APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ACCESSION NR: AP5024411 ENCLOSURE 01

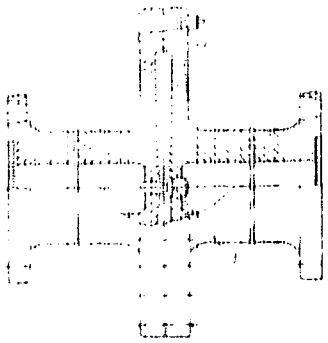

Fig. 2 Pressure sensor measuring attachment

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ZUBAKOV, R.A.; CHOCHIA, N.S.

Geochemical landforms and the distribution of some trace elements in the soils and ground of the Sakmara region, the southern Urals. Izv.Vses.geog.ob-va 95 no.1:9-22 Ja-F '63. (MIRA 16:4)
(Sakmara Valley--Landforms)
(Sakmara Valley--Trace elements)

ZUBAKOV, S.

Chemical Abst.
Vol. 48 No. 5
Mar. 10, 1954
Mineralogy and Metallography

Use of raw magnesite materials for maintenance of basic bottom of open-hearth furnaces. P. Basin, and S. Zubakov. Vestnik Akad. Nauk Kazakh. S.S.R. 10, No. 2 (Wkbk No. 88), 60-72(1953).—Addn. of raw dolomite to magnesian industrial powder for maintenance of open-hearth furnaces was shown to be practical by actual experience of a Kazakh metallurgical plant. The ground dolomite was used up to 30% of the total formulation; with mill scale up to 40% can be used for the production of 15-20% Ca ferrite. The mixts. lower melt and insure the chem. constancy of the compn. Particle size of 1-40 mm. can be used. G. M. Kosolapoff

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Chemical Abstracts
May 25, 1954
Metallurgy and Metallography

(3)

The service of magnesite powder in the deep parts of Martens furnace fettling. S. Zubakov and E. Shch... Vestnik Akad. Nauk Kazakh. S.S.R. 10, No. 10 (Whole No. 103), 70-5(1953). — The grains of magnesite powder left

after repairs on the lining of openhearth furnaces are able to retain their form after service although they undergo enrichment in CaO and SiO₂. The Fe oxides concentrate on the surface and are transformed into metallic Fe. There is a general decline in MgO and Fe oxides, resulting in loss of color. The product contains monticellite and forsterite. MgO and CaO are found predominantly as single phases.
G. M. Kondrat'ev

ZUBAKOV, S.M.; BABIN, P.N.

Alekseyevka dolomite as raw material for the production of powdered metals. Izv. AN Kazakh. SSR Ser.gor.dela, met. i stimat. no.2:143-149 '54. (MLRA 9:6)
(Alekseyevka--Dolomite) (Powder metallurgy)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

SHEVTSOV, Ye.I.; ZUBAKOV, S.M.; BABIN, P.N.; YATSOVSKIY, S.A.

A new rapid method for repairing basic hearths in openhearth furnaces. Izv. AN Kazakh. SSR Ser.gor.dela, met. i stroimat. no.2:151-163 '54. (MLRA 9:6)
(Open hearth furnaces)

ZUBAKOV, S APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

(3)

The service of magnesite lining of open-hearth-furnace beds. S. M. Zubakov and B. I. Shevtsov. Filipiak Akad. Nauk Kazakh. S.S.R. 1954, No. 3 (Metall No. 108), 55–9.—Magnesite brick in the course of service on the open-hearth-furnace bed undergoes phys.-chem. changes and acquires "zonal" characteristics: 2 zones develop one of which is dense and dark, the other porous and light gray. In the latter the silicate part is low in content and consists of forsterite and ferruged clinoenstatite. The dark part contains monticellite (up to 30%) and magnesite. Periclase grains in this zone absorb much Fe oxide in contrast to the light zone where these grains are deprived of Fe. These changes lead to strains which in time destroy the mech. structure of the lining. G. M. Kosolapoff

ZUBAKOV, S. M., SHEVTSOV, Ye. I. and BABIN, P. N.

"A New Rapid Method for Repairing Basic Hearths of Open-Hearth Furnaces". Izv. An Kazakh SSR, No 126, pp 151-163, 1954.

Application of the new method of hot repairing of hearths at the Kazakh Metallurgical Plant shortened heavy repairs to 4-5 hours and light repairs to 1-2 hours. Describes technology of sintering-in of individual parts of the hearth by the new method which is recommended for furnaces of small and medium capacity operating on mazut and smelting ordinary grade carbon steel. (RZhKhim, No 4, 1955)

SO: Sum No 884, 9 Apr 1956

SOV/137-58-11-21921

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 11, p 12 (USSR)

AUTHORS: Zubakov, S. M., Balakh, I. K.

