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Environmental, Engineering and Legal Aspects for Sustainable Living

Programm Abstracts

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OBTAINING RAW MATERIALS FOR SYNTHESIS OF DEMULSIFYING COMPOUND FROM BY-PRODUCTS FROM COTTON OIL PROCESSING

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The problem of effective waste recycling and secondary resources for producing a competitive product is relevant for all industrialized countries. However, despite the importance and the economic feasibility of the most complete recycling of secondary resources, the level of their current use is still insufficient and far from optimal. Given the potential for oil and fat enterprises of southern Kazakhstan, the problem of efficient processing of secondary resources of oil industry goes beyond the industry and the gains the national importance. The main component of the secondary resources obtained in the processing of vegetable oils is soap stocks and gossypol pitch. An economic zone has been created on the territory of South Kazakhstan region, entitled to development of cotton cluster. Accordingly, the problem of recycling of gossypol pitch is relevant and it requires solutions. The problems are solved comprehensively outlined above: through the use of waste oil and fat production – gossypol pitch is synthesized demulsifying compound - a valuable product enabling to replace imports in this field.

The main goal of our research is to obtain demulsifying compound by a method of compounding surfactants of different structures using waste oil and fat production – gossypol pitch. This paper presents the results of a study of the process of fatty acid release (RFA) - a feedstock for emulsion breaker – gossypol pitch in the free form after the step of saponification. It should be noted that the several of reagents of demulsifiers groups have not only a number of positive characteristics, but show some disadvantages. For example, some agents provide clean water separation, but emulsion break down fast enough. Other reagents contribute to a rapid destruction of the emulsion, however drainage waters contain a lot of oil. Many of the reactants are not sufficient to separate effectively mechanical impurities. Therefore, in recent decades we have developed a composition, in which some part of individual compounds in a mixture exhibiting a synergistic effect.

We used the reactor, which is a model of an ideal mixing batch in laboratory studies. Considering that the complex series - parallel reactions structure of material flow has a significant impact on the distribution of the components of the reaction mixture, all the technological parameters of the synthesis process at the initial stage were recorded at the level determined from the literature. Standard installation has been intended for preliminary working off of the way of obtaining of demulsifying compound on the basis of allocated RFA and developments batch for testing surfactants and demulsion properties. Thus, the possibility of the use of new raw materials - fatty part of gossypol pitch - for the synthesis of non-ionic emulsion, when industrial tests showed that a compound derived in

the laboratory exhibits properties of the emulsion breaker, which provides a good degree of desalting and dehydration at rates of 20-25 g. on ton of crude oil. When using demulsifier "Gossilvan" residual water content in the oil is reduced to 0.09% percent and the salts up to 108 mg / l. Demulsifier "Gossilvan" will serve as the basis for creation of highly efficient demulsifier, nanomodified of several chemical compounds with a synergistic effect with more valuable properties of the complex.

V.A. Burkovskaya
I.V. Burkovsky

THE PROBLEMS OF ECOLOGY THROUGH THE AGES: FROM HOLY WRIT TIMES TO THE PRESENT

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The protection of the environment, the harmony based relationship between man and nature are considered to be topical issues despite their long-aged history and numerous efforts to find solutions in different sciences and with reference to different aspects.

Together with juridical laws regulating the legal field of interaction of the citizens in a society there are equally existing, immutable laws of nature, the negligence of which is destined to be punished by both the planet as a whole and its local eco-systems.

The significance of the problem for the Universe and mankind can be already traced in the greatest memorials of Christian religious thought – the Holy Scriptures: the Creator endows a man – "the Lord of nature and its defender" – with enormous responsibility before God for the surrounding world of nature. In other words, the sacred book determines the Absolute Law of Morality obliging to take care of and protect the cradle of man's existence.

Much to regret, the development of civilization entailing the submission of natural resources to utilitarian tasks to achieve convenience, comfort, enrichment, power, often aimed at meeting instantaneous demands, has actually caused the non-observance of this law of morality.

At present the official point of view of the Russian Orthodox Church on the problems of protection of the environment suggests admitting the thought that the man should change the environment in accordance with his inner life needs and thus the transformation of nature must start with the overcoming of the crisis in relation to man's morals. The Russian Orthodox Church encourages the priests studying the laws peculiar to the functioning of the biosphere and joins them in acquiring the fundamentals of ecology and ecological education. Moreover, the ecological programme of the Russian Orthodox Church is designed to become a special part of the bishopric and parish activities. Ecological problems are considered with reference to pastors', missionaries', social and youth service. As a positive example are to be taken monasteries and convents developing the agriculture of eco produce and seeking the opportunities of the rational use of local resources.

Due to their importance for life ecological issues should not become an object of various manipulations, tough competition campaigns or a means of socio-economic and political speculation.

The Russian Orthodox Church welcomes the participation of its priests in ecological projects thoroughly and rationally devised. The Church declares free opportunities "in the framework of cooperation with the state and the society", first of all, for the participation in ecological conferences, symposiums, forums with the aim of exchange of experience for the solution of ecological problems; secondly, for independent evaluation of socially

significant economic projects, the realization of which could have a negative impact on the environment; thirdly, for carrying out joint projects of nature-protective activities at different levels; fourth, for the participation in scientific and ecological researches; fifth, for the participation in the development and discussion as well as the implementation of the programmes of informative and educational character.

Pursuing the dialogue with the state, public, international organizations and communities on a permanent scale the Russian Orthodox Church contributes to the development of joint responsibility for the condition of the environment surrounding the people irrespective of their social status, ethno-cultural identity, gender, age, professional background, for this should be understood as a duty bound by the Absolute Law of Morality.

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THE REMOVAL OF OIL CONTAMINANTS BY THE METHOD OF DEFORMATION OF THE ICE COVER

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Huge hydrocarbon reserves in the Arctic requires environmental safety in extraction and transportation. Feature of oil production in the Arctic is the presence of ice cover, which prevents the elimination of spills of oil and oil products. Currently there is no effective technology for removal of oil pollution under ice cover, which significantly reduces the level of environmental safety of this region of our planet. In this regard, the development of new means and methods of liquidation of oil spills and oil products under the ice cover is very important.

Analysis of existing research and methods of liquidation of oil pollution of various water bodies, shows that the Arctic will require the development of inexpensive, simple but very effective methods of removing oil spills. In this paper we propose a new technology for removal of oil pollution, based on the use of natural remedies and conditions inherent to the water bodies of ice cover. In particular, the technology uses the actual ice cover to remove dirt and oil.

The technology is based on the following principle. The ice cover is deformed by application to it upward buoyancy force arising during the injection of air placed under the ice pontoon. When this occurs, the deformation of the ice cover formation of ice domes. The difference in densities of oil and oil products allows to assemble them in the top of the dome where they are removed. Attached to the ice cover of the lifting force should be less than the force causing the destruction of the ice cover, otherwise, with the destruction of the ice dome method implementation will be impossible.

The technology involves the process of localizing the spots of oil or oil product that is provided with accommodation under ice booms, for example by moving unmanned underwater vehicles, or by putting it through a drilled around the perimeter of the oil slick or oil wells. Further, in the region of localization of spots of oil or oil products under the ice cover serves at least one pontoon, pump him full of air in an amount sufficient to lift the ice cover on the local site of localization of spots of oil or oil product to the required height to ensure due to deformation of the ice cover formation in the last dome, sufficient for collecting oil or oil product is located between the water surface and ice cover. Under the dome ("inverted bowl") deformation of the ice cover at the site of localization of the spots, a lighter than water oil (oil, oil pollution) displaced and collected at the vertex formed from the ice cover of the dome. To enhance the effect of displacement can be increased deformation of the ice, providing application load sufficient to (full or partial) immersion in ice water at this boundary. The quality of goods can be used, for example, ice or water. In the latter case, the perimeter spots on the surface of the ice cover is made of pool (capacity) in the form of a ring and fill it with water, or a ring of flexible (elastic, soft),

for example, polymeric or rubber-fabric tanks, creating the required load by pumping water in them.

Removal of oil or oil product from formed under the ice dome by pumping by pump produce, either through drilled into the ice at the top of the dome hole either directly in the pontoons. The pontoons (rigid or flexible) fill removed from the ice by oil or oil products providing a given force of their influence on the ice cover due to the removal of ballast water, in return, received oil or oil products.

The removal efficiency of petroleum oils or oils can be, in some cases enhanced by the use of the vortex generated by immersion in a drilled bore, the swirler with device. The rotation creates a swirl in the water beneath the ice vortex funnel that collects in the oil or oil product. As a result of centrifugal forces in the water under the ice, forming a funnel- and a funnel formed from the water surface (with boundary "water – oil - ice") are going water-oil and oil products. Then assembled into the vortex funnel of the oil pumped by the pump through the perforations of the sampler in the hollow shaft of the swirler in tank whose functions are performed by a soft or flexible containers or annular reservoir. Then after removal of the oil or oil of an integrated mobile unit rolled and transported for storage and later use for emergency oil spills.

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TREATMENT OF MUNICIPAL SOLID WASTE

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Key words: municipal solid waste, regional program, municipal formation, separate collection disposal

In connection with change of the legislation of the Russian Federation in the field of the inversion of waste production and consumption the question of municipal solid waste management is becoming increasingly urgent. With the adoption in December 2014 Federal law No. 458 "On amendments to the Federal law "On wastes of production and consumption, certain legislative acts of the Russian Federation and the annulment of certain legislative acts of the Russian Federation" the concept of "municipal solid waste" was enshrined in the Federal law No 89 "On wastes of production and consumption" from 24.06.1998. Responsibility for organizing the activities for the treatment of municipal solid waste, development and implementation of regional programs in the field of municipal solid waste management within the jurisdiction of the regional and municipal branches of government. However, the implementation of the municipalities of this responsibility hindered by the lack of well-defined comprehensive regional programs in the field of municipal solid waste management, which in turn leads not only to environmental hazards, but also to the loss of secondary products, biogas and energy resources which are municipal solid domestic waste. A necessary condition for effective integrated management of municipal solid waste is to improve the investment climate and to create creating favorable conditions for formation of a full technological cycle for the collection and disposal of municipal solid waste.

