



**CENTER OF EARTH SCIENCES,
METALLURGY AND ORE
BENEFICATION**

"CESMOB" JSC – one of Kazakhstan Republic leading scientific centers carrying out fundamental and applied researches, experimental-design and technological developments in the field of ore beneficiation and processing of mineral and secondary raw materials, metallurgy and materials science.

"CESMOB" JSC is the accredited scientific organization (Order of RK MES № 392 from 18.03.2008).

In the organization the certificated system of quality management in respect to research activity and scientific staff training in conformity with ST RK ISO 9001-2009 «Systems of quality management» requirements is introduced (Certificate of conformity № KZ 7500195.07.03.05054 from 15.03. 2010).

BASIC DIRECTIONS OF ACTIVITY:

- development of theoretical bases for new processes in the field of metal-containing raw materials beneficiation, metallurgy and materials science;
- development of innovative technologies of ore beneficiation and deep processing of mineral, secondary raw material, obtaining materials with the set level of properties;
- formation of modern scientific-technological infrastructure, organizing of construction department;
- organizing of pilot and small innovative productions;
- expansion of sphere of National scientific laboratory activity;
- evolution of cooperation in the field of science and technologies with high schools, foreign research centers, industrial enterprises, institutes of development.

"CESMOB" JSC MISSION

development of fundamental bases for metal-containing raw materials beneficiation, metallurgy and materials science, development of competitive technologies directed on upgrade of metallurgical productions, including creation of technological cycle with high repartitions, on new knowledge basis.

"CESMOB" JSC VISION

the large research center of world level which are carrying out fundamental researches with application of modern apparatus and development of new technologies with pilot approbation in the field of mineral ores beneficiation, metallurgy and materials science, capable to solve significant for national economy scientific and technical problems and to realize new innovative technologies and equipment into production, and to develop international cooperation in science and technology sphere.

"CESMOB" JSC PRESIDENT

Abisheva Zinesh Sadyrovna,
Corresponding member of National
Academy of Sciences of Republic
Kazakhstan, Doctor of Technical Sciences,
professor.

She is author of more than 500 scientific publications, including 2 monographs, 75 inventor's certificate of USSR and Patents of RK, 7 of which are implemented into production.

Since 1999 – expert of European community “INCO – Copernicus” and “INTAS” programs; member of editorial boards of prestige scientific journals “Hydrometallurgy” (publishing house “Elsevier”) since 2002 and “Nonferrous metals” (publishing house “Ore and Metals”, Moscow) since 2004.

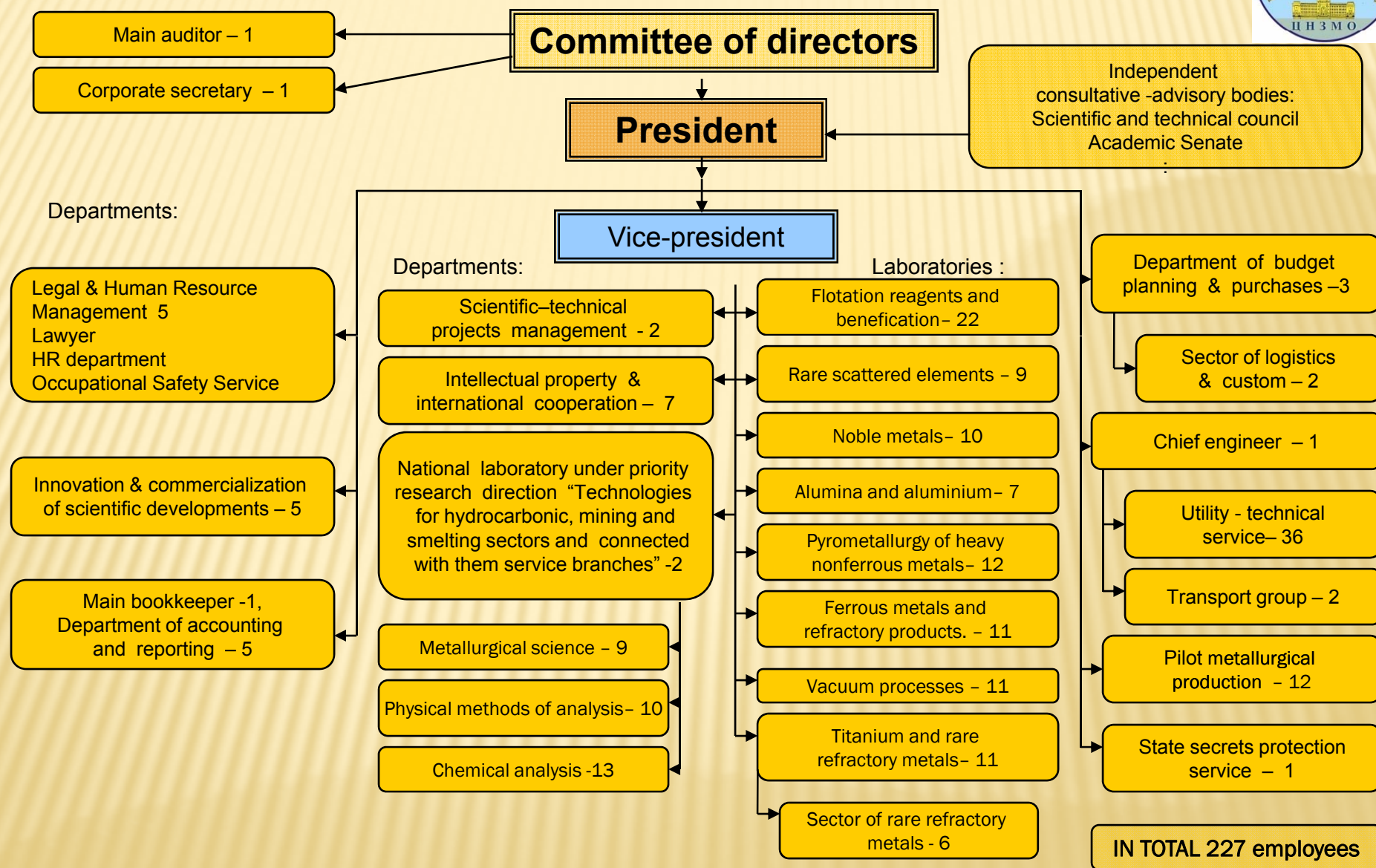
"CESMOB" JSC VICE-PRESIDENT

Panichkin Alexander Vladimirovich,
Candidate of Technical Science.

