural sorbents and antibacterial drugs reduces the recovery time and increases the therapeutic action of the specific medicines, because minerals containing montmorillonite have an anti-adhesive effect on the agent of disease and binds bacterial and other toxins created during digestion function disorder in livestock.

Laboratory animals showed good results when treated from experimentally infected wounds by means of combined medicine based on montmorillonite-containing clays which also included medicinal herbs sap.

Several scientific developments and the corresponding technological solutions provided the basis for the organisation of the small innovative company "Nanosorbent-Belgorod State University", which produces feed additives for livestock, adsorbents for water purification, complex mineral and organomineral fertilizers, the implementation of which suppresses the growth of unhealthy microflora.

A.L. Podolsky

ENVIRONMENTAL FRIENDLINESS OF URBAN AREAS: THE ANALYSIS

Yuri Gagarin State Technical University of Saratov, Russia

Big industrial cities of the Russian Federation have low levels of environmental friendliness (EF). This situation cannot be changed soon due to lack of large investments and readiness of the local and federal governments for such changes. However, existing international examples should be taken into account. Raleigh (USA) is a big city (300 km^2) with over 500,000 inhabitants. Founded in 1792, it was being developed in pre-ecological era of human knowledge. Thus, its high EF may be explained in terms of conventional wisdom of city planners and competency of chief city architects. I consider nine components of the city infrastructure accounting for its high EF.

The 1st component is related to preserving patches of natural landscapes within the city limits. Natural ravines, water bodies surrounded by wetlands and flood-plain forest corridors, and streams were not destroyed in the course of the city development, which accounts for an excellent drainage and provides for the variety of rare plant and animal species occurring and breeding in the city.

The 2nd component translates into clean urban environment as a result of spatial

separation of industrial and residential areas. Major polluting industrial enterprises are located outside city limits, which benefits air, soil, and surficial and ground water quality as well as urban biodiversity.

The 3rd component of Raleigh EF is defined by the state-of-the-art technologies used at the city wastewater treatment plants and strict control of vehicle exhaust during annual inspections as well as by advanced mechanical and chemical filters at factories emitting pollutants into the air.

The 4th constituent of the city EF is represented by one the world's best solid waste collection and recycling systems. Paper, cardboard, glass, cans, and metal, plastic and wooden trash are collected separately for their consequent recycling. Leaf litter, dead tree trunks and branches are ground to mulch that goes on sale at home improvement stores. Worn-out tires are sliced into pieces used for greenway trail cover. Outdated electronic equipment containing valuable metals or hazardous materials is collected from the residents at specialized recycling centers and stores selling such items. Saving strategies for residential electricity and water use are maintained by differential billing (the increased rate charge for utilities used above established monthly consumption limits).

The 5th infrastructural component of Raleigh EF relates to promoting residents to use environmentally friendly energy sources via income tax deductibles for those home and business owners who used solar roof batteries and wind power stations, or bought hybrid-engine vehicles.

The 6th EF component is represented by exceptionally high proportion of natural forested habitats and gardens in Raleigh. City parks account for 20% of its area (57 km^2). Additionally, Raleigh hosts the Umstead Forest State Park and 143 km of greenway trails through the corridors of undisturbed natural habitats. Thirteen public and numerous private lakes along with Neuse River and its tributaries, flowing through the city while being surrounded by natural landscapes excluded from residential development, created unique opportunities for in-city recreation. Greenway trails are also used by city residents for bicycling to work, which reduces traffic intensity at city streets.

The 7th component of Raleigh EF is environmentally-adequate urban architecture and planning. The city has small high-rise downtown surrounded by the low-rise "green city" comprising of one to three story residential houses, apartment complexes, hotels, etc. Constructing low-rise buildings does not require cranes and other bulky machinery, which makes possible to build houses without total destruction of natural landscapes. Architectural and landscape design styles are harmonious due to the fact that they must comply with regulatory codes of particular residential neighborhoods.

The 8th EF component is adequately organized street traffic. Two multi-lane beltlines connected by several radial city highways lacking stoplights or intersections ensure high speed and safety of the city traffic. One-way city streets exclude the possibility of head-on crashes while highway medians inhibit illegal U-turns thus reducing car accidents and road congestion. Traffic flow at city streets is also improved by car-pool lanes and adequately organized parking system that includes multi-level parking decks, bans for smaller street

parking, efficient towing service, and park-and-ride facilities preventing city residents from driving on downtown streets. Transit trucks are prohibited on city streets while store deliveries and road repairs are conducted during night hours.

The 9th component of Raleigh EF is related to highly effective system of environmental education provided to all age categories of city residents by the state-of-the-art museums, botanical gardens and numerous nature preserves located all over the city. In accordance with the Federal Law, state museums have free admission. Each year, they conduct numerous environmental awareness events, such as Amphibian & Reptilian Days, Bug Fest, Chemistry Festival, Astronomy Days, etc., and involve school students in extracurricular courses and research work on a daily basis. Relatively small museum staff is aided by thousands of volunteers (school and college students having mandatory public service assignments as well as adult and retired city residents).

A.D. Potapov
S.S. Ryabova

ENVIRONMENTAL AND ECONOMIC APPROACH TO EXISTING TOWN-PLANNING DEVELOPMENT URBOSYSTEMS

Moscow State University of Civil Engineering, Moscow, Russia
Academy of Public Administration under the President of the Republic of Belarus, Minsk, Belarus

Cities and metropolitan areas, as they are the most massive expression will grow due to the socio-environmental causes and the problems of housing and construction, industrial and socio-cultural significance will grow in the mode of a significant shortage of vacant land. In general, urbanized landscapes are growing, and the area of the territories of land suitable for urban development does not increase that dramatically raises the price of land, particularly the previously undeveloped. At the same time increasing the value previously used for agricultural purposes land within the city and within industrial zones. The main problem lies in the following: how to assess the value of the land at the former building compared with a plot that has not been used previously. All of the previously built-up areas are technologically-contaminated sites. Urban study of technologically-contaminated areas to meet the challenges of rehabilitation highlights the macro-, meso-, micro-levels and levels. Remediation - "treatment" of technologically-contaminated areas with natural processes. The development of technologically-contaminated areas require significant economic investments in this important is the development of optimal methods of valuation areas for further investment, design and construction activities. Soil and land as one might think have value as such, which would have to be commensurate with the income, only the market price of one square meter in the end gives the value of undeveloped land, and crucial location, status, and the possibility of further use. When choosing a method of determining the value of the land undeveloped land allow for direct

comparison of purchase prices with the prices of similar land, an indirect comparison with the cadastral valuation of land. In determining the value of land prices compared plots of land may rise with the price of the land of the earth if they have the distinction of local importance, taking into account their location and status of development and sufficiently defined type and a measure of use in the construction, openness and, accordingly, the predominant form of land. The cadastral value of land is confirmed by the expert opinion of the value of the land map of the cadastral value of land, in which case it needs to be updated after 1 or 2 years. In determining the value of the land to the net price of 1 square meter is necessary to consider the costs of determining the amount of land, transfer of ownership, opening and making a plan of development. Knowledgeable investors view real estate not only by location, price-determining characteristics are decisive material, revenue and profitability. The improvements have a direct impact on the cost of reclaimed technologically-contaminated areas. Determination of the purchase price on sites developed territories can be made essentially three ways to fit the situation in the land market: a way to compare costs, income method, the cost method.

B.G. Preobrazhensky
N.V. Sirotkina

DEVELOPMENT AND IMPLEMENTATION CONCEPT OF THE REGIONAL POLICY IN THE ENVIRONMENTAL FIELD

Russian Academy of National Economy and State Service under RF President, Voronezh State University, Voronezh, Russia

A necessary condition for the effective development of the regional economy and one of its basic imperatives are the development and implementation of the regional policy in the environmental field. The objective of the politics is to guarantee high living standards and comfortable environment for the citizens and to preserve a stable ecological balance. The duality of this objective has no contradiction, because comfortable ecological environment as a place where people live, is the main component of the human habitat.

Already in 1866, Ernst Gekkel, founder of the scientific section of biology "ecology" called it "science about the habitat". V.I. Vernadsky, one of the founders of the modern ecology theories, called human activity a "new noological power" which influences all processes taking place in both organic and inorganic nature. In this context, implementation of the effective policy in the environmental field has a special life-sustaining meaning.

The distinctive features of the development and implementation concept of the effective regional policy in the environmental field are the the creation of the ecologically oriented control mechanism on the basis of the three-level decision model and formation of set of criteria (parameters) for the evaluation of the environmental situation.

The decision model is formalized in the hierarchy of macro-, meso- and microlevels with their specific authorities. On the macrolevel (regional level), the authority formulates strategic objectives and tasks in the ecosystem management and develops solutions in

order to maintain the system of interrelations "men - nature" in the context of their interdependency on one hand and egocentrism and segregativeness on the other hand.

On the mesolevel (municipal level), the authorities develop complexes of tactical tasks in order to manage processes in the social and demographic sphere and nature management. Furthermore, they make decisions in the field of provision of services for the population.

On the microlevel (economic entities), the authorities develop and implement practical measures in order to eliminate the negative effect of industries on the environment.

The ecologically oriented control mechanism is developed taking into account economic, organisational, legal and information factors. The efficiency of this control mechanism is evaluated according to three aspects. First, the evaluation has to reflect interests and demands of different stakeholder groups. Second, it has to take into account the analysis results of economic, social and environmental parameters of the economic entities' influence on the environment. Third, it has to take into consideration the efficiency parameters in regard to development and aggregation of information about the state of the environment, used for strategic decision making.

An additional evaluation criterion for the efficiency of the regional policy is a balance parameter for industrial, ecological and socio-demographic indicators.

The effectiveness of the regional policy is determined by three factors: 1) the socio-economic development level in the region; 2) lobbying factor in the financing of environmental programmes by the regional authorities; 3) specific characteristics of the region (potential, specialisation, other competitive advantages).

The limitation of the budget possibilities to improve the local environment and life activity areas of the population is a restrictive development factor of the socio-economic potential of the region.

A development of a system of effective measures in the regional policy aimed at an interaction between all involved in the implementation of environmental programmes will guarantee an improved quality of the living environment for the population on one hand and economic development in the region on the other hand.

B.G. Preobrazhenskiy
N.V. Sirotkina

PROBLEM OF THE ENVIRONMENTAL SAFETY IN THE CONTEXT OF THE DEVELOPMENT OF INDUSTRIAL POLICY

Russian Academy of National Economy and State Service under RF President, Voronezh State University, Voronezh, Russia

Systematization of the approaches to the definition of the core content of industrial policy made it possible to distinguish the following main directions in the research of this phenomenon:

industrial policy is viewed at a macro level through the prism of the processes occurring in the industrial sphere of economy and determine the state of and prospects for the development of industrial organizations engaged in mass production of products, differentiated according to types of activities;

industrial policy is studied on the microeconomic level as an attribute of increase of efficiency of functioning of the enterprises, subject to filling out the relevant documentation, which regulates the production and sales of products in accordance with the strategic guidelines of the conduct of the enterprise on the market.

Regardless of the level of management, subjects of the development and implementation of industrial policies face the problem of the preservation and maintenance of ecological safety.

The problem of security in the environmental field can be solved only with the complex use of legal, institutional, environmental and economic, technical and other measures in the result of provision: industrial safety of the enterprise (micro); technogenic safety of the environment (macro level).

Environmental security of the Central Chernozem region is provided by the agreed managerial influence of subjects of the Russian Federation on a small, essentially territory. Therefore, processes of environmental degradation in some areas also affect the situation in the neighboring areas. For areas of the CCA priority program should be to preserve topsoil and increase of their fertility. Fundamental to overcoming the degradation of soils play a gradual recovery of the optimum combination of different kinds of agricultural lands, forests, meadows, water bodies, soil erosion control, causing enormous damage, prevention of technogenic pollution of solid, liquid and gaseous waste. In order to improve crop rotation is necessary to introduce tax incentives and subsidies for crops, forage crops, additional taxes on excess environmentally sound share of sunflower crops, as well as encourage the application of organic fertilizers. To evaluate the use of soil is required land monitoring. According to the monitoring data of the enterprise, irrational use of land, should be subjected to sanctions.

In conditions of high anthropogenic load on the environment are becoming increasingly urgent problems of forest protection, careful and efficient use of all its resources. At the same time, to the enterprises, irrational use of natural resources or polluting the environment, should apply strict punitive measures. Softness of such measures has been preserved since the Soviet times free of nature management. The state of the nature of the Central Chernozem region is such that already one of its preservation cannot limit: urgent need to improve the natural environment. Key issues are (in addition to the degradation of soils, water pollution and urban environment. Although the volumes of use of natural resources and waste decreased in the Central Chernozem region does not lead to improvement of the ecological situation. This is largely due to the fact that the main role in the contamination of the territories currently play firms experiencing serious problems in its operation. Frequent change of owners is the factor that determines their disinterest in nature management optimization. On rational land use also affect the very difficult, because the manufacturers are interested

in getting immediate profit. City choking on excessive transport, which in the last 20 years increased five-fold. To solve these problems by administrative way is very difficult, and (in socio-economic terms) can cause big problems. In connection with this imperative is the harmonization of management actions aimed at the development of industrial policy taking into account interests of all parties interested in its formation groups.

S.A. Prokofiev

THE DEVELOPMENT OF ECOLOGICAL CULTURE AND ECOLOGICAL CONSCIOUSNESS OF THE PERSONALITY IN MODERN CONDITIONS

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

The problems of ecological character having a broad cultural context and dealing with the level of culture and consciousness of modern man appear to be in the foreground in the life of mankind at present.

Misunderstanding by the man of his place and position in the universe, irrationality towards the rich natural resources threaten with the spiritual degradation and physical extinction.

The path of transformation and harmonization of modern man's environment should involve the process of ecologizing his consciousness on the basis of the development of ecological culture and its values.

Unfortunately, the facts received in the course of researches demonstrate the low level of the development of ecological culture by the population and the alienation of pupils and students from nature.

The development of ecological culture and ecological consciousness corresponding to the level of the development of our civilization has become a priority in matters of ensuring national security of the state.

The content of ecological education is implemented at three overlapping levels, those of science, regulation and human values. On this basis, the following main areas of building ecological education can be singled out:

- an interdisciplinary approach to the development of ecological culture of the personality; consistency and continuity in studying materials related to ecology;
- the unity of rational and artistic knowledge acquired in the process of cognition and communion with nature, which serves as a bridge to the intellectual and emotional integrity of the individual;
- the relationship of the global, national (regional) and that of local lore (local) aspects while considering ecological issues.

It is necessary to emphasize the need for an efficient mechanism to incorporate

environmental knowledge into the educational process of schools, colleges and universities, to coordinate the efforts of different departments and courses, to exchange information and experience, to give methodological and methodical support.

Thus, teaching of environmental knowledge with the use of activity-based methods, if properly done, is capable of giving good results in respect of the development of ecological literacy and ecological culture among pupils and students.

Ecological objectives should become a first priority in every sphere. Under the new circumstances one should revive "ascetic" ideals, which is to mean a reduced consumption in favour of the interests of future generations. As a result, it would mean the replacement of the existing type of modern culture by the only possible one – ecological.

L.N. Rachkovscaya
N.E. Gelfond
A.I. Bulavchenco
T.Yu. Podlipskaya

APPROACH TO THE DESIGN MEDICAL SUPPLIES SORBENTS

Federal State Budgetary Institution "Scientific Institution of Clinical and Experimental Lymphology" of the Siberian Branch under the Russian Academy of Medical Sciences (FSBI "SICEL" SB RAMS), Novosibirsk, Russia
Nikolaev Institute of Inorganic Chemistry (NIIC SB RAS), Novosibirsk, Russia

One of the conditions for recovery and maintenance of health is the timely removal of accumulated harmful products of exogenous and endogenous nature. Sorption technologies: hemo-, lymph sorption, enterosorption, intraoral sorption are serve these purposes. Clinical experience with effective use of sorbents in various fields of medicine, argues that without the elimination of toxic products at all methods of treatment or poorly effective, or not effective at all. The logic design of pharmaceuticals leads inexorably to what should appear new generation of drugs that have not only a high therapeutic potential, but also has a pronounced effect of detoxification, which can be achieved with the use of sorption materials. Sorbents , according to scientists (Borodin Yu.I., Konenkov V.I., 2012), are synergistic lymphatic system and manifest themselves as limfoprotectors and limfocorrectors, effectively draining the pericellular space and fixing on the surface various toxic poisons. Sanogenic action of sorbents is significantly increase if modified sorbents biologically active substances, such as a compound include silver, lithium, copper, zinc, bioflavonoids etc..

Creating the desired concentration of active ingredient in the area of therapeutic, cosmetic effects achieved sustained release modifying agent from the surface of the sorbent in a biological environment, for example enterally in the gastrointestinal tract when , or exposed on the skin. Sustained release of water-soluble reactive modifiers can provide "immurement" them in the porous surfaces of the sorbent. As a "bricked" agents

can be used high molecular weight polymers, such as water soluble and water emulsion. The particle size of emulsions is very important. The smaller the particles, the stronger the active component can be mounted without reducing the specific surface area. For studies was selected silicone emulsion polymer with a molecular weight of 18000-19000 AU particle size of 0,3-60 mm.

Evaluation of aqueous emulsion particle size was carried out using the photon correlation spectroscopy (device 90 plus, USA). For a sample prepared in aqueous emulsion have investigated the dependence of the particle size changes of the temperature of the solution from 20 to 60°C.The instrument photon correlation spectrometer allow to heat the emulsion in the cell (disposable plastic cuvette 1cm thick). After measurement at a selected initial temperature, the temperature is uniformly increased in intervals of 5°C, kept short time and making several measurements of particle size. It was found, that emulsion particle diameter are decreased at increasing the temperature to 600C. Particles are rearranged, changing the size of the associates under the influence of temperature in the cell without stirring. Found polymodal distribution of the particle fractions, moreover, at temperatures of from 50 to 60°C found only two fractions (at lower temperatures, there were three fractions). The best results were obtained at temperatures of 55 - 60°C, when size particle in the solution were 88 nm and 578 nm. This size comparable to the size of meso- macroporous alumina sorbent matrix. Alumina matrix were treated by emulsion (it obtained at 55-60°C followed by drying and calcining) kept high specific surface area comparable to the initial matrix (190 m^2/g) , indicating the availability of all the pores interconnected with each other. Uses for these purposes emulsion with size 0,3-60 micrometers led to a decrease in the surface up to 140 m^2/g.

Conclusion: environmentally safe method for the synthesis of powdered sorbent using only water solutions without the use of organic solvents designed. New synthetic white powdery sorbent, the chemical nature and surface properties which are determined by the combined action of a mineral matrix properties obtained. Sorption efficacy shown for molecules of various sizes and weights. The resulting sorbent does not have the toxicity and can be used both as enterosorbent and hygienic powder-medical sorbent.

K.A. Romanova

THEORY AND METHODS OF ORGANISING ECOLOGICAL MANAGEMENT

Department of Authorized Representative under RF President in Volga Federal District, Nizhny Novgorod, Russia

In recent years the worries of ecologists- specialists and various social organizations have been on the increase. They are concerned about the problems connected with the human-nature.

Aggravation of ecological conditions is the result of structural deformations which have

been accumulated for many years in the national economy and have led to dominating of nature intensive industries, resource and energy intensive obsolete technologies, resource oriented export

J.Odum wrote: «... when the science about home (Ecology) and the science about householding (Economics) join together and when the subject of Ethics widens its borders and includes not only the values produced by human beings but also the values created by the nature, we will surely become optimists about the future of human beings"

So, how can we combine ecology, economics, and ethics? By working out and realizing the ecological policy of the state as a whole and separate constituent entities in particular taking into account the principles of steady development.

We propose a new understanding of ecological policy implementation through ecological management. Ecological management must be considered as the system based on structure of social relationships and must include not only economic, legal, technological and managerial aspects, but also ethical and moral standards, ecological issues. Ecological content, strategies and technologies of human-nature relationships must be aimed at forming ecological consciousness of a human being.

Consciousness (social as well as individual) is determined to a great extend by social relationships.

Social relationships are various connections appearing among social groups, classes, nations, as well as within the groups in the process of social, political, economic, cultural life and activity. This is the system of social relationships which predetermines the human existence in a particular country and forms social and individual consciousness.

I.N. Rybuk
O.Yu. Grigoryeva

THE DEVELOPMENT OF ECOLOGICAL CONSCIOUSNESS IN CHILDREN AS A FACTOR OF THEIR SOCIALIZATION

State Comprehensive School # 4, Klin, Moscow region, Russia

The socialization of the children is a many-sided and difficult process, suggesting the acquisition of social roles and rules by the children, the basics of culture and the values of civilization, the development of skills and habits which enable them to exist in the system of social relations efficiently.

Of significance in the process is the development of ecological consciousness of a child, which is based on a humane attitude towards the environment and incorporates not only the knowledge (facts, information, conclusions, generalizations) in the sphere of relations between man and nature, but also ecological responsibility, ecological thought, which manifests itself in the ability to establish connections and interrelations in the biosphere, to use habits as to the protection of nature, and the ability to forecast possible damage to the environmental balance.

The development of ecological consciousness deals with a number of functions to be

realized: educative, that of development and bringing up, organizational, educational, prognosticative, etc. That is the way of developing ecological culture of the schoolchildren, their competence, moral and esthetic constituent of the personality.

Ecological consciousness of the pupils is developed both in the course of learning, while teaching such subjects as biology, geography, physics, chemistry as well as the subjects of humanitarian and esthetic cycles: literature, history, social sciences, arts - and during extra-curricular activities aimed at educating a harmonized personality. One should not underestimate the role of socially useful work, organization of ecological teams, participation in volunteer movements to protect the environment including the programme "A Green Patrol", charity actions to take care of animals, organization of "corners of nature" at schools; the work of sanitary inspection teams to protect town, etc.