Consumption wastes refer to one of the basic factor of anthropogenic exposure on the environment leading to deterioration of life quality of man. According to the experience only 20-40% of the whole volume of wastes is fully processed and applied whereas the most part of the wastes being transformed into the wastes of different degree of danger. Geological resources during various stages of their processing give way of another category of waste. Ultimately a huge volume of gained natural resources is being transformed into wastes, which present even more environmental challenges than unprocessed resources.

The problem of separate collection of solid municipal wastes can be solved in two ways: using waste sorting plants or separate collection of wastes by the producers of the wastes. The first option implies serious investments, which is hardly possible on the regional level. Besides, the search of distribution markets for sorted wastes is problematic due to deficiency of such plants in Russian Federation and in Kemerovo region in particular. Municipalities prefer the second option dealing with developing and implementing regional target programs aiming at separate collection of solid municipal wastes on the primary level.

It is worth mentioning that in Region Kemerovo the developing of waste processing branch has been taking place during last 6 years. The processing plants perform sorting, processing and profiling of different kinds of wastes. In Region Kemerovo investment program «Management of industrial and municipal wastes on the territory of Kemerovo Region in the period up to 2020" has been carried out, stipulating activities of municipal entities of Kemerovo Region on treatment of industrial and municipal wastes as well as participation at investment projects.

342 entities of waste disposal were registered in Kemerovo Region including 16 entities where solid municipal wastes are located. 173159 sources of production of solid municipal wastes were detected, which are spread sporadically all over the region.

54 specialized enterprises operate on collection and processing of wastes, among them 19 enterprises within the city of Kemerovo.

Analyzing the experience of managing solid municipal wastes it should be noted that there are disadvantages in regional programs due to absence of a complex approach to management of SMW enabling to solve technical, political and sociological issues. This means that improvement of investment climate is a necessary condition for the effective complex management of wastes, which also provides favorable conditions for setting up a technologically competent system to collect and utilize SMW.

Fulfilling the above mentioned tasks on managing SMW will be in line with the policy of resource saving. Failure to comply with this policy will make it impossible to form a modern economic system both on a regional and on national level.

N.E. Garashchenko

SCIENTIFIC-TECHNICAL DEVELOPMENT OF BOTTOM ASH WASTE USING ANALYSIS

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The bottom ash waste using, obtained during to coal combustion on HES, becomes more and more important problem. It is caused by two main reasons.

Firstly, accumulation of waste increases every year. According to Consortium Fenix review 30 mln tones bottom ash waste forms in Russia every year. Of course, this leads to high costs of energy companies in the transportation and service ash-disposal area economy. Negative impact on the environment payments is also increasing due to the annual increase in payment rates.

The amount of ash has accumulated more than 1.5 billion tons. Storage area, which house the waste, the so-called ash dumps, more than 20 thousand hectares. According to forecasts, voiced at the round table "On normative support expanding the use of ash and slag waste" in the State Duma, it was noted that if the situation does not change, by 2020 the volume of ash will exceed 1.7 billion tons, and by 2030 - 2 billion.

The second reason is caused by the usefulness of waste is increasing on primary raw materials costs, which can be replaced by secondary. This applies primarily to the construction industry. Here the waste thermal energy can replace mineral resources such as sand, gravel. As they reach the feedstock composition consisting of at least 50%.

Foreign experience shows that the ash and slag resulting from the combustion of coal in thermal power plants, can be used by 70-100% in different spheres of production. So, at present, in the major European countries, a whole formed ash in Poland and China - 80%, Indii-.50%

The preconditions' analysis shows that the main incentive is the adoption of laws which prescribe the mandatory use of ash and slag materials in various industries, such as construction of roads.

There are factors that inhibit or, conversely, the use of ash and slag. In the first place - it is the legislative and regulatory requirements to encourage this process, as well as economic incentives or sanctions.

It is believed that with the 80-ies of the last century in Russia has developed more than 300 technologies, the implementation of which would allow use of ash and slag in the more than 20 applications.

An analysis of publication and patent activity of the subject in Russian and foreign scientific and technical information resource bases was carried out. Analysis of the collected data was carried out using a programming language means R. The source of information for the analysis of the database were of scientific publications and patents of Russian and foreign sources

It is evident that a very significant number of foreign scientific papers devoted to reflection of the results of research on the use of ash and slag materials. And most importantly, it revealed a steady increase publication activity. Over the past 17 - 20 years the number of publications has tripled. Only on the basis of a number of foreign sources of publications, for example in 2015 it are about 24,400, and has already exceeded 25,500 for 10 months of 2016.

Analyzing Patent Activity in Russia, we can say that its a significant increase occurred in the period 2012-2015 year. You can almost certainly relate this to the adoption of the plan to improve the use of ash and slag waste in 2011 Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation" the law was introduced in the State Duma of the Russian Federation 06.12.2010.

Development of the bill has served as a powerful incentive to strengthen the scientific and technical work on recycling and the use of ash and slag. This has led to an increase of publication and inventive activity. However, unfortunately already 17-11-2011 bill was withdrawn from consideration, and hopes for a radical improvement in this area have been deprived of a real perspective.

Sen Kim[1]
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DER WEG VON DEN CHEMISCHEN ELEMENTEN ZU DEN NATÜRLICHEN ELEMENTEN DES UNIVERSUMS (DYADISCH PERIODISCHE GESETZ)

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Chemische Elemente, die im Periodensystem IUPAC dargestellt sind, beinhalten noch nicht mal einen geringen Teil der Gesamtheit aller Materie. Neutrinos deren Masse vergleichbar mit der Masse des realen Universums ist, sind ein Teil des materiellen Universums. Aber auch damit ist die materielle Gesamtheit nicht komplett erfasst. Was ist mit den Neutronensternen? Sind sie nicht auch Teil der Gesamtheit? Ja, denn in einem Stoff sind mehr Neutronen als Protonen vorhanden.

Die erste Systematisierung von fünf Elementen der Natur wurde von Antoine Laurent de Lavoisier im 18 Jh. durchgeführt. Drei Elemente wurden der molekularen Masse nach geordnet: Wasserstoff, Stickstoff und Sauerstoff. Ihnen folgten die massenlosen kalorischen Substanzen wie Äther. Während der Zeit der Entdeckung neuer Elemente wurden von Hamphry Davy mehrere Versuche unternommen die chemischen Elemente zu systematisieren. Diese beruhten auf dem Anstieg der Masse. Dabei wurden periodische Veränderungen der chemischen Eigenschaften festgestellt. Einen großen Anteil an der Systematisierung hatten auch Lothar von Meyer, John A. R. Newlands und Dmitri Mendelejew. Newlands entdeckte die periodische Gesetzmäßigkeit der Änderung der chemischen Eigenschaften von Elementen, wofür er die Medaille von Davy erhielt. Es entstand das "periodische Gesetz". Meyer und Mendelejew die ihre Systeme später vorstellten erhielten die Medaille von Davy für das Entdecken der atomaren Wechselwirkungen. Alle drei Systeme von Newlands, Meyer und Mendelejew beruhten auf der Periodizität der Veränderung von chemischen Eigenschaften, sowie dem Anstieg der atomaren Masse. Die Zahl, die ein Element definierte, stieg mit der atomaren Masse, da die elementaren Teilchen und der Atombau zu der Zeit noch nicht bekannt waren.

Auf der Grundlage der Kenntnisse des Atombaus, wurde bereits im 20. Jh. von Ernest Rutherford und Niels Bohr das Gesetz zur Regelmäßigkeit der chemischen Eigenschaften in Abhängigkeit von der elektrischen Ladung des Atomkerns formuliert. Dabei wurde festgestellt, dass die physikalisch, chemischen Eigenschaften sich in einem periodischen Zusammenhang mit der zuvor festgelegten Zahl, die das Element bestimmt, befindet.

Der Prozess der Erschließung der Regelmäßigkeit dauerte folglich mehr als zwei Jahrhunderte. Die Periodizität der physikalisch, chemischen Eigenschaften der Elemente in Abhängigkeit von der Atommasse und der Ladung der Atomkerne ist die gesetzmäßige

Veränderung der physikalisch, chemischen Eigenschaften der Elemente. Dabei wurde die Gesamtheit aller chemischen Elemente in Tabellenform zusammengefasst: die am weitesten verbreitete kurzgefasste Form ist die des IUPAC. Nur selten wird die langgefasste Form genutzt. Die Aussagen der periodischen Gesetzmäßigkeit haben allerdings zwei Nachteile.

- Es gibt keine mathematische Formel.
- Es gibt eine Vielzahl freier unbelegter Felder.

In unserer Ausarbeitung die vor mehr als zwei Jahren begann setzten wir uns das Ziel die o.g. Nachteile aus dem Periodensystem zu entfernen. Dabei nutzten wir die Abhängigkeit der chemischen Eigenschaften von ihrer Ordnungszahl und nicht von den physikalischen Eigenschaften. Dies wurde soweit auch in den Überlegungen der letzten zwei Jahrhunderte genutzt. Dabei beachteten wir auch, dass jedes chemische Element Element eines anderen Stoffes ist. Außerdem sind nicht alle Elemente gleichzeitig Elemente des Universums. Daher haben wir auf die natürlichen Elemente des Universums zurückgegriffen, die alle chemischen Elemente beinhalten.

Die Aufgabe bestand darin, eine mathematische Verteilung der Zahlen der natürlichen Elemente zu finden. Der allgemeine mathematische Weg benötigt dabei keine Beachtung besonderer physikalischer oder chemischer Eigenschaften. Deswegen kann das Verfahren als rein mathematisch betrachtet werden.

Das dyadischperiodische Gesetz, kann in der kreisförmigen Variante, welche die chemischen Elemente des Universums darstellt, als theoretische Grundlage und “materielle” Basis für den naturwissenschaftlichen sowie technologischen Progress bei der Ausarbeitung von ökologisch sicheren Technologien zur Erzeugung und Nutzung von Energie, Material und diverser Produkte dienen.

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WASTE MANAGEMENT SYSTEM AS AN ECONOMIC SYSTEM OF THE ECONOMY ORGANIZATION RESOURCE THEORY

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The solution of ecological and economic problems of modern Russia is impossible without the creation of management tools for the organization of the waste management system (WMS), which relies on the universal economic theories and models. One of them is the resource theory of system economy organization developed by G.B. Kleiner.