He is author of more than 50 scientific publications, including 2 RK Patents, 4 RK State Standards – ST RK 1152-2002, ST RK 1153-2002, ST RK 1154-2002, ST RK 1156-2002 (for special alloys application in medicine).

He is developer of technical specifications and scientific program for National laboratory under priority research direction “Technologies for hydrocarbonic, mining and smelting sectors and connected with them service branches”.

"CESMOB" JSC ORGANIZATIONAL STRUCTURE



NUMBER AND STRUCTURE OF THE STAFF

Parameter	2013
Total employment	227
From them researchers:	85
Doctors of science	15
Candidates of science	47
Without academic degree	23

"CESMOB" JSC LABORATORIES

- Flotation reagents and ore beneficiation;
- Rare scattered elements;
- Noble metals;
- Alumina and aluminium;
- Pyrometallurgy of heavy nonferrous metals;
- Ferrous metals and refractory products;
- Vacuum processes;
- Titanium and rare refractory metals;
- National scientific laboratory for collective using under priority research direction "Technologies for hydrocarbonic, mining and smelting sectors and connected with them service branches" includes laboratories:
 - Metallurgical science;
 - Chemical analysis laboratory;
 - Physical methods of analysis.

At "CESMOB" JSC

RESEARCH AND PILOT METALLURGICAL PRODUCTION is available

MAJOR SCIENTIFIC ACHIEVEMENTS OF METALLURGY & ORE BENEFICATION INSTITUTE – CESMOB, TECHNOLOGIES IMPLEMENTED TO INDUSTRY

- KIVCET method for smelting copper-zinc concentrates was developed and implemented at Irtysh polymetallic industrial complex in collaboration with the VNII Tsvetmet.
- The technology of smelting in molten bath was developed and implemented at Balkhash copper-smelting plant in collaboration with MIS&A.
- Vacuum process of refinement of pig tin was developed and introduced at Novosibirsk tin plant. License agreements were concluded with Bolivia, Spain.
- Unique ecologically pure technology of gallium obtaining was developed and introduced at Pavlodar aluminium plant. License agreements were concluded with Japan, Switzerland and Germany.
- The method of processing high-silica Kazakhstan's bauxite was developed and introduced at Pavlodar aluminium plant.
- The new extraction technology for vanadium oxide recovery from by-products of titanic subindustry, aluminous production and from industrial solutions was introduced at Ust-Kamenogorsk Titanium-Magnesium Industrial Complex and «Vostokredmet» enterprise (Chkalovsk, Tajikistan).
- Production of rhenium outputs from by-products of lead manufacture was organised at Chimkent lead factory.
- For the first time in the world practice the technology of rhenium recovery from solutions of underground uranium ores leaching was developed and introduced at Mining and Smelting Industrial Complex (Navoi, Uzbekistan).
- The technology of ammonium perrhenate obtaining was developed and introduced at «Gezkazganredmet» enterprise.
- For the first time in the world practice industrial production of radio gene osmium-187 was organised at «Gezkazganredmet» enterprise.

LABORATORY OF FLOTATION REAGENTS AND BENEFICATION

Basic directions of scientific researches :

- Research of flotation processes mechanism and developing technology for synthesis of selective flotation reagents from domestic raw materials for increasing extraction of non-ferrous and noble metals;
- Creation of nano-dimension activators, depressors and modifiers of flotation for selecting copper-lead and lead-zinc concentrates
- Developing technology for synthesis of highly effective flocculating agent for thickening and filtration of non-ferrous metals concentrates and slime;
- Developing new and perfection of existing effective technologies for beneficiation of ferrous, non-ferrous, rare and noble metals ores.

Main achievements:

- Ultrasonic hydrodynamic radiators, allowing decrease expense of reagents and improving technological parameters of beneficiation were developed and introduced at Hajdarkansky and Belogorsky ore mining and processing enterprises;
- Low-waste technology of wolframite re-extraction from final tailings of tungstenous raw materials at Akchatausky concentration plant was developed;
- The recycling water supply system was introduced at concentration plants of East Kazakhstan: Berezovskaya, Belousovskaya, Nikolaevskaya and Zhezkentskaya;
- Modified flotation reagents possessing simultaneously collecting and foaming properties; the catalyst of the minerals oxidation, providing high efficiency at selection of copper-lead and lead-zinc concentrates; nano-dimension depressors and activators for zinc-containing ores were developed

Services in performance of experimental-research works:

- Research of various ore samples on washability by gravitational, flotation and magnetic methods of beneficiation.

Scientific and technical developments offered to introduction:

- Technology for selection of collective copper-lead concentrates, obtained from ores of deposit Artemevsky with applying oxidation catalysts;
- Technology of thickening and filtration of enriched products of Kentau concentrating factory with applying new flocculating agent;
- Technology of obtaining qualitative zinc concentrates on basis of poly-metallic ores of Tekeli deposit by method of pulp heating .

Numerical structure of laboratory:

In total 22 employees work in laboratory, from them 1 academician of NAS RK, 2 doctors and 5 candidates of sciences.

LABORATORY OF FLOTATION REAGENTS AND BENEFICATION



LABORATORY OF RARE SCATTERED ELEMENTS

Basic directions of scientific researches :

- Hydrometallurgy, chemical technology of rare and nonferrous metals;
- Research and developing technological schemes of rare elements (Os, Re, Ga, In, Te) recovery from by-products and wastes of metallurgical and chemical industry with using processes of extraction, ionic exchange, leaching, sedimentation, electrodialysis;
- Obtaining mineral fillers and stabilizers from by-products and wastes of chemical and metallurgical industry;
- Research and developing methods of electrochemical processing chalcogen containing raw materials, obtaining pure metals and nanostructured alloys on the basis of rare metals by membranous electrolysis method.