TITLE: Producing Standard Chemically-bonded Magnesite-chrome Refractory Products From the Ores of the Kempirsay Deposit (Normal'nyye khromomagnezitovyye izdeliya iz rud kempirsayskogo mestorozhdeniya)

PERIODICAL: Izv. AN Kaz. SSR, Ser. Gorn. dela, Metallurgii, Str-va i stroy" materialov, 1956, Nr 10, pp 91-100

ABSTRACT: A reduction in scrap and increase in output of first-class merchandise is noted at the Chasov-Yar and Panteleymonovo plants subsequent to switchover from Saranovsk to Kempirsay chromites in the production of standard chemically-bonded magnesite-chrome products. An investigation is made of the influence of the composition of the charge upon the density and strength of the products, 4 groups of magnesite-chrome materials being studied: That used at the plants, a type having selective granular composition, a type with a distinctive quantity of fine-ground magnesite, and one containing 70% chromite and 30% magnesite of various fractions. The specimens were made in the form of 38x38 mm cylinders, pressed under 1000 kg/cm^2

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Producing Standard Chemically-bonded Magnesite-chrome Refractory Products (cont.)

pressure, and burned in an oxidizing atmosphere for 4 hours at 1650°C. To obtain strong and dense products from Kempirsay chromites made by the technology that has won industrial acceptance, it is recommended that the magnesite be of discontinuous granular composition (the 3-0.5 or 1-0.5 and 0.2-0 or 0.088-0 mm fractions), wherein the fine-ground particles (<0.06 mm) be limited to 30% of the mass. When a mix based on 70% chromite is used (1-0 mm), fine-ground magnesite (0.086-0 or 0.06-0 mm) should be used instead of the 1-0 mm fraction. The sinterability of these chromites is found to fall into the following sequence, in declining order: Saranovsk, dense Kempirsay, loose Kempirsay, and clinkers of loose Kempirsay.

N. M.

ZUBAKOV, S.M.; BABIN, P.N.; SHEVTSOV, Ye.I.; YATSOVSKIY, S.A.

Repair and maintenance of basic fettlings. Vest.AN Kazakh.SSR 12 no.4:68-78 Ap '56. (MLRA 9:8)

1. Institut stroitel'stva i stroitel'nykh materialov AN KazSSR (for Zubakov, Babin); 2. Kazakhskiy metallurgicheskiy zavod (for Shevtsov, Yatsovskiy).
(Open-hearth furnaces--Repairing)

ZUBAKOV, S.M.

Friable differences in chromite used as raw material for the production of chrome-magnesite crown refractories. Izv. AN Kazakh. SSR. Ser. gor. dela, met., stroi. i stroimat. no.3:103-113 '57.
(Chromite--Testing) (Refractory materials) (MIRA 10:11)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S.M.; BABIN, P.N.; KOKA, P.A.; KARLYSHEV, B.N.; POLYAKOVA, T.P.

Mineralogical composition of chromite ores from the Kimpersaskiy deposit. Trudy Inst. stroi. i stroimat. AN Kazakh SSR 1:114-130 '58. (MIRA 11:6)

(Aktyubinsk Province--Chromite)

ZUBAKOV, S.M.

Reaction of chromite with certain minerals. Trudy Inst. stroi. i stroimat. AN Kazakh SSR 1:170-190 '58. (MIRA 11:6)
(Refractory materials)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

Zubakov, S.M.

131-2-4/10

AUTHOR: Zubakov, S. M.

TITLE: Testing Chromite Ores of Low Quality From the Kimpersay Source for the Production of Normal Chromium Magnesite Products (Oprobovaniye nizkosortnykh khromitovykh rud Kimpersayskogo mestorozhdeniya dlya proizvodstva normal'nykh khromomagnezitovykh izdeliy).

PERIODICAL: Ogneupory, 1958, Nr 2, pp. 66-71 (USSR)

ABSTRACT: The author conducted laboratory tests on two samples of chromite ores of low quality in order to assess their applicability as raw material for the production of normal chromium magnesite products. B. N. Karlyshev and L. G. Yegerova took part in this investigation. Table 1 contains the chemical and mineralogical composition of these samples, from which it can be seen, that they do not comply with the technical specifications for chromium magnesite products. The chemical and mineralogical heterogeneity of the chromite samples and the increased losses at their annealing makes it necessary to bake them to clinkers in advance. The refractoriness of the average chromite ore samples is above 1750°C. For the purpose of establishing a technology of