In his work, which is dedicated to development of the system paradigm of economic systems, the following explanation of the system concept is given: "The system is a relatively stable in time and space part of the surrounding world, which has at each monitoring level characteristics of the unity appearance, internal diversity and gnosiological integrity. The system is considered to be economic if it is involved in the production and consumption processes, as well as in processes of economic goods distribution and exchange".

So we can attribute WMS to the economic system of resource theory as it meets all the above mentioned characteristics.

If we consider space and time as the basic strategic resources of economic systems, as proven in the aforementioned work of G.B. Kleiner, the unused waste which are disposed and recycled by not a proper way (which is typical for nowadays Russia), inevitably reduce and take these strategic resources from the economic system. Following the theory of the basic strategic resource used by each economic system, it should be mentioned that such systems should have two kinds of abilities - the intensity (the ability to use space resources) and activity (the ability to use time resources).

In there is a classification of economic systems, which can be used in the formation of WMS management tools: environmental system - the system has no defined boundaries either in time or space; process system – the system's boundaries are defined in time but not defined in space; object system – the system's boundaries are defined in space but not defined in time; project system has more or less definite boundaries in space and time.

Taking into account the characteristics of WMS in nowadays Russia we can attribute them to the project type of economic systems.

Thus, to achieve a high level of the resource conservation and efficiency of the secondary resources use, as well as the release of the territories currently used for the waste disposal, it is necessary that WMS has gone the evolution way from the project economic systems to the environmental economic systems.

WMS evolution to the level of environmental economic systems is impossible without an active government participation: support for small and medium-sized businesses engaged in waste recycling, the development of tax benefits system for producers, etc. In this case, the government must be considered as an integral subsystem of national WMS,

and its management should be organized through a set of economic regulators directly and indirectly affecting the economic agents in the WMS.

I.D. Kolmakova

EXPERIENCE IN THE IMPLEMENTATION OF LOCAL INITIATIVES SUPPORT PROGRAMS

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Local Initiatives Support Programs in Russia involve the provision on a competitive basis on the terms of co-financing from the regional budgets for the projects supported by local citizens to develop public infrastructure. Local citizens at the meeting determined the project co-financing share and elect a group of social control and promote the implementation of the project.

Project selection criteria are:

1. The share of co-financing the project by municipality and the proportion of project co-financing by local citizens.
2. The social efficiency of the project (it is proportion of population that will benefit from the result of the project).
3. The degree of popular participation in the definition of topics (issues) of the project according to the protocol of the meeting of citizens and people's participation in the project (unpaid labor, materials and other forms of community participation in the project).
4. The presence of sources of financing and community participation in the maintenance of municipal property created during the project.
5. Informing the public in the preparation and implementation of the project.

The implementation of Local Initiatives Support Programs promotes the formation of social capital territory, it is more useful to humans as a result of the development of human relations, the maintenance of social norms, social relations (networks) and people contacts based on mutual obligations and expectations of each member of the community, which allows for local identity.

Social capital can achieve a local identity, form of local patriotism, is the basis of human love in the "native land" and so on. Social capital gives a person a sense of belonging, involvement, unity within the social networking space, which leads to a sense of safety, peace of mind and confidence.

Social interaction leads to a synergistic effect. Co-operation (mutual trust, partnership, responsibility, equality and involvement of participants in a common cause) is the result of manifestations of social capital of the community.

More successful may be a city at which are active non-profit organizations, different forms of territorial public initiatives communities that combine local citizens (general population of the city).

Implementation of Local Initiatives Project is the first stage in the process of updating the social capital of the territory, formed active group of citizens continues its work on the creation of local public goods, which leads to an increase in non-financial areas

capitalization. In some cases, there is evidence of registration of non-profit organizations, territorial public self-administrations and other forms of active citizen participation in local governance.

The main directions of the projects are provision of urban amenities, water services, repair of cultural facilities, construction of playgrounds and sports grounds, repair of bridges, local roads and others.

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METHODEN DER WASSERDAMPFABSETZUNG IN KÜHLTÜRMEN

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Gegenwärtig wird für die Kühlung der Turbinenkondensatoren von Heizkraftwerken (HKW) durch die weitverbreiteten Kühltürme ausgeführt. Um 1 kg Dampf zu kondensieren, werden 60-100kg Wasser gebraucht. Beispielsweise werden für ein Heizkraftwerk der Stärke 2400MW 323 Tausend m3/h Wasser gebraucht.

Während des Prozesses der Wasserkühlung entsteht in den Kühltürmen ein Wasserverlust auf Grund der Verdampfung und des Abganges von kleinen Tropfen in die Atmosphäre, was sich negativ auf die Umwelt auswirkt, da es einer der Hauptgründe für die Entstehung des Treibhausgaseffekts ist. Außerdem vermischen sich die Wasserdämpfe, wenn sie in die Atmosphäre gelangen, mit Autoabgasen und anderen Dampfquellen und bedingen den Ausfall von saurem Regen, der sich auf den Zustand der nächstgelegenen Ackerflächen auswirkt. Die rutschigen Straßen, die durch die gefrorenen Wassertropfen in der Nähe der HKW entstehen, erhöht die Wahrscheinlichkeit von Autounfällen.

So ist das Verringern von Wasserdampfausfällen in die Atmosphäre ein aktuelles ökologisches und technisches Problem.

Im Folgenden werden Verfahren zur Dampfausfällung aufgeführt, die in Zusammenarbeit mit den Autoren erarbeitet wurden.

1. In der Mitte des Kühlturms werden Lautsprecher und ein abgestumpfter Konus aufgestellt. Im Fall, dass Schall auf die seitliche Oberfläche des Konus trifft, wird er reflektiert und entwickelt durch die Interaktion mit der Innenfläche des Kühlturms stehende Schallwellen. Die Dampftropfen gelangen bei ihren Bewegungen nach Oben in das Feld der stehenden Wellen, koagulieren und unter dem Einfluss des Gewichts setzen sie sich in Reservoiren ab (Patent für die Erfindung RF.2360198).

2. Das Verfahren zur Absetzung von Dampf im Kühlturm ausgestattet mit einem Reservoir mit einem Bewässerungssystem, beinhaltet folgende Operationen: es werden dynamische Lautsprecher kreisförmig auf der Innenoberfläche des Kühlturms über dem Bewässerungssystem angebracht; man gibt technisches Wasser auf das Bewässerungssystem zur Abkühlung mit kalter Luft mit Dampfausscheidung; mit fallenden Strahlen des technischen Wassers wird im Reservoir der Ton angeregt und nach oben gerichtet, in den Kühlturm; mit Hilfe der Lautsprecher werden sich entgegengesetzte Töne erzeugt, die diametral entgegengesetzt im Kreis des Kühlturms angebracht sind; man summiert durch die Amplitude die gleichen Frequenzen, die durch die ins Reservoir fallenden Strahlen des technischen Wassers angeregt werden in dem Tonumfang Frequenz zur Frequenz, die durch die Lautsprecher generiert werden; es entstehen stehende Schallwellen im Raum zwischen den dynamischen Lautsprechern, man produziert eine Dampfkoagulation in den stehenden Schallwellen, die sich zwischen den dynamischen Lautsprechern befinden;

nach dem Koagulationsprozess produziert man kleine Dampftropfen, die sich durch ihr eigenes Gewicht in Form von Wasserstrahlen ins Reservoir absetzen (Patent für die Erfindung RF. 2339888).

3. Es werden im Kühlturm Bewässerungssysteme mit Lautsprechern mit einer Quarter-Wave-Box parallel von einander aufgestellt. Es wird technisches Wasser gegeben und mit diesen in das Reservoir fallenden Strahlen des technischen Wassers werden Geräusche im Schallumfang der Frequenzen angeregt und nach oben geleitet, in die Kühltürme. Die Geräusche werden mit Hilfe eines Akustikumwandelsystems in Ultraschall umgewandelt und es bilden sich stehende Ultraschallwellen in der Größe der Fläche des Akustikumwandelsystems. Es werden durch Koagulation in den stehenden Ultraschallwellen Dampfwassertropfen gebildet (Patent RF. 2295684).

Die Einführung der patentierten technischen Entwicklungen bietet die Möglichkeit der Erhöhung des Wirkungsgrades der Heizkraftwerke durch die Reduzierung des Energiekonsums für den Eigenbedarf des Heizkraftwerkes und eine beträchtliche Reduzierung der Verluste großer Wassermenge durch die Verwehung der Tropfen aus den Kühltürmen und der Verdampfung von Wasser in die Atmosphäre.

S.V. Ostakh
O.S. Ostakh

DEVELOPMENT OF TECHNOLOGY FOR THE IDENTIFICATION OF TOXIC BOTTOM SEDIMENTS OF WATER BODIES

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Bottom sediments of water bodies are the indicator of ecological condition and an indicator of the level of contamination, because it accumulates contaminants coming from the catchment areas for a long period of time. Bottom sediments of reservoirs of oil and gas regions are characterized by a high content of oil and oil products significantly affect the state of water ecosystems. The presence of hydrocarbons in the sediments is the result of the production processes and the transport of oil, as well as accidents at sea and river waters.

Surface watercourses and water bodies are sections of the discharge or supply aquifers and are considered as external and internal boundaries (boundary conditions) flow.

Pollution of bottom sediments in water bodies creates a risk of secondary environmental pollution not only due to toxic substances, including persistent organic pollutants and naturally occurring radionuclides within the sludge, but more dangerous products of their transformation.

Currently there is no single approved methodology for the determination of these pollutants in the sediments.

Existing methodological guidelines allow assessing the level of contamination from a single source only.

The aim of this work is development of technology for the identification of toxic bottom sediments of water bodies using hydrogeological modelling and forecasting the damaging factors.

Proven methodology involves the following sequential steps:

- a retrospective analysis of the results of previous hydrogeological, chemical analytical and geophysical studies will provide a model groundwater flow and to determine the dynamics of the formation and spread of contaminated;
- conducting a comprehensive analysis of chemical and related forecasting and analytical assessment using aerospace monitoring results;
- implementation of a complex engineering surveys, geophysical engineering, geotechnical engineering and environmental studies;
- the construction of hydro-geological model and the permanent contamination model for predicting damaging factors;
- environmental impact assessment;
- the development of a geospatial database containing annotated and attribute information, and representing the result in the form of information cards;
- creating sound optimal technological schemes for the creation of posts and

environmental points of local environmental monitoring within the boundaries of fragile ecosystems on the basis of risk analyzes when sensitive landscape components are exposed to hazardous components.