Main achievements:

- For the first time in USSR the manufacture of rhenium product from by-products of lead manufacture was organised. The work was awarded USSR Ministry Council Premium;
- The electrodialysis method of ammonium perrhenat obtaining was developed and introduced at Kazakhstan and Uzbekistan enterprises of nonferrous metallurgy;
- Technological schemes of rare metals (Os, Re, Ga, In, Te) recovery from by-products and wastes of metallurgical, chemical and power industry were developed and introduced

Scientific and technical developments offered to introduction:

- Technology of lead dusts and slimes of copper production complex processing with obtaining compounds of three-basic lead sulfate, salts of nonferrous metals, ammonium perrhenat, concentrate of radio gene osmium-187 and silver;
- Technology of interphase suspensions separation from washing sulfuric acid of copper production at rhenium re-extraction stage into separate product containing up to 2 % (weight) osmium and up to 10 rhenium.
- Technology of rhenium recovery from solutions of underground leaching Kazakhstan uranium ores.
- Technology of complex processing slags of phosphoric industry with production of mineral fillers and mineral fertilizers.
- Technology of complex processing volatile dusts of phosphoric, aluminium and power industry with production of gallium, rubidium and mineral fertilizers.
- Technology of obtaining metal rhenium of high cleanliness.
- Technology of obtaining electrolytic coverings on the basis of rhenium-tungsten alloys.

Numerical structure of laboratory:

In total 9 employees work in laboratory, from them 1 Corresponding member of NAS RK, 2 doctors and 4 candidates of sciences.

LABORATORY OF RARE SCATTERED ELEMENTS



LABORATORY OF NOBLE METALS

Basic directions of scientific researches :

- Developing theoretical bases of new chemical and biochemical technologies for processing persistent, hard treated mineral and secondary raw materials containing noble and nonferrous metals;
- Research of structural transformations mechanism of noble and nonferrous metals compounds under processing mineral and secondary raw materials;
- Research and development of technological scheme for biochemical leaching noble metals from higharsenious ores and concentrates;
- Research of kinetic laws of noble metals and foreign-metal impurities sorption by Kazakhstan ionites.

Main achievements:

- Ecologically pure method of bacterial-chemical recovery of noble metals from persistent higharsenious ores and concentrates with neutralisation of waste heaps and sewage from cyanides and arsenic was developed;
- Stage method of gold heap leaching was developed and introduced in the conditions of Vasilkovsky GOK ;
- Experimental-industrial trials were conducted and production schedule for industrial designing of Aktogajsky deposit's copper heap leaching was developed ;
- Possibilities of Kazakhstan's ionites using for sorption of noble metals and foreign-metal impurities from cyanide solutions were estimated.

Scientific and technical developments offered to introduction:

- Ecologically pure method of bacterial-chemical extraction of noble metals from persistent higharsenious raw materials of the Akbakajsky deposit;
- The method of bacterial-chemical neutralization of waste heaps and sewage from cyanide and arsenic .

Numerical structure of laboratory:

In total 10 employees work in laboratory, from them 4candidates of sciences

LABORATORY OF NOBLE METALS



LABORATORY OF ALUMINA AND ALUMINUM

Basic directions of scientific researches :

- Hydrometallurgy and technology of alumina
- Physical and chemical researches and development of alumina obtaining technology from ill-conditioned aluminous raw material;
- Creation of complex technologies for processing of secondary aluminous raw materials

Main achievements:

- In collaboration with scientists and engineers of VAMI at Pavlodar aluminum plant the technology for processing low-quality bauxites was introduced, and for this work USSR State Premium was awarded;
- New methods for waste-free processing of high-silica high-ferriferous bauxites, red slimes, providing along with high degree of alumina recovery ($> 90\%$), also recycling of iron, rare-earth elements (yttrium, scandium, etc.), and silica in the form of various silicate products (cement, zeolites, silicon dioxide) were offered;
- The complex technology of processing ashes with obtaining alumina, ferriferous concentrate and silicate products (zeolites, liquid glass) was developed;
- The high-temperature autoclaving technology of processing low-quality aluminous raw materials (nepheline, clay, red slime, low-quality bauxites) was developed.

Scientific and technical developments offered to introduction:

- Technology of scandium oxide concentration by processing red slime in autoclave conditions;
- Design of ion exchange device for effective recovery of rare and rare-earth metals from waste solutions;
- Technology of hydrothermal leaching sub-standard silica-alumina raw material with aluminum oxide effective recovery.

Numerical structure of laboratory:

In total 9 employees work in laboratory, from them 1 doctor and 3 candidates of sciences.

LABORATORY OF ALUMINA AND ALUMINUM



LABORATORY OF PYROMETALLURGY OF HEAVY NONFERROUS METALS

Basic directions of scientific researches :

- Physical and chemical bases and developing new technologies in area of heavy nonferrous metals pyrometallurgy;
- Autogenous processes of working up sulphide polymetallic raw materials;
- Processes of working up liquid metallurgical slags. Structure and properties of slags systems. Optimisation of slags composition with using various flux materials. Converting copper mattes;
- Fire and electrolytic refinement of copper.

Main achievements:

- Theory of liquid-phase processes of metals sulphides oxidation, and reduction of pure metals oxides and also oxide fluxes was developed;
- Theory of fluxing properties of silicate ores and slags of copper-smelting manufactures was developed;
- The KIVCET method of copper-zinc concentrates and by-products smelting was developed and implemented at Irtys Polymetallic Industrial Complex in collaboration with VNIITcvetmet;
- Technology of smelting in molten bath, developed in collaboration with MIS&A, is used on Balkhash copper-smelting plant from 1985. In 2004 Balkhash copper-smelting plant has been completely transferred on technology of smelting in molten bath.
- Works for improving quality of blister copper and anode copper were carried out at Kazakhstan's copper plants (Zhezkazgan, Balkhash, Ust Kamenogorsk).