Close links can be traced between the activities for the protection of nature and the tourist and the-study-of-local-lore work aimed at the enrichment of the inner world of the pupils, the development of their ethic ideas regarding the interaction of people and nature.

Internet resources also influence the development of ecological consciousness of the pupils, therefore it is essential to teach the pupils to make the right choice as to the use of mass media products, which are not always of good quality in respect of moral and ethic rules and cultural level directing the cognitive activities of the children into the sphere of vulgar, extremist attitudes and moral vandalism. Teaching to perceive the information data flow in a proper way is also an essential part of the development of ecological consciousness of schoolchildren.

Tuyakbai Rysbekov

DIE BEWAHRUNG DER UMWELT- DIE GRUNDLAGE DES LEBENSQUALITÄT

M.Utemissow West-Kasachstanische staatliche Universität Uralsk, Kasachstan

In der zweiten Hälfte des 20. Jahrhunderts sind ökologische Probleme Kasachstans durch eine Menge der Gründe vertieft. Die wesentlichen davon sind die anthropogenen Faktoren.

Die Hauptgründe der ungünstigen ökologischen Situation im Land sind:

- die extensive Entwicklung der Wirtschaft, die von den riesigen Umfängen der Ausbeutung des Rohstoffs begleitet wird, die Abwesenheit des Systems der Überarbeitung der mehrelementaren Arten der Rohstoffquellen, sowie der Produktions- und Haushaltsabfälle;
- die Deformationsstruktur der Volkswirtschaft mit dem Vorherrschen der Produktionen, die die Natur bewirtschaften und die übermäßige Belastung auf die Ökosysteme schaffen;
- die Unzuverlässigkeit (die Rückständigkeit) der technischen Systeme und Mangel

der qualifizierten Fachkräfte in Unternehmen mit erhöhtem ökologischen Risikos;
- das Vorhandensein der veraltenden und nicht effektiven Naturschutzausrüstung;
- die Konzeption "der schmutzigen" Produktionen in der begrenzten Zahl der industriellen Bezirke und der Städte;
- die Unvollkommenheit des Einschätzungsystems in der Produktionseffektivität, die nicht vollkommen ökologischen Kosten berücksichtigt;
- die nicht rationale Nutzung der Wald-, Wasser- und Landressourcen, die Regelverletzung der Aufbewahrung und der Nutzung der Pestizide für den Kampf mit den landwirtschaftlichen Schädlingen, der Mineraldünger usw.;
- die Abwesenheit des vollkommenen Systems der ökologischen Regulierung der Naturschutztätigkeit;
- die Unentwickeltheit des Systems der ökologischen Bildung usw.

Das 21. Jahrhundert stellt die neuen Aufgaben vor der Menschheit auf der ganzen Erde. Darunter sind: die Biovielfältigkeit der lebendigen Organismen aufzusparen. Wenn das 20. Jahrhundert in die Geschichte eingegangen ist, als das Jahrhundert des wissenschaftlich-technischen Prozesses, so soll das folgende 21. Jahrhundert als die Epoche der harmonischen Entwicklung des Menschen, der Gesellschaft und der Natur sein.

In diesem Zusammenhang sind in unserer Republik einige Gesetze ausgegeben. Es ist das Gesetz «Über den Umweltschutz» (1977), «Die Konzeption der ökologischen Sicherheit der Republik Kasachstan» (1996), «Die Nationale Entwicklungsstrategie der ökologischen Bildung und der Erziehung in Republik Kasachstan» (1996) u.a.

Der Übergang zur standfesten Entwicklung meint die konsequente Lösung der Reihe der prinzipiellen Aufgaben:
- im Laufe des Ausgangs des Landes aus der Krise, die Stabilisierung der Wirtschaftssituation zu gewährleisten;
- zulassend nach der gründlichen Verbesserung des Zustandes der Umwelt zu streben, mittels Ökologisierung der Wirtschaftstätigkeit in den Rahmen der betrieblichen und strukturellen Umgestaltungen, das Entstehen und breiter Vertrieb des ökologisch ausgerichteten Modells der Wirtschaftsführung zu gewährleisten;
- die wirtschaftliche Tätigkeit innerhalb der Kapazität der Ökosysteme aufgrund der Masseneinführung der Energie- und Ressourcesparenden Technologien, der zielgerichteten Veränderungen der Struktur der Wirtschaft, des persönlichen und öffentlichen Konsums zu führen.

Die Hauptkennziffern der Qualität des Lebens: die Lebensdauer des Menschen (von der Geburt und tatsächliche), der Zustand der Gesundheit, Abweichung des Zustandes der Umwelt von den Richtsätzen, der Lebensstandard, das Einkommen (gemessen vom Bruttoinlandsprodukt pro Kopf bei der Bevölkerung), das Niveau der Beschäftigung, die Stufe der Realisierung der Menschenrechte.

Zur Zeit hat Kasachstan den Rating erreicht und in die die Zahl der 50 entwickelten Staaten eingegangen, die bestimmte Ergebnisse in der Realisierung der Hauptkennziffern der Qualität des Lebens haben.

S.T. Rysbekova

FOOD SECURITY IS THE GUARANTEE OF HUMAN LIFE

Al-Farabi Kazakh National University, Almaty, Kazakhstan

The country's food security is an indivisible part of its national security.

Kazakhstan is an agrarian - industrial country. On our opinion, the Republic compete with economically developed countries in the sphere of production of high-tech products in the near future very difficult. However, to use its agricultural potential in the sphere of production and realization of agricultural production is quite real.

Today our Republic was one of the first seven countries-exporters of grain of wheat and flour. In this sense, the Republic has all necessary for strengthening its positions on the international market, where demand is ecologically clean Kazakhstan agricultural products. This will be facilitated by two major factors: growth of consumption of grain in developing countries due to growing population and increased recycling of grain for technical purposes. Kazakhstan is able to introduce a further 6 million hectares of cultivated land.

Ensuring food security of the country is a national and a national objective and increases the influence of two groups of factors.

The first group of factors includes:

a) the agricultural sector as a branch of national economy, is inherently less competitive, that already complicates formation of market relations;

b) agriculture is heavily dependent upon climatic conditions, especially in the zone of risky agriculture of Kazakhstan. Therefore, there is an objective necessity of education and development of the insurance funds regulated by the state;

c) significant influence is determined by the volatility of agricultural prices, systematic their oscillations not so much on climatic conditions, but on the duration of the production cycle, as well as market conditions and the seasonal nature of the final products of agricultural production.

d) it is known that this sector has a high capital intensity, longer payback period compared with other industries, low profitability of investments.

e) the inequality of economic entities in the agricultural sector compared to other branches of production, which is called the specificity of agriculture as an industry with a high degree of industrial-economic risk and a lesser degree of concentration and specialization of production, for production of which is retained the disparity of prices.

The second group of factors is connected with the degree of structural and financial deformations, and also features of the transition period from a rigidly centralized state economy to a market-oriented.

Ensuring food security of Kazakhstan is connected not only with the production of agricultural products, but also with its processing.

Development of the sphere of grain processing has obvious benefits. Firstly, new

jobs. Secondly, the export of products of processing of grain (flour, cereals) gives more foreign exchange earnings, than export of grain. Thirdly, deep processing of grain will create the possibility of using by-products of flour-milling production (bran) in the feed industry. Fourth, the transportation of the finished product is much cheaper than transportation of raw materials

L.M. Satajewa
A.M. Azimow
G.S. Turebeckowa
A.Zh. Dajrabajewa

ODERNISIERUNG DER REINIGUNGSTECHNOLOGIEN FÜR ERDÖLHALTIGE ABLÄUFE

Südkasachstanische Staatliche M. Auesow-Universität, Schymkent, Kasachstan

Als Hauptquelle für Umweltverschmutzung durch Erdöl und -produkte dienen die Havarieausfließen, die bei Erdölgewinnung, -transport und -verarbeitung entstehen. Es werden dabei die Technogenwüste formiert, derer Autoreduktion von 10 bis 25 Jahren dauert. In Kasachstan werden jährlich mehr als 50 Tausend Tonnen von Erdölschlämmen und erdölverschmutzten Böden gebildet.

Die Kohlenstoffe in den Erdöl- und Erdölprodukte-Zusammensetzungen sind die verbreitetesten und die giftigsten Verschmutzungsstoffe in der Hydrosphäre. Die Untersuchung des geochemischen Zyklus von Kohlenstoffen, die als ständige Bestandteile bei organischen Verbindungen auftreten, ist wegen der anthropogenen Belastung auf das Meerökosystem sehr wichtig; die mit den negativen ökologischen Folgen verbundenen Havarieerdölausfließen rufen die ernste Besorgtheit der Öffentlichkeit hervor. Im Meer gibt es auch viele andere Quellen für anthropogene Kohlenstoffe, unter denen die gefährlichsten diejenige sind, die die ständige Verschmutzung des Ökosystems durch die Ansammlung der giftigeren Kohlenstoffe bilden.

Die meisten Erdölraffinerien sind heute mit effektiven Systemen für mechanische und biochemische Reinigung ausgerüstet, dazu gehören Erdölauffänger, Teiche für zusätzliches Absetzen, Sandfilter, Flotatoren, ein- und zweistufige Anlagen für biochemische Reinigung. Sehr verbreitet ist ein ausgearbeitetes Schema für Wasserversorgung und Kanalisation, das die Verteilung der Abwässer nach Verschmutzungsart, ihre differenzierte Reinigung und einen maximalen Rücklauf der gereinigten Abwässer in den Wasserlauf vorsieht.

Die mehrfache Nutzung des Wassers in einem Werk reduziert die Menge der Abwässer, die in Gewässer abgelassen werden. Sie wird in den modernen Erdölraffinerien mehr und mehr eingeführt. Es sei aber die Anforderungen zu berücksichtigen, die den Ansprüchen an das in den Systemen der rückläufigen Wasserversorgung benutzte Wasser nicht nur vom Standpunkt der Sicherung eines normalen technologischen Produktionsprozesses aus, sondern auch den Sanitäts- und hygienischen Normativen gerecht werden sollen.

Die in der Literatur vorhandenen Angaben, die den Untersuchungen der Ultrafiltrationsreinigung der Abwässer von Erdölprodukten gewidmet sind, sowie die Erfindungen in dieser Richtung sind knapp genug, und das lässt die Untersuchungen zur Entwicklung der Technologie für Feinreinigung der Abwässer, zu den Konstruktionen und zum Arbeitsprinzip von Membran-Apparaten, zum Modellieren der Prozessparameter für Reinigung der Abwässer von Erdölprodukten und zur Einschätzung des Umweltzustandes bei Einführung der rückläufigen Wasserversorgung in den Erdölraffinerien als aktuelle Aufgaben für heute halten.

Im Zusammenhang damit sind unsere Forschungsentwicklungen auf die Feststellung der hydrodynamischen Gesetzmäßigkeiten bei Membran-Reinigung der erdölhaltigen Abwässer gerichtet und in der Arbeit sind folgende Aufgaben gestellt: die Entwicklung der hocheffektiven Konstruktionen von Membran-Apparaten zur Reinigung der erdölhaltigen Abwässer, die Begründung des technologischen Schemas für die Reinigung, die Feststellung der Gesetzmäßigkeiten des Membran-Reinigung-Mechanismus, die Entwicklung eines mathematischen Modells zur Feststellung der optimalen Parameter für Ultrafiltrierung und die Erstellung einer wissenschaftlich begründeten Methodik für Berechnung eines Membran-Apparates.

Sergej Schmanjow

CHAOTISCHE PROZESSE DER INNOVATIVEN TÄTIGKEIT EINES INDUSTRIEBTRIEBS

Staatliches Institut für Wirtschaft und Handel, Orjol, Russland

Das Vorhanden des wirtschaftlichen Chaos spielt eine wichtige Rolle bei der wirtschaftlichen Prognostizierung, der Methodik und der Methodologie der Forschung. Das Chaos kann beobachtet werden, diese Erscheinung ist kein bestimmter Mechanismus, es entsteht aus der Ordnung und einiger ganz rationaler Mechanismen, die ihrem Wesen nach nicht zufällig sind.

Für die mathematische Beschreibung der chaotischen (katastrophalen) Zustände in Synergie wird der Begriff Bifurkation (Gabelung) verwendet. In den Punkten der Bifurkation (oder Polyfurkation, bei mehr als zwei Alternativen) gabelt sich der mögliche Entwicklungsverlauf des Systems. Zwischen dem Verstoß der Stabilität und Bifurkation existiert ein enger Zusammenhang. Die Veränderung der qualitativen Eigenschaften verletzt gewöhnlich die Stabilität des Ausgangssystems, und infolgedessen soll das System in diesem Fall über noch einen Zustand, der sich von dem Ausgangszustand unterscheidet, verfügen. Die Werte der Parameter, bei denen solche qualitativen Veränderungen vorhanden sind, heißen charakteristische Bifurkationswerte des Systems.

Die dynamischen mathematischen Modelle für die Einschätzung der Effektivität

der innovativen Tätigkeit in den Industriebetrieben, die unter Berücksichtigung der Theorie der Selbstorganisation aufgebaut wurden, wurden zuerst für die Modellierung der physischen, später der biologischen und wirtschaftlichen Prozesse verwendet. Diese Modelle haben viel Gemeinsames, obwohl sie spezifische Besonderheiten jedes dieser Wissenschaften enthalten. Heutzutage werden die Modelle dieser Klasse in Soziologie und Wirtschaft breiter verwendet, besonders bei der Beschreibung und der Prognostizierung der innovativen Prozesse, die sich ihrem Wesen nach durch Instabilität und starke Abhängigkeit von zufälligen (unvorhersehbaren) Veränderungen der äußeren und inneren Umgebung unterscheiden.

Die synergetische Wirtschaft brachte das neue Verständnis dafür, welchen Einfluss stochastische Prozesse auf die wirtschaftliche Evolution leisten. Es wurde gezeigt, dass, wenn das dynamische System stabil ist, der Lärmeinfluss mit Null-Wert bei der wirtschaftlichen Analyse vernachlässigt werden kann. Die qualitativen Schlussfolgerungen der Analyse wird solche Vereinfachung nicht beeinflussen, so dass der in der traditionellen Wirtschaft vorwiegende Standpunkt auf die kleinen Fluktuationen nur bei der offenkundigen Stabilität des Systems richtig ist. Doch wenn das System nicht stabil ist, wird die Analyse des Lärmeinflusses sehr kompliziert. Kleine Fluktuationen können wesentliche Veränderungen im Verhalten des dynamischen Systems verursachen.

So spielt das wirtschaftliche Chaos eine wichtige Rolle bei der Prognostizierung der wirtschaftlichen Prozesse in der Industrie, der Methodologie der Einschätzung der innovativen Prozesse in den Betrieben usw. Obwohl das wirtschaftliche Chaos die Möglichkeiten bei der wirtschaftlichen Prognostizierung der Prozesse infolge der chaotischen oder komplizierten Umwandlungen beschränkt, schafft der Synergieansatz neue Möglichkeiten, umdie Qualität der Prognostizierung im Rahmen der gefundenen Beschränkungen zu verbessern, indem man Merkmale identifiziert, die sowohl das herangehende Chaos, als auch die potentielle Ordnung, die aus ihm entsteht, ankündigen können.

Jekaterina Schmanjowa

VERWALTUNGEN VON DEN RISIKEN DER INNOVATIVEN TÄTIGKEIT AUF DEM UNTERNEHMEN

Staatliche Universität für Wirtschaft, Moskau, Russland

Die Verwaltung von den Risiken ist heute eine der sich dynamisch entwickelnden Arten der beruflichen Arbeit. In vielen westlichen Firmen gibt es das besondere Amt: der Manager für das Risiko (das Risiko-Manager), zu wessen Pflichten die Versorgung der Senkung aller Arten des Risikos gehört. Der Risiko-Manager nimmt neben den entsprechenden Fachkräften an der Annahme der riskierten Lösungen teil und sucht die Weisen, wie die unerwünschten Risiken zu vermeiden. Diese Handlungen sind als das

System der Verwaltung von den Risiken genannt.

Die Verwaltung von den Risiken verlangt das Wissen auf dem Gebiet der Theorie der Firma, der Versicherungssache, der Analyse der wirtschaftlichen Tätigkeit des Unternehmens usw. Die Tätigkeit des Unternehmens auf diesem Gebiet ist auf den Schutz der Firma vor den Handlungen der Risiken gerichtet, die ihrer Einträglichkeit drohen und trägt der Hauptaufgabe des Unternehmens bei: in Abhängigkeit von der Situation aus einigen Projekten das optimale zu wählen, dabei berücksichtigend, dass je das Projekt rentabler ist, desto höher ist die Stufe des Risikos für die Firma. Qualitative Verwaltung von den Risiken erhöht die Chancen des Unternehmens auf Erfolg in der langfristigen Perspektive und vermindert die Gefahr der Verschlechterung seiner Finanzlage.

Die innovative Tätigkeit ist immer zum Risiko verknüpft, das von dem Vorhandensein der Reihe der Faktoren bedingt ist, deren Einwirkung auf die Ergebnisse der Tätigkeit nicht im Voraus bestimmt werden kann. Bei der Auswahl des Projektes, der Einschätzung seiner Effektivität sind die Faktoren der Unbestimmtheit und des Risikos unbedingt zu berücksichtigen.

Vom Niveau des Risikos der innovativen Tätigkeit zeugt die Tatsache, dass durchschnittlich von jeden zehn Venture- Capital- Firmen nur eine oder zwei das Ziel erreichen. Das hohe Risiko wird in der Regel von der hohen Kompensation jedoch begleitet: die mögliche Profitrate von der Einführung der innovativen Projekte ist viel höher als gewöhnliche, die bei der Verwirklichung der anderen Arten der Unternehmertätigkeit bekommen wird.

Gerade das lässt die innovative Sphäre existieren und sich entwickeln. Im Allgemeinen kann das innovative Risiko als die Wahrscheinlichkeit der Verluste bestimmt werden, die bei der Geldeinlage des Unternehmens in die Produktion der neuen Waren und Dienstleistungen, in die Entwicklung der neuen Technik und Technologien entstehen, die vielleicht die erwartete Nachfrage auf dem Markt, sowie bei der Geldeinlage in die Entwicklung der Verwaltungsinnovationen nicht finden und den erwarteten Effekt nicht bringen werden.

In einigen Fällen sind direkte Verwaltungseinwirkungen auf mögliche gesteuerte Risikofaktoren die wirksamste Möglichkeit, negative Folgen zu vermeiden oder das Niveau des Risikos in der innovativen Tätigkeit zu verringern.

Die Auswahl des konkreten Weges der Minimierung des Risikos in der innovativen Tätigkeit hängt von der Erfahrung des Leiters und der Möglichkeiten der innovativen Organisation ab. Jedoch wird in der Regel für die Errungenschaft des wirksamen Ergebnisses nicht ein, sondern die Gesamtheit der Methoden der Minimierung der Risiken auf allen Stadien der Verwirklichung des Projektes verwendet.

Ljudmila Schmanjowa

DAS MODELL FÜR DIE EINSCHÄTZUNG DER EFFEKTIVITÄT DER INNOVATIVEN TÄTIGKEIT UNTER BERÜCKSICHTIGUNG DER RISIKEN AUFGRUND DES SYNERGIE-ANSATZES

Forschungszentrum für Verkehrssicherheit des Innenministeriums der Russischen Föderation, Moskau, Russland

Die innovative Tätigkeit vermutet die Planung in der Zeit von drei Geldströmen: der Investitionen, der laufenden (operativen) Zahlungen und der Geldeingänge. Weder der Strom der laufenden Zahlungen, noch der Strom der Geldeingänge können vollkommen genau geplant werden, weil der zukünftige Zustand des Marktes nicht völlig bestimmt ist, und nicht völlig bestimmt sein kein. Der Preis und der Umfang der Verkaufswaren, der Preis für den Rohstoff und Materialien und die übrigen Preis-Geld-Parameter können sich in der Zukunft von den vermuteten planmäßigen Werten, die von der Einstellung der Gegenwart eingeschätzt werden, stark unterscheiden.

Die unüberwindliche informative Unbestimmtheit veranlasst das genauso unüberwindliche Risiko der innovativen Entscheidungen. Es bleibt immer die Möglichkeit dafür, dass sich das innovative Projekt, das als finanzkräftig anerkannt ist, als verlustbringend erweisen wird, weil die im Verlauf des innovativen Prozesses erreichten Parameterwerte von den geplanten Werten abweichen, oder irgendwelche Faktoren überhaupt nicht berücksichtigt wurden. Der Neuerer verfügt über keine allumfassende Einschätzung des Risikos, weil die Vielfalt der äußeren Umgebung die Verwaltungsmöglichkeiten der Person, die einen Entschluss fasst, immer übertrifft, und unbedingt kann sich eine wenig erwartete Situation entwickeln, die ins Projekt nicht einkalkuliert wurde, trotzdem kann sie in Erfüllung gehen und den innovativen Prozess über den Haufen werfen. Gleichzeitig ist der Neuerer verpflichtet, das Niveau seiner Informiertheit zu erhöhen, und, zu versuchen, die Risiken seiner Lösungen messen zu können, sowohl bei der Entwicklung des Projektes, als auch im Laufe der innovativen Tätigkeit. Wenn das Risiko bis zu den unzulässigen Werten wächst, und der Investor davon nichts weiß, so ist er dazu verdammt, im Dunklen zu tappen.

Die Einschätzungsmethode des innovativen Risikos ist mit der Beschreibungsmethode der informativen Unbestimmtheit durch gemeinsame Ausgangswerte des Projektes verbunden. Wenn die Ausgangsparameter eine wahrscheinliche Beschreibung haben, so sind die Kennziffern der Effektivität der Neuerungen den Zufallsgrößen mit der implikativen wahrscheinlichen Verteilung ähnlich. Aber je weniger diese oder jene Parameter statistisch bedingt sind, je schwächer der Informationsumfang über den Zustand der beschriebenen Marktumgebung ist, und je niedriger das Niveau der intuitiven Expertenaktivität ist, desto weniger kann die Anwendung beliebiger Typen von Wahrscheinlichkeiten in der Analyse der innovativen Tätigkeit rechtfertigt sein.