E.A. Paripskaya
S.V. Ostakh

ECONOMIC ASPECTS OF THE IMPLEMENTATION OF THE BEST AVAILABLE TECHNOLOGIES FOR PHYSICAL AND CHEMICAL WASTE TREATMENT

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Implementation of best available technologies (BAT) to an object of economic activity is a very important process. It is necessary to take into account the cost of all decisions (technological, technical and organizational). It is also important to take into account the need for the necessary modernization of production taking into account the costs of business entities, the expected economic feasibility of the introduction of BAT and the environmental impact.

Limitations of the implementation of BAT, implementing physical and chemical methods of waste disposal, should be attributed relatively high cost of the process equipment and the need for large initial capital investments, taking into account the guaranteed lifetime of the equipment.

Economic efficiency is an integral part of the concept of BAT and of stimulation of the creation and modernization of production and technical complexes.

Identification of waste and / or physico-chemical waste treatment technologies is suggested. Implementation and operation technologies, which are less expensive without compromising the environment, are considered.

In practice, cost data are evaluated frequently, but rarely are detailed in the components or to the level when the detected cost changes can be displayed with a specified degree of accuracy.

This limits the possibility of the multicriteria evaluation of feasibility and environmental performance.

The authors used a serial (step by step) approach, which deals with selection of best (optimal), or acceptable satisfactory alternative. That is, certain actions on a variety of alternatives are carried out, and as a result we obtain a subset of the valid (possible) alternatives that satisfy the imposed restrictions.

Multi-criteria evaluation of the technical and economic feasibility is carried out when there are disagreements on what kind of BAT can be introduced efficiently.

When there are prices and cost data for the implementation of specific technologies (technological processes, equipment, tools, materials), next comparative evaluation is carried out.

The assessment of this approach was tested to identify promising technologies of physical and chemical neutralization of waste, including after washing, decantation and solidification.

When implementing waste reuse and recycle activities feasibility of the project should

be considered and profitability of the applying BAT process should be analyzed.

The suggested algorithmization approach can be applied for ranging BATs depending on their increasing cost efficiency relative to feasibility as well as performance without compromising the environment.

Klaus Schierbaum

GASSENSOREN MIT TITANOXIDSCHICHTEN

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Der Vortrag behandelt den aktuellen Entwicklungsstand chemischer Sensoren, die zur Detektion von umweltrelevanten und giftigen Gasen eingesetzt werden können. Wir haben eine spezielle Technologie zur Herstellung spezieller Sensoren entwickelt, die auf der plasmaelektrochemischen Oxidation von Titanfolie beruht und die zu porösen Titanoxidschichten mit gut definierter Phasenzusammensetzung und reproduzierbarer Mikrostruktur führt. Mittels einer Drucktechnik werden auf der Oberfläche des Oxids katalytisch aktive Elektroden abgeschieden und damit chemische Sensoren mit hoher Stabilität erzeugt. Unser Design ermöglicht die Anwendung unterschiedlicher Detektionsprinzipien. Durch Messung von Strömen, Spannungen, Kapazitäten, Impedanzen und katalytischen Umsätze können Wasserstoff, Kohlenmonoxid und Stickoxide in Luft nachgewiesen werden. Die Ergebnisse und mögliche Anwendungen werden diskutiert.

G.N. Sergeyeva
V.I. Ilyin
O.V. Mesinova

NEW TRENDS IN THE ENVIRONMENTAL POLICY OF THE RUSSIAN FEDERATION AND THE LIPETSK REGION

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The year of 2017 is declared in Russia the Year of environmental protection. The fact serves as evidence of increasing attention of the government to topical environmental problems, the solution of which requires no delay. The Executive Order of the RF Government dated 2 June 2016 N 1082-R approved the plan of principle measures on the realization of the Decree of the RF President dated 5 January 2016. The Executive Order reflects the immediate tasks for the improvement of the environment in different regions of the country and the state as a whole with the specification of objects and areas.

Of the 234 items of the Order in question three (11, 64 and 151) are directly related to the Lipetsk region. In particular, they include the decision on the elimination of the burial ground of pesticides "Bolshiye Isbishcha" located by Lebedyan; approved is the plan for integrated processing of wood waste and low-quality wood by making different kinds of wood products, including wood chips and pellets. The environment of the regional centre is also affected by the plan of activities. So, there is a task to reconstruct and technically re-equip "Novolipetsk Steel Works", which is ultimately aimed at reducing emissions of coke products; indicated is also the need for reconstruction of the blast furnaces of the plant.

The environmental policy appears to develop a new trend, which means a departure from declarative statements, slogans and appeals and identification of the most problematic objects in terms of ecological effects; the development of particular approaches to strengthen environmental activities, appointing the persons entrusted to perform the tasks within 2017, and not later.

In the Lipetsk region there was also adopted a Resolution defining the exact boundaries of 125 sites under the state and regional protection. They are all listed now on the public cadastral map compiled by the Federal registration service. The measures taken are intended to contribute to improving the efficiency of preservation in respect of the natural monuments located in the region. In addition, tenant landholders are vested with the responsibility of taking into account the special status of these natural areas in the course of planning and exercising economic activities. The priorities of the environmental policy implemented by the Lipetsk region include the promotion of the creation of new environmental objects to be preserved and conservation of the unique landscapes that are habitats of rare and endangered animal species.

In 2016 the Lipetsk region joined the realization of the project "Ecology of Russia" developed by the all-Russian political party "United Russia". The project involves 57 Russian regions. The main goal of the project is the introduction in the subjects of the Federation of a sustainable, environmentally oriented model of economic development. The project suggests the participation of the regions in the independent ecological and

economic rating that gives one the opportunity to obtain objective information about the ecological state of the area, its social and economic development.

The project to be considered embraces such directions as "Russian Water" (ensuring the water safety in Russian regions), "Green Energy" (use of energy recycling), "Green Ring of Russia" (development of ecotourism), "Memorandum of Environmental Transparency" (introduction of instruments of public control of nature-protective activities), "Environmental Education" (acquiring ecological cultural patterns by the population of the region and development of ecological consciousness of young people), as well as "Promoting the Development of the Industry of Waste Management" and "Arranging Environmental Actions and Events". So, this year there have been carried out environmental raids, the competition "Ecoleader-2016", the action "Green Spring-2016", round table "The Use of Waste Pits for the Construction of Industrial Waste Burial Grounds"; there have been opened "hot lines" on particular environmental issues.

Thus, the environmental policy of Russia and its regions is becoming more systematic, specific and effective.

S.G. Sheina
E.V. Martynova
A.S. Starodubtseva

IMPLEMENTATION OF STANDARDS OF GREEN BUILDING ON EXAMPLE OF OLYMPIC FACILITIES IN SOCHI (RUSSIA)

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Coming across environmental issues human philosophy of life gradually began to change: In the 1970s worldwide movement for a healthy lifestyle and a cleaner environment was popularized, approaches to construction, security and sustainable urban development were enrooted.

Currently, Green building standards are being actively implemented in European countries, and Russia is actively involved in their implementation. In our country, there are already two buildings that are certified according to international standards BREEAM and LEED: office building Ducat Place III in Moscow and industrial building SKF Group under the city of Tver. However, the first large-scale project for the introduction of environmental and energy principles of construction in Russia was the construction of facilities for the Olympics in Sochi in 2014.

For the XXII Olympic Winter Games the following structures were built using both international standards of green building (BREEAM), and the Russian GOST R 54694-2012 "Conformity assessment. Environmental requirements to the objects of real estate ":

- building of the Russian International Olympic University;
- cottage village Mountain Olympic Village;
- the central stadium "Fisht" with the capacity of 40 000 spectators and the area of 142 000 sq m .;
- an indoor skating ring, "Adler-Arena" with the capacity of 8000 spectators and an area of 49,643 sq.m .;
- station "Olympic Park", etc.

The introduction of green building standards were reflected not only in buildings, but also on the improvement: for example, the first parking for bicycles with electric drives was built in Russia, which is charged by solar panels.

A program of "zero waste" was implemented in the project, which includes the organization of waste reduction techniques, emissions and discharges of wastes related to the operation of buildings; a system of separate waste collection, composting and waste sorting.

In addition, the environmental activities were organized: the protection of the surface topsoil, landscapes, objects of flora and fauna, reclamation areas, promoting natural reproduction of aquatic biological resources.

Before improvement of the city, Sochi consumed 70% of the electricity in the Stavropol TPP, but with the help of modern high-performance equipment the city needs

less energy from TPP. Natural gas is used as the main fuel. Due to the introduction of new technology CO2 emissions were reduced as well. Sochi Thermal Power Plant was built with a gas turbine equipped with DLE (fuel combustion with dry low NOx emissions). Energy efficient solutions were also used during designing the thermal power plants: the use of energy-saving light sources; Automatic control systems for ventilation and air-conditioning rooms; mounted thermostatic and switching valve for heating riser.

You should think about implementation of green building standards at the design stage. So, it is possible to support the rational use of energy during the entire life cycle of buildings.

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WORLD RENEWABLE ENERGY IS GAINING MOMENTUM

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Every year the "green" energy is providing the most part of the energy needs of the world's leading economies. For a long time the world's energy balance structure had been formed for more than 80% at the expense of oil, gas and coal. However, high energy prices up to 2014, as well as scientific progress contributed to the development of alternative energy technologies. In fact, today there is a new alignment of world energy paradigm involving the decisive contribution of renewable energy sources (RES) in the total energy consumption and the gradual replacement of traditional fossil fuels. To the category of renewable energy resources, which are also often referred to as alternative energy sources, it is decided to attribute some not yet received widespread in Russia sources of constant renewal of energy through natural processes. These are the sources associated with natural processes in the lithosphere (geothermal energy), hydrosphere (different types of water energy resources) in the atmosphere (wind energy), the biosphere (biomass energy) and in space (solar energy).