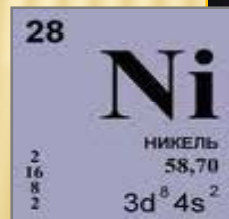
Scientific and technical developments offered to introduction:

- Technology of processing melted slag in the furnace with coke filter;
- Technology of processing high-silica copper concentrates by autogenous smelting together with high-sulphur copper concentrates (for «Corporation " KAZAKHMYS");
- Technique for determining fluxing properties of silicates ores and slags of copper-smelting production;
- Technique of decrepitation analysis of flux ores;
- Technology of processing the oxidised nickel ores by smelting in molten bath (in collaboration with MIS&A)

Numerical structure of laboratory:

In total 11 employees work in laboratory, from them 1 academician of NAS RK, 2 doctors and 2 candidates of sciences.

LABORATORY OF PYROMETALLURGY OF HEAVY NONFERROUS METALS



LABORATORY OF FERROUS METALS AND REFRACTORY PRODUCTS

Basic directions of scientific researches :

- Creation of physical and chemical bases and new ecologically pure technologies for complex extraction of valuable components from nonconventional iron-and-phosphor-containing mineral and secondary raw materials.
- Developing scientific bases for process of forming amorphous and nanocrystalline magnetically soft materials for new technics on basis of naturally alloyed iron-phosphorous alloys.
- Developing technologies for obtaining new heatproof materials with specified properties from natural and secondary Kazakhstan raw materials for lining metallurgical units.

Main achievements:

- Rational technological schemes of complex processing rare-metal high-silica and phosphor-containing raw materials with accompanying extraction of vanadium and niobium were developed.
- Scientific and technological bases of obtaining conditioned concentrates were developed for metallurgical repartition from Kazakhstan brown iron-ores.
- The new class of inexpensive amorphous and nanocrystalline alloys, comparable with expensive materials, for energetics and electronics was offered.
- Theoretical bases of synthesis of heatproof materials for metallurgical units were developed, new magnesia refractory products on a basis of chromite ores were created and tested.
- The technology of iron-phosphorous ferroalloys using in production of cast iron brake shoes with heightened durability was developed and introduced.
- The technology of using the granulated blast-furnace slags as hardening mixes for road coverings and filling mixes for mine-excavations was developed and introduced.
- The technology of complex using flotation slime wastes of by-product-coking industry in thermal power station's boilers instead of power coals was developed and introduced.

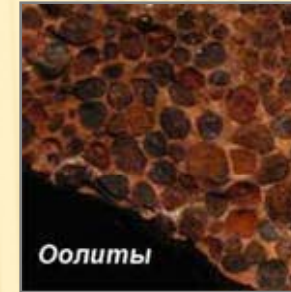
Scientific and technical developments offered to introduction:

- Technology of smelting new chromic and manganous ferroalloys with using highly effective charge materials.
- Technology for deep dephosphorization of oolitic brown iron-ores and concentrates.
- Technology of production new magnesia refractory products on basis of chromite raw materials from Kempirsajsky deposit.

Numerical structure of laboratory:

In total 11 employees work in laboratory, from them 1 academician of NAS RK and 5 candidates of sciences.

LABORATORY OF FERROUS METALS AND REFRACTORY PRODUCTS



LABORATORY OF VACUUM PROCESSES

Basic directions of scientific researches :

- Studying thermodynamic and kinetic laws of processes of evaporation, thermal decomposition of metals compounds, and steams condensation in vacuum;
- Working out vacuum-thermal technologies and equipment for processing complicated polymetallic natural and secondary raw materials of nonferrous metallurgy;
- Creation of vacuum-distillation methods and equipment for obtaining high-cleanliness metals.

Main achievements:

- Theoretical bases of vacuum pyro-selection of mineral and secondary raw materials were created;
- Ecologically-safety technologies of arsenic removal from stubborn arsenic-containing polymetallic raw materials and mercury removal from mineral and secondary materials were developed. For practical realisation of the technologies - continuously working vibro-vacuum installations with various productivity and having no analogues in world practice were created and tested in experimental-industrial scale;
- The vacuum-thermic technology and equipment for processing mercury concentrates was implemented at Hajdarkansky Mercury Industrial Complex (Kirghizia);
- Theoretical bases of vacuum-distilling refinement of metals and separation of alloys were created;
- Technologies for refining selenium, obtaining high-cleanliness Pb and Cd were developed;
- Pilot production of refining crude selenium was created;
- The most considerable success in using vacuum-distilling technologies was realisation in industrial scale of processes for refining tin, lead and cadmium.

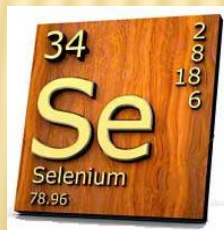
Scientific and technical developments offered to introduction:

- Environmental-safety vacuum technology and continuously operating equipment for removal of mercury from spent devices with mercury filling;
- The method and the device for vacuum-distillatory processing rich lead;
- The technology for arsenic removal from stubborn gold-and-arsenic-containing raw material with taking out arsenic in low-toxic sulfide form.

Numerical structure of laboratory:

In total 11 employees work in laboratory, from them 1 academician of NAS RK, 2 doctors and 5 candidates of sciences.

LABORATORY OF VACUUM PROCESSES



LABORATORY OF TITANIUM AND RARE REFRACTORY METALS

Basic directions of scientific researches :

- Research of physical and chemical properties of chloride and metal systems, containing titanium, magnesium, vanadium, niobium, tantalum with the aim of their deep extraction from the ilmenite concentrates.
- Developing and introduction of technologies for titanium and magnesium production with obtaining high-quality commodity products.
- Developing technologies for recovery rare-earth elements from secondary and mineral raw materials.