Als Instrument, das die möglichen Risiken und die Unbestimmtheit der innovativen Prozesse zu messen ermöglicht, gilt die Theorie unscharfer Mengen, der Fuzzy-Mengen.

Gerade die Theorie unscharfer Mengen ist zurzeit eines der Perspektivansätze für die Analyse und die Einschätzung der wirtschaftlichen Prozesse unter den Bedingungen der beschränkten Informationen.

Peter Schweigert

OPTIMIERUNG DER KONTROLLE LANDWIRTSCHAFTLICHER NITRATEMISSIONEN IN DEUTSCHLAND

Institut für Bodenkunde, ehemals Universität Hannover, Hannover, Deutschland

Durch die Landwirtschaft ist die Nitratkonzentration in den Gewässern Deutschlands oft unerwünscht stark erhöht. Besondere Probleme bereiten erhöhte Nitratgehalte im Grundwasser, das in Deutschland die Hauptquelle der Trinkwasserversorgung ist. Deshalb wird in Trinkwassereinzugsgebieten eine emissionsärmere Landbewirtschaftung angestrebt und der Erfolg der Maßnahmen oft durch mehrjährige Messungen der Nitratgehalte der Böden vor dem Beginn der winterlichen Auswaschungsperiode kontrolliert. Diese Werte sind jedoch stark witterungsabhängig, so das besonders bei kürzeren Messreihen keine gesicherten Trendanalysen möglich sind. Es wird deshalb dargestellt, wie die Einflüsse von Niederschlag und Temperatur der Monate vor der Probenahme auf die Bodennitratgehalte im Herbst durch multiple Regressionsmodelle quantifiziert werden können. Ein aktueller Rückgang der Nitratbelastung des Bodens und ein zeitverzögert zu erwartender Rückgang der Nitratkonzentration im Grundwasser kann so innerhalb kürzerer Zeit gesichert festgestellt werden.

G.N. Sergeyeva

LINGUO-ECOLOGY AS AN INNOVATIVE BRANCH OF THE SCIENCE OF LANGUAGE

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

The beginning of the 21 st century was marked by the emergence of new scientific branches: linguo-culturology, text linguistics, communicative, cognitive and computer linguistics, psycholinguistics, etc. The given branches evolved with the use of different spheres of knowledge, since the present state of science is noted for a high degree of diffusion. Linguo-ecology makes one perceive numerous phenomena from innovative positions, with reference to the study of negative factors influencing the lingual environment.

Linguo-ecology is designed not only to monitor the state of speech culture at a given moment, but also to work out definite recommendations concerning the revival and cultivation of the national language wealth.

The modern Russian Language is the state language of the Russian Federation; therefore, the protection of its structural and functional features must become part of the state policy, especially in the spheres of the inter-nations relations, diplomacy, in law-making and law-applying practice, education, business correspondence.

Language is indicative of the state of the society; a high level of lingual culture indicates to the welfare of community, since the language does not only reflect but also develops thought, world-outlook, coordinates interpersonal and inter-corporative relations, serves as a universal means of control and education, contributes to evolving national ideas.

Modern speech practice in the Russian society is characterized not only by neglect, poor vocabulary and phraseology, semantic inaccuracy, overuse of clichés, but also by the vast influx of obscene words that ought to be taboo, unreasoned addiction to slang words and expressions, jargonism uses, an unskillful and not motivated by the context habit to use foreign words. The vague meaning, the possibility of interpreting the units of language in different ways cause significant deformation of speech communication, distortion of the lingual picture of the world, which results in the destruction of mechanisms of national identity and, broadly speaking, in the negative impact on the socio-cultural constituent of the environment.

Language directly linked with reality and consciousness is to contribute to normalizing social processes in the community, to perform a consolidating function, to reduce the shortcomings of technocracy, to serve the purposes of humanizing the process of development of the society at the present stage. In this context, the urgent task of linguo-ecologists consists in searching for methods and means to improve speech communication for the sake of making the environment healthy in a broad sense.

P.A. Schinnikov

THE ROLE OF POWER-ENGINEERING IN POLLUTION OF CITY ATMOSPHERE

Novosibirsk State Technical University, Novosibirsk, Russia

For Russia and especially Siberia the large expanse is typical. That is why an average population density is low there: 8.4 persons/km^2 in Russia, and 3.7 persons/km^2 in Siberia. However, in Siberia life is mainly concentrated along the railway, where the population density is 20 persons/km^2. At the same time, 70-80 % of population in Siberia (depending on territory) are urban, and population density in cities is now around 8,000 persons/ km2. In turn, city residential buildings is mainly multi-storey and here , in particular in Novosibirsk , the population density is 30,000 persons/km^2. Therefore, pollution of city atmosphere is an important environmental factor , and the role of power-engineering in the pollution is high.

The report includes the following topics .

1. The structure of Siberian power-engineering, fuel balance, power-engineering in the cities.
2. The gas pollution index of cities atmosphere, the possibility of its maintenance in power-engineering development.
3. The distribution of emissions over the Novosibirsk territory taking into account the types of generation, fuels and pollutants.
4. Ability to manage the development of thermal generation of cities (for example, Novosibirsk) to ensure the new generation capacity and building of engineering infrastructure , taking into account public health.
5. The environmental education and a wide range of citizens including the city people.

Svetlana Sheina
Liya Babenko

BEST PRACTICE IN MUNICIPAL SOLID WASTE MANAGEMENT

Rostov State University of Civil Engineering, Rostov-on-Don, Russia

Municipal solid waste management (MSWM) is one of the most important and challenging international issues. This issue has gained in importance due to increasing waste amounts, complexity and the multidisciplinary nature of the problem. Rapid globalization and urbanization has increased the quantity of municipal solid waste (MSW), which is currently predominantly disposed of in landfills in many counties. This generates environmental pollution, such as emissions of carbon dioxide (CO2) and methane (CH4) into the atmosphere and leaching of chemicals or toxic materials into groundwater.

Rostov-on-Don has a distinct advantage over other Russian cities in terms of formulating and implementing a best practice in municipal solid waste management. Municipal Establishment “Clean City” was created with the aim to implement the integrated waste management at collection, removal and recycling of MSW in Rostov-on-Don in 2003. In 2008 Rostov-on-Don City Council has produced a strategy of integrated municipal solid waste management for creation of a new system of waste management in Rostov-on-Don. The strategy focuses mainly at Resource efficiency, which is a blend of good infrastructure, collection and design, with a dash of innovation and a strong policy framework to back it up. For the successful implementation of the strategy it was necessary to introduce an integrated system of municipal solid waste management using GIS.

The methodology of integrated system with using of geographic information system was developed by specialists of City Planning and Community Development Department of the Rostov State University of Civil Engineering. It includes implementation of collection and storage of waste and environmental data along with vehicle’s navigation system through ArcGIS ESRI software. This system was created as a separate module in the general system of the urban management. It implies sequential solution of a number of optimization problems

in all stages of waste management to achieve the main goal – to create a comfortable living environment. The developed GIS "Municipal solid waste management" is divided into four levels: "MSW Accumulation", "MSW Collection", "MSW Transportation" and "MSW Disposal":

1. System level "MSW Accumulation": the database of the population, small to medium-sized enterprises (SMEs), projects under construction, enterprises in the sector of housing and utilities infrastructure, dumps and links with the electronic map.

2. System level "MSW Collection": an electronic map of the existing bins location, the existing routes of garbage trucks for hourly removal of MSW, development of the optimization models of solid waste collection – creation of the software module to account for the density of solid waste producers and the need for bins and trucks; the development of the strategy for the management of MSW collection (based on optimization models); development of the software.

3. System level "MSW Transportation": analysis of the existing system of solid waste transportation, mapping the territories of landfills and dumps and density of their location; development a system of rationing arrangements; development of the module of informational analytical system "MSW Transportation".

4. The level of "MSW Disposal": analysis of existing systems for disposal of solid waste; search for alternative cleavage of solid waste, waste-free processing and disposal of solid waste; development of a strategy of zero-waste disposal of solid waste; development of technological lines for zero-waste technology, feasibility study; development of options for recycling; development of the software module – "MSW Disposal".

5. Implementation.

Creation and implementation of GIS-systems for monitoring the accumulation, collection, transportation and disposal of MSW through a comprehensive assessment of the city and plans for its development, as well as the automated traffic control of garbage trucks, solves for Rostov-on-Don one of the important tasks in the field of urban management and also helps to create a comfortable and environmentally safe living environment for the citizens.

I.V. Shkarina

LOCAL LORE: ITS EDUCATIVE AND EDUCATIONAL POTENTIAL WITH RESPECT TO ECOLOGY OF CULTURE IN THE COURSE OF FOREIGN LANGUAGE LEARNING

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

The major task of education is transmitting traditions and experience no matter what branch of science one deals with. It is impossible, however, to have an intimate knowledge of the traditions related to a certain field, develop them, produce new

knowledge and apply it without understanding and acquiring the cultural heritage of the country one lives in. An architect who develops his plans disregarding the historic lay-out and landscape is lacking in what is called ecology of culture and what is related to it. The authorities adopting such plans also lack the right perception of the cultural values typical of the place. The fact of educative and educational impact of the cultural environment on the individual does not permit of any doubt, and the attitude of respect towards it based on the knowledge of local lore should be cultivated. The range of problems concerning the subject-matter is vast and calls for taking urgent measures; and it is not by mere coincidence that the year of 2014 has already been declared to be The Year of Culture in Russia.

The task of learning foreign languages is to get prepared for efficient cultural and professional intercourse with a foreign partner. The task is achievable if the facts and phenomena of one's own culture in relation to history, economy, geography, politics, science, language, literature, established traditions and values become part of the humanitarian background of a student. This knowledge contributes to the development of the cultural identity of the individual in the process of communication, which, in the end effect, makes the cultural interaction successful.

The use of materials pertaining to local lore while studying foreign languages is aimed at overcoming the inconsistency of knowledge about one's native places and making an emphasis on the activity-oriented method of teaching and learning foreign languages. These materials give an excellent opportunity to get ready for real communication thanks to a vast range of subjects they cover. The local and regional subject-matter enables the teachers and the students to acquire professional layers of vocabulary, to get accustomed with stylistic values and registers of specialist foreign language usage.

The use of local lore in the process of learning foreign languages embraces curricular and extra-curricular activities at the university, the project "Elets as an attractive destination" being an example.

A creative approach to the use of the materials dealing with different aspects of native culture helps in solving the tasks of learning foreign languages for practical purposes and serves as a way of transmitting the knowledge of local lore disclosing the educative and educational potential of the subject-matter in question.

Z.A. Simonova
D.A. Chemarkin
A.A. Makarova

BIOLOGICAL CAPACITY OF THE URBAN ENVIRONMENT

Yuri Gagarin State Technical University of Saratov, Russia

Recently, more and more importance in the preparation of national and regional programs for sustainable development becomes subject of ecological footprinting, which is largely determined by the notion of biological capacity. For computing biological capacity

of the Earth as well as for calculating the ecological footprint, biological capacity of individual countries and cities is taken into account, which largely depends on the state of urban vegetation.

In the urban environment, plants constantly experience negative effects that affect their growth, development and functional activity. Assimilation activity and gas-consuming ability of plants depend on their enzymatic activities, and to a greater extent, on the activity of antioxidant enzymes. Accordingly, in order to observe changes that occur in plants at the biochemical level under the influence of the urban environment factors, it is necessary to use relevant methods of determining enzymatic activity. The latter can ultimately act as an indicator of changes in the biological capacity of urban environment.

The goal of this study was investigating the possibility of using peroxidase activity as a corrective measure of biological capacity of urban vegetation. We determined the peroxidase activity levels in the leaves of woody plants that dominate urban vegetation in Saratov. We have also identified adaptive features of these plants to the factors of the urban environment and the possibility of using enzyme activity as an indicator of changes in biological capacity.

The objects chosen for this study were silver birch (Betula pendula) and pyramidal poplar (Populus pyramidalis) vegetative in the areas of the city with different degrees of anthropogenic impact. Peroxidase activity levels in the leaves of woody plants were assessed during several vegetative seasons using the photometric method for benzidine oxidation.

Our results showed that during the vegetative season, woody plants attempt to counterstand adverse conditions of the urban environment by means of activating antioxidant enzymes, particularly peroxidases. In birches, adaptive properties were minimized at the end of the vegetative period, whereby they reduce their productivity, and their contribution to the absorption of carbon dioxide and oxygen production sharply decreases. Poplars were more stable having high peroxidase activity, which indicates that they have certain defense mechanism.

At the end of the vegetative season, peroxidase activity in the poplar leaves was 87 times higher than in the leaves of birches. This fact implied that poplars were more resistant to the adverse factors of the urban environment, and therefore they had relatively high adaptation abilities. Furthermore, it should be noted that plants with increased peroxidase activity had also increased photosynthetic activity, which was essential for the biological productivity.

Our studies showed that the enzymatic activity of woody plants, in particular, the peroxidase activity could be used as an indicator of changes in biological productivity, which influences the biological capacity. Consequently, for the purpose of determining the biological capacity of urban environment and calculating the ecological footprint of the city, it is necessary to introduce some corrective index taking into account the state of the plant communities in the actual conditions of the urban environment.

N.Ya. Sinitskaya

INCLUSION OF EDUCATIONAL ECOLOGICAL PROGRAMS IN THE PROCESS OF MANAGERS' TRAINING IS AN EFFECTIVE WAY OF TRANSITION TO PURE PRODUCTION

The Northern (Arctic) Federal University, Arkhangelsk, Russia

The problems of ecological safety are among the most actual ones attaching to the northern territories.

Purposeful work on elimination of earlier accumulated ecological damage and decreasing of negative impact on environment is conducted in Arkhangelsk region. The state supervision in the environmental protection and environmental management sphere, supervision in use and protection of water and soil objects, land supervision, supervision by the sea and continental shelf, geological supervision, supervision in forestry sector and forest exploitation sphere, in the sphere of circulation with production and consumption waste are organized. The payment for negative impact on environment is taken, the long-term target programs directed on decreasing of environmental problems are accepted and realized.

At the same time, it is time to prevent not consequences of deterioration of ecological situation, but the reasons that have generated this deterioration.

A lot of attention is paid to development of ecological education directed on formation of system of scientific and practical knowledge and abilities, valuable orientations, behavior and the activity providing the responsible relation to environment and health at people of all age and social groups in recent years.

Knowledge about environmentally friendly technologies that could become a basis of future business development, and about the principles of ecological efficiency assuming decrease and prevention of negative impact of production on environment at the simultaneous increase of financial efficiency of its functioning are the more necessary for modern production managers.

Concepts of pure production and ecological efficiency, focusing business for sustainable development, are under construction not on economy and ecology opposition, but on creation of synergetic effect from ecological and economic components. Application of the technologies, allowing reducing of consumption of resources and harmful effects on environment at conservation of existing level of production, leads to reduction of expenses for acquisition of raw materials, water and energy; on emissions, discharges and waste disposal, to receiving economic benefits from extraction of valuable side products, therefore provides increase in profit of the companies. At the same time, the use of the concept of ecological efficiency in production guarantees possibility of more consecutive and active approach to environment protection problem, therefore possibility to increase of ecological component of life quality of current generation and that not less important, to appearance of guarantees on satisfaction of requirements for natural resources by future generations.

Establishing of the enterprises based on pure production has to be accompanied by preparation of the appropriate specialists and training in their methods of management necessary for safe, effective and ecologically friendly activity.

The program of professional retraining "Pure production (Environmental management)", calculated on the heads of enterprises of the region and including four large modules: basic module "Environmental Management" (10 ECTS), advanced module "Ecological Management and Economics" (10 ECTS) and two special modules (by 5 ECTS): "Environmental business" and "Quality management". Retraining will take 8-9 months while training 2-3 times a week in the evening (it is possible to use remote educational technologies).

Certainly, the possibility of attraction to carrying out this program of our foreign colleagues from the countries where the methodology of pure production is introduced at the enterprises would be ideal for us. It will increase sharply the appeal of the program to representatives of real sector of the regional economy. We hope that colleagues will be interested in our offers and these offers may become the basis for further cooperation.

N.V. Sirotkina
M.G. Allabyan

ENVIRONMENTAL ASPECTS OF HARMONIZATION OF INDUSTRIAL POLICY

Institute of Management, Marketing and Finance, Voronezh, Russia

Industrial policy refers to the number of the management techniques that are likely to impact on various aspects of life. The most important component of industrial policy is its focus on protecting the environment and improving the ecological situation. According to the authors, the priority areas of development and realization of industrial policy, relevant to the achievement of the environmental effect are:

1. at the macroeconomic level - innovative transformation of the industrial sector of the economy, suggesting the technical-technological improvement of industrial production; development of material-technical base; application of effective instruments of public administration for the development of the industrial sector; training of skilled personnel in accordance with the profile of the industrial production;
2. at the microeconomic level, compliance with requirements of environmental safety during operational activity; socialization of business; observance of the interests involved in industrial production of the parties; diversification of production, promotes the output of the industrial enterprises on the new markets; organizational improvement of industrial enterprises.

These guidelines do not contradict each other, moreover, their consistent implementation is able to create an overall favorable background for the achievement of the objectives of development and implementation of industrial policy.

The immediate implementation of industrial policy, including environmental questions depends on individual industries and related enterprises. The basic characteristics of the subjects of development and realization of industrial policy are: release of import-replacing and export-oriented products (except raw materials subjected to the initial and subsequent treatment), knowledge-intensive and high-tech nature of production, competitiveness in the national and world markets, can generate a multiplier effect when interacting with other market counterparties; budget performance, estimated from the position of the specific weight of tax deductions of the enterprise in budgets of various levels; social efficiency, as expressed by the ability of the industrial enterprises to create jobs and conditions for human development; environmental effectiveness assessed in terms of preservation ecological balance.

The functioning of the subjects of development and realization of industrial policy in modern conditions must meet the following requirements: the cast of measures to support the industrial business in accordance with the program of Russia's membership in WTO; subsidies for development of innovative and educational infrastructure industry; financial support for implementation of works and projects in the field of research and development, implementation of innovative activity, financing of modernization of engineering, energy and transport infrastructure; subsidies tax rates and tariff payments priorities for the development of the economy organizations with high competitiveness; creating an enabling administrative and organizational-legal conditions for the development of the processes of clustering.

Observance of the specified requirements and effective implementation of the industrial policy depend on the level of harmonization of management actions at the macro - and microeconomic levels, enhance which are capable of methods and tools applied jointly by the state authorities and management of industrial enterprises.

E. N. Skarupo

ON THE PROBLEMS OF INCORPORATING ECOLOGICAL KNOWLEDGE INTO MODERN EDUCATION

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

The modern Russian society is characterized by a low level of ecological culture, on which, in its turn, depends the nation's educational status. As illustrations could serve the poor knowledge of the Constitution of the RF by the citizens of our country, environmental legislation, the inability to exercise their rights and fulfill their responsibilities related to ecological issues, which is caused by a certain gap between the theory of the science of ecology together with law and the objective needs of society and which is the root cause of the lack of attention to the problems of environment.

Under these circumstances, ecological education and ecologization of the educational system are acquiring great significance. The moral rules in relation to nature, which are to become part of the inner world of the person, could play a relevant role in solving environmental problems.

One of the obstacles to the development of ecological education is the presence of the elements of formalism explained by the fact that the existing concept of environmental education itself suggests the use of ''formal" methods of teaching: ranging from those of a directive art as regards the organization and management of environmental education to those of wording, "being far away" from nature in the teaching of natural sciences. Also, you cannot but mention the fact that for a long time, the content of environmental education in Russia had been full of statements emphasizing the pragmatic value of nature.

At the present stage, despite the recognition of the need of person-oriented, developing ecological education the elements of formalism remain the prevailing ones in teaching practice. At the same time, ecological education has great psycho-pedagogical potential, allowing the former to become a factor in the general development of the individual.

First and foremost, the way of overcoming the elements of formalism in ecological education is the psychological training of a teaching ecologist enabling him to achieve the effective implementation of ecological learning programs at all levels.

Second, psycho-pedagogical projects are also essential to get rid of the elements of formalism in ecological education.

In conclusion, it would be necessary to emphasize that without the progress in the sphere of science and technology, investments and production, without the change of priorities, the spiritual life being the supreme one, the introduction of changes in the system of ecological relations as well as the overall improvement of the situation on our planet do not appear to be possible.

V. Starostina
A. Damgaard
T.H. Christensen

EVALUATION OF A NEW LANDFILL (IRKUTSK) IN TERMS OF REDUCING THE IMPACT ON THE ENVIRONMENT (GLOBAL WARMING)

Department of Mineral Processing and Engineering Ecology, National Research Irkutsk State Technical University, Irkutsk, Russia

Department of Environmental Engineering, Technical University of Denmark, Lyngby, Denmark

Municipal solid waste (MSW) management in Irkutsk, which is the main city in eastern Siberia, Russia, involves annually 500 000 tonnes of waste from a population of approximately 590 000 people. Only 4 % of the waste is recycled. About 96% of the MSW

is landfilled in a single landfill without any controls on leachate and gas. As the capacity of the existing landfill soon will be exhausted (within next 4-6 years), a new landfill is likely to be established as part of the future waste management system. We investigate how the environmental profile of the waste management system would be with a new modern landfill with up-to-date environmental technology to control gas. We applied MFA using STAN and LCA using EASETECH to model the current and alternative future scenarios for waste management in the Irkutsk region.

The current waste management system has a significant environmental impact in terms of global warming impacts measured in terms of CO_2-equivalents. The Irkutsk waste management system shows very significant Global Warming impacts: a net load of 28 000 person equivalents (PE; PE = 7700 kg CO_2-equivalents) or about 220 000 tons of CO_2 emitted per year.