In total, around the world at the expense of RES there are savings about 358 million tons of oil equivalent per year, i.e. about 7 million barrels oil per day. In 2015 three countries, the leaders by the use of RES (USA, China and Germany) were in considerable lead over other states. Russia on this indicator took 51-th place in 2015, the USA located on the first line of the rating. But the rate of increase installed capacity of RES in China is very high and according to the results of 2016 China overtook the USA.

At the present stage of development acute interest in energy security and environmental protection can be traced. So, at the beginning of 2016, 173 states have set targets for the development of RES, and 146 countries pursued policies to support the sector.

There are more than 20 countries, where the share of renewable energy in the overall energy balance is more than 20%. Among them are: Iceland, Norway, Scotland, Denmark, Germany and others. According to the Energy Strategy, adopted by the EU, by 2020, the Commonwealth member states should ensure 20% reduction of greenhouse gas emissions, increasing to 20% the share of renewable energy and a 20% increase in energy efficiency. In the longer term, many countries can go significantly further. In particular, Germany plans to achieve by 2050 a 60% share of renewable energy in the overall energy balance of the country and an 80% - in the production of electricity.

World's Renewable Energy develops successfully despite the crisis phenomena in the global economy. And, in fact, it is one of the most effective ways to overcome the energy crisis. An indicator of utilization of renewable energy for 2015 will largely determine the validity of forecasts of development for 2020 and subsequent years. In European countries wind energy takes the leading position in 2015. Taking average annual growth rate of

wind power plants (WPP) for 15% and solar photovoltaic power stations (SPPS) for 31% up to 2020, the future capacity to 2020 will be: 845 GW for WPP, 867 GW for SPPS, ie these indicators will be equal.

Wind energy, solar energy and biofuel production are the most rapidly growing sectors of modern industry, to the development of which all scientific and technical potential of the leading countries of the world are thrown. Under these conditions, the debate about the economic feasibility of renewable energy development activities in the Russian Federation is transformed into political awareness of the inevitability of the movement in the direction of alternative energy.

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URBAN ATMOSPHERE AEROSOL CONTAMINATION RESEARCH

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Aerosols – solid or liquid particles, are suspended in the air. Solid ingredients of the aerosols in some instances are very dangerous for organisms and cause human specific diseases. In the atmosphere, aerosol contaminations are perceived as fumes, gaze, dry fog or dust haze. The considerable part of the aerosols is formed in the atmosphere in interaction of solid and liquid particles among themselves or with water vapor. The mean aerosol particle size consists 1-5 mcm. Annually about 1 km^3 of flour particles of artificial origin enter to the earth atmosphere. A great number of the flour particles is formed in the course of operational procedures of people.

Chemical pollution of the atmosphere is one of the most large-scale by its effect. Every day gaseous and aerosol pollutants of industrial household origin raise their volumes. At this stage, outside air contamination level monitoring and ecological activities for reduction of the destructive effect from these pollutants become critically important.

Actuality of the aerosol contamination ecological monitoring is defined by several factors. In the first instance, the aerosol contaminations destroy the ozone layer, protecting people from the destructive space ultraviolet radiation. The following important factor is that these contaminations cause different diseases of cancerogenic and pulmonological character, which every year acquire increasingly wide spread among population. Also, the contaminations result in reduction of the atmosphere transparency and plants' photosynthetic rate. Besides, we should not forget about decrease in the biological diversity of the biosphere and human life quality degradation.

As a whole, Shymkent city atmosphere aerosol contamination ecological monitoring objectives are the following:

1. Determination of the pollution source:
- stationary;
- mobile.

2.Characteristics of the pollution sources.

3. Setting of geographic coordinates of the stationary pollution sources in the coordinate system of Shymkent city.

4. Determination of the wind diagram for Shymkent city.

5. Determination of prevailing direction of aerosol cloud drift in the period of its intensive formation.

The following analytical instrumentation was used to carry out qualitative and quantitative composition of the atmospheric aerosol contamination:

1. Aerosol particle mass concentration meter "Aerokon".

2. Dust concentration meter “IDIP-01P”.

There is excess of MPC = 0,1 mg/m^3 by contamination by the aerosols everywhere in the studied points. It should be noted that the air contamination level in the premises strongly exceeds the air contamination level in automobile tracks. Most probably it is connected with the fact that territory of automobile tracks is intensively aerated, whereas the air in the premises is stagnant. However, the cleanest air in the premises is in corridors, where always, several times a day a wet cleaning takes place.

S.V. Shmanev

FORECASTING OF EFFICIENCY OF USE OF FINANCIAL RESOURCES OF THE STATE IN MARKET ECONOMY

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Improvement of existing economic and social relations in the Russian Federation influences a formation of financial system and finance management methods. Financial planning and forecasting are necessary in modern conditions as components of the mechanism of the financial system. Absence of appropriate methodological, methodical and organizational maintenance of financial planning of economic activities has led to refusal of operational finance administration. However, carefully planned tactical steps and predicted reference points of financial development that will deduce function of forecasting are necessary for a successful operational administration for new level in a control system of financial subjects.

The effective budgetary policy is the important factor of social and economic development regulation of the state. One of the basic tools of budgetary regulation of social and economic processes is budgetary forecasting because quality and timeliness of decisions depends on such forecasts concerning formation of a profitable part of the budget, carrying out the tax policy, state expenditure and interbudgetary relations, accordingly and equation of budgetary system, level of efficiency of budgetary regulation.

Thanks to forecasting there can be solved following primary goals: analysis and estimation of processes and tendencies, revealing of key problems of development; definition of character of development of these processes and tendencies in the future and predictions of new situations and problems; revealing of possible alternatives of development; substantiation of optimum variant of development for the purpose of rational decision acceptance. Forecasting is necessary when it is almost impossible to the concrete decision as it depends on many objective and subjective factors.

The major feature of budgetary forecasting is an accurate definition of sphere of its application (it is the budget and budgetary system of the state). Budgetary forecasts should cover those distributive processes which are connected with formation and use of means of budgetary fund of the state, interbudgetary relations organization and influence of the budget on development of economy, social sphere and well-being of its members. In the conditions of market transformations budgetary forecasting is a very important component of budgetary planning as difficult economic event. Budgetary forecasts should be based by working out of problems and budget indicators for planned year. Without it is impossible to provide submission of tactical decisions to strategic targets of development of a society.

In development of market relations by one of the basic conditions of effective functioning of economy of the state creation is a perfect financial system as maintenance

of appropriate level of economic growth and improvement of well-being of the population depends on construction of an effective financial system of the country. In this point in question studying the considerable role belongs to research of structure and functional elements of a financial system as a whole and definitions of such important link of a financial system of Russia, as the finance of public sector of economy. The role and value of the last is underestimated, first of all, because of uncertainty concerning structure of public finances and accurate definition of essence of the finance of public sector of economy.

Ekaterina Shmaneva

THE SYSTEM APPROACH TO REGULATION OF BUSINESS PROCESSES OF THE REGIONS ENTERPRISES

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Modern manufacture represents the set of business processes accompanied by growth of uncertainty and non-equilibrium. They are many-sided and multilevel formations, therefore the system approach to their modeling and regulation focuses attention on revealing of set of the obvious and latent communications and interactions. That is why building on the basis of this approach of techniques of management of productions at the enterprise with use of modern instrumental methods and economic-mathematical models becomes rather actual.

The success of any enterprise is defined not only by quality of the created control system, but also by its ability to adapt for possible changes of environment in time. For this purpose at the enterprise should be formed the conditions for effective functioning of the regulation system which would be based on mobile information system, providing its quality and promoting a search for effective decisions in quickly changing environment of managing in regions, coordination of operating business processes and working out of the new should be generated.

At a choice of effective methods of regulation by business processes it is expedient to use modeling which helps to consider and to analyze all "bottlenecks", steps and stages, to track dynamics of communications development and to build a strategy of their further perfection.

The analysis of various approaches and mechanisms of modeling and regulation of business processes at the region enterprise has allowed to allocate some recommendations:

- while creating of system of business processes regulation it is necessary to develop models that simulate real business processes and allow to save means, time and enterprise resources, taking into account real conditions;
- for developing adequate models to set a development direction, to designate necessary for aims decision tasks, to define demanded methods and techniques for effective regulating influence, to carry out step-by-step analysis of functions of business process;
- for simplification of model constructing process and increasing of their reliability, it is necessary to use modern information technology at the concrete enterprise;
- to decrease expenses of the enterprise, to reduce the decision-making time and substantial increase of operational efficiency either separate stages of business processes, or working of the whole system, it is necessary to computerise all procedures.

For adequate reflecting in the model of the developing project of business processes, it is necessary to form a holistic view, and to include all basic functions of the subsystems. At that the model should represent system which reproduces structure and features of

functioning, problem areas of business processes, and all investigated (modeled) processes. In the given context the problem area can be shown as a result of interaction of subjects and objects of management where functions of management with use generated on the enterprise of information system and program-means are carried out.

L.V. Shmaneva

INSTITUTIONAL-SINERGETIC APPROACH TO SOLVE PROBLEMS OF MANAGEMENT OF ECONOMIC ACTIVITIES AS SYSTEMS

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The economic science develops last decades on the basis of merge of various concepts. The reason of it is the recognition by many economists the fact that complexity and many-sided nature of economic processes does not allow to develop the models adequately reflecting mechanisms of their functioning within the limits of any one economic theory. It also explain the aspiration of the increasing number of scientists to searching for the general laws in development of open circuit elaborate (also economic) systems, system with attraction of other sciences knowledge. For example, synergetrics.

Economic, as well as all open systems, have a number of the general properties reflecting their immanent similarity, and are characterized by inequality, emergence, irreversibility, self-organizing ability and self-development. Unlike traditional approaches, synergetic predicts ways of their development proceeding not from entry conditions and previous tendencies, but from possible ways of development to the future which are defined in a point bifurcation and are connected to concrete areas of an attraction (attractors). Consideration of the question connected with application of the synergetic approach to economic processes, has shown that the problem of variability is not only ignored by researchers, but also its role in development of social and economic relations is in general denied. It leads to distortion of a look-ahead estimation of dynamics of economic development.