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Testing Chromite Ores of Low Quality From the Kimpersay Source for the Production of Normal Chromium Magnesite Products

131-2-4/10

clinker production from chromite ores of low quality, the influence of the degree of grinding up, of the moulding pressure and of the baking temperature on the degree of sintering of the briquets was investigated. Table 2 gives the composition of the moulding mass and table 3 the values of sintering at various production conditions, which subsequently are explained in detail. Table 4 gives the composition of the chromium magnesite mass and table 5 the properties of chromium magnesite products. The following conclusions are drawn: 1) Laboratory experiments have shown, that it is possible to obtain normal chromium magnesite products from chromite ores of low quality from the source of Kimpersaysk by means of an addition of magnesite powder and a subsequent baking to clinker.
2) The laboratory results of the layer composition must be defined more exactly and afterwards be reexamined in standard products.
There are 5 tables, and 2 references, all of which are Slavic.

Card 2/3

Testing Chromite Ores of Low Quality From the Kimpersay Source for the Production of Normal Chromium Magnesite Products 131-2-4/10

ASSOCIATION: Institute of Building Activities and Building Materials AS Kazakh SSR (Institut stroitel'stva i stroitel'nykh materialov AN Kazakhskoy SSR).

AVAILABLE: Library of Congress

Card 3/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

BABIN, Pavel Nikolayevich, kand.tekhn.nauk; ZUBAKOV, Sergey Mikhaylovich, kand.tekhn.nauk; AVER'YANOV, Veniamin Aleksandrovich, inzh.; VASHCHENKO, Fedor Il'ich, starshiy master; KUNAYEV, Vyacheslav Gavrilovich; EPOV, Georgiy Agafonovich, inzh.; BYCHKOV, Fedor Nikolayevich; DANIL'CHENKO, Mikhail Pavlovich; GOTS, Stepan Nikolayevich; ZHUKOVA, N.D., red.; ALFEROVA, P.F., tekhn.red.

[Work practices of the Kazakh Steel Mill] Iz opyta raboty Kazakhskogo metallurgicheskogo zavoda. Alma-Ata, Izd-vo Akad. nauk Kazakhskoi SSR, 1960. 112 p. (MIRA 13:12)

1. TSentral'naya laboratoriya Kazakhskogo metallurgicheskogo zavoda (for Kunayev). 2. Nachal'nik martenovskogo tsekha Kazakhskogo metallurgicheskogo zavoda (for Epov). 3. Inzhenerno-tekhnicheskiye rabotniki prokatnogo tsekha Kazakhskogo metallurgicheskogo zavoda (for Bychkov, Danil'chenko, Gots).
(Kazakhstan--Steel industry)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, Sergey Mikhaylovich; ZHUKOVA, M.D., red.; ROMOKINA, Z.P., tekhn.red.

[Formation of minerals in chrome-magnesite refractories] Mineraloobrazovanie v khromomagnezitovykh ogneuporakh. Alma-Ata, Izd-vo Akad.nauk Kazakhskoi SSR, 1960. 102 p. (MIRA 14:2)

(Refractory materials) (Mineralogical chemistry)

ZUBAKOV, S.M.; KARLYSHEV, B.N.; YUSUPOVA, M.N.

Mineralogical composition of natural and fired Kempirsai chromite ores. Izv.AN Kazakh.SSR.Ser.met.obog.i ogneup. no.2:79-93 '60. (MIRA 13:8)
(Kempirsai--Chromite)
(Mineralogy--Determinative)

BABIN, P.N.; ZUBAKOV, S.M.

Prospects for the expansion of the manufacture of refractories in Kazakhstan. Trudy Inst. met. i obogashch. AN Kazakh. SSR 3:51-57 '60. (MIRA 14:6)

(Kazakhstan--Refractory materials)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S.M.; BALAKH, I.K.

Phase composition of chrome-magnesite products with varying degrees of firing. Izv. AN Kazakh. SSR. Ser. met. obog. i ogneup. no.3:109-119 '60. (MIRA 14:4)

(Refractory materials)

ZUBAKOV, S.M.; KARLYSHEV, B.N.; YUSUPOVA, E.N.

Chemical-mineralogical composition of chromite ores and transformations occurring during roasting. Trudy Inst. mat. i obogashch. AN Kazakh. SSR 3:201-211 '60. (MIRA 14:6)
(Chromite--Analysis)
(Ore dressing)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S.M.