Establishing a new but modern landfill when the old landfill will be completed would in itself provide significant environmental improvements just by introducing well-established technologies as gas collection, utilization of the landfill gas for energy purposes, and soil covers to provide oxidation of escaping methane. Collection of landfill gas and utilization for 30 years for electricity production (gas turbine) would reduce the global warming impact completely and result in a small net savings due to storage of biogenic carbon in the landfill after 100 years.

The gas generation was estimated by a first-order degradation model with degradation rates adjusted to a cold and semi-dry climate. Oxidation of methane in the top cover was assumed to be modest in the early phases of the landfill but considered to increase as the flux of methane would decrease in the later stage of the waste stabilization within the landfill. Considering other first-order degradation rates for the landfilled organic matter did not affect the results much, while assumptions about the top cover oxidation of methane significantly affected the results. This shows the importance of controlling the gas escape from the landfill.

The study shows that introduction of modern landfill technology can significantly improve the global warming contribution from waste management.

V.V. Stepanova
S.V. Lupacheva

INSTITUTIONAL ISSUES IN THE DEVELOPMENT OF REGIONAL ENVIRONMENTAL PROJECTS

Northern Arctic Federal University, Arkhangelsk, Russia

In connection with the transition of the Russian Federation to the sustainable development issues of environmental safety sound more urgent. Environmental management, improving the quality of life of the population and the economy - are key factors for sustainable development of the region. The real greening is not possible without government regulation (the development of normative and legislative acts) and control (

monitoring compliance with developed regulatory and legislative acts). There is a necessity to develop not only the federal institutional infrastructure, but also regional.

The institutional infrastructure of the Arkhangelsk region includes:

- Legislation and regulations;
- Organizations that provide law enforcement, the development of business networks, clusters, development banks and funds of the economy;
- The local culture as a system of basic values and knowledge, traditions and habits, informally define rules of behavior.

Regional Environmental Policy consists of two main components:

- Natural resources;
- The formation of a regional human environment.

Environmental programs and projects are being developed not only at the macro level, but any company, both existing and under construction should pay close attention to the environmental safety of its production. Greening the business contributes to the development at the level of an individual enterprise environmental projects. The following types of environmental projects are required for the normal activity of the enterprise:

- Projects of waste generation and disposal limits;
- Draft standards for maximum permissible emissions into the atmosphere;
- Projects of sanitary protection zone.

All these environmental projects include plans for necessary actions that ensure the ecological security of the company, control of existing production and the necessary actions in case of reconstruction of the company.

The complexity of the development and implementation of environmental projects at various levels associated with a number of institutional issues:

First, the numerous doctrinal sources, as well as an extensive range of legal acts have different approaches to solving problems greening of life of Russian society, which is often misleading law enforcer.

Second, many laws and regulations on a number of provisions contradict each other and require adjustment to comparable form, according to international requirements and standards.

Third, for the majority of the leaders of Russian business and small and medium-sized enterprises is not peculiar to environmental responsibility to the state and society, have not formed the tradition of compliance with environmental regulations and compliance with environmental standards.

Fourth, today, at the regional level of the Russian Federation, there is a low level of social activity in the development of environmental projects and the lack of well- developed mechanism to support community initiatives in the field of environmental protection.

Fifth, the lack of environmental knowledge and insufficient number of projects in the field of environmental education.

G.G. Sukhanov
E.V. Sukhanova

ECONOMIC ASPECTS OF SOLID WOOD WASTE USE

Northern (Arctic) Federal University named after M.V. Lomonosov, Arkhangelsk, Russia

The development strategy of power engineering in the Arctic zone of the Russian Federation provides for the bringing of the existing generating capacities and generating capacities under construction in accord with the modern requirements of economy, efficiency, reliability and ecological cleanness. One of the promising development directions of the energy supply to consumers is the use of modern equipment with an increased performance factor and the use of ecologically clean technologies. A large economic effect can be obtained due to the use of wood waste in order to reduce the volume of the fuel brought from afar, a reduction of dependency from its deliveries and a decrease of annual budget subsidies for northern deliveries. The Arkhangelsk region has a large wood reserve and a well-developed timber processing complex which uses the whole volume of the procured wood. At the same time, during the wood procurement and processing there are solid wastes in the form of rind, sawdust and saw timber scraps. At present, the technologies of burning sawdust, wood chips and old wood are being actively implemented. This process of the direct use of wood cutting and woodworking waste has several disadvantages. First, in order for the combustion process to be efficient, sawdust and wood chips must be dry, which requires additional technological processes. Second, there is a problem of storage. In addition to the need of large storage areas, fresh sawdust and wood chips are susceptible to spontaneous ignition. Third, it is economically disadvantageous to transport small fraction wood wastes further than 20-40 km due to their low apparent density. A type of biofuel types which can solve the above mentioned problems is wood pellets. As a type of fuel, wood pellets are regarded as “fuel of the future” or “fuel with future certainty” in Europe. Wood pellets are not a new type of fuel. Already in the 19th century houses were heated by means of wood chips and sawdust, which were compacted for their transportation and storage. Similar technologies of the wood waste implementation are increasingly spreading in the European north of Russia. Modern wood cutting companies carry out an extensive modernisation of their power plants and install equipment which enables them to use raw rind. Sawdust and raw waste lumber are used for the production of wood pellets. A leading role in the implementation of these techniques in the Arkhangelsk region is the sawmill number 25 in Arkhangelsk. The company has made large investments in order to introduce techniques of the combined wood utilisation. The production volume of wood pellets exceeds 50 thousand tons, the largest part of which is exported. It is connected to the fact that the inner demand for this kind of fuel is low. A further development of ecologically clean technologies requires significant investments into the reconstruction of small municipal boiler installations, and municipal budgets do not provide for this. The production of wood pellets can also be organised in small companies with low power. With the existing prices for raw materials and the ready product, projects with the volume of 6 thousand tons can be compensated in the course of 5 years. The

payback period can be reduced if there is budget financial support within the scope of small and medium enterprise development programmes.

Viktor Suzdorf
Aleksandr Meshkov
Miron Grinkrug

ECOLOGICAL MICRO HYDROPOWER PLANT WITH AXIAL HYDRO-TURBINE

Federal State-financed Educational Institution of Higher Professional Learning "Komsomolsk-on-Amur State Technical University", Komsomolsk-on-Amur, Russia

Creating a stand-alone power source with the use of energy of small water flow deals with the implementation of a number of conflicting requirements. The source should generate stable AC voltage and frequency values, and at the same time be simple and cheap. One of the most promising designs, which will be able to enforce these requirements, is a direct-drive micro hydropower plant (HPP) with a combination of axial impeller turbine and electric arc-type stator inductor generator.

The advantage of systems with axial propeller type turbines is the maximum rapidity at low water pressure, allowing to create direct-drive variant of the micro HPP. Hydroturbine placed in the river with a small flow rate on the floats, which are regulated by submergence of the impeller in the water. Therefore, it has no negative impact on the environment, including salmon streams.

Stabilization of output electrical parameters of HPP by using auto ballast loads (heaters), connected in parallel to the payload of through the semiconductor regulator.

The flow enters the rotor wheel, and then flows into the blades in relative motion. The flow takes place in relative motion under rated angle when passing through the impeller and acquires the desired speed. The work that is performed in a wheel flow is characterized by the projection of the velocity of flow in the circumferential direction. Stream goes out the same speed as that goes in the axial direction.

The flow parameters and turbines are calculated by the computer.

The design parameters of hydraulic turbine, as well as the flow of water, given the nature of the Amur River, are shown below:

The diameter of the turbine blade tip	2 m
Dam height	0.2 m
The flow rate of the river	1.5 m/sec
Number of blades	8
The thickness of the blades	0.004 m
The total energy of the flow upstream of the turbine	2.1 J/kg
Circumferential speed power take	2.1 m/sec
The frequency of rotation of the turbine wheel	20.05 rpm

Experimental graphic is convenient to approximating expressions for numerical calculations on a computer operating modes depending on micro hydro. In particular, the mechanical characteristic $M=f(\omega)$ is well described by the following expression: $M = 1.2 - 0.18\omega^2$ o.e.

If we generalize the prospects of development of micro hydro and development of alternative renewable sources in the Far East Region of Russia, as well as the results of the above studies, we can draw the following conclusions:

- The use of an inductor-based micro hydro arc-type stator generator for the Far East Region and similar areas is perspective;
- For remote areas, spawning rivers, the northern areas with vulnerable environment, the use of low-power micro hydro damless generates energy without significant damage to the environment.

E.A. Teimurova
R.G. Gamidov
I.A. Talybly
M.M. Akhmedov

METHOD DEVELOPMENT OF THE INTEGRATED TREATMENT OF RED MUD AFTER ALUMINA PRODUCTION FROM BAUXITES

Institute of Chemical Problems named after M.F. Nagiev of the Azerbaijani Academy of Sciences, Baku, Azerbaijan

In its production and consumption volume, aluminium plays a leading part among nonferrous metals worldwide. Due to its wide application in key branches of economy, this metal has become one of the factors contributing to the scientific and technical progress. At present, the production of aluminium is mainly based on bauxites.

According to the US Geological Survey, the world resources of bauxites are estimated at 55-75 billion tons. Aluminium production and the corresponding extraction of bauxites and alumina are being actively developed worldwide. The opening of a large industrial centre-complex "DET-AL" Ltd. of the Gyandzha aluminium plant in Azerbaijan in 2012 with the annual capacity of 50 thousand tons of the primary aluminium served as a basis for the creation of a modern aluminium industry in the country.

The object of the presented research was the red mud from the alumina production after the bauxite processing at the Gyandzha aluminium plant. Red mud is the residue from the alumina production which is practically not used and is dumped. The accumulation of this residue in the sludge depositories and their annual inflow leads to a series of serious environmental and technical and economical problems.

The topicality of the utilisation problem of the red mud, which contains a number of useful components (Al, Fe, Ti etc.) in concentrations valuable for industries, is caused by the necessity to develop a method of their integrated treatment.

The researched red mud has the following average chemical composition in percent:

SiO_2=5.8; Al_2O_3=24.6; Fe_2O_3=45.8; TiO_2=4.82; Σ R_2O=3.1.

Due to the high content of the ferric oxide in the red mud, the latter can be regarded as an iron-containing raw material. Apart from iron, the red mud also contains aluminium, silicon and titanium oxides.

Under laboratory conditions we have developed a recovery alkaline method of the integrated red mud treatment which includes a complex of interconnected chemical and physiochemical operations: granulation, recovery, hydrochemical treatment of the recovered material, wet magnetic sludge separation and a sulphuric acid leaching of the non-magnetic fraction.

The granulated batch consisting of red mud, commercial soda and calcium oxide in the ration of red mud : soda :CaO=75:20:5 was recovered by a converted natural gas at 1080-1150°C. Under optimal condition, the reduction value of the ferric oxides reaches up to 90-94%: the alumina extraction is 80-86%. The additional use of commercial soda in the red mud recovery process by means of the converted natural gas makes possible to obtain Na hydroxide necessary for the subsequent hydrochemical treatment of the recovered material. This way, in spite of a relatively low content of Al_2O_3 in the red mud, the possibility to obtain alkali makes the integrated treatment of the red mud by means of the suggested method economically justified.

The hydrochemical treatment of the recovered batch includes its leaching by a 4 % solution of NaOH at t=25°C. After the leaching there is a wet magnetic sludge separation with its subsequent division into its component parts, i.e. the magnetic and non-magnetic fractions and the aluminate solution. The extracted Al_2O_3 and SiO_2 in the aluminate solution are 19-20% and 2.44-3.2%, correspondingly.

After a tenfold wet magnetic sludge separation the content of $Fe_{met.}$ in the magnet fraction reaches 95%. It has been determined that the non-magnetic fraction contains TiO_2, Fe_2O_3, Al_2O_3, SiO_2 in the amount of 11.22, 19.30, 11.8 and 4.5%, correspondingly.

The next step consists of the sulphuric acid leaching of non-magnetic fraction which contains TiO_2, Fe_2O_3 and Al_2O_3. In the process of the integrated treatment of the researched red mud, TiO2 is concentrated in the non-magnetic fraction. Under optimal conditions (acid concentration – 60%, t= 100°C), the extraction of $Fe2O_3$, Al_2O_3 and TiO_2 came up to 95, 80 and 85%, correspondingly. We have also determined the conditions for the separation of titanium oxides from other components.

When evaluating the development perspectives of the alumina production, it is necessary to mention that the future development and implementation of the integrated treatment of the red mud in the industrial production will make possible to be oriented towards an extensive secondary industry of industrially valuable metals such as Al, Fe, Ti etc.

I.A. Teteneva

HYGENIC ASPECTS OF THE UNUTILISED PART OF SOLID DOMESTIC WASTE TREATMENT AFTER WASTE SORTING IN UKRAINE

Institute of Hygiene and Medical Ecology named after A.N. Marzeev of the National Academy of Medical Sciences of the Ukraine, Kiev, Ukraine

Over the last few years, waste sorting plants have been put into operation in Ukraine. Having selected the commercially attractive fractions, there remains an unutilised part, the composition and properties of which differ from native solid domestic waste. Safe treatment of this fraction is a significant hygienic problem.

We have examined the influence of the waste sorting on physicochemical and bacteriological properties of the solid domestic waste. According to the results of the study, the density of the waste in the course of the waste sorting increases from 210-300 kg/m^3 to 350-450 kg/m^3, the organic waste fraction increases on average by 6% due to the removal of nonorganic components. During the waste sorting, the content of heavy metals (lead, cobalt, nickel, cadmium) in the solid domestic waste decreases; however, there is a slight increase in the content of zinc, copper and manganese, which is caused by an increased share of food and vegetative waste in the solid domestic waste structure. Bacteriological parameters do not change after the waste sorting.

In order to establish a safer, from the hygienic point of view, burial method for unutilised part of the solid domestic waste after waste separation, we have carried out an experimental research of the influence exercised by the density of the remaining part of the solid domestic waste after waste separation on its biological activity.

Biological activity was examined according to the parameter of the dehydrogenase activity.

The research results shows that in the uncompressed unutilised part of the solid domestic waste after the waste separation there is a high dehydrogenase activity, which proves the presence of intensive biological processes in the solid domestic waste. Intense compaction significantly reduces the activity of biological processes. The dehydrogenase activity is on average 2 times larger in the uncompressed solid domestic waste than in the intensely compacted solid domestic waste (1300 kg/m^3). Over a certain period of time the dehydrogenase activity grows in the uncompressed waste. The waste compaction up to the density of 1000 kg/m^3 leads to a slowdown of the biological oxidation process of organic substances. If the density is 1300 kg/m^3, the level of the dehydrogenase activity stays almost on the same level; however, biological processes in the compressed solid domestic waste are not fully suppressed. In order to stabilise biological processes in the unutilised part of the solid domestic waste after waste sorting, it is possible to apply more intense compaction of the waste or binding additives. By adding red clay in the ratio of 1:5 with

the subsequent compaction of the mixture up to 1000 kg/m^3, the dehydrogenase activity is considerably reduced (up to 0.5 AU), however, enzymatic processes in the waste are not suppressed due to the small liquid loss in the waste because of the high moisture capacity of natural clay. The use of the bottom ash from thermal power plants as a binder lead to a considerable reduction of moisture and the pH shift towards the neutral. The compaction of the mixture (10 parts of waste and 1 part of bottom ashes) up to 1000 kg/m3 leads to a reduction in the dehydrogenase activity level to 0.3 AU, which shows the process minimization of biological degradation of organic substances.

Intense compaction (up to the density of natural soil) and waste burial in the form of pellets on special polygons is the most promising treatment method of unutilised part of the solid domestic waste after waste sorting in the Ukraine.

E.I. Tikhomirova
E.S. Troyanovskaya
O.V. Abrosimova

EFFICIENCY OF SORPTION TECHNOLOGY FOR CLEANING SOILS CONTAMINATED WITH HEAVY METALS

Yuri Gagarin State Technical University of Saratov, Saratov, Russia

The soil cover is a self-regulating biological system and an essential part of the biosphere. Soil contamination by heavy metals has a specific significance among many man-made factors negatively affecting soil cover. Contamination with heavy metals such as zinc, nickel, lead and cadmium, is considered the most dangerous. Soil is a powerful depositor of heavy metals but it has very weak self-purification ability. One of the topical issues of applied ecology is the improvement of the soil remediation technologies and restoration of its biological activity.

The goal of our study was to evaluate in vitro the ecological state of various types of soils contaminated by heavy metals. In the process of remediation, we used different combinations of sorbents. We investigated the typical chernozem and chestnut soil from the fields of Saratov Region, sod-podzolic soil obtained from the Moscow Region. Soil samples were placed in pots. We conducted tests in spring and summer of 2012 under the following static conditions: an average air temperature of 22-25 degrees Celsius and relative humidity of 30-45%. For pollutants, we used salts of heavy metals: nickel sulphate, zinc sulphate, cadmium sulphate and lead acetate. We have added heavy metals in doses of 100 maximum allowable concentrations (MAC). As sorbents, we used KAU (activated carbon), clinoptilolite and vermiculite. Sorbents were used 7 days after contamination. We further sampled the efficiency of heavy metal sorption on day 7, 14 and 30. We assessed the ecological condition of soils on the basis of chemical, eco-toxicological and microbiological analyses. We found a significant decrease in heavy metal concentrations in experimental soil samples, compared to the original 100 MAC, to the maximum permissible concentrations of 1 or below 1 after 30 days when we used the following combinations of sorbents: KAU + clinoptilolite, and KAU + vermiculite. We discovered a

correlation of soil sample toxicity for the test objects (Chlorella vulgaris Beijer, Daphnia magna Straus) with a residual content of heavy metals. We have shown high information capacity of determining soil respiration activity as an integral indicator for the assessment of environmental condition of soils in the course of remediation using combinations of sorbents.

We identified patterns of changes in the qualitative and quantitative compositions of soil microorganisms in experimental samples in the process of remediation, depending on the priority pollutant and the main characteristics of soils. We analyzed morphological features of microbial colonies in the course of studying cell morphology and their tinctorial properties (smears were stained by conventional methods). This permitted us to make conclusions about specific microbial compositions of the studied soil samples (both Gram-positive and Gram-negative bacteria) and spore forms of microorganisms. We also identified dominant forms. Under microbiological study, we found the greater efficacy of the KAU + clinoptilolite sorbent combination. Application of these sorbents resulted in increase microorganism numbers in the studied samples of contaminated soil already on the 7th day. In our study, we observed the restoration of the numbers of dominant microbial species and increase in the numbers of actinomycetes in various types of soil by the end of sorbents depending on the nature and extent of soil contamination, and for monitoring ecological status of anthropogenically disturbed soils along with ecological forecasts of the effects of human activities on agricultural ecosystems and urban soils.

S.E. Tretyakova
E.I. Tikhomirova
O.Y. Ksenofontova

TESTING REMEDIATION TECHNOLOGIES OF CONTAMINATED SOILS USING BIOLOGICAL PREPARATION BASED ON THE STRAIN - DESTRUCTOR OF THE PROMETRIN PESTICIDE

Yuri Gagarin State Technical University of Saratov, Russia
Saratov State University named after N.G. Chernyshevsky, Saratov, Russia

One of the challenges of modern biotechnology is the creation of biological preparations based on strain-destructors of xenobiotics obtained from the native microbial flora in order to solve a complex of problems associated with the rehabilitation of contaminated soils. A promising direction is the use of combined physical and biological methods based on destructive capacities of soil microorganisms and strong accumulative ability of sorbents towards contaminants, particularly pesticides. The goal of our study was the creation of a biological agent from the strain-destructor prometrin obtained from the native microbial flora of contaminated soils. This preparation was immobilized on microcapsules. Consequently, we have tested remediation technologies

for experimentally contaminated southern chernozem soils in laboratory and field conditions.

We experimentally proved the conditions for extracting the consortium of bacteria that were resistant to 100 MAC of prometrin. We characterized strains-destructors of Pseudomonas putida P2, P. putida 1.1.2 and P. putida 6.7.2. for the prometrin pesticide. These strains were able to use the pesticide in a concentration of 100 MAC as the sole source of carbon. For the creation of the biological preparation, we have selected the strain of Pseudomonas putida P2 that was characterized by the ability to destroy 80% of prometrin in 7 days. The strain was characterized by high adaptive and destructive capabilities towards soil contamination with 100 MAC of prometrin. For the first time, we have justified the creation of a biological agent from the strain of the destructor of prometrin, Pseudomonas putida P2, immobilized on microcapsules of polyurea with diameter of 40-60 nm. We studied the destructive capacity variants of the biological preparation based on non-capsulated strain-destructors as well as on those immobilized on microcapsules in laboratory and field conditions in the course of modeling soil system experimentally contaminated with 100 MAC of prometrin. We identified optimal ways of using combinations of remediation techniques (irrigation, tillage and introduction of biological destructors), providing the maximal reduction of the concentration of the prometrin pesticide and not causing detrimental changes in microbiological balances of the southern chernozems.

We discovered that in the absence of technological agricultural practices and biological remediation, concentrations of prometrin in soils remained almost unchanged. Using technological agricultural practices without biological remediation stimulated the activity of the aboriginal microbial flora, the result of which was a natural bioremediation of contaminated soils. However, the degree of natural biodegradation of xenobiotics was insignificant. Using technological agricultural practices combined with the introduction of strains-destructors to soils has had a significant impact on the rates of bioremediation processes. The most effective option turned out to be using technological agricultural practices in combination with introduction of the biological preparation (based on strains-biodestructors) in micro capsules: prometrin in soil was reduced by 80 %. Encapsulation of strain-destructors permitted tenfold reduction of the biological preparation concentration compared to strains-destructors delivered to soils without capsules.