Besides, the important fact is the understanding of importance of institutes in definition of its direction, as efficiency of economic development is in many respects defined by quality of existing and again created institutes, thus it is necessary to distinguish formal laws, rules and the norms setting economic growth in long-term prospect, and informal norms and the rules of behavior providing economic development only on short time intervals. Specificity of development of the institutional approach in Russia is the following: the institutional approach to the analysis of economic processes develops on the basis of the new thinking assuming presence of nonequilibrium processes in economic systems and ability of changes, proceeding in it, to cumulative effect. The given campaign differs radically from the standard schemes which are based on positions about balance and optimality. It expands toolkit of the analysis of problems of effective development of national economy and allows to have correcting influence in due time and adequately.

Thus, the institutional economy represents synthesis of economic processes and the phenomena of public life described by the humanities: political science, rights, sociology, mathematics, history, psychology, philosophy. Therefore for creation of viable look-ahead model of development of the organization is necessary to collaborate synergetic and

institutional approaches. The new institutional synergetic methodological approach to the management of the process is the one that has the concept of system complexity and development as the base. Models based on institutional-synergetic approach will allow (taking institutional factors into account) to build management in the way that will help to prevent the decline in the quality of system performance by controlling the internal and external environment.

A.V. Sushkova
S.V. Mescheryakov

DEVELOPMENT OF BORON REMOVAL TECHNOLOGY FROM DRINKING WATER

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Currently, relevant problem of groundwater sources cleaning (artesian waters are used for drinking water) from the individual components, in particular, boron and its compounds due to the steady growth of the use of this water. Boron is a biologically active element can be classified as a very toxic substance in accordance with the classification.

Long-term consumption of drinking water with in excess of the boron content is the risk to human health. It provokes the increase in the content of total sugar in the blood, metabolic disturbance of the body mineral composition, brain damage, etc. The need to extract the boron compounds in drinking water due to health requirements. It is necessary due to adversely affect of boron compounds to human and animal organisms. It is known that the sodium salts of boric acids are much more soluble than calcium and magnesium salts.

Removal of boron and borates in water treatment is a very urgent problem. It is not always possible to clean the water from the boron compounds by standard water treatment schemes.

For water purification from boron compounds the following methods are used: co-precipitation and sedimentation, adsorption, ion exchange, membrane (electrodialysis and reverse osmosis) methods. Boron removal by co-precipitation with magnesium hydroxides, aluminum, lanthanum, silicon, titanium, and iron (III) is ineffective in low boron sorption capacity of these substances, complexity of metal hydroxides reuse and the complexity of the implementation of the treatment processes.

The common disadvantage of these water purification methods from boron compounds are the high financial costs of implementation. Furthermore, they do not remove boron compounds from water.

Choice of boron removal technology from water is quite complex and depends on many local factors: the electricity cost, the requirements for sewage water, technical staff preparedness, financial capability, attachment to certain technologies and others.

An integrated technology of removal boron compounds from water, including a combination of several methods, is the solution to this problem. This manner reduces the concentration of the boron compounds to the MPC.

Existing data on the extraction of boron from solution by different methods show significant dependence of these processes on many factors. Obviously, to create optimal conditions is necessary to increase the degree of delay in the processes of boron membrane desalination solutions, such as pH, temperature, etc. All this requires a comprehensive study for the specific water supply design in turn.

The relevance of the work is in an integrated approach solving the removal boron compounds problem from drinking water with selection methods and introducing the optimum parameters to achieve the best results.

B.V. Testov

RADIATION AND HUMAN ENERGY

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1. In his "Biochemistry" A.L. Lehninger states that cells are isothermal systems. That is, all biochemical reactions proceed at constant temperature. However, when a white man is getting a tan in spring his skin may heat up more than 43°C which may cause sunburn. A dark pigment which appears as a result of exposure to ultraviolet radiation from sunlight in the process of tanning is a biochemical reaction occurring with increasing temperature.

2. ATP decomposition is caused not by hydrolysis, but occurs due to exposure to ultraviolet radiation that occurs under the biochemical reactions. This is illustrated by a Russian researcher A.G. Gurvich in "Mitogenetic radiation" published in 1932.

3. At present, ionization of atoms and molecules is considered to be a conventional mechanism of radiation. But ionization does not destroy atoms. A lethal dose for hematothermals is 10 Gy (1000 rad). Our mathematical calculations show that at an amount of 10 Gy one atom out of 10^7 in the human body is destroyed. So if a person's weight is 70 kg, this amount can destroy only 7 mg of substance distributed uniformly throughout the body. Such damage definitely is not fatal.

4. Ionizing radiation (hard ultraviolet, X-rays and gamma rays) have a great penetrability and can easily penetrate into the body. Interacting with molecules and atoms, this penetrating radiation loses its energy and turns into soft ultraviolet. Soft ultraviolet splits ATP molecules which causes heating of body tissues. Therefore, organisms with a high metabolic rate in tissues are the most sensitive to irradiation. This implies that animals are significantly more sensitive to ionizing radiation than plants.

5. Observations made during the Chernobyl accident have shown that in the most polluted area there were no animals during the first year after the accident. The vegetation here was damaged significantly, especially conifers. However, a total loss of trees in the radioactive areas was not observed, only badly rotten pine trees had fallen. The number of trees with green needles gradually increased over time. Finally, the pine growing on the production site which received the greatest dose of exposure, turned green.

6. Two years after the Chernobyl accident, the number of rodents began to increase in all areas, and moist biotopes got populated most quickly. The number of animals did not depend on the amount of radiation pollution. Distribution of animals over the radioactive territory mostly depended on shadow conditions of the area. This confirms our assumption that the dominant factor in radioactive sites is not the radiation dose rate, but temperature conditions. When using laboratory rats (Wistar) in cells at radioactive sites, we observed their rectal temperature rise by 2-3 degrees. After the rats were moved to Chernobyl, where the radiation level was 50 times less, their rectal temperature decreased to become equal to the temperature of control animals. According to the dendrologists who studied the damage of conifers in the radioactive area, needles of the trees were damaged a bit more

on the southern side rather than on the northern one. These data confirm that the trees were damaged due to the thermal effect caused by a mass decomposition of ATP molecules under the effect of radioactive contamination.

7. Unlike plants, humans and animals require periodic sleep. Six-day sleep deprivation causes death in puppies. This is due to the fact that during sleep the energy reserve in the form of ATP molecules is accumulated to allow the animals to lead an active life. This fact has long been surmised by researchers, but the ATP reserve was considered to be generated in the blood. Analyses showed that the blood of animals contains no ATP. The author happened to read in the literature that in 1958 American researchers demonstrated that cells can exchange small molecules the mass of which does not exceed 500 atomic units, and realized that the supply of energy is generated in small lymphocytes. Now researchers believe that lymphocytes are responsible for human immunity. The author believes that lymph cells in a human body stockpile ATP and transfer energy to the intensively working cells.

8. This can be proved by the fact of existence of two circulatory systems -cardiovascular and lymphatic in animals' organisms. They are connected to all cells in the body, but perform different functions. The blood circulatory system (cardiovascular system) delivers nutrients and oxygen to all cells in the body. The main function of the system is to deliver them uninterruptedly. The lymphatic system delivers energy in the form of ATP molecules to cells that lack for their own energy due to intensive work. The lymphatic system is a system of energy emergency aid. It is a system where lymphocytes move unimpededly in any direction to deliver quickly molecules of ATP to a cell in need of energy. Japanese researchers characterize this system as energy meridians.

9. According to the literature, the mass of ATP amount generated per day can be 40 - 60 kg. Calculations show that if the supply of energy, which was generated during the night, gets immediately converted into heat, then the temperature in lymphatic ducts can reach 2000°C. But to do this a human body has to be exposed to a very strong ionizing radiation flow. Such flows can be caused by solar flares. In 10 minutes after a flare occurs, Earth gets exposed to a strong flow of scattered radiation, which will lead to the momentary disintegration of the ATP reserve and inflammation of the body. Such cases of spontaneous inflammation of people are observed on Earth once or twice a year. Most of them occur at nighttime, all that remains from a human is a handful of ashes.

10. In view of the aforesaid, we can conclude that a strong flow of X-rays and gamma rays transforms the body's energy reserve to heat and the body dies of high temperature.

11. It is no coincidence that the mass mortality of people (Hiroshima and Chernobyl) was observed only when radiation was accompanied by high temperature. Therefore, the best protection from radiation exposure is not lead shielding but COOLING the body.

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PROSPECTS FOR USING SOUTH KAZAKHSTAN PLANTS

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Republic of Kazakhstan has practically no its own pharmaceutical industry. Almost 90% of pharmaceuticals is imported from far and near abroad countries. A vast amount of money in foreign currency is spent in the state scale. At that, quality of imported preparations does not always meet GOSTs and technical conditions. Pharmaceuticals prepared from plant raw materials are especially effective at treatment of chronic diseases, do not cause ghost effects at their usage and are non-toxic in comparison with pharmaceuticals derived synthetically. Probably, therefore, recently in such developed countries as America, Japan and countries of European Union, basic components for production of pharmaceuticals are natural compounds of plant and animal origin. More than 20 thousand kinds of plants grow in Kazakhstan, 6 thousand of them contain biologically active substances. 600 kinds from these 6 thousand can be used as semi-finished products for production of pharmaceuticals, ready pharmaceuticals can be produced from more than 500 kinds. However, available technologies for production of pharmaceuticals have very labor intensive, multistage and expensive processes. Besides, purity of these products leaves much to be desired, therefore, they are not competitive in the world market.

Such pharmaceuticals as codein, papaverine, etc., are produced at Shymkent chemical pharmaceutical factory from plant raw materials by means of extraction, and accompanying alkaloids flow to waste, as some of them toxic, others – inefficient, and some have no physiological activity. Up to the present moment these byproducts are stored in storage facilities unrealized. However, structures of these alkaloids allow produce on their basis known or new biologically active substances by modification of their structure, by introduction of new functional groups -OH, $-OCH_3$, $-OC_2H_5$, $-NO_2$, etc. When producing pharmaceuticals in the usual manner, outcome of the target product is not high. We developed a technology for extraction of valuable biologically active substances that increases outcome of the product up to 80% at the high purity. It is offered to use drug plants of South Kazakhstan for production of biologically active additives. However, mentality of Kazakhstan population is such that the people do not like to use dietary supplements, thinking that they are pharmaceuticals. Therefore, we offer principally new solution – take the dietary supplements in the form of herbal teas with different actions: from hypertension, vitaminized, calming, for improvement of digestion, etc.