Interaction of chromite with magnesium oxide during heating.
Ogneupory 25 no.6:275-280 '60. (MIRA 13:8)

1. Institut metallurgii i obogashcheniya AN Kazakhskoy SSR.
(Chromite)
(Magnesium oxide)

complicated processes of interaction among the components of the burned-in layer take place during rapid burning in of hearth bottoms in open-hearth furnaces. The burned-in layer is consolidated by the diffusion of various elements (iron, chromium, aluminum , manganese) into periclase. The heterogeneity of the mass which weakens the structure and strength of the layer, is due to the increased size of the periclase grains. The structure of the internal layers of a hearth in operation is similar to that of a rapidly burned-in hearth bottom. This confirms the correctness of the new rapid methods and of prophylactic hearth checking. There are 6 figures, 6 tables, and 7 Soviet references.

ASSOCIATION: Institut metallurgii i obogashcheniya AN Kazakhskoy SSR (Institute of Metallurgy and Dressing of the AS Kazakhskaya SSR)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S.M.; KAIRBAYEVA, Z.K.

Thermographic investigation of chromite ores from the Kimpersay massif. Izv.AN Kazakh.SSR.Ser.met., obog.i ogneup. no.1:73-83 '61. (MIRA 14:6)

(Aktyubinsk Province--Chromite) (Thermal analysis)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

32779
S/137/61/000/012/004/149
A006/A101

15 2230

AUTHOR: Zubakov, S.M.

TITLE: On the phase composition of spinellides in chrome-magnesite refractories prior to and after service

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 12, 1961, 5, abstract 12B27 ("Izv. AN KazSSR, Ser. metallurgii, obogashcheniya i ogneuporov", 1961, no. 1 (10), 84 - 91, Kaz. summary)

TEXT: The technical properties of chrome-magnesite articles depend on the phase composition of spinellides. However, the study of the latter is difficult owing to the small difference of parameters and structure and to the variability of the composition forming the solid solution of 6 basic types of plain spinels: $MgOCr_2O_3$, $MgOAl_2O_3$, $MgOFe_2O_3$, $FeOCr_2O_3$, $FeOAl_2O_3$ and $FeOFe_2O_3$. Spinellides were studied which had been singled out of synthesized chrome-magnesite sinters of various composition and different degrees of roasting, and spinellides of industrial types of chrome-magnesite refractories after service in an open-hearth furnace. The Rayt method was employed to calculate the phase composition of spinellides and the parameters of their lattices from data of

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32779
S/137/61/000/012/004/149
A006/A101

On the phase composition ...

chemical analysis. Spinellides of all sinter types had a non-stoichiometric composition after roasting, with excess of R_2O_3 as compared to RO; this proved the incompleteness of synthesis processes: only at triple heating to 1,700°C, spinellides of conventional composition were formed with R_2O_3 : RO = 1 : 1. There are, however, two types of spinellides: basic types, composed of $MgOCr_2O_3$ and $MgOAl_2O_3$, with lattice parameters of 8.26 - 8.27 Å; and secondary types, consisting mainly of $MgOFe_2O_3$ with isomorphic admixtures and parameters of 8.35-8.27 Å. Thus, the basic (residual) and secondary spindellides are different in principle: in the former the main molecule is $MgOCr_2O_3$ picotite having a conventional crystal lattice where all the 16 cations are arranged in an octahedron; in the latter magnesia ferrite, $MgOFe_2O_3$, is the main molecule having a inverse structure. This proves the incompleteness of the reaction between chromite and magnesia even at triple roasting at 1,700°C. The investigation of spinellides in chrome-magnesite articles shows that they are mainly enriched by Fe oxides during service; the substitution of magnesia spinellides by ferric ones in solid-solutions was observed; this entails the growth of parameters of the cube lattice (from 8.26 - 8.31 to 8.30 - 8.37 Å) and probably, the transformation of the conventional structure into inverse one.

N. Molchanov

[Abstracter's note: Complete translation]

Card 2/2

ZUBAKOV, S.M.

Interaction of ferrous melts with chrome-magnesite refractories.
Izv.AN Kazakh.SSR.Ser.met., obog.i ogneup no.1:92-100 '61.
(MIRA 14:6)

(Refractory materials) (Liquid metals)

ZUBAKOV, S.M.; ASPANDIYAROVA, S.G.; KORZHENEVSKIY, A.I.; CHERNYAVSKAYA, V.P.; OSIPOVA, L.Ya.

Using a treated Kimperay chromite for the production of magnesia refractories. Ogneupory 30 no.12:33-37 '65.
(MIRA 18:12)

1. Institut metallurgii i obogashcheniya AN KazSSR (for Zubakov, Aspandiyarova). 2. Zavod "Magnezit" (for Korzhenevskiy, Chernyavskaya, Osipova).