The results of our study on destructive capability of encapsulated biological product in laboratory and field conditions can be used for the projects involving the elimination of accumulated environmental damage associated with the storage of pesticides at the stage of biological remediation of soils.

N.A. Tropin

THE HISTORIC LANDSCAPE IN THE VICINITY OF MEDIEVAL ELETS: MAN AND NATURAL ENVIRONMENT

Yelets State University, Yelets, Lipetsk Region, Russia

The environment changed by the man on a certain territory is to be understood as a historic landscape. Our reconstruction experience is based on the ecological research conducted along the Elchick River, at the mouth of which in the last quarter of the 14th century (not earlier than 1881) there was founded the town of Elets. The archeological data, a wide range of the records of the late 16th-17th centuries and the maps of the late 18th-19th centuries have been taken as a starting point for research purposes.

An archeological approach is used to study Old Russian monuments along the Elchick banks 5 km in length from the northern end of the town (the Znamensky Convent) up to the village of Pishulino – the area that has been investigated relatively well. The tasks of the research work are aimed at assessing the extent of the anthropogenic impact in the area along the Elchick River in the 14th -17th centuries. The novelty in solving the tasks is achieved by the use of a comparative historic approach in relation to the research of the character of developing the valley of the Elchick in the 14th century with the settlements of the late 16th –the first third of the 17th centuries which are known to us thanks to the records of that time. This method enables us to understand the logic of the settlement of the territory near the Elchick River in The Middle Ages and establish the degree of anthropogenic influence.

The analysis of the research work done shows that the anthropogenic influence in Old Russia was inconsiderable, which is explained by the small population.

Further, the analysis of the situation in the 16th-17th centuries brings us to the following conclusions:

1. Gullies and gorges, places of watershed and by the river are considered to be typical of the character of settlement which corresponds to the mode of economic life based on agriculture and agricultural trades. The settlements used to be located mainly in the gorges with constant watercourse and along the river-bed.
2. The emergence of the settlements in the upper reaches of gorges and near the watershed is conditioned by the roads that passed through the vicinity. The original location of many settlements along the main roads points to the good knowledge of the locality by the people who settled the territory in the second half of the 16th century.
3. All the settlements were located near the forests, which answered the economic needs. The forests also served as “a shelter” in the time of the tartar invasion the danger of which had kept on within the borders of Elets uyezd (district) up to the end of the 17th century.

Some natural results include: 1) The main zone of settlement in the neighbourhood

of Elets in the 14th century coincides with that of the late 16th century. The area between the lower reaches of the Vorgol and the Palna known as the core of Elets land developed further into Elets uyezd. The basic reasons for the coincidence are of economic and political character, of mental quality that has allowed the people to retain the memory of generations. 2) The settlements of the 14th century discovered near the gorges and gullies are indicative of the functioning of the road along the watershed of the Elchick and the Palna. Nevertheless, as it has been already stated, the settlements along the Elchick banks forming no separate local groups correspond, to a greater degree, to the logic of the migration movement that participated in the development of the middle and lower reaches in immediate proximity to the Elets we know of from the records of the 14th-15th centuries. 3) The settlements of the 14th-17th centuries tend to be located closer to the wooded areas.

I.I. Ustinova

UNIVERSAL SPATIOTEMPORAL DEFINITIONS OF URBANIZATION IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

Kyiv National University of Construction and Architecture, Kyiv, Ukraine

As defined by John Maxwell, Jules Henri Poincaré, Niels Bohr, Albert Einstein, Volodymyr Vernadskyi and Robert Bartini physical quantity is considered to be universal when its relation to space and time is clear. In 1873, J. Maxwell exhibited the connection between mass dimension, space and time as $[L^3T^2]$ (where, $[L^3]$ means volume with an angular acceleration $[T^2]$). The latter enabled R. Bartini (1936, 1965) to put all other physical quantities in space-time units and form a "periodic system of physical quantities", the axial invariants of which vary by speed and are placed by levels in speed ascending order, where: $[L^1T^1] = [V^1]$ is speed; $[V^2]$ is potential difference; $[V^3]$ is current; $[V^4]$ is force and $[V^5]$ is power. LT system is a hierarchy of settled measures with the power $[L^5T^5]$ on the top of it that allows for standard representation of the laws of nature. Thus, the law of energy conservation looks like $[L^5T^4]$ = const., and the law of power conservation (energy flux per unit time) - like $[L^5T^5]$ = const. And here we face a paradoxical situation, in which it is not really clear how sustainable development is concerned with the fundamental laws of conservation, which are well-known to the science. Any development always means changing "something". But how "something" can change and at the same time stay constant? All well-known conservation laws are valid for closed systems. However, the world of Nature, to include a Man and Mankind is an open system. Does the science know any laws of conserving open systems? If there are no any such laws known, then which fundamental natural and scientific principle the

concept of sustainable development is based on? As demonstrated by our studies, such a conservation law is the law of ecosystem self-regulation. The given law accumulates the components of organic and inorganic nature and defines a "demographic constant" as the capacity (maximum number of stable population) of the territory of a certain level of spatial integrity and stages of development. The law fixes the constancy of the annual flow of solar energy that falls on a specific territory and under certain climatic conditions turns into food energy. Based on the analogies between physical and urban and environmental indicators obtained in the course of the study (abstract published in the Euro-Eco - 2010 - 2012), we've converted the measuring of environmental and urban systems i.e. "population-environment within city-region space" into the universal spatiotemporal variables, where: the quantity of population → mass [L^3T^2]; the dynamics of the quantity of population → current [L^3T^3]; the rate of increase (decrease) of population → angular acceleration (deceleration) of mass [L^3T^4]; population density → acceleration [L^3T^2/L^2] = [L^1T^2] and demographic capacity (population strength growth) in a particular area within a specified period (time scope) → "free energy" of environmental and urban system development [$L^3T^2 * L^2/T^3$] = [L^5T^5]. Therefore, to solve environmental problems, one of the most important urban planning tools shall be a spatiotemporal measuring of population density and demographic capacity of a particular area. These results coincide with the fundamental laws of historical development of the Mankind. As defined by O.L. Kuznietsov, these laws are the law of saving time (where, acceleration results in → densification) and the law of increasing usable capacity (where accumulation of "free energy" is manifested in → capacity reserve), which are so typical for such an achievement of civilization as urbanization. As concerns "free energy", the given result coincides with a new definition of "sustainable development" stated in the course of discussing UN program "On Sustainable Development of Cities" (Moscow, 1999) specified at the UN General Assembly as a "steady growth of free energy". "The ability to meet the growing needs of current generation notwithstanding the ability of future generations to meet their own needs", which is a widely accepted definition (Gro Harlem Brundtland, 1987), and a new definition both express the essence of sustainable development, but in different languages. As O.L. Kuznietsov said: "The first definition is expressed in natural language of commonplace sense, while the second one is in the language of scientific terms of measurable quantities". The phrase "…ability to meet growing needs" is a common demotion of the academic term "free energy growth". Based on the aforementioned, it is offered to workout national and regional strategies for sustainable development of the territories with due account for their "free energy" reserve (the author has developed a method for determining demographic capacity). Thus, in the course of studying opportunities, directions and parameters of sustainable development of Ukraine, we've defined the reserve of "free energy" of its territory.

M.M. Vakaraeva
O.V. Nechaeva
E.I. Tikhomirova

DEVELOPING AND TESTING THE APPLICATION OF INNOVATIVE ANTISEPTIC MEDICATION FOR DISINFECTING DRAINAGE SYSTEMS OF MEDICAL PURPOSE

Yuri Gagarin State Technical University of Saratov, Russia

Development and application of new chemical compounds in medical and veterinary practice is a very important problem. These compounds should possess antimicrobial properties, which is connected with the necessity of fighting the acquired drug resistance emerging in microorganisms as a result of chemotherapy drug or disinfectant application. We studied the biological activity of poly azolidine ammonium modified by the hydrate halogen ions (PAAHH). Preliminary testing of this compound on bioassay objects allowed classifying it to the toxicity class IV. As an experimental model, we used the reference strains of Staphylococcus aureus 209 P and Pseudomonas aeruginosa ATCC 27853 because in recent years, in clinical practice, these microorganisms become increasingly important pathogens of community-acquired and nosocomial purulent-inflammatory diseases. At the first stage of our research, we studied biological activity of PAAHH. Biological activity was determined by sequential dilutions. For this purpose, we prepared a series of dilutions of PAAHH in the beef-extract broth (BEB) to a final concentration of 2 mg/ml In each tube, we introduced a suspension of the studied bacteria at a concentration of $2x10^5$ microbial cells per ml. Microbial cultures were incubated in a thermostat for 24 hours at a temperature of 37°C. Biological activity of PAAHH was assessed by the presence of microbial the growth in test tubes.

We established that while cultivating S. aureus 209 P, visible growth of microorganisms was absent in all test tubes, which did not permit us to identify the minimal inhibitory concentration (MIC) of the drug. In the control test tubes, we observed the growth of bacteria in the form of uniform turbidity. MIC of PAAHH for P. aeruginosa ATCC 27853 was 64 mcg/ml. However, when exposed to PAAHH at a concentration of 32 mcg/ml, P. aeruginosa lost the ability to pigmentation. To determine the minimum bactericidal concentration (MBC) of PAAHH, we conducted uniform seeding of bacterial material onto meat infusion agar (MIA) from the tubes that lacked a visible bacterial growth. Bacterial cultures were incubated at 37°C during 24 hours. After that, we counted the number of colony-forming units (CFU) in control and experimental samples. It was established that MBC of PAAHH for S. aureus 209 P amounted to 16 mcg/ml. Lower concentrations of PAAHH provided a partial bactericidal effect. In the experimental samples based on MPA, we observed the growth of bacterial culture in the form of isolated colonies (in contrast to the control samples with the uniform growth across the surface of nutritious medium). PAAHH concentrations from 250 mcg/ml down to 64 mcg/ml had a bacteriostatic action against P. aeruginosa ATCC 27853 since bacterial growth was

observed in MPA-based control samples. Growth in the form of individual colonies was observed at PAAHH concentrations 1000 mcg/ml down to 500 mcg/ml, which indicated partial bactericidal action of the preparation to P. aeruginosa.

At the next stage of our research, we studied variations in biological activity of PAAHH depending on concentrations of iodine hydrate ions included in its composition. We used four following variants of the polymer: iodine hydrate ion concentration was 100 mcg/ml in PAAHH-2, 200 mcg/ml, in PAAHH-4, 500 mcg/ml in PAAHH-10, and 750 mcg/ml in PAAHH-15. It was established that gram-positive bacteria were more sensitive to PAAHH. We were unable to determine MIC of PAAHH for the standard strain of S. aureus 209 P because visible growth of bacteria was absent in all tubes. In control samples, the growth was recorded in the form of uniform turbidity. The sensitivity of the reference strain of P. aeruginosa ATCC 27853 to iodine-containing polymer was lower and depended on the amount of iodine hydrate ions. MIC of PAAHH-2 in respect to the standard strain of P. aeruginosa was 64 mcg/ml, of PAAHH-4 was 32 mcg/ml, and of PAAHH-10 was 8 mg/ml. We could not determine MIC PAAHH-15 because visible growth was absent in all test tubes - while in control test tubes, the bacterial growth was recorded in the form of a uniform turbidity with a film on its surface and intensive pigmentation.

R.Sh. Valiev
L.N. Olshanskaja

USING OF HISTOCHEMICAL METHODS FOR QUALITY EVALUATION OF CONTAMINATION OF NATURAL WATER BODIES WITH SOME HEAVY METALS

Engels Technological Institute (Branch), Gagarin Saratov State Technical University, Engels, Saratov Region, Russia

Recently, due to the increasing pollution of the environment with heavy metals, the study of plant responses to these substances is an important environmental issue. Development of methods for soil purification, waste water from heavy metal ions by plants also increases interest in revealing the mechanisms of interaction of plants with metals.

Because of a number biological features plants have to absorb the most of the heavy metals. Therefore, the question of the localization of metals in plants is important in the study of their toxicity and resistance mechanisms. Various organs, tissues, and even different cells within the plant tissue accumulate metals different and their distribution in the whole organism can be extremely uneven. There are simple histochemical methods allowing qualitatively or semi-quantitatively evaluate the distribution, storage, and paths of movement of metals in plants [1]. Base of the methods is formation of colored complexes in the cells and tissues from metal and an specially selected reagent. In combination with the methods of determining the total metal content in plant organs histochemical techniques allow to build a complete picture of the interaction of the metal and plants.

It is known that the plants of the genus Lemna are colored with special reagents after staying in the model solutions of heavy metals (nickel, cadmium, lead, copper). The staining can be seen using a microscope or with the naked eye, depending on the metal concentration and residence time of the plant in the solutions.

We have made a study to detect some heavy metals in natural waters with duckweed and histochemical methods. In this case, duckweed has been selected as a plant-biological indicator because of its wide distribution.

In the city of Engels water samples and duckweed were taken from a small stream flowing at a distance of 15 or 20 meters from the roadway. The samples were brought to the laboratory, where they were carried out quantitative analyzes of nickel, lead, cadmium and copper content. The duckweed was treated with a solution of dimethylglyoxime (for detection of nickel), dithizone (detection of lead and cadmium), sodium diethyldithiocarbamate (for detection of copper). The results of quantitative analysis showed that the water from the natural source contained: 0.026 mg l^{-1} of nickel, 0.001 mg l^{-1} of cadmium, 0.035 mg l^{-1} of lead and 0.07 mg l^{-1} of copper. The concentration of nickel and copper were below than the limit for natural waters (0.1 mg l^{-1} for nickel and copper), the concentrations of cadmium and lead were matched and exceeded the maximum allowable concentration (0.001 mg l^{-1} for cadmium and 0.03 for lead respectively). In the treatment of the duckweed with dimethylglyoxime and sodium diethyldithiocarbamate staining of fronds was not observed, but intense staining of the roots was seen after treatment of the duckweed with solution of dithizone. After staying duckweed in solutions of copper and nickel at concentration of 0.1 mg l^{-1} the staining of fronds was noted.

Thus, simple histochemical methods can be used to improve bioindicative techniques of evaluation of the natural freshwater condition.

N.V. Vedeneeva
O.V. Nechaeva
E.I. Tikhomirova
D.A. Zayarsky

THE STUDY OF ANTIBACTERIAL PROPERTIES OF POLY AZOLIDINE AMMONIUM HYDRATE ION DEPENDING ON SUBSTRATES

Yuri Gagarin State Technical University of Saratov, Russia

Currently, the problem of drinking water quality remains relevant. There are many methods of water treatment, the most common of which are filtering through sorption materials and treatment by strong oxidizers such as chlorine, chlorine-containing reagents, and ozone. However, using conventional methods of disinfection, such as chlorination, is often hazardous to human health and to the environment. Therefore, searching for promising chemical compounds that can be used to disinfect water jointly with sorption materials is relevant and is in demand in the practice of water treatment.

We studied antibacterial activity of poly azolidine ammonium hydrate ion depending

on the substrate. We used that innovative nanostructured biopolymer as bactericidal agent. This polymer is derivative of azolidin and quaternary ammonium. It is characterized by the positive charge of polymeric chain. This compound has anti-microbial properties due to inhibition of active transport processes. Earlier studies established its environmental safety: poly azolidine ammonium hydrate ion is classified to the toxicity class IV (low hazard).

Bentonite pellets serving as the basis for application of bactericidal biopolymer can be obtained by annealing nanostructured bentonite. Annealing technology was developed by the specialists of Scientific Production Enterprise "Lisskon" (Saratov, Russia). It is protected by a patent application. Bentonite is a natural nano-clay containing 70% of montmorillonite. As a result of annealing, the bentonite is formed of fine pellets (0.5-1 mm) with a very high specific surface area (about 40 m^2 to 1 g), hence its high adsorption properties. At the annealing temperature of 540°C, pellets have specific surface area of 37 m2/g and the total pore volume of 0.092 cm^3/g. These pellets have very good absorption properties but are not capable of long-term preservation of their structure. At annealing temperature of 800°C, granulate structure has high mechanical strength. However, their specific surface undergoes significant reduction to only12 m^2/g, and the total pore volume declines to 0.031 cm^3/g.

The pellets were soaked in 1% polymer solution for 24 hours. Suspension of gram-negative bacteria Escherichia coli 113-13 at the concentration of E.coli-forming units (CFU) equal to 5×10^4 was used as an experimental model. This suspension was filtered through the pellets, and the filtrate was plated on nutritious agar. The results of the experiment are presented in table 1.

Table 1. Influence of substrate surface on polymer bactericidal properties.

Experimental groups	Filtrate, CFU/ml (M±m)
Control group	$4.8 \pm 0{,}4\times10^4$
Treatment 1: Bentonite pellets (540°C)	$8.8 \pm 0{,}8\times10^3$
Treatment 2: Bentonite pellets (800°C)	$3.0 \pm 1{,}2\times10^1$

All differences of treatment groups versus control were statistically significant ($P < 0.05$). Our results confirmed that the disinfecting ability of filtering systems depends on the substrate to which the polymer is applied. Thus, the most significant antibacterial effect was observed when polymer was applied onto bentonite pellets obtained at 800°C (99.9% disinfection). Good bactericidal effect was associated with pellet structure: solid surface with a small amount of pores then gave the polymer an opportunity to remain attached to the pellet surface and to unfold its chains. In the course of filtering bacterial suspension through bentonite pellets obtained by annealing at the temperature of 540°C, we observed approximately fivefold decrease in the numbers of microorganisms as compared with the control.

A.A. Vedyagin
E.F Krivoshapkina
P.V. Krivoshapkin

SYNTHESIS OF CORDIERITE CERAMICS WITH HIERARCHICAL POROUS STRUCTURE BY SOL-GEL TECHNIQUE

Boreskov Institute of Catalysis, Siberian Branch of RAS, Novosibirsk, Russia
Novosibirsk State Technical University, Novosibirsk, Russia
Institute of chemistry of Komi Scientific center, Ural Branch of RAS, Syktyvkar, Russia
E-mail: vedyagin@catalysis.ru

It is well known that such porosity characteristics as total amount of pores, open/closed porosity ratio, average pore size and distribution, and pore shape play important role in determining the potential applications of ceramic materials. As example, the microporous systems can be effectively used in catalytic-adsorptive purification of both gaseous and liquid streams, while macroporous ones are useful for filter cleaning processes, biomedical applications and thermal insulation. The combined morphology and pore structure of monolith matrixes allows one to extend and to widen significantly the range of its applications. When porous materials are required to perform multiple functions, hierarchical porosity constitutes a means to accomplish these complex tasks. Thus, the micro–macro porosity can greatly improve the characteristics of porous materials in the cases when both catalytic activity and high mechanical strength are required.

This work was focused on the development of synthetic routes to produce the cordierite ceramics with hierarchical porous structure. The macroporous cordierite ceramics was prepared by using the natural raw materials of Komi Republic (kaolin, bauxite, talc, alumina, and silica sand). This approach allowed us to reduce the cost of the products. The micro/mesoporous layers were synthesized by means of sol-gel technologies when the organic and inorganic compounds were used as precursors.

This work was partially supported by the Ural Branch of the Russian Academy of Sciences (integration project No. 12-C-3-1019) and the Russian Foundation for Basic Research (grant No. 13-08-90727).

Yu.I. Vinokurov
B.A. Krasnoyarova

DEVELOPMENT PROBLEMS OF ENVIRONMENTALLY SENSITIVE RUSSIAN REGION, THE REPUBLIC OF ALTAI

Institute for Water and Environmental Problems, SB RAS Barnaul, Russia

The Republic of Altai is located in the south of Western Siberia, and from the ecological point, it is a part of the Altai-Sayan ecoregion, which is indicative of a high

level of biodiversity. The policy papers of the Republic demonstrate hard lobbying of its ecological status and the tourist-recreational way of development with a focus on eco-tourism.

Focus on eco-tourism is completely unbiased, nevertheless one should keep in mind three things. First, it is national- ethnic structure of the population and the need to maintain its life-support systems considering the needs and mentality of indigenous people. Note, that in some places the traditional forms of ethnic nature management among the Altaian, Kazakh and Russian (Old Believers) prevail, while in the central part of the Republic the urbanized type of settlement is cultivated.

Second, when creating the regional development strategy, tourism should be considered as a type of economic activity with its acceptable impact on the environment. It must be profitable for the reproduction of the means of production. Also it should combine high preservation of recreational resources and fragile mountain landscapes with the provision of comfortable infrastructure services to the tourists. The hotels and campsites must be harmoniously fit in with the environment.

Third, what is meant by eco-tourism, and which of the existing models best suits to the region: the European model of nature -oriented tourism based on the programs of environmental education or the Australian one representing the "immersion into the wild"?

Both models are quite applicable in the Republic of Altai. In our opinion, it is reasonable to develop a 'combined' model of eco-tourism including the features of both models with elements of " volunteerism " when the tourists gain new knowledge and aesthetic experience and at the same time bring their own contribution to the restoration and preservation of Altai beautiful landscapes. The implementation of the concept on the Establishment of the Transboundary Biosphere Reserve "Altai" at the intersection of four countries (China, Kazakhstan, Mongolia and Russia) supported by the GEF financially could become an excellent example of such a development.

However, to implement the proposed model of eco-tourism in the Republic, it is necessary to introduce a large number of innovative solutions allowing the creation of comfortable environment for both local residents and potential tourists. Particularly, it is the best international practice in energy supply and consumption, including the alternative energy sources, recycling of solid domestic wastes, environmentally oriented spatial planning and landscape design in view of social and economic interests of local communities.