I.I. Ustinova

ECOLOGICAL AND DEMOGRAPHIC ASPECTS OF SPACE URBANIZATION

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The problem of stabilizing the population of Ukraine, which has been reducing since 1993, is extremely important. According to the ecological theory, the purpose of all ecosystems development is to achieve a state of the ecological balance. This condition is the final phase of that cycle of their oscillating development, in which they can exist indefinitely in time in a particular area due to self-healing resources of the environment. The defined is postulated with the law of ecosystem self-regulation, on which each species of the ecosystem has a capacity, which reserve – underpopulation of the territory determines growth, and its exhaustion - overcrowding of the territory causes the reduction of species. Therefore, for the purpose of finding the ecological mechanisms of population stabilization, Ukraine (collectively with its regions) has been investigated as environmental and urban planning system (EUPS) "population ↔ environment". This system analyzes the joint changes in ecological and demographic indicators of its development for the period from 1973 to 2013. As the indicators of the maturity and natural directional of changes, we considered the population density (the most important characteristics of urban space) measurements of reserve-exhaustion of the demographic capacity of the regional and national EUPS, fertility and mortality indicators, and average annual population dynamics.

The changes of the indicated parameters were analyzed using graphs within the successive stages: from 1973 to 1986 - the stage of growth of the population in the terms of demographic reserve capacity of Ukraine; from 1986 to 1993 - the stage of the inertial growth in the conditions of the exhaustion of this capacity; from 1993 to 2000 – the stage of the reduction of capacity in terms of the exhaustion; from 2000 to 2013 - the stage of inertial reduction of the population in terms of the accumulation of the reserve of the demographic capacity of the country. The location of the regions in order of increasing of the population density has shown a counter, inverse direction "resistance of the environment" in terms of exhaustion-reserve of EUPS capacity. The purpose of this support (as in the case of self-induction) is the balancing of the system and support of its ecological balance. Thus, in terms of the exhaustion of the population capacity (after 1986), the environment resistance was aimed at accelerating vibrational population reduction through the accelerated decline in fertility and increase in mortality, with increasing density of the population. The defined is consistent with the law of reversibility of the biosphere P. Dansero, according to which "the more biosphere aims to restore ecological balance, the more pressure it faces." In terms of accumulation of the demographic capacity (after 2000), by contrast, the resistance of the environment was aimed at the vibrational increase and accelerated decrease in population due to rapid

increase in birth rate and growth of the mortality with the increase in the population density in the areas. The trend of the inverse action of resistance of the environment in the conditions of the successive vibrational change of the measurements of stock-exhaustion of the demographic capacity is a manifestation of the laws the ecosystem self-regulation, in which, with the increase-decrease anthropogenic impact on the environment, respectively, its environmental reaction increases-decreases, which is aimed at keeping the population in an environmentally acceptable range at the demographic capacity. The result obtained resembles to some extent the principle of the EMF self-induction and confirms the action of the principle of environmentally optimal density in the development of "population ↔ environment", under which, underpopulation of the space is as harmful to the sustainable development of population, as its overpopulation. The study determined the density expressed by the different levels of the spatial integrity of EUPS.

From the foregoing it appears that urbanization can be seen as a natural and, density dependent self-regulating mechanism of EUPS. Following that, urbanization is not opposed to the environment, and is an integral strategic link, which function is the regulation of the population to maintain the process of civilization in the proper ecosystem stability, range of environmentally friendly vibrational change. The definitions match the words of V. Dolnyka, according to which "... what a city would have been for people, why they would not appeared, they work as a regulatory factor anyway".

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WASTE PROBLEM IN THE ASPECT OF VIOLATION OF ECOLOGICAL BALANCE AND METABOLISM OF THE CITIES

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The cities that arose were the first temporary settlement of people. Gradually increasing in numbers, expanding geographically, getting complicated in structural and informational sphere, they united with other cities, forming different shapes and settlement system. Today the settlement systems are extremely complex ecological and urban planning systems, whose development cannot be understood without knowledge of the general laws of the formation and the development of the world around us. The cities as a reflection of life forms of human activity, assimilate a boundless manifolds social and economic processes, material and technical means and aesthetic ideals. Today the city is the dominant type of the artificial human environment space, which is formed in the development of the society as its protective shell. In relation to the surrounding area, the city serves as a holistic education that absorbs and recycles elements of their environment (energy and raw materials, water, air, etc.) and at the same time producing a large number of different types of waste (industrial waste, wastewater, air emissions, solid waste, etc.). These features allow us to consider the city as an open fixed system of the metabolism traits – exchange of the substance, energy and information with the environment, which is the basis for the existence and development of all natural systems.

As for the metabolism of the cities. Nowadays, each inhabitant of the planet on average annually produces about 20-45 tons of raw materials, of which about 90-98% goes to waste. Household waste in this volume are 0.3-0.6 tons, the rest are the industrial waste. The scale of the material produced (100 Gt/year), human activities exceeded the planet's volcanic activity (10 Gt/year). Over the years, mankind has sent the main efforts on creating the technologies of production and consumption while only recently it focused on the problems of the waste management, since the load on all components of the environment through waste accumulation started to significantly affect the living conditions and health.

Regarding the general laws of formation and development, according to the law of ecosystem self-regulation, for each type, the area has a population capacity, which reserve - "underpopulation" of the territory causes growth and exhaustion - overcrowding of the territory is reducing the number of species. The defined is resulting from the numerically growing the species increases the pressure on the environment, causing its degradation or indirect resistance aimed at maintaining the ecological balance in the system. A excessive

population density of any type, including the type of «homo sapiens», degrades the environment that does not have time to recover and becomes less suitable for life. The pollution as a form of the deterioration of the environment, is a measure of the imbalance of the ecosystem. In a balanced system, all products of one type are eliminated by others. The pollution accumulates if the balance is disturbed. As noted in our time, mankind has increased the scope and range of wastes of his life so that nature did not have time (and cannot in cases of some waste) to recycle efficiently, because there are pollutants in the processing of which there is no appropriate "technology". Due to this the accumulation of human waste, which were excluded from the biosphere cycles, acts nowadays as a growing ultimatum factor of the environment that increases the counter pressure on people. The action of the ultimatum factors in the mechanisms of self-regulating ecosystem is direct and ruthless (natural disasters, disease, famine, war). This action is aimed at reducing the number of species to the level suitable for all biological community through the growth of its death. The review of the problem of waste and pollution in terms of metabolism of cities and the action of the law of ecosystem self-regulation may contribute to the development of tools for management of the waste creation process with a view to their minimizing in the sources of the emergence and development of new techniques for safe waste management to harmonize ecological and urban planning systems population-environment, in which the problem of waste of the urban civilization is becoming more urgent.

Ekaterina Volobueva

ECONOMETRIC ANALYSIS OF THE IMPACT OF GDP ON THE HAPPINESS LEVEL IN RUSSIA

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According to the results of the study conducted under the auspices of the UN, it can be argued that at the macroeconomic level, people in countries with high levels of GDP on the average feel happier than people in poor countries. At the micro level happiness also depends on money. However, the researchers claim that the more money people have the less impact it has on their happiness. This means that for humans the functional dependence of feeling happiness from the amount of money is non-linear and concave.

In order to test this assumption with respect to citizens of the Russian Federation the author brought statistics of the Russian Public Opinion Research Center and of the International Monetary Fund for the period from 1995 to 2015. The object of research is the dependence between the happiness index and the value of gross domestic product (GDP) per capita. The subject of this research is the analytical form and properties of this dependence. The purpose is the assessment of the impact of per capita GDP level on the level of happiness in Russia.

As a result of the study a non-linear model of the Russian index of happiness yt was received, explaining its change as a result of GDP growth xt on the average per capita:

$$\begin{cases} y_t = \underset{(0,03)}{0,08}x_t^3 - \underset{(0,65)}{2,31}x_t^2 + \underset{(3,38)}{21}x_t + \underset{(7,72)}{\varepsilon_t} \\ \varepsilon_t = \underset{(0,18)}{0,58}\varepsilon_{t-1} + \underset{(7,3)}{e_t} \end{cases}$$

The function of the reaction of the Russian index of happiness to a change in GDP:

$$\Delta y_t = 0,24x_t^2 - 4,62x_t + 21.$$

Based on the study, the following conclusions:

1. The happiness index has the leading position in the field of measuring the level of social and economic development, therefore, it will be the driver of a new study of science;

2. It is necessary to create a common methodology for evaluating the level of socio-economic development and a more detailed study of the factors of influence on this indicator in order to obtain reliable dependence for a more accurate measurement of the level of well-being;

3. In particular, for the Russian Federation the economy of happiness will be a new round of development and improving the quality of life provided more attention to the study of external influences on the performance indices of happiness by country.

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POLYMERIC-MINERAL MATERIALS MANUFACTURING FROM WASTE

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Keywords: mineral-polymer composite, fly ash, plastics wastes, extrusion process

Project goal: technological development on large-scale industrial waste recycling into building materials.

During the research following activities were carried out:

Characterization of waste materials in terms of chemical and mineral compositions, particle sizes, physico-mechanical properties, toxicity, and hazardousness (industrial waste of thermosetting oligomers and heat power (fly ash));

Experiments on industrial waste materials to find ways to innovative and competitive building materials;

Study of waste components and their physico-chemical interactions relevant for production technology of materials of target properties;

Fabrication of samples of innovative materials in industrial scales;

Elaboration of investment proposal to implement the production technology for building materials based on local industrial wastes.

Regularities of changing structure and properties of wastes under various technogenic factors (temperature difference; oxidation; wind erosion; caking) have been established. Structure and composition of technogenically affected mineral and polymeric wastes have been characterized. Compositions and structures of coals, dry fly ash and old landfilled ash-and-slag materials from several power plants have been studied by X-ray scattering, X-ray spectroscopy, gamma-ray spectroscopy, etc. to establish phase composition, particle sizes, moisture content, poured density, adhesive properties, and caking ability.