ACC NR: AP6000637 SOURCE CODE: UR/0407/65/000/001/0047/0048

AUTHOR: Stanek, V. (Novoye Mesto nad Vagom); Heng, Sty Ing (Novoye Mesto nad Vagom); Zubak, V. (Novoye Mesto nad Vagom); Zhukha, T. (Novoye Mesto nad Vagom)

ORG: VUMA Institute, Czechoslovakia (VUMA Institut)

TITLE: Electrochemical grinding of metal-ceramic alloys

SOURCE: Elektronnaya obrabotka materialov, no. 1, 1965, 47-48

TOPIC TAGS: electrochemical grinding, metal ceramic material

ABSTRACT: These experimental results of electrochemical grinding of cutting tools and dies are briefly reported: (1) Both outer and inner surfaces can be ground by the electrochemical method. (2) As the process is "cold," no defective layer is formed on the surface. (3) With a current density of 50 amp/cm^2, the productivity is 60 mm^3/min, the roughness of the resulting surface being 0.4 μ; (4) The attainable error is $\pm$ 0.03 mm; (5) The nonhardened-steel grinding wheel wear is 0.1 mm after the grinding of 20 pieces; (6) The cost of electrochemical grinding is one-half the cost of abrasive grinding. Orig. art. has: 2 figures.

SUB CODE: 13 / SUBM DATE: none

Card 1/1

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8

ACC NR: AP6033370 (A) SOURCE CODE: UR/0131/66/000/008/0029/0036

AUTHOR: Zubakov, S. M.; Aspandiyarova, S. G.

ORG: Institute of Metallurgy and Ore Benefication AN KazSSR (Institut metallurgii i obogashcheniya AN KazSSR)

TITLE: Composition and properties of chromium spinellides extracted from Kimpersaysk ores by acids

SOURCE: Ogneupory, no. 8, 1966, 29-36

TOPIC TAGS: refractory compound, chromium compound, x ray diffraction analysis, crystal structure

ABSTRACT: The authors study the composition, properties and structure of the elementary nuclei of Kimpersaysk chromium spinellides extracted by acids from six ore deposits of Kazakhstan. The chemical composition of the chromium spinellides is comparatively constant and close to stroichiometric with R_2O_3:RO ratio varying from 0.9 to 1.2. Chromium spinellides are classified with magnesium chromites $(Mg, Fe)Cr_2O_4$. The properties of chromium spinellides vary with composition according to a law which approximates a linear function. These materials melt at 2050-2060°C and belong to the higher class of refractory materials. Chromium spinellides hold promise for producing new types of refractory products. X-ray diffraction analysis shows that

UDC: 553.461.001.5

Card 1/2

ACC NR: AP6033370

Kimpersaysk chromium spinellides have a spinel type crystalline structure. Bivalent magnesium and iron cations are located in a tetrahedral environment with trivalent chromium, aluminum and iron cations in a octahedral environment. The cations have the following distribution in the elementary nucleus of these chromium spinellides: 5-6 Mg^{2+} ions and 2-3 Fe^{2+} ions located in tetrahedra, and 12-13 Cr^{3+} ions, 2-3 Al^{3+} ions and 1 Fe^{3+} are located in octahedra. The acid parameter for the Kimpersaysk chromium spinellides somewhat exceeds the value for an ideal spinel structure. This is explained by the expansion of the tetrahedral spaces and contraction of the octahedral spaces. Orig. art. has: 7 tables.

SUB CODE: 11, 20/ SUBM DATE: None/ ORIG REF: 021/ OTH REF: 005

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ISHMUKHAMEDOV, N.K.; ZUBAKOV, S.M.; ANOKHINA, A.I.; YUSUPOVA, E.N.

Burning in new fetrlings. Vest. AN Kazakh.SSR 21 no.2:73-75 F '65. (MIRA 18:3)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S. M., kand. tekhn. nauk

High-speed sintering and the physical and chemical characteristics of the process. Vest. AN Kazakh. SSR. 19 no.5:26-34 My '63. (MIRA 17:7)

S/0131/64/000/001/0026/0033

ACCESSION NR: AP4015330

AUTHORS: Zubakov, S. M.; Yusupova, E. N.

TITLE: Phase composition of chromium-magnesite refractories

SOURCE: Ogneupory*, no. 1, 1964, 28-33

TOPIC TAGS: refractory material, chromium magnesite refractory, converter refractory material, crown refractory material, periclase spinel, magnesium spinel, phase transformation

ABSTRACT: This work was carried out in order to study the influence of different Kimpersaysk chromite ores (from newly discovered deposits) on the phase composition of chromium-magnesite refractories. It was established that the quality of the refractories