S.V. Vitrishchak
A.K. Klimenko
O.L. Savina
O.V. Sanina
I.O. Pogorelova
O.V. Sichanova
G.V. Klimenko
I.I. Izorkina

THE HYGIENIC IMPERATIVE OF INNOVATIVE FORMS OF PHYSICAL EDUCATION OF STUDENTS IN MEDICAL UNIVERSITIES

Department of Hygiene, Ecology, SE "Lugansk State Medical University", Lugansk, Ukraine

It was found that the functionality of the body of modern medical students is lower than their peers had in the early 90-ies of the last century. Innovative forms and means of physical education increase the functional reserves of the growing organism, which is confirmed by a comparative analysis of the traditional form of organization of physical education of students in medical university.

Functionality of the body of students is a highly sensitive indicator of the impact of biomedical, psychosocial, ecological and other factors. Based on the values of the growth and development of students is carried out an optimization of the conditions of their life, evaluation of the effectiveness of preventive and health-improving measures.

The success of learning and adaptation of students to the systematic load at the university largely depends on the level of functionality of an organism. In this regard, the search for effective ways to improve the functional reserves is one of the important problems of hygiene of children and adolescents. Reserves of increasing of developmental, preventive and health-improving efficiency of active movements at the medical university are first and foremost, with the use of modern innovation ways of physical education.

The purpose of the study was to determine the functional capacity of the organism of modern students (17-23 years old) and hygienic evaluation of innovative forms of physical education.

The study was conducted in several stages. First stage: 285 students (131 boys and 154 girls) who study at medical university and don't have any health deviations.

The findings suggest that today's young men and women have reduced functionality of the body, which is particularly important in the analysis of long-term dynamics of muscle strength of hands, which is one of the integral indicators of the state of the body. The same dynamics (but less pronounced) is typical for vital capacity.

Middle-age values of FVC, strength muscles of the right and left hands are set by the study and can be used to assess the effectiveness of preventive and health-improving measures at the educational institutions of III-IV accreditation levels.

The conducted studies also show higher levels of functional capacities of students with innovative active movements compared with students with traditional active movements. It was found that junior students have rarely revealed high level of functional reserves than the senior students have, which may be due to the additional stress during the preparing for state exams, KROK-2, according to the Bologna process.

Results of the study justify the need for a differentiated extra physical and sports activities for students with low level of functional reserves, taking into account the state of their health, the level of development of motor skills and physical fitness of all students.

S.V. Vitrishchak
K.V. Klimenko
O.L. Savina
S.O. Svitlichna
A.E. Akberov
D.P. Tatarenko
V.V. Zhdanov
N.V. Kachur

PSYCHOHYGIENIC ASPECTS OF THE STUDY OF THE MARGINALILY PHENOMENON

Department of Hygiene, Ecology, SE "Lugansk State Medical University", Lugansk, Ukraine

Marginality [from lat. margo (marginis) - the edge, the boundary] - the phenomenon of mutual alienation between traditional society and non-traditional people.

Now foreign and native social science and medical discipline often enough return to the problem of marginalization, marginalized society, and marginal personality type.

As a result of the loss of familiar roles and functions, landmark of personal biographies, social persons thus found themselves in a state of uncertainty, which can be interpreted within the framework of the sociological tradition as the category of "marginality."

This situation characterizes the modern Ukrainian society, in which as a result of transformational changes, some economic, social, and spiritual structures (that were stable) have been significantly disrupted, and the elements that make up each of these structures - institutions, social groups and individuals - were in the border state.

To characterize the latter is advisable to use the concept of marginality, which takes qualitatively new content that is fundamentally different from traditional interpretations. This leads to the need for detailed consideration and clarification of the concept as a constructive framework for the analysis of current processes and phenomena in society, the development of adequate methods of its cognition, hygienic correction of population and individual health.

An overview of the main provisions of the marginality concept in the context of the analysis of its stratification manifestations leads to the following conclusions:

- marginality is a natural functional product of society, namely its social structure, that not necessarily arising during the rapid social change;
- marginality - is not only psychological state of the individual, but also a condition of social organization which limits the actions of individuals;
- marginality - is a result of conflict with the generally accepted regulations. Namely, as a result of the mismatch of values and norms in the minds of the individual is formed the position of marginality (alternative to official one);
- marginality in Ukrainian society is mainly the result of the mismatch of social structures and structural relationships.

Marginality - attributive state of modern Ukrainian society, the regulation of which is caused by the collapse of a stable framework of the social structure. And is the sociological criterion that provides to measure the stability of society as a whole, and the positions of individuals.

A.V. Voronina
V.S. Semenishchev

SORPTION DECONTAMINTION OF LIQUID RADIOACTIVE WASTES WITH FURTHER IMMOBILIZATION OF RADIONUCLIDES INTO MINERAL-SIMILAR SORBENTS

Ural Federal University, Ekaterinburg, Russia

The problem of radioactive wastes (RW) treatment is one of the main problems of atomic power engineering. In accordance with IAEA conception liquid radioactive wastes (LRW) should be converted to solid form allowing to safely isolate radionuclides from environment for a long period.

Sorption method of LRW treatment with further immobilization of radionuclides into mineral-similar sorbents is suggested in this work. The mixed nickel-potassium ferrocyanide based on hydrated titanium dioxide was used as a sorbent. Described method can be used for decontamination of LRW from long-lived radionuclides ^{137}Cs, ^{134}Cs, ^{90}Sr, U, Th; it differs from other methods in higher efficiency of separation of radionuclides as well as in combination of stages of radionuclides concentration and immobilization with the aim of their long-term storage or final disposal. Used sorbent meets the demands for matrix materials, therefore, it can be disposed/storaged immediately in hermetically sealed container without additional immobilization into cement matrix, that will allow to reduce volume of RW and decrease storage expense.

The possibility of decontamination of wide spectrum of LRW from caesium and strontium radionuclides was experimentally confirmed.The sorbent efficiently extracts radionuclides from neutral aqueous media: the value of distribution coefficient of Cs from tap water is $10^{(5,6\pm1,0)}$ mL/g, static exchange capasity of Cs is 270 mg/g; distribution coefficient of Sr is $10^{(2,9\pm0,2)}$ mL/g, capasity is not less than 34 mg/g. The 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 alkalescent (up to 0,002 M NaOH) solutions. With solution acidity increasing, distribution coefficient of caesium decreases to $3.7 \cdot 10^3$ mL/g at 3 mol/L of HNO_3 and remains almost constant at more acidic solutions. Increasing of $NaNO_3$ concentration up to 10 g/L also leads to decreasing of distribution coefficient of caesium; at $NaNO_3$ concentration up to 300 g/L K_d value remains almost constant on the order of $10^{2,75}$ mL/g. It is not recommended to use the sorbent alkalescent solutions with NaOH concentration more than 0.01 mol/L in view of partitional destruction of the sorbent.

It was shown that the sorbent can be efficiently used for decontamination of Cs-contaminated waters containing surfactants and EDTA. There is no any influence of surfactants on sorption of caesium at concentrations up to 10 g/L. The affect of EDTA on caesium sorption is determined. It is shown, that at initial concentrations of caesium up to 1 mg/L there is no influence of EDTA concentration (up to 0.01 mol/L of EDTA) on sorption of caesium. Distribution coefficient of caesium at 10^{-3} mg/L of Cs is slightly lower than at 1 mg/L of Cs; the K_d values are respectively $10^{(4.1\pm0.2)}$ and $10^{(4.7\pm0.2)}$ mL/g. Distribution coefficient of caesium decreases at EDTA concentrations higher than 0.01 mol/L. When initial concentration of caesium is 10^{-3} mg/L, distribution coefficient of caesium doesn't depend on EDTA concentration at whole studied concentration range and its value is 10^2 mL/g.

The sorbent is able to extract U (VI) and Th with distribution coefficients respectively $10^{(3.6\pm1.4)}$ and $10^{(2.7\pm0.8)}$ mL/g.

Leaching rates of caesium and strontium from saturated samples of the sorbent were determined. When distilled water was used as a leachant, leaching rates were $3.7\cdot10^{-10}$ to $8.2\cdot10^{-12}$ g/(cm^2·day) for caesium and from $1{,}8\cdot10^{-10}$ to $1{,}2\cdot10^{-12}$ g/(cm^2·day) for strontium; for tap water as a leachant leaching rates were $1{,}4\cdot10^{-11}$ to$1{,}5\cdot10^{-12}$ g/(cm^2·day) for strontium. It was experimentally confirmed that the sorbent can be successfully used as a matrix material for immobilization of radionuclides.

A.V. Voronina
V.S. Semenishchev
M.O. Blinova

THE ASSESSMENT OF EFFICIENCY OF USING OF NATURAL ALUMINOSILICATES AND MODIFIED SORBENTS BASED ON THEM FOR RETURNING OF RADIOACTIVELY CONTAMINATED LANDS TO FARMING INDUSTRY

Ural Federal University, Ekaterinburg, Russia

High efficiency of retention of radionuclides in soil is necessary to prevent their migration through food chains when remediation of radioactively contaminated soils is realized with the aim of their returning to farming industry. The method of addition of sorbents with affinity to natural systems, high specificity and selectivity and also irreversibility of sorption of radionuclides to soils can be used for solution of this problem.

Comparative study of specificity, selectivity and reversibility of sorption of radionuclides by natural aluminosilicates (glauconite and clinoptilolite) and modified ferrocyanide sorbents based on them is presented in this work. It is shown that modification of natural aluminosilicates by ferrocyanides allows to increase their sorption and mechanical features and to make sorption of caesium more selective and almost irreversible. Ferrocyanide sorbents effectively concentrate caesium and strontium radionuclides: distribution coefficient of Cs from tap water by mixed nickel-potassium ferrocyanide based on

glauconite is $10^{(5,9\pm1,6)}$ mL/g, static exchange capasity of Cs is (63,0±2,0) mg/g; for mixed nickel-potassium ferrocyanide based on clinoptilolite these characteristics are respectively $10^{(7,4\pm1,3)}$ mL/g, 500 mg/g. The assessment of efficiency of sorption of caesium from soil solution is performed.

It is shown that longer time of contact ofsorbent with soil solution leads to higher efficiency of decontamination. Using of modified sorbent is more economically sound, because 500 mg/L of ferrocyanide sorbent gives the same decontamination factor as 25000 mg/L of natural glauconite.

Reversibility of sorption of caesium by natural glauconite and ferrocyanide sorbent was determined as caesium leaching degree from saturated samples (Fig. 2). High caesium leaching rates and degrees are typical for natural glauconite irrespective of leachant salinity, therefore, it could be expected, that there will not be reliable retention of caesium by solid phase after addition of natural aluminosilicates into soil. Surface-modified glauconite provides low caesium leaching degrees, so it can be successfully used for remediation of radioactively contaminated lands. Quantity of added sorbent and efficiency of this addition will depend on type of soil on contaminated lands.

V.A. Zakamski

MONITORING AND SILVICULTURAL AND ECOLOGICAL CONTROL OF FOREST COMMUNITIES IN THE SANITARY PROTECTION ZONE OF THE OIL REFINERY

Volga State University of Technology, Yoshkar-Ola, Russia

In the field of organisation of monitoring and control of forest objects with an anthropogenic character, the science of the forest has accumulated a lot of experience. A variety of techniques and assessment methods of a constantly growing influence of various factors, above all, anthropogenic ones, on forest ecosystems leads to the necessity to implement a systematic approach to the study of how forest communities function. Stabilisation principles and techniques of improving their stability have to be taken into consideration as well.

Summary: the present work suggests systematisation of the knowledge about ecological monitoring (forest monitoring) from the point of view of seeing the forest ecosystem as a single functioning unit which comes into existence based on the interdependence and cause-and-effect relations between single components in natural complexes.

In this regard, forest inventory in Russia as well as in many other countries opens a prospect of organising monitoring on the geographical base. At the same time, various aspects of forest planting use, in particular, for oil-processing industries, require various assessment criteria. In this case, on the territory adjoining the oil refinery, biological monitoring is acceptable, i.e. the determination of the biota condition, its reaction to the

anthropogenic influence, state function and a deviation of this function from the normal natural state on the population level of the forest community.

This way, a theoretic basis for developing a system of monitoring parameters for forest ecosystems is the fundamental study about the dynamics of components in the plant communities. The silvicultural and ecological control during the monitoring organisation in forest ecosystems has to take into consideration solutions of the concrete tasks:

- detection of the potential negative influence on ecosystems and organisation of the corresponding monitoring directions in the forest ecosystems and soil;
- establishment of the necessary and sufficient characteristics of vegetation and soil in order to control their condition;
- development and substantiation of optimal fixation methods, periodicity and rpeatability of observations;
- development of methods and ways to process and analyse the collected information for the efficient detection of changes in the vegetation and soil cover;
- designing measures for preventing negative consequences of the influence on the vegetation and soil;
- determination of the connection between the organisers of the monitoring and administrative authorities in order to prevent negative changes in the vegetation and soil cover.

According to the results of the research, the created local monitoring system of forest ecosystems can methodically and organisationally be included to the co-operative European system of regional monitoring of forests by means of the bioindication net within the frame of the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forest).

For the designated direction of organisation and control of forest ecosystems it would be appropriate to unite researches conducted by specialists in the sphere of forest management in anthropogenic forests of oil refineries and to create a unified international project.

V.A. Zamatyrina
E.I. Tikhomirova
A.V. Koshelev

IODISED SURFACTANTS USE EFFICIENCY FOR THE PURIFICATION OF DOMESTIC AND INDUSTRIAL SEWAGE

Saratov State Technical University named after Y.A. Gagarin, Saratov, Russia
"Lisskon" Ltd., Saratov, Russia

A special impurity type in domestic and industrial sewage are microorganisms. Cholera agents multiply in water, causative agents of dysentery, typhoid fever and other diseases can live in water for a long time. Harmful chemical substances and microorganisms can be

brought into water bodies in quantities exceeding maximum permissible concentrations, which leads to a decrease in their sanitary condition. All this leads to the fact that a profound purification is necessary before using water for economic, drinking and some industrial purposes, which in its turn leads to large financial expenses. This problem can be solved by reducing the load for municipal water treatment facilities. In order to do so, it is possible to use local filters, the bed of which will not only purify sewage from chemical impurities but will also neutralise pathogenic germs. The most promising materials are nanostructured forms of the natural sorbent organobentonite, with an inner structure different from the original mineral, and into which it is possible to include substances with bactericidal properties. A number of authors have been looking at bactericidal properties of some surfactants in their publications. Iodine has a high bactericidal activity and is widely used in medicine as an antiseptic. At the same time, iodine belongs to the number of the most important microelements. In our research, we studied antimicrobial properties of non-iodised surfactants DDAC, alkyltrimethylammonium chloride and alkylbenzyldimethylammonium chloride and their iodised forms constructed according to our technology. At stage one of the experiment we researched the antimicrobial activity of these surfactants in comparison to standard test microorganisms Staphylococcus aureus 209 P and Escherichia coli M-17. For the experiment, we prepared 1% surfactant solutions and microorganism suspensions in the physiological solution. Microorganism suspensions were added into 1% surfactant solutions and were incubated there for 30 minutes at room temperature. Using microbiological loops, supernatant liquid was inoculated in the nutrient medium optimal for the test microorganisms. The results were recorded according to the presence of a visible growth on Petri dishes.

We determined a bactericidal ability of DDAC in relation to the used microorganisms. In case of alkyltrimethylammonium chloride we noticed a bacteriostatic influence on the colibacillus and a bactericidal influence on the staphylococcus. Alkylbenzyldimethylammonium chloridedid not have any bactericidal or bacteriostatic effect on gram-positive cocci or gram-negative rods.

At stage two of our research we prepared iodised forms of the surfactants. The iodised form of alkyltrimethylammonium chloride was most stable, that is why we studied its antimicrobial activity. As test samples we took alkyltrimethylammonium chloride solutions with different iodine concentrations: 1 and 0,5%. Microorganism suspensions were prepared the same way as at stage one. Microorganism suspensions were added into the prepared iodised alkyltrimethylammonium chloride solutions and were incubated there for 30 minutes at room temperature. Supernatant liquid was then inoculated in the nutrient medium and the results were recorded according to the presence of a visible growth on Petri dishes. 48 hours later, there was no bacterial growth in all the plantings.

The obtained data shows that iodine increases the bactericidal effect of surfactants. The iodised form of alkyltrimethylammonium chloride can be used for filtering systems for domestic and industrial sewage purification.

V.N. Zaslonovski
A.P. Shcherbatyuk

COMPLEX OF ENGINEERING SOLUTIONS IN ORDER TO PROTECT THE CITY ECOSYSTEM UNDER CONDITIONS OF THE COMPLEX LANDSCAPE AND PROLONGED COLD PERIOD

Trans-Baikal State University, Chita, Russia

The priority list of Russian cities with the highest level of air pollution as an element of ecosystem in which the air pollution index is 14 or larger is annually updated. Over the past 5 years, this priority list always included Bratsk, Irkutsk, Magadan, Selenginsk, Ulan-Ude and Chita. In all these cities, unlike other cities situated in the plain part of the Russian Federation, the climate is rougher, sharply continental, with large daily temperature extremes. Furthermore, there is a complex landscape of the location with large elevation changes relative to the sea level. Due to these two specific characteristics, the anthropogenic load on these territories increases multifold, which reveals itself particularly in the air pollution.

In order to solve the problem of air pollution caused by exhaust gases in the cities under conditions of the complex landscape and prolonged cold period, we offer a complex of engineering solutions, the realisation of which will improve the qualitative parameters of the air on these territories. The solution consists in the patented method of city ecosystem protection from pollution by cars the in case of cities under conditions of the complex landscape. In the places where toxic and harmful substances are concentrated, i.e. in the lower points of the basins, we suggest creating technological parks. Moreover, next to open car parking areas and above closed underground parking lots we suggest creating technological gardens situated in a certain way. The technological result of this method is the possibility of the natural air cleaning from toxic and harmful substances formed due to the exhaust gases from internal combustion engines in the frost-free season. In the cold period, the authors suggest a technical solution created on the basis of the invention, the practical realisation of which will enable the transition of a considerable number of cars to gas fuel.

Conclusion: The practical realisation of the complex of engineering solutions suggested by the authors creates a real possibility to protect ecosystems, improve qualitative parameters of the air in the cities situated in the regions with the complex landscape and prolonged cold period, which will improve people's health.

E.V. Zelinskaya
N.A. Tolmachova
A.E. Burdonov
V.V. Barahtenko
A.V. Golovnina
S.A. Pronin
K.I. Vlasova
V.E. Sumorokov

INVESTIGATION OF NEW POLYMER-MINERAL MATERIALS

Irkutsk State Technical Universit, Irkutsk, Russia

Studies have been conducted to study the mutual influence of components of the waste, nanostructured and reinforcing additives on properties of the resulting composites.

Identified species waste suitable for recycling at the end of the life cycle, using as a secondary raw material. This is a waste of processing polyvinyl chloride (PVC end of life) and the thermal power plant fly ash (the end of the life cycle of coals). It was determined that as alternatives may be used such polymer waste as recycled polyethylene of high and low pressure and mineral residues such as waste vermiculite and perlite.

Identified physical, mechanical, thermal engineering, pozharotehnicheskie, sanitary and hygienic characteristics of new composite materials derived from anthropogenic and modified waste. It is shown that the properties of new materials meet the existing requirements for building materials.

Based on the range of research on the mechanism of interaction between the binder and filler (fly ash) in the processes of extrusion and termoreaktsii established mechanisms of interaction of technologically altered waste matrix material and additives.

It is shown that the introduction of a filler (ash) in a polymer matrix (polyvinyl chloride PVC) gives rise to a heterogeneous phase system, regardless of size and shape of the filler particles.

Found that by using as a template PVC extrusion process on the surface of fly ash formation of the boundary layer occurs. It is a thin film of PVC, and the physical and chemical properties of these thin films are different from those of the original PVC as a result of interaction with the surface of the filler, which is typical for all existing polymer-mineral compositions. Found that the decisive role in the formation of the boundary layer in the extrusion process in contact with PVC particles of fly ash binder belongs wettability which is defined surface energy components.

Found that the use of recycled, technologically modified PVC leads to disruption of the thermal stability of the melt in the extrusion process. It is shown that the solution to this problem is achieved by using additives whose mechanism of action is aimed at further strengthening the stabilizing group.

The mechanism of action of additives and filler in the manufacture of mineral insulating polymer-based material waste (fly ash thermal power), modified in the process of participation in processes installed as a physical adhesion. Some of the fly ash and the coated polymer reacting polymer-filler is not strong enough as the material passes through the fracture surface of a polymer.

It is shown that the introduction of additives leads to nanostukturiruyuschih increase the strength characteristics of composites by forming a large contact surface area and

strengthen the binding phase of the matrix and filler particles.

Defined processes for the production of mineral-polymer composites (IPC) and the boundary conditions for the effective use of technologically altered secondary waste (fly ash and waste PVC).

It is proved that the fly ash from power plants together resole resins can be used for insulating materials of mineral filled with an exothermic reaction of the catalyst.

The results will be used for research to create new compositions using industrial wastes for the production of thermal insulating and finishing of composite materials. As a secondary raw materials will be used mineral waste chemical and energy companies in the region, such as calcium fluoride, silicon waste.

The results will be used to further develop the theory of waste management, in particular the assessment of the life cycle of waste.

Was supported AVTSP, the project Gz No. 3.2091.2011

E.V. Zelinskaya
N.A. Tolmachova
A.E. Burdonov
V.V. Barahtenko
A.V. Golovnina
S.A. Pronin
K.I. Vlasova

PROSPECTS FOR IMPLEMENTATION OF WASTE TREATMENT TECHNOLOGIES IN THE BAIKAL REGION

Irkutsk State Technical University, Irkutsk, Russia

The most significant human impact on the environment in the global energy sector, including Russia, have a generating capacity. The main types of generations in Russia include hydropower plants (HPP), nuclear power plant (NPP) and the thermal power plants (TPP), power generation in which the total number in the Russian Federation as follows: nuclear power plants - 12%, thermal power plants - 69%, hydro - 19 % [1].