Regularity of changing composition and other properties in "coal – dry fly ash – landfilled ash" series have been established. Morphology of coals and fly ash has been studied on the JSM-6469 LV microscope (Jeol Inc.) to show that the particles' shape is almost ideally spheric which is favourable for production process and for properties of the product.

Particle size distribution was determined in fly ash from four thermal power stations of the Irkutsk region.

It was found that all the fly ash contains both small and large fractions. Such a particle size distribution will have a positive effect on the rheological properties of the resulting materials, namely, to reduce the viscosity of the composition.

Possibility of using technogenically affected wastes for production of innovative composite materials has been established.

Polymer-mineral composite material producing technology was developed through

research. The material includes 50% polyvinyl chloride (primary polyvinyl chloride and waste mixture) and 40% thermal power stations fly ash. Plasticizers, modifiers, pigments, stabilizers and other additives are 10% by weight. Construction materials such as decking and bar were obtained from this material by extrusion.

The materials have high strength, low flammability, chemical, biological and water-resistance than the closest analog - wood-plastic composite.

The materials structure considerably different from a coal structure.

The material technical specifications properties are shown below. Normative data for WPC shown in parentheses.

- Soaking water absorption 24 h, 0,2 % (< 2);
- Soaking inflation on length 24 h, 0,24 % (< 2);
- Boiling absorption 2 h, 0,36 % (< 5);
- Boiling inflation on width 2 h, 0,62 % (< 1,5);
- Density, 1637 kg/m
- Ball hardness, 200 N/mm^2 (> 90);
- Charpy non-notched impact strength, 10kJ/m^2 (> 3,5);
- Flexural strength, 52 MPa (> 25);
- Tensile strength, 18,9 MPa (>10);
- Screw pulling out specific resistivity, 330 N/mm (> 120)
- Plank rupture load with a 400 mm distance between supporting structures, 5292 N (> 2000).

Construction materials from developed material production pilot factory started to work in the Irkutsk region.

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THE POSSIBILITY OF APPLYING SULPHUR WASTE FROM OIL INDUSTRY IN THE PRODUCTION OF RUBBER

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In the process of cleaning crude oil from hydrogen sulfide produced many elemental sulfur, which is in Tengiz field a result of processing of sour oil and gas, indicating the content of hydrogen sulfide. Many elemental sulfur consumes the rubber industry for the vulcanization of rubbers. Sulfur vulcanizing agents included in the group, ensures the vulcanization, i.e., the transformation of plastic and viscoelastic rubber compounds in highly elastic rubber due to the formation of a uniform spatial with the sulfur atoms linking the individual chemical bonds of the macromolecules rubber.

Constantly increasing demands on the quality of tires cause the necessity of creation of effective components of rubber compounds. Particular attention is paid to development of curing agents. Previously, we have carried out work on the application of purified sulphur in the Tengizbrekina and tread rubber compounds that have shown promise for the future. However, the manufacture of frame rubber compounds using purified Tengiz sulfur is not justified, because rubber was hard. In this work, we have conducted research and presented the results of experiments on the possibility of application of polymeric sulfur, obtained from purified Tengizsulfur.

Polymeric sulfur reduces the amount of sulfur in the formulation of rubber compounds without reducing the curing rate, which leads, consequently, to improve the quality of rubber. The use of polymeric sulfur can also adjust the elastic properties of the resulting rubbers. Polymeric sulfur was introduced on a laboratory mill at the end of mixing, in a second stage, in order to prevent premature vulcanization. In the process of cleaning crude oil from hydrogen sulfide produced many elemental sulfur, which is in Tengiz a result of processing of sour oil and gas, indicating the content of hydrogen sulfide. Many elemental sulfur consumes the rubber industry for the vulcanization of rubbers. Sulfur vulcanizing agents included in the group, ensures the vulcanization, i.e., the transformation of plastic and viscoelastic rubber compounds in highly elastic rubber due to the formation of a uniform spatial with the sulfur atoms linking the individual chemical bonds of the macromolecules rubber.

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The experiments have shown that the technology of mixing, processing of rubber

mixtures and vulcanization is virtually indistinguishable from the standard mode, used in normal practice. Vulcanization of the samples was conducted at a temperature of 1550C for 15 utes. It can be seen that when using Tengiz purified sulfur a decrease in abrasion of the rubber frame, which shows an improvement of elastic properties. From the experimental data with the addition of polymeric sulfur in the compounding of the mixture a significant increase in lasting properties characterized by conventional tensile strength and bond strength between rubber and textile cord carcass rubber was observed

Thus, the results showed that the use of polymer sulphur leads to improvement of the strength properties of the rubber frame by increasing the number of intermolecular bonds in elastomeresmatrix, since all used in the recipe of the rubber mixture, the sulfur reacts to better physico-mechanical properties and quality of tire rubbers.

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ECOLOGICAL EDUCATION OF COLLEGE STUDENTS IN THE DUAL TRAININGSYSTEM

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The specialists with high theoretical and practical preparation of ecological education and acquired professional regulations and labor values are necessary in the modern production. To answer to challenges of new global reality in the Republic of Kazakhstan continuously enhances the complete strategy of actions on the basis of real opportunities. According to Ivanova T. M. it is possible to express an essence of ecological education and education in the following type: ecological education is a continuous process of training, education and development of the personality directed to form of system of knowledge and abilities, valuable orientations, moral and ethical and esthetic relations providing ecological responsibility of the personality for condition and improvement of the socionatural environment.

In the works of E. V. Garusov, N. N. Kiselev, A. N. Kochergin, Yu. T. Markov, S. A. Lipin, N. N. Moiseyev, K. A. Schwarzman, V. A. Shtainberg, E. N. Aganinaand etc., ecological education as an urgent problem of the present, including complex and pedagogical and social problems, became object of attention of the philosophical and social researches considering environmental problems as universal. The problem of ecological education are lit in the works A. N. Zakhlebny, I. D. Zverev, T. Ioganzen, N. Arykov, I. T. Suravegina, A. P. Sidelkovskaya.

In the message to the people of the President of the Republic of Kazakhstan N. A. Nazarbayev made emphasis that technical and professional education has to become one of the main directions of investment policy. For this purpose it is necessary to create the centers for training together with Germany, Canada, Australia and Singapore. They will become model of system of technical and professional education for all country. Dual system of training of future specialists is one of the most effective forms of preparation of professional personnel in the world. Its feature is that professional training is provided by the most part not in educational institution, and at the enterprises. This system is successfully used in such countries as Germany, Austria, Denmark, the Netherlands, Switzerland. The dual model is combination of interests of business, future specialist and the state. This system assumes that 60% of time the pupils study directly at production, and only 40% study at college.

Thus, implementation of the offered in research system of training of college students in system of dual training to ecological education and education really increases quality of professional readiness of future specialists for ecological activities under certain conditions:

- process of preparation will be purposeful, system and systematic;

- structural components of system of students' training will be determined;
- process of teaching of natural sciences and technique of natural study at college will be oriented to problems of environmental upbringing and education;
- process of professional training in the field of environmental upbringing and education will include possibilities of interdisciplinary communications of various educational units within the curriculum;
- process of preparation will provide unity of educational and production work and professional practice.

Prospects of further research are connected with enhancement and methodical providing of structural components of the offered system.

Larisa Pruntseva
Aleksander Pruntsev

ÜBER EINIGE MÖGLICHKEITEN DER PRÄVENTION DER RADIOAKTIVEN UMWELTVERSCHMUTZUNG NACH UNFÄLLEN IN ATOMKRAFTWERKEN

Moskau, Russia

Die menschliche Zivilisation ist auf der Schwelle zur Erschöpfung aller organischer Kraftstoffressourcen, da ein erheblicher Anstieg des weltweiten Energieverbrauches unumgänglich ist, besonders in entwickelten und sich entwickelnden Ländern. Zur Mitte des 21. Jahrhunderts wird sich der globale Energieverbrauch, sehr wahrscheinlich, verdoppeln. Insoweit ist die Suche nach alternativen Quellen ein aktuelles Problem, mit dem die moderne Welt konfrontiert sein wird. Zu solchen Quellen könnte man vor allem Atomenergie zählen, die darauf basiert, dass durch eine Reaktion Atomkerne gespalten werden, um Wärme zu erzeugen und Energie zu produzieren. Im Jahr 1990 haben die Atomkraftwerke (AKW) weltweit 16% der Elektroenergie produziert. Solche Kraftwerke gab es in 31 Ländern und wurden in sechs weiteren gebaut. Diese Länder produzieren einen Viertel bis zur Hälfte ihres Stroms in AKWs. Zur selben Zeit bleibt die Atomenergie Gegenstand von brisanten Debatten. Die Fürwörter und Gegner gehen sehr stark auseinander in Ihren Wertungen was die Sicherheit, Verlässlichkeit und ökonomische Effektivität angeht. Die Erfahrung zeigt, dass der gefährlichste Faktor die radioaktive Verschmutzung der Umwelt ist. Die Radiation kann dabei sowohl im Stadium der Gewinnung von radioaktiven Kraftstoffen Einfluss nehmen als auch im Prozess der Nutzung des Atomkraftwerkes, wo in den letzten Jahrzehnten besonders schwere Probleme entdeckt wurden. Es reicht, sich nur die Unfälle in dem AKW in Tschernobyl und dem AKW auf der Insel Fukushima (Japan) ins Gedächtnis zu rufen. Die Katastrophen in Kraftwerken, die als Folge eines Erdbebens entstehen, sind besonders gefährlich, da die Unvorhersehbarkeit der unterirdischen Stöße es unmöglich macht im Voraus Maßnahmen zu treffen, um die Atomkraftwerke, sowie die naheliegenden Region, zu schützen.

In dieser Arbeit wird die Forschung russischer Wissenschaftler analysiert, welche die Prognose von Erdbeben erlaubt, sowie die Generierung von Tsunami für Frühwarndienste. Die vorgestellten Prognosen haben eine genaue physische Begründung und eine anschauliche Interpretation. Das Einsetzen der diskutierten Methode, die Erdbeben vorhersagen und Tsunami generieren kann, ermöglicht, wenn nicht vollständig, dann in dem maximal möglichen Maß, menschliche Opfer, Zerstörung, radioaktive Verschmutzung der Erdatmosphäre, ihrer Oberfläche, sowie ihrer Wasserressourcen zu vermeiden.

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