Main achievements:

- For the first time in USSR extraction technology for obtaining pure vanadium oxide from products of Ust-Kamenogorsk Titanium-magnesium Industrial Complex was realised. The work was awarded USSR State premium;
- The technology for cleaning titanium tetrachloride from metal-chloride-impurities was developed and introduced at Ust-Kamenogorsk Titanium-magnesium Industrial Complex;
- For the first time in the world, technology for obtaining metallic gallium from by-products of aluminous manufacture was created. For working out and introducing this technology into production the scientists were awarded USSR State premium;
- The first in Republic ore-thermal furnace for ilmenite concentrates electrosmelting with high-titanium slags production was implemented on Ust-Kamenogorsk Titanium-magnesium Industrial Complex under scientific support and direct participation of laboratory experts.

Scientific and technical developments offered to introduction:

- Intensification of magnesium-thermal reduction of titanium tetrachloride
- Roasting-magnetic technology of titanium raw materials preparation for industrial processing;
- Increasing individual capacity and intensification of processes in reduction devices;
- Updating process of ilmenite concentrates electrosmelting;
- Technology of obtaining (rare-earth elements)REE-concentrate from wastes of mineral-fertilizers production.

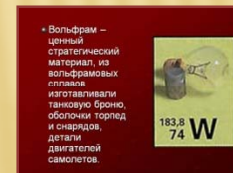
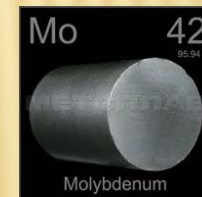
Numerical structure of laboratory:

In total 15 employees work in laboratory, from them 1 doctor and 3 candidates of sciences.

LABORATORY OF TITANIUM AND RARE REFRACTORY METALS



 Sc	 Y	 La	 Ce
 Pr	 Nd	 Sm	 Eu
 Gd	 Tb	 Dy	 Ho
 Er	 Tm	 Yb	 Lu



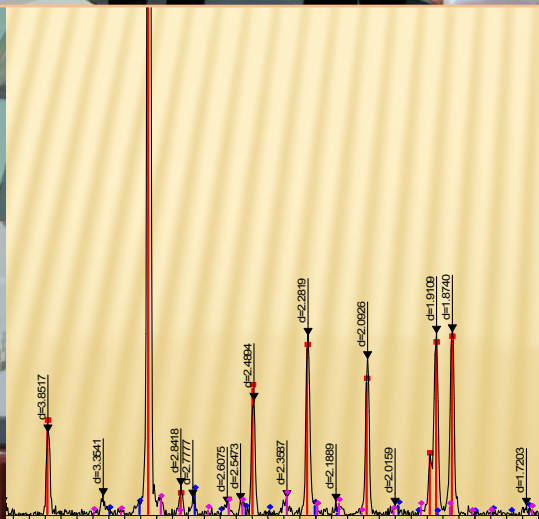
NATIONAL SCIENTIFIC LABORATORY FOR COLLECTIVE USING UNDER PRIORITY RESEARCH DIRECTION “TECHNOLOGIES FOR HYDROCARBONIC, MINING AND SMELTING SECTORS AND CONNECTED WITH THEM SERVICE BRANCHES”

National scientific laboratory under priority research direction “Technologies for hydrocarbonic, mining and smelting sectors and connected with them service branches” was opened on the base of «Center of Earth Sciences, Metallurgy and Ore Benefication» JSC according to results of Competition organized by RK ESM Science Committee in 2008.

MAIN PURPOSES OF NATIONAL SCIENTIFIC LABORATORY ACTIVITY:

- achievement of advanced level of scientific developments and effective using of material, technical and personnel resources by providing open access to carry out researches on the laboratory basis for domestic and foreign scientist;
- analytical and scientific support of researches and developments carried out by domestic and foreign scientists;
- expansion of researches field with use of modern high effective equipment, that will form base for development of competitive technologies for hydrocarbonic, mining and smelting sectors and connected with them service branches.

**NATIONAL SCIENTIFIC LABORATORY FOR COLLECTIVE USING UNDER PRIORITY RESEARCH
DIRECTION "TECHNOLOGIES FOR HYDROCARBONIC, MINING AND SMELTING SECTORS AND
CONNECTED WITH THEM SERVICE BRANCHES"**



LABORATORY OF METALLURGICAL SCIENCE

Basic directions of scientific researches:

- Research of physical and chemical bases, developing of technologies and the equipment for sedimentation of composite electrolytic coatings on chromium and other metals basis with high tribotechnical and antirust characteristics;
- Research of structure formation laws and properties of coatings and thin films obtained on metal and nonmetallic materials by methods of ionic-atomic kneading; developing of new coatings, technologies and equipment for increasing materials' tribotechnical characteristics;
- Research of physical and chemical processes developing when alloys of light and nonferrous metals interact with nonmetallic and metal materials; working out of new composite constructional, anti-frictional and frictional materials, technologies and equipment for their obtaining.
- Working out of metals and alloys plastic deformation theory; research of mechanisms and physical and chemical peculiarities of constructional materials deformation and destruction.

Main achievements:

- technology and installation for obtaining nano-, poly-composite electrolytic coatings on chromium basis; composition of electrolyte and method for plating composite electrolytic coatings on parts from steel, aluminium and other alloys were developed;
- magnetron dispersion installation, allowing essentially increase speed of application of refractory metals thin films on various materials, was improved;
- installation and technological bases for alumomatrix composite materials obtaining by method of mechanical kneading was developed.

Scientific and technical developments offered to introduction and services:

- Technology and apparatus for obtaining nano-composition electrolytic chromium-schungite coatings;
- Services of carrying out metallographic analysis of metals and alloys, determination of electroconductive, strength characteristics, hardness and microhardness of materials.

Numerical structure of laboratory:

10 employees work in laboratory, from them 1 doctor and 4 candidates of science.

LABORATORY OF PHYSICAL METHODS OF ANALYSIS

Basic directions of activity:

- Analysis and research of raw material, products and semi-products of metallurgical production during development of highly effective technologies for complex processing of mineral and secondary raw materials by physical methods of research.

Main achievements:

- Rapid method of conglomerate quality control by using x-ray-phase analysis was developed and introduced at Pavlodar Aluminium Plant;
- More than forty techniques of emission spectroscopy quantitative determination of impurities in various metallurgical products were developed; techniques of IR-spectra research were developed for increasing a method sensitivity.