Thermal power plant in Russia there are two major types of fuel - it is gas, and coal. Thermal power plants that burn coal, are the most environmentally dirty. However, coal is the cheapest fuel and its proven reserves will last for more than 200 years of operation. Therefore, coal-burning thermal power plants are extremely promising, but it is necessary first of all to solve the environmental problems that arise from coal combustion, namely the formation of large-tonnage of waste [2].

Another is a serious problem in the Russian energy sector - energy loss and energy conservation. Russia's energy riches, the world's leading producer of oil and gas, fading on the eyes, according to an article published in The New York Times. For example, in 2008 it lost as much energy as the UK would be enough for a whole year. 70% is the total heat loss in the Russian sector of housing, of which approximately 40% of the losses from the depreciation of heat.

December 27, 2010 the Government of the Russian Federation approved the State program "Energy saving and energy efficiency for the period 2020» ' 2446-p, aimed at

ensuring competitiveness, financial sustainability, energy and environmental security of the Russian economy. One of its tasks is to develop a coherent and effective system of power management and energy efficiency in an integrated infrastructure development.

It makes sense to say about the action plan to implement the "Principles of state policy in the field of environmental development of the Russian Federation for the period up to 2030." The achievement of the strategic objectives of the state policy in the field of environmental development will be provided, inter alia, the following tasks: preventing and reducing the negative impact of this on the environment; ensure environmentally sound management of waste; development of economic regulation and market-based instruments for environmental protection and ecological security.

Creation of energy-saving materials from waste heat power complex is a promising direction in the area of energy conservation. In the Baikal region, on the basis of the Irkutsk State Technical University were initiated studies on the establishment of two types of high-performance materials based on waste heat power (fly ash), thermoset and thermoplastic oligomers.

Developed new fire-resistant materials may be used for thermal insulation of residential and civic buildings all building types, as thermal insulation layer exterior wall panels and interior walls, attic floors, local and trunk mains.

The implementation of this production on an industrial scale allows you to: gain competitive building materials; bring to the Russian and foreign markets new construction products; dispose of large amounts of waste products; to reduce the fees for waste disposal; Implement a policy of energy conservation in the preparation and delivery of heat; to reduce human impacts on the environment.

Xiongfei Zeng

ON EARTHQUAKE MECHANISM AND SHORT- IMPENDING PREDICTION

Huizhou Sanbao Biochem.-Science-tech.Co. LTD, Huizhou Yugong Institute of Science Technology Theory, Huizhou, Guangdong, China

Study of Wenchuan earthquake, found that the earthquake process, seismic mechanical conditions, seismic occlusion body as an energy storage, explosion chimney and shock wave trigger mechanism, established the theory on burst dynamics of earthquake structure and earthquake prediction. The earthquake precursor is superposition wave between tidal wave with rupture wave, combined with the HRT geoelectric instrument inventing, to diagnose seismic precursor information, captured wave velocity, period and change of amplitude with time, can be in 2-3 days or hours, accurately determine the earthquake's epicenter, magnitude and the outbreak time, China is expected to be the first in the world to realize earthquake prediction.

A.K. Zhaksylykova
B.N. Nurmukhambetova
N.L. Tkachenko

STRUCTURE CHANGES IN ORGANS UNDER ADAPTATION TO TOXIC STRESS

Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan

Introduction. In toxic stress, which occurs in the result of different things' effect, there will be necessity of research adaptive, compensation processes in organism. Prolonged effect of harmful toxic factors of environment will lead to development of diseases of civilization or diseases of adaptation. Prolonged action of extreme factors will be the reasons of intensive function of adaptative reactions and therefore increasing of using energetic and plastic resources. Additional functional assignments can lead to exhaustion of reserve opportunities of organs and tissues, firstly in liver and kidneys, which can transform to pathologic process.

Materials and methods of research. Experimental models of toxic stress were made with using of 130 white male rats by chronic exotoxic cadmium chloride. Experimental animals were divided into two groups. Daily within 2,5 months in the ration of rats were toxicants (cadmium chloride) in dose 1,5 mg/kg b.w. and 3 mg/kg b.w. There were researches with using of histological, electronic microscope, biochemical, morphologic, functional and statistic methods for estimation of adaptation processes in the cells of liver of rats and their organelles. The researches were in the 1st, 7th, 14th and 21st days.

Results and discussions. First day researches after exotoxic were show that in the process of adaptation effort in presence of chemical stress factor effect in liver were: hypertrophy of liver cells, growth of number of two-nucleic hepatocites, enlargement of nuclei and organelles. There were changes as edema of cells, vacuole and lipid dystrophy of cytoplasm. Most of hepatocites basically in periportal zone were in destruction. Necroses and necrobioses were in hepatocites of animals who get 3 mg/kg b.w.

Ultra structure researches of hepatocites with chronic effect of cadmium were show destruction of membrane's trophy. There were changes in nucleus, organelles, intracellular contacts, configurations of microfibres, bilious capillaries in preparations, which lead to microcirculation offence. There shown variable forms, sizes and compactness of mitochondria matrixes, edema of mitochondria with crists' reduction, which indicate difference of their energetic situation, that may be the result of intoxication and deficiency of energy support of hepatocites. There appeared giant mitochondria. Signs of protein synthesis destructions can be proved by: enlargement and fragmentation of endoplasm reticulum (ER) cisterns, where were extended sections without ribosome; decrease of number of fixed and non-fixed ribosome. There were substantial decreases of glycogen. Volume compactness of lipid inclusions was increased; it proves destruction of lipid metabolism and can develop steatosis of liver. Increasing of lipid concentration or decreasing of glycogen concentration after effect of cadmium proves about offence

of correlation of main energetic substrates of cells by cadmium intoxication. It shows energetic disbalance in liver cell in cadmium intoxication.

All destructions are signs of adaptation and compensational transformation of liver cells and their organelles after toxic stress effect. Simultaneously there were biochemical researches, which showed the increasing of AlAT, AsAT and bilirubin.

After 7, 14 days in parenchyma of animals' liver there were signs of compensator processes. But in spite of this structural changes were saved. There saved edema of hepatocites, dystrophic changes with vacuolization of cytoplasm, necrobioses and necroses of some cells. Ultra structural in hepatocytes after compensator processes there were reconstruction of protein synthesis and energy producing functions of cells, that can be proved by decreasing of volume compactness of ER membrane, increasing of number of ribosome, reduction of mitochondria edema. In 21st day there were repeated morphologic and biochemical researches, that showed gradual decreasing of morphofunctional offences in cells, it proves activation of development of adaptation and compensation processes.

In kidneys microscopic changes showed crimpiness of renal capillaries and insignificant enlargement of their diameters. In 7th day crimpiness is strengthened, appeared enlarged venous. The glomerule loops in kidney were collaborated, there were granular or vacuole dystrophy in epithelium of proximal part of nephrone. In 14th day there were significant enlargement of capillaries; spasm of arterioles and enlargement of venules, and in some places there appeared intravascular micro thrombus and glomerulothrombosis. In dose 3 mg/kg b.w. there were edema of paranephral cellular tissue, isolated hemorrhages.

So, we can say that under toxic stress with chronic influence of different doses of cadmium chloride there shown significant destruction of cell structure and their organelles. There were expressed changes with development of bypassed blood circulation in kidneys. This can be explained by the development of compensatory, adaptive reconstruction, which activated in late terms after exotoxicosis and depend on dosage of toxicant.

There are significant structural changes in the cells and sub cellular organelles under the influence of the different dosages of chloric cadmium what is toxic stress. This can be explained by the development of the compensatory and adaptive cellular reconstruction that are activated in the relatively late stage after exotoxicosis and depend from toxicant's dosage.

Glomerulo-thrombosis and multiple hemorrhages in the capsule were registered in kidneys in 14 day. The glomerule loops are collaborated, granular or vacuole dystrophy in epithelium of proximal section of the nephron was registered.

V. A. Zolotarev

FOREIGN LEGISLATION IN THE SPHERE OF THE PROTECTION OF NATURE APPLIED IN RUSSIA

Information Centre for Continuing Professional Training, Yelets, Lipetsk Region, Russia

The threat to environmental security has become one of the major problems of nowadays. In order to neutralize it the states are attempting to bring their legislation into line with the national situation in the environmental field, as well as with international law.

Despite the fact that there is a sufficiently developed international law basis to regulate the problems concerning the protection of the environment from pollution

criminal law regulation is not up to the mark in most of the countries of the world. Unlike the institutions that protect property rights, personal rights and public order the issues pertaining to the protection of nature have not been developed to the full, though the subjectmatter is urgent for the international community: the fact is that the entire international criminal law (as well as ecological) remains to be liberal in the application of the institutions of liability for environmental offenses.

To pursue a coordinated policy in the field of ecology and environmental protection the states need harmonizing the laws, environmental rules and standards; developing and carrying out by joint efforts international programmes and projects in respect of subsoil management and the protection of the environment, including the programmes for secure destruction and neutralization of chemical and nuclear weapons, highly toxic and radioactive waste products. The problem of criminal law liability of all kinds of legal entity also requires a proper settlement.

The new philosophy of survival and security must combine as a whole: the development and guarantee of human rights, security, i.e. provide international environmental security through steady development.

It is impossible to provide international and environmental security without guaranteeing everyone's right to the protection of the environment.

In modern conditions, the convergence of different criminal law systems allows to solve the tasks of criminal law at the national level. The universal character of criminal law systems would certainly contribute to the course of protection of human values and maintenance of international order.

A.A. Ataeva
J.S. Abubakarova
A.V. Kosarev
E.I. Tikhomirova

IMPROVEMENT OF WATER TREATMENT USING ADSORPTION TECHNOLOGIES FOR WASTEWATERS CONTAINING HEAVY METALS

Chechen State University, Grozny, the Chechen Republic, Russia
Chechen State Petroleum Technical University named after the academician M.D. Millinschikov, Grozny, the Chechen Republic, Russia
Yuri Gagarin State Technical University of Saratov, Saratov, Russia

The problem of environment pollution by heavy metals is an urgent environmental challenge. The solution of this problem is related to improved technologies for rehabilitation of contaminated environments. This problem is particularly relevant for surface water of the Chechen Republic containing specific heavy metal complexes. One of the most effective physicochemical methods of cleaning such waters is sorption. It is now widely used in a variety of sorbents, but each has its own advantages and disadvantages. Zeolites are one of the most effective classes of sorbents. According to some authors, the effect of composition of zeolite adsorbents can have a leverage effect on the sorption capacity.

We have implemented a series of pilot studies to determine the equilibrium sorption activity traits of activated coal, mineral sorbents and their compositions. The objects of our study were activated coal BAU and KAU-types, mineral sorbents (vermiculite and clinoptilolite) and the composites based on them. We investigated the sorption efficiency of copper and cobalt acetates. We placed sorbents in aqueous solutions of metal salts kept those on the ultrasonic shaker for two hours. Then we filtered sorbents and determined the residual metal concentrations in aqueous solutions. We have identified the content of metal ions using the photometric method. The content of copper ions Cu^{2+} was determined in ammonia solution. Concentrations of Co^{2+} were determined by means of $NO(HO)C_{10}H_4(SO_3Na)_2$. We then conducted a comparative analysis of the sorption activity of fetching Co^{2+}, and Cu^{2+} by different sorbent systems. Calculation method of the sorbent dose was proposed by associated professor A.V. Kosarev (YGSTU.).

The experimental sorption isotherm was built for each system. It was shown that for systems with a single sorbent the process could be described as a monomolecular sorption on a smooth surface. That is why it could be characterized by the Langmuir equation (Karnauhov 1999). We evaluated the equilibrium traits of sorption after linearization of the Langmuir isotherms. Description of the equilibrium in the system was conducted on the basis of the Freundlich equation (Karnauhov 1999). This was due to the fact that the slight gradient changes in sorption capacity occurred in a wide range of changes in equilibrium concentrations of heavy metal ions. We estimated the equilibrium sorption characteristics after linearization of the Freundlich isotherm. Statistical similarity of correlation coefficients of linearized forms permitted to apply the generalized Langmuir-Freundlich equation to the description of equilibrium in the studied systems. Our studies of interfacial equilibrium

distribution of the Co^{2+} and Cu^{2+} ions by activated coals, vermiculite, klinoptilolite, and their composites revealed the effect of significant strengthening of the sorption activity of zeolite compositions. Further testing of these compositions in water treatment systems have proved to be promising in their use to address pressing environmental challenges in relation to waters polluted by heavy metal ions.

L.V. Faktorovich

INTEGRATION OF SCHOOL AND UNIVERSITY EDUCATION FOR SUSTAINABLE DEVELOPMENT AS A POSSIBILITY OF THE ENVIRONMENTAL EDUCATION OF THE NEW GENERATION

Novosibirsk State Pedagogic University, Novosibirsk, Russian Federation

In modern Russian educational institutions, environmental education is found everywhere. Nowadays, there is hardly anyone who has doubts about its importance. Unfortunately, there is a deceptive opinion that environment is a field of activity in which anyone can work. This is a reason for unprofessional education, incorrect interpretation of natural and technogenic events and their consequences. Environmental education of middle and high school students has to be systematic, consequent and very professional.

Working experience with schoolchildren who specialise in chemistry in biology shows that education has to be directed towards the formation of competences which will enable students to build their professional work environmentally correctly in future, independently of their specialty.

Environmental education suggests active development of practical activities including obligatory laboratory and practical classes, during which schoolchildren master research skills and study deep and delicate function mechanisms of biological systems and receive a possibility to study the specifics of their response to potential changes in the environment and the adaptation formation of single organisms, populations and communities. Environmental education means active participation of schoolchildren in project activities. These projects can deal with various topics and be highly interesting for schoolchildren due to their involvement into practical projects of research institutions and institutions of higher education. An example of such a collaboration is the integration of school and university education at the Chair of Botany and Ecology of the Novosibirsk State Pedagogic University within the framework of the subject field “Ecology of Microorganisms”. Schoolchildren together with Bachelor students learn available methods by means of which it is possible to study microorganisms as components of the ecosystem and their functions. Microorganisms are able to create ecosystems of full value on the microlevel. Their availability as well as simplicity with which they can be studies create a unique

opportunity to organise and carry out practical training sessions. A logical conclusion of such a work is the readiness of schoolchildren to present the obtained practical results during various events of "game pedagogy" with competitive elements, among which it is possible to mention school theoretical and practical conferences of different levels and ecology contests.

Against the background of modernisation of the Russian education and transition towards new federal state education standards and subject-oriented education, school has to guarantee a versatile and full value education. It is possible if the integrated forms of the school and university education process are correctly organised. In order to make environmental education effective, it is necessary to develop new concepts and new methods of education capable to change the existing harmful type of the environmental mentality and form an environmentally cultured personality.

G.N. Falkova

IMPLEMENTATION MECHANISMS OF THE REGIONAL LEGISLATION IN THE AREA OF WASTE MENAGEMENT

Kemerovo State University, Kemerovo, Russia

Environmentalization of industry requires implementation of a new legal mechanism of environmental management which would motivate natural resource users to introduce the best techniques, modernise companies and construct modern polygons for the neutralisation and disposal of nonrecycled, including toxic, waste.

Speaking about development and implementation of the regional legislation, first of all it is necessary to establish an entity's responsibilities for the construction of waste disposal facilities, to stimulate recycling and to determine penalties for failures to perform these duties. All over the world, waste management regulations belong to the responsibilities of the state, and sooner or later our country will have to do the same.

Governmental regulation of legal relations starts from passing laws and other regional normative legal acts, control and monitoring activities in the area of waste management, financing regional and municipal purpose-oriented programmes and economic incentives.

Methods of economic regulation in waste management leads to an increase in the efficiency in this area of activity. In the Kemerovo region, these methods are rarely implemented, therefore, it is necessary to determine objectives and priority directions in the area of domestic and industrial waste management:

- reduction of the waste volume by means of preventive measures against waste formation, more efficient resource management and creation of more stable production and consumption models;
- reduction of the volume of waste which must be buried on polygons as well

as a reduction of hazardous waste with the corresponding decrease of harmful emissions into air, water and soil;
- incentives in the area of waste and material recycling, reduction of waste toxicity, regulations in the area of final disposal of nonrecycled waste;
- development of special subject strategies in sustainable resource management and implementing preventive measures against waste formation;
- organisation of a waste management system.

Furthermore, it is necessary to review the legislation regulating treatment of different (separate) kinds of waste, e.g. construction waste. Until recently, one of the reasons for the formation of unauthorized dumps was considered to be the lack of possibilities to recycle demolition waste, waste generated during replanning of buildings and the actual construction waste. All these problems are already being solved in the Kemerovo region: a mobile crushing complex makes possible to carry out the full technological waste treatment from recycling of materials to demolition. By the volume of the generated waste, Kuzbas has one of the leading positions in Russia. In the opinion of specialists, a prevention of the environmental catastrophe is only possible by means of a complex plan of operations.

A.V. Koshelev
E.V. Skidanov
E.I. Tikhomirova
V.A. Zamatyrina
T.V. Anohina

EXPERIENCE WATER STRATEGY IMPLEMENTATION OF THE RUSSIAN FEDERATION FOR THE RURAL DRINKING WATER

"LISSKON", Saratov, Russia
Yuri Gagarin State Technical University of Saratov, Saratov, Russia

The availability and quality of drinking water determines nation's health and quality of life. Provisioning clean water has a direct impact on the reduction of mortality, especially among children and the increase in life expectancy. Currently, a significant proportion (50%) of rural settlements in Russia is supplied with technical water. In most cases, water quality does not meet hygienic requirements to the quality of centralized drinking water supply. Depending on the source, pollutants in residential use water may significantly exceed the maximum permissible concentrations of chemical and bacteriological parameters.

Scientific and Production Enterprise "LISSKON" participated in the development and implementation of the regional program "Provisioning drinking water to the Population of the Saratov Region in 1999 - 2010". To implement this program, the efforts of the Saratov Region Government, rural municipal authorities, the Office of Epidemiology at the Saratov Region Government, Yuri Gagarin State Technical University of Saratov, and "LISSKON" were combined.

The developer and manufacturer of the equipment for the water treatment plant was "LISSKON". It developed design documentation and technical specifications, prepared production facilities with certified jobs, and received the sanitary-epidemiological assessment

of the water treatment plant "LISSKON -101". The company in cooperation with Yuri Gagarin State Technical University of Saratov conducted scientific research in the field of water treatment technologies. From 2002 to the present, "LISSKON" have received 15 patents of the Russian Federation for the innovations.

Sanitary-hygienic assessment of the stations "LISSKON" was performed in an accredited research laboratory. The high efficiency of water treatment (both surface and underground water sources) was established regardless of the contamination source. Water cleaned at the station Received at the station completely complied with the hygienic requirements for the quality of drinking water.

Determination of necessary water treatment plant for the area was conducted by the municipal administrations of the Saratov Region and by territorial "Rospotrebnadzor" of the Russian Federation. Market volume was estimated in the framework of the Regional program "Providing the population of the Saratov Region with drinking water" (2006) taking into account the transfer of rural water supplies to groundwater sources.

Underground waters in the Saratov Region are characterized by a high content of iron, manganese along with high values of hardness and total dissolved matter. Therefore, for the treatment of different groups of waters, it was analyzed the need in the proposed number of stations, depending on the desired performance. In accordance with the federal program "Clean Water", water treatment stations were installed at more than 50% of the sources of water supply for rural settlements and isolated social facilities in the Saratov Region.

The high-tech water treatment stations "LISSKON-101" allow provisioning of the rural population with drinking water from almost any surface or underground water source. "LISSKON" is ready to cooperate with enterprises in other regions of the Russian Federation and the countries of the Customs Union on the installment of water treatment plants "LISSKON-101" on equal terms.

M.S. Liashenko

FORMATION OF ECOLOGICAL CULTURE OF STUDENTS IN ECONOMIC INSTITUTION

National Research University Higher School of Economics, Nizhny Novgorod, Russia

In modern economic conditions the question about changes in human attitude towards nature arises and is becoming more acute. Education is faced with the challenge how to create such an environment in which learners would be educated on the basis of respectful and careful approach to nature.

The main contradiction existing between the modern education system and social demands is the following: the ecological component of professional education is not fully included in educational standards of higher education. The analysis of educational standards of economic specialization (bachelor degree) showed that ecological component is not given

or described as a separate competence but it is supposed to be the part of general cultural competence (GC2). Ecology as a discipline is not the part of the obligatory humanitarian, social and economic cycle.

Though the professional activities which the bachelor must be prepared to – carrying out economic, scientific, managerial, pedagogical activities- presuppose not only high level of professional culture but also ecological culture as well. Speaking about ecological culture we would stick to the definition given by Likhachyov B.T. (1995). The essence of ecological culture, from his point of view, is considered to be the organic entity of ecologically developed consciousness, emotional-psychical states and scientifically proved volitional utilitarian- practical activity. The concept "ecological culture" comprises the culture which helps preserve and develop "society-nature" system.

The diagnostics of 2nd and 3rd year students in National Research University Higher School of Economics revealed that the students think about their attitude towards nature but their position regarding nature is not active and fully comprehended. There arises the necessity to pay more attention to ecological issues and human-nature relationships.

One of the ways how to increase the ecological culture of students in economic university is task oriented pedagogical activity of educators to make student be aware of acute ecological issues, get them acquainted with pieces of art depicting nature, human history which is inseparably connected with nature. Classes of foreign languages can become an educational platform where students can be more actively engaged and motivated to understand the necessity of nature oriented economic activity. Additional ecologically oriented texts and problematic articles about ecology for additional reading, role plays and group discussions, case studies, dilemmas and solutions tasks, project works, essays- all these active forms encourage students to participate more and increase their motivation and interest in ecological problems and ecology friendly economic policies, make them think more about the responsibility of their future economic decisions.

N.V. Nemchinova
S.S. Belskii
S.N. Fedorov
T.A. Buzikova

HIGH QUALITY METALLURGICAL SILICON AS A NEW MATERIAL FOR SOLAR ENERGY

Irkutsk State Technical University, Irkutsk, Russia

Silicon is used in various branches of industry widely. Traditional methods of metallurgical silicon production are based on charge mixture smelting, which consists of silicabearing materials and carbon reductant by heating in arc furnaces due to main chemical reaction: $SiO_2+2C=Si+2CO$. Consumers requirements about silicon quality increase constantly. Nonstandart semi-conducting silicon (scrap), mono- and multisilicon recieved from polysilicon for semiconductor industry, and polysilicon recieved by simplized technology of Germany firm "Siemens" are used for production of photoelectric converter (PEC). Low production volumn and high cost of those by SoG-Si ("solar" grade silicon) method are the

constraint for more intensive growth of PEC output. The direct reduction technology of high-quality silicon-containing feedstock by carbon reductant (CR) in ore-thermal furnace (OTF) among alternative technology of SoG-Si receipt occupies special position in gaining certain purity-degree silicon, from what after further refining by crystallization method it's possible to get the material having characteristics and chemical composition closed to SoG-Si.

Enlarged-laboratory tests were conducted by zone melting method for multisilicon gaining from Si_{ref} in Co. Ltd KM – "Kvarsevaya palitra" (Alexandrov city, Vladimirskaya region) by the apparatus "Sapphire – 2MG" in the graphite heat block at 0.0067 Pa. In order to get strictly-oriented crystal on the top of container (quartz boat) seed from monocrystal silicon was set up.

Double-ply recrystallization was conducted for the purpose of maximum silicon refining from impurities: the first – at transport speed 3 cm/h; recieved ingot was released from quartz boat by dissolving hydrofluoric acid, ingot then is etched in HCl and the last quarter of ingot was separated, where the impurities are forced out; the second was conducted on the base of purified ingot (after the first recrystallization) at 1 cm/h transport speed. Recieved multicrystal silicon ingot was characterized with high grade purity and obtained brightly expressed mirrored surface (reflex coefficient of the sample determined by sphere integrating method for diffuse reflection in UV-3600 spectrometer of "Shimadzu" firm (Japan), was upon the average 33% at wavelength 1500 nm, that well correspond to literature data due to semiconductor silicon).

Conducted enlarged-laboratory tests for purification of refined industrial silicon by zone melting method showed high grade purity, %, respectively, for: Al - 93,85; Ca - 68,84; Mg - 29,17; Fe - 96,81; Cu - 81; Ti - 98,0; Mn - 92,25; Ni - 88,24; Co - 96,25; V - 97,37; Cr - 30; Zr - 97,47; B - 33,33; P - 88,67; Zn – 10,0; Pb - 81,82; Na - 80,75. It is confirmed that for increasing the effectiveness of Si it is reasonable to conduct double-ply recrystallization of the material.

The dependence of chemical composition of recieved multisilicon from Si on parameters growth process was confirmed, i.e. the lower the growth speed of crystals and the rotation speed of crucible are, the higher the quality of recieved material is.

E.E. Vasilevich
A.A. Lapkovsky
E.S. Chernukha
A.K. Govorina

AIMED BIOLOGICAL DESTRUCTION OF POLLUTION OF WASTE WATER AND SLUDGE / USING EM AND GRR TECHNOLOGIES

State Technical University, Irkutsk, Russia

The species composition of biocenoses is one of the key parameters affecting the biodegradation of organic pollutants in the effluent. Therefore, research on individual treatment facilities of Irkutsk region identified the following important areas: cultivation

of biocenoses for the biological treatment facilities in order to intensify treatment of domestic and industrial wastewater from the EM - and GRR- technologies.

The concept of "friendly microorganisms" was developed by Professor Teruo Higa, from the University of the Ryukyus in Okinawa, Japan. He reported in the 1980s that a combination of approximately 80 different microorganisms is capable of positively influencing decomposing organic matter such that it reverts into a "life promoting" process.

Development of the technology that combines microorganisms for various beneficial uses, was named discovery «Effective Microorganisms™» or «EM» and started to use the term internationally in 1986. Effective Microorganisms™ is a brand name for various products which EM Research Organization (EMRO) have developed.

«Primorskiy EM-center» Co.Ltd is working together with EM Research Organization (EMRO) (Japan) , promote and further develop the technology of Effective Microorganisms™. For the time being EM•1® is manufactured in Russia by "Primorskiy EM-Center" Co.Ltd under the name "Vostok EM•1"

Our laboratory several years working with"Primorskiy EM-center" Co.Ltd and specialists from Khabarovsk, producing unique products from plastics, the technology which includes adding « Vostok EM•1».

As a result of plastic manifests all microbiological properties - acceleration of development of plants, increase of their masses, safety of crop, the suppression of the pathogenic microflora, etc. Studies EM-plastic showed that its effect is particularly strong in the radius of 30-35 cm, and lasts up to 9-10 years.

As known, that adding « Vostok EM•1» into water bodies and soil and stimulates the work of biocenoses. Our research on biological wastewater treatment in cities of the Irkutsk region with the addition of EM drug confirmed a more intense reduction of nutrients (in average by 10%). Breeding and periodic adding the liquid preparation complicates the technology of water treatment. Studies on the introduction of drains elements of EM-plastic showed results similar with the drug. The advantages of such plastics are obvious, as they are cheap and quite small % square for positive displacement process of biodegradation.

In parallel experiments on adding the GRR powder - development of experts of the International Research and Production Institute for environmental technology In its production goes GRR-processing vibration 8 gts., as a normalizer of biological processes. GRR - generation rational radiation inhibits the growth of pathogenic micro-organisms in the soil, accelerates plant growth, increase their mass, and yield increases product shelf. The results showed a reduction of nutrient pollution compared to conventional aeration average 10-13 %.

According to microbiological studies after EM-fermentation visible intensification of sludge. The improvement in the sedimentation properties of mud with addition of 0.3% by mass (average of 3 times).

A mixture of non stabilized sewage sludge (raw sludge and surplus activated sludge),

treated « Vostok EM•1» showed the absence of smell when storing up to 2 weeks compared with the untreated control sample. Reduction smells of sewage sludge is very important for Siberia .

As shown by luminescent bacterial test on the device «Ekolum», the introduction of GRR powder derived as liquid EM-drugs significantly reduces the toxicity of samples (in average 2 times) already for 3 hours contact.

T.A. Deviatova
V.G. Artiukhov
L.A. Alaeva
E.A. Negrobova
T.N. Kramareva

ECOLOGICAL EDUCATION AT VORONEZH STATE UNIVERSITY

Voronezh State University, Voronezh, Russia;
email: devyatova@bio.vsu.ru

The article deals with the principles of ecological education at the Faculty of Biology and Soil Studies of Voronezh State University. Different types of interaction in three university levels of education are characterized. The priorities for the development of technology of the educational process at the faculty are showing.

The principal statutes for the realization of the ecological lifelong learning are:

- systematic approach to educational activity (lectures and practical trainings stipulating consecutive getting ecological knowledge;
- effective practical training through the system of laboratory and field methods at classes, educational and practical trainings; conducting ecological business games;
- individualization of ecological teaching of students in accordance with their bents and chair specialization;
- practical activity on ecological education;
- participation in the formation of united informational space providing an interchange of ecological educational and methodological information between all the persons concerned.

Among all the faculties of Voronezh State University the faculty of Biology and Soil Studies is best prepared for formation and approbation of the ecological lifelong learning. Some of the determinative factors in solving the questions of the ecological lifelong learning at the faculty are the following:

- abundant informational and analytical material;
- the guideline of the faculty leaders for a harmonious combination of scientific and educational components in the professorial and teaching staff's work;
- the availability of a developed system of subdivisions which are a base for both university and pre-university education and realization of supplementary educational programs.

The system of the ecological lifelong learning consists of three main modules: pre-university education, university education, post-graduate education.

Pre-university education is realized in the following directions:

1) Student scientific society provides the continuity of education in the "school-institution of higher education" system and is realized in the animal ecology, plant ecology, ecology and nature protection, ecological monitoring. The work results in annual scientific conferences for schoolchildren on the basis of the university;

2) "Museum pedagogics" is an important form of teaching schoolchildren. It includes a multilevel system:

- primary school age: forming a child's conception about nature, developing naturalistic skills;
- intermediate juvenile age: developing children's attitude to the world of nature, reinforcement of their attention to the practical nature conservation activity;
- senior juvenile age: organizing and participating in nature conservation activities.

There are 5 museums of nature in the structure of the faculty of biology and soil studies: The Zoological museum, The Botanical museum, The Museum of Nature Biological Educational Scientific Centre "Venevitinovo", The Museum of Nature on the basis of a natural reserve "Galichya Gora", The Botanical Garden named after prof. B.M. Kozo-Polyanskiy;

3) School ecological field camps. Field excursions which are annually organized by the faculty teachers represent one of the forms of effective studying natural objects . To achieve this aim school ecological field camps are organized on the basis of the VSU Biological Educational Scientific Centre "Venevitinovo". School ecological camps include the educating arrangements (excursions, laboratory studies, practical trainings, carrying out individual tasks with the subsequent independent research work, conducting lectures, seminars, final tests), socially useful activities for environmental protection. Educational and entertaining arrangements – contests, quizzes, evening campfires, etc. Educational and entertaining activities are part and parcel of leisure in the ecological camp. Students take part in biological and ecological quizzes, ecological parody shows, contests of songs on the topic of biology with a great enthusiasm.

University education on The Faculty of Biology and Soil Science of Voronezh State University realizes several degree programs in ecology. The first level – the Bachelor's degree program in ecology. The second level – the Master's degree in ecology, the program - ecological management and the Master's degree in biology, the program – ecology.

Bachelor's education is profiled and apart from fundamental disciplines includes practical training (practical training sessions, educational practice and fieldworks). A great number of education and methodical literature as well as the student's books with the stamp of Educational and Methodical Association are worked out at the faculty.

Practical training session "Ecological excursions and tourism" is conducted at the

training grounds of Voronezh and other regions of the Central Black Earth Region: Voronezh State biosphere reserve, Khopyor State biosphere reserve, State natural architectural and archaeological museum-reserve Divnogorye; Central Black Earth State natural biosphere reserve named after V.V. Alyokhin; State natural wildlife preserve Stone Steppe (Kamennaya Step) and others.

Within the bounds of the practical training "biogeography and landscape studies" students get acquainted with the peculiarities of geographic distribution and structure of flora and fauna of the European part of the Russian Federation. Students master methods of field landscape research and methods of ecological assessment of biogeosystems for practical purposes. Practical training session is aimed at consolidation of theoretical knowledge and mastering scientific research methods. Research laboratories, enterprises and research institutions represent the base for practical training.

The necessary requirement for realization of the lifelong learning is conducting interactive classes in the educational process. The examples of this kind of work at the Faculty of Biology and Soil Science include conducting classes in the form of discussions, presentations, round tables, trainings, making cooperative decision of creative tasks, case-study.

The major task of the Master's Degree course is a profound scientific manpower in a more narrow ecological profile. However, in connection with the labour-market instability in Russia and the VSU possibilities (engagement of specialists from the Faculties of Economics, Geography and Law) we have chosen the program "Ecological management" which allows the graduates to study the questions of practical ecology.

Among all the competences acquired by the ecologists in their educational process a big part is assigned to motivating, ethical, social and behavioral competences. They define a graduate's system of values. The given competences are formed not only by the content of the Basic educational programs but also by educational atmosphere of the University, organization of educational process, educational technologies, including practices, museum pedagogics, students' individual work, their participation in research work and social life of the University.

During the last 10 years a post-graduate manpower development training has been realized according to the following programs:

- "Ensuring of ecological safety of objects of economic or any other activity capable to have a negative impact on the environment";
- "Ensuring of ecological safety in Hazardous Wastes management";
- "Normative-legal provision of business entities nature protection activity".

A graduate state certificate is given after finishing the courses. The courses are approved by the Ministry of Natural Resources. More than 1000 specialists of the Black Earth Region enterprises have gone through the courses.

Ju.G. Ivashchenko
I.L. Pavlova
N.A. Ivashchenko
A.A. Garkavenko

BUILDING MATERIALS MADE OF INDUSTRIAL WASTE

Saratov state technical university named after Yuri Gagarin, Saratov, Russia

The problem of creation of building materials and construction with the specified properties is the one of the major problems in today's construction materials science. The problem has two main aspects such as: material science and technology. The first aspect provides an establishment of the quantitative relationship of composition and structure of materials and their properties and also the establishment of regularities of changes the properties of materials in use. The second aspect relates to the technological maintenance of specified quality indicators. The solution of these problems is a methodological approach in which building composites are considered as complexly organized material systems. Qualitatively new stage in the development of a unified theory of structure formation and properties of the highly organized material systems is fundamental tenets of scientific disciplines such as: construction materials science, synergy, physical and colloid chemistry, mechanics of heterogeneous structures that deepen understanding of the processes of multi-level structural organization of materials at all stages of the process.

Environmental issues resource saving energy efficiency comes to the fore in the building materials industry. Demand for different binders and fillers for concrete and mortar increases continuously, which increase the relevance of these issues many times. We need a more complete and comprehensive use of reserves and mineral resources, which include a variety of industrial wastes.

Guidelines on using of various industry wastes as binders, mineral fillers, active modifying additives have an experimental - theoretical foundation. Having been developed compositions of mixed binding agents, such as gypsum cement, pozzolanic, slag-alkaline, filled with cement compositions, sodium silicates, furan and other binders with the use of solid mineral waste are finely dispersed fillers obtained by grinding the concrete scrap, various glass dihydrate phosphor gypsum, pickling sludge, slag-ferrous metallurgy. Also a composite-technology approach, which provides a fairly wide range of building materials for various purposes in industrial and civil engineering and road construction has been developed. However, the problematic subject is a matter under consideration and requires further solutions.

I.V. Sergeyeva
E.S. Sergeyeva

USING BIOLOGICAL INDICATORS FOR ECOLOGICAL AND HYGIENIC ASSESSMENT OF NATURAL WATER BODIES UNDER THE ANTHROPOGENIC IMPACT

Vavilov State Agricultural University of Saratov, Russia
Razumovsky State Medical University of Saratov, Russia

Intensive industrial development and urbanization result in changes in significant changes in structure and functioning of aquatic ecosystems. The Saratov Region, Russian Federation, is classified as the area with low environmental quality. Emissions from some enterprises in Saratov belong to the 1st and the 2nd classes of environmental hazard. Saratov Oblast has abundant water resources. It is one of the most affluent areas of the Volga region. The region has low degree of environmental health, which makes it very relevant to develop the methods of assessment of environmental quality and its possible impact on the health of the local population. The region has numerous problems related to wastewater treatment and control of wastewater discharges from various enterprises. As a result, polluted waters are widely used for residential and agricultural needs. Comparative study of environmental risks would allow predicting the health of the local population under various scenarios of man-made environmental impact.

Ability of living organisms to survive in conditions of anthropogenic pollution is widely used for assessing the quality of aquatic environment. Comprehensive ecological and hygienic assessment of water bodies on the basis of biological indicators is a promising scope of scientific studies.

Aquatic benthic communities are especially sensitive to water pollution. For example, both highly specialized species and species requiring high levels of dissolved oxygen disappear from benthic communities in the conditions of water contamination. Larvae of chironomids (Diptera) are common dominant species in benthic communities. They are frequently used as biological indicators of water quality. Among them, there are anthropophilic, anthropophobic, and eurybiontic species.

We used larvae of subfamily Tanypodinae (Diptera, Chironomidae) for environmental assessment of watercourses in Saratov Oblast. Among benthic organisms, these larvae are particularly sensitive to water contamination. They form bioassay test-object complex including 41 species. These larvae are adapted to various types of water bodies and watercourses and are associated with different types of silt, which facilitates their dispersion and prevalence over other chironomids.

Presence of various species of Tanypodinae allow assessing ecological and sanitary condition of water bodies, particularly establishing whether they belong to the 4th, 5th, or 6th class of water quality. Most species (48) prefer waters with medium and high levels of organic pollution. Some genera (Procladiu, Tanipus) are tolerant to eutrophic waters. Depending on water flow velocity and type of bottom sediments, there exist seven ecological

complexes of Tanypodinae: psammophilic, lithophilic, lithopsammophilic,argylophilic, phytophilic, and eurytopic. In the course eutrophication, tanypodin communities transform towards dominance of anthropophilic species.

The Volgograd Reservoir near Saratov has high levels of anthropogenic impact. Lately, due to worse environmental conditions, total number of tanypodin species decreased: species-bioindicators of clean water (Telmatopelopia nemorum, Conchapelopia viator, Rheopelopia maculipennis) disappeared whereas species-bioindicators of dirty water (Macropelopia nebulosa, Natarsia punctata, Thienemannimyia geijkesi, Th. lentiginosa) appeared in natural communities. Changes in chironomid communities of tanypodins under critical anthropogenic impact go in two directions: 1) the early disturbance stage characterized by total species number increase and replacement of dominant species, and 2) the progressing crisis stage characterized by disappearance of many species, reduction in abundances of dominant species and emergence of anthropophilic species.

In the studied area, Tanypodinae are represented by 16 species. Their proportion in chironomid communities in clean waters does not exceed 20% whereas it is 35% at the medium levels of water pollution, and only 5% in eutrophic, highly toxic waters.

E.V. Zelinskaja
N.A. Tolmatschjova
N.V. Fedotova
A.V. Golovnina
K.I. Vlasova
A.S. Corzh
A.E. Olejnikov

DIE BILDUNG DES CLUSTERS DER ABFALLVERWERTUNGS-UNTERNEHMEN IN DER BAIKALREGION

Irkutsker Staatliche Technische Universität, Irkutsk, Russland.

In der Irkutskregion, wie auch in anderen Subjekten der Russischen Föderation, steht das Müllproblem sehr scharf. Nach dem Zustand auf 2012 beträgt der Umfang der gespeicherten Haushaltsabfälle von der Bevölkerung ungefähr 4.848.000 m^3.

Insgesamt wird die Zusammensetzung der Haushaltsabfälle durch einen hohen Anteil von Sekundärrohstoffe gekennzeichnet. Heute kann man 38 Prozent der Gesamtmasse von Abfällen wiederherstellen, die von kommerziellem Interesse sind. Das Vorhandensein von einer überwiegenden Menge der Wertfraktionen bestätigt, dass Sortierung von Abfällen in der Stadt nötig ist und die Organisation der selektiven Auswahl der Abfälle zweckmäßig ist.

Die Unvollkommenheit der normativen Basis hat zum Entstehen noch eines ernsten Problems, die unbefugten Müllhaufen, geführt. Die spontanen Ansammeln der Abfälle beschädigen die ästhetische Art der städtischen und natürlichen Landschaften, verschlechtern die sanitär-hygienischen Bedingungen und die Behaglichkeit des Aufenthaltes der Bevölkerung.

So sind die Versorgung der gesetzgebenden Basis, die Organisation der Gebühr und die Abfallverwendung auf dem Territorium des Irkutskregion sehr aktuelle Probleme.

Sie kann man mittels der Bildung des territorialen Clusters nach der Abfallaufbereitung entschieden.

Bildung des territorialen Clusters nach der Abfallaufbereitung in der Irkutskregion erlaubt wesentlich die Situation auf dem Gebiet der Abfallaufbereitung zu verbessern. Im Rahmen der vorliegenden Konzeption ist die Durchführung der Veranstaltungen vorgesehen, die auf folgende Punkte gerichtet sind: Bildung der normativ-rechtlichen und technologischen Basis in der Umgang mit den Abfällen; Verhinderung der unbefugten Unterbringung der Industrieabfälle und die Rückgabe der Territorien in den Wirtschaftsumsatz, die mit den unbefugten Deponien belegt sind; Maximale Nutzung von Abfällen, um die Sekundärrohstoffe zu produzieren; Förderung des Recyclings, der Wiederverwendung von Materialien und der Reduzierung der Toxizität von Abfällen; Entwicklung des Marktes der Sekundärrohstoffe und seiner Produktion; Reduzierung des Ausmaßes der Abfälle auf Kosten von den Maßen für die Verhinderung ihrer Bildung, die wirksamere Nutzung der Ressourcen und die Erschaffung der standfesteren Modelle von Produktion und Konsum; Organisation der Forschungs- und Entwicklungsarbeiten an der Einführung moderner Technologien für die Abfallverarbeitung; Ökologische Erziehung und Aufklärung der Bevölkerung, einschließlich die Erhöhung des Kulturniveaus und des Interesses von Bevölkerung auf dem Gebiet von Abfallsammeln. Wirtschaftliche Regulierung schafft günstige Bedingungen für das Umwelt-Unternehmertum. Die ist Steuererleichterungen und Kredite für Unterstützung von mit der Abfallverarbeitung gebundenen Projekten und auch Investitionen für die Verwirklichung von Umwelt-Aktivitäten.

Recycling durch Bildung des territorialen Clusters nach der Abfallaufbereitung in der Irkutskregion hilft eine Rahe ökologischen Probleme zu entschieden: schnelle Verschwinden der Wälder; Beseitigung großer Mengen von Industrieabfälle; Reinigung von Industrieterritorien von Abfälle und die Freigabe von Flächen für andere Zwecke: Land-und Bauwirtschaft; Die Senkung der Degradation von Boden und der nochmaligen Verschmutzung unterirdisches und oberflächliches Gewässern.

Bildung des territorialen Clusters nach der Abfallaufbereitung beschleunigt den Prozess von Abfallverwertung und auch vergrößert das Ausmaß von Abfallverarbeitung

Solches Recycling-System kann bestehende regionale Nische besetzen und die günstige Produktion der Kundschaft bieten. Das ist wegen der Reduzierung von Transportkosten und Gemeinkosten aufgrund der nahen Lage der Produktion für die Verbraucher und der Kontrolle von Produktqualität. Dies erlaubt neue Arbeitsplätze und zusätzliche Steuerabführungen ins Budget zu schaffen.