Research methods:

- Emission spectral and roentgen fluorescent analysis: qualitative, quantitative and semi-quantitative element analysis of various products.
- Radiographic analysis: qualitative and quantitative x-ray-phase analysis; determination of parameters and singonia of crystal lattice; determination of crystals sizes.
- Crystal optical analysis: optical microscopic researches in passing and reflected mode for studying of phase composition, structure of rocks, ores, metals and alloys; determination of minerals in immersion liquids; recalculation of the analysis of minerals at crystal-chemical formula by A.G.Bullah method.
- Metallographic analysis: measurement of phases areas and their percentage ratio in metallurgy products; the analysis of granularity of steel, nonferrous metals and alloys by a grain point; the analysis of non-metallic inclusions in metals; the analysis of graphite inclusions in pig-iron; determination of a layer thickness
- IR -Fourier analysis: the structurally-group and phase analysis of organic, inorganic materials in a liquid and solid state, coverings on a surface of chemically treated metals without sample preparation.
- Thermal analysis: identification of separate chemical compounds (by the melting temperatures, polymorphous transitions and thermal decomposition); the qualitative and quantitative analysis of mechanical mixes of several substances; measurement of phase transitions temperatures of individual substances and systems, construction on their basis of a state's diagrams.

Numerical structure of laboratory:

In total 10 employees work in laboratory, from them 4 candidates of sciences.

CHEMICAL ANALYSIS LABORATORY

Basic directions of activity:

- Physical and chemical analysis of solid and liquid phases;
- Finished products certification;
- Improvement of standard and developing new techniques for analysis of raw materials and products;
- Creation of databank of analysis methods and techniques

Analyzing products and materials:

- Ferroalloys; steels; cast irons;
- Nonferrous metals and alloys of nonferrous metals; rolled nonferrous metals; copper and zinc powders; lead sulphate; lead litharge
- Alumina, bauxites; ores and concentrates of ferrous metals;
- Rubble; quartz sand; vein quartz; sandstone; quartzite; coke; portland cement; cements; soils; fire-resistant materials and products;
- Secondary metals and wastes; inorganic reactants and chemical products;
- Drinking water in a wide range of concentrations.

Investigation methods:

- Emission spectroscopy;
- Spectrophotometry;
- Atomic absorption spectroscopy;
- Gravimetry;
- Flame photometry;
- Titrimetry

It is accredited on technical competence

The accreditation certificate

№ KZ.H.02.1138 from 8 april 2011

TECHNICAL EQUIPMENT OF NATIONAL SCIENTIFIC LABORATORY

- Electronic raster microscope with analyzer JEOL JXA-8230 ;
- Atomic absorptive spectrometer AA240 FS Varian BV;
- Synchronous thermal analyzer TG-DTA/DSK with quadrupole mass spectrometer : STA 449 F3 Jupiter® NETZSCH;
- Roentgen fluorescent spectrometer with wave dispersion Venus 200 PANalytical B.V.;
- Express analyzer on carbon AN-7529M ;
- X-ray diffractometer «BRUKER D8 ADVANCE»;
- Universal electromechanical testing machine up to 100 кН Shimadzu AG-100kNx;
- Multifunctional stationary hardness meter HBV-30A;
- System of microwave decomposition with vertical feeding and temperature and pressure control function speedwave four BERGHOF;
- Acids clearing system Berghof BSB-939-IR;
- Planetary mono-mill Pulverizette 6 Fritsch GmbH;
- Vibration micro-mill Pulverizette -0;
- Jaw crusher Pulverizette -1;
- High-temperature chamber furnace 1600 °C HTC 08/16 Nabertherm GmbH;
- High-temperature tubular furnace 100/600 for vertical mode RHTV 120-600/C 40 Nabertherm (Germany);
- IR-Fourier spectrometer Avatar-370 Csl ;
- Metallographic workstation on basis of inverted microscope Leica DM IRM;
- Serial atomic emission spectrometer Optima 2000 DV;
- Flame photometer PFP7 model;
- UV-Vis Spectrophotometer Agilent 8453;
- Micro hardnessmeter PMT-3; Hardnessmeter MET-UD.



**Electronic raster microscope with analyzer
JEOL JXA-8230 (Japan)**



**Roentgen fluorescent spectrometer with
wave dispersion Venus 200 PANalytical B.V.
(Holland)**



**Synchronous thermal analyzer TG-DTA/DSK with
quadrupole mass spectrometer : STA 449 F3
Jupiter® NETZSCH (Germany)**



**Atomic absorptive spectrometer AA240 FS
Varian BV (Australia)**



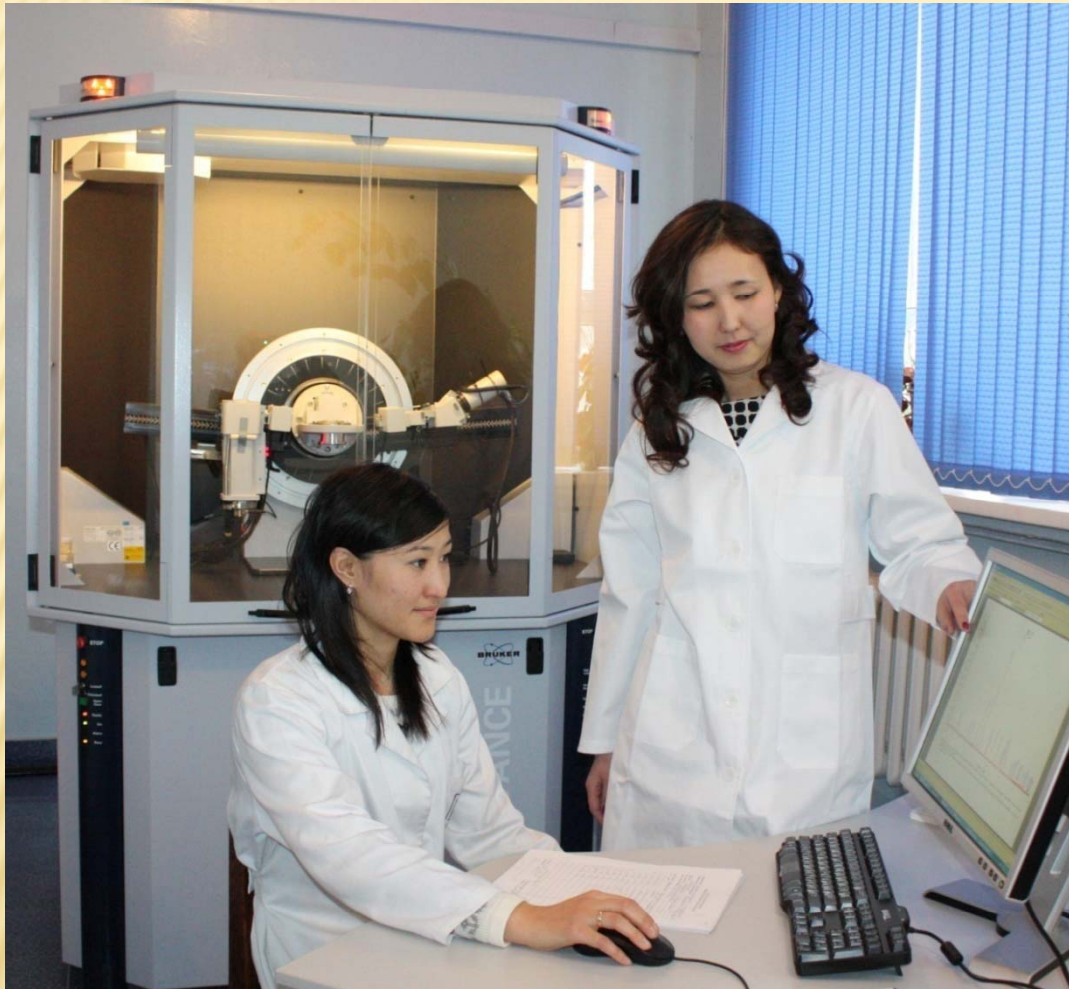
Express analyzer on carbon AN-7529M (Gomel instrument-making factory, Belarus)



System of microwave decomposition with vertical feeding and temperature and pressure control function speedwave four BERGHOF(Germany)



Universal electromechanical testing machine up to 100 kN Shimadzu AG-100kNx (Japan)



**X-ray diffractometer ADVANCE D8
«BRUKER »(Germany)**



**Multifunctional stationary hardness meter
HBV-30A (Laizho huayin testing instrument
co., LTD, China)**



**Spectrophotometer Agilent
8453 UV-Vis (Germany)**



High-temperature chamber furnace 1600 °C HTC 08/16 (Nabertherm GmbH, Germany)



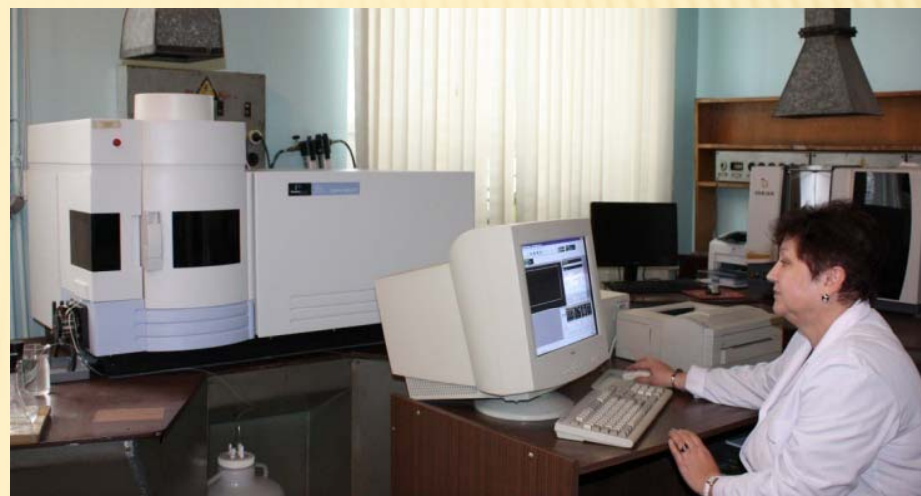
IR-Fourier spectrometer Avatar-370 Csl «Termo Nicolet» (USA)



High-temperature tubular furnace 100/600 for vertical mode. RHTV 120-600/C 40 Nabertherm (Germany)



Metallographic workstation on basis of inverted microscope Leica DM IRM, «Vetclar», Germany



Serial atomic emission spectrometer Optima 2000 DV (Perkin Elmer, USA)



Acids clearing system Berghof BSB-939-IR (Germany)



Flame photometer model PFP7 (Jenway, England)



**Planetary mono-mill Pulverizette
6 Fritsch GmbH (Germany)**



**Vibration micro-mill
Pulverizette -0**



**Jaw crusher
Pulverizette -1**

CENTER INFRASTRUCTURE

Address of “CESMOB” JSC basic building location is Shevchenko St., corner of Valikhanov St., 29/133, Almaty, Medeu district. There are administrative, laboratory, productive, auxiliary and warehouse rooms with total area 8405,2 m² which are provided by ventilation, hot and cold water supply, electric power, compressed air, air condition systems, phones and the Internet.

For carrying out of integrated - enlarged tests Center has special Research and pilot metallurgical production, wherein buildings with total area of 12532 m² are located: administrative-productive and experimental housing; auxiliary-productive housing; raw materials and equipment warehouse.

The small innovative production for vacuum-distillation refinement of crude selenium with obtaining branded metal of mark ST-0 with content of the basic component more than 99,8 % was organized at pilot metallurgical production - experimental base of "CESMB" JSC.

Works for implementation of vacuum-distillation technology and equipment for crude selenium refinement with obtaining fine selenium of mark ST-1 are carried out at **"Corporations" Kazahmys" Ltd.** At annual productivity of 102 tons and metal sale at the world quotations economic benefit will be 1 188,86 million tenge.

In 2010-2011 technology of complex processing of blackness from salts compartment is introduced **at "Zhezkazganredmet" RGE.** As a result of processing of production waste - accumulated blackness - **ammonium perrhenat output increased by 6,9 %** during the period from 2009 to 2010, extractant losses decreased by 5 %. Current rhenium recovery into ammonium perrhenat increased by 1 % due to the technology introduction. The certificate of introduction from 25.03.2011

PILOT METALLURGICAL PRODUCTION

The basic function:

- pilot approbation of technologies and constructions of concentrating and metallurgical units developed by scientists of Center and related organizations;
- checking of realizability of the projects, audit of technical and technological projects, R&D.

Infrastructure of PMP:

- there are incoming electrical supply, water supply and sewerage, automobile approaches, etc.;
- in the industrial building of the PMP unique experimental equipment for integrated tests and low-tonnage production are placed.

Following technological developments of Kazakhstani scientists are mastered and successfully implemented:

- technology for processing crude selenium;
- technology for recycling mercury- containing devices and products;
- production of catalysts for neutralization of exhaust gases of motor transport (1000 pieces per year);
- production of anticorrosive materials;
- production of alkyd paints and their modifications.



INTERNATIONAL COOPERATION

“CESMOB” JSC has scientific relations with a number of the foreign research centres:

In the field of ores beneficiation – Institute of mineral resources integrated development problems of Russian Academy of Sciences (Moscow), St.-Petersburg state university, Ural technical university (Yekaterinburg, Russia), Institute of biocolloid chemistry of National academy of Sciences of Ukraine.

In the field of metallurgy – Institute of metallurgy and materials sciences named A.A.Bajkov of Russian Academy of Sciences (Moscow), Institute of steel and alloys (Moscow), Moscow academy of fine chemical technology named M.V.Lomonosov, Institute of physical chemistry and electrochemistry of Russian Academy of Sciences (Moscow), Laval university (Canada), Brukhaven National laboratory (USA), Queensland university (Australia), Xinjiang institute of nonferrous metals (China), Tabbin institute of metallurgy (Egypt).

In the field of materials science – Physicotechnical institute of National academy of Sciences of Belarus, Physicomechanical institute of National academy of Sciences of Ukraine, Institute of electric welding named E.O.Paton, Kiev polytechnical university (Ukraine), Israel institute of technology, Center of new minerals and metallurgical processes of University of Montana (USA).

Membership in international organizations and editorial boards of international journals

- Academician of RK NAS Kozhakhmetov S.M. is a member of the International Scientific Council on new materials at the International Association of an Academy of Sciences (MAAN), Kiev, Ukraine.

- Corresponding member of RK NAS Abisheva Z.S. is a member of editorial boards of scientific journals: “Hydrometallurgy” (publishing house “Elsevier”), “Nonferrous metals” (publishing house “Ore and Metals”, Moscow, Russia).

Foreign scientists have been invited and participate in work of an editorial board of journal “Complex use of mineral resources” published by “CESMOB” JSC. They are known scientists: professor Ata Akçil (Turkey), professor Brajendra Mishra (USA), professor Ellina Lunarska (Poland).

INTERNATIONAL COOPERATION



RELATIONSHIPS WITH MAJOR INDUSTRIAL ENTERPRISES OF KAZAKHSTAN

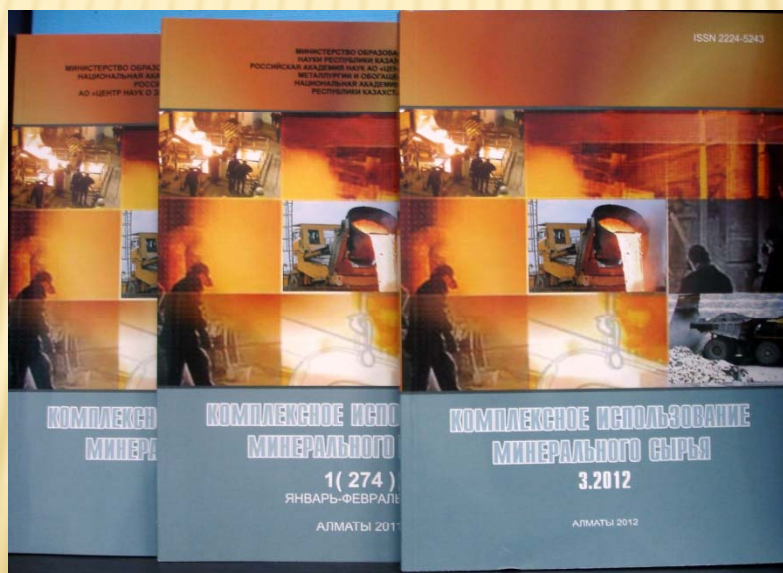
"CESMOB" JSC participates in improvement of technological processes and solving industrial problems of mining and metallurgical complex and has research-and-production relationships with major industrial enterprises of Kazakhstan.

Among this enterprises "Corporation "Kazahmys» LTD, "BalkhashTsvetMet" LTD, "ZhezkazganRedMet" RSE, "Altynalmas" Open JSC, «Ust-Kamenogorsk titanium-magnesium combine" JSC, «Stepnogorsk mining-chemical complex", LTD, "Kazatomprom» NAC, "KazZink" LTD, «Aluminum of Kazakhstan» JSC.



INTERNATIONAL SCIENTIFIC JOURNAL «COMPLEX USE OF MINERAL RESOURCES»

“CESMOB» JSC publishes international scientific journal «Complex use of mineral resources» since 1978. Rules for authors and journal’s section list are available on the Center’s web-site: www.cnzmo.kz, as well as content and abstracts of published in the journal papers since 2010.



THANKS FOR ATTENTION

Our address:

Shevchenko st., corner of
Valikhanov St. 29/133,
Almaty 050010, Kazakhstan
Phone/fax: +7(727) 291-81-27,
291-46-60
E - mail: ao.cnzmo@rambler.ru
www.cnzmo.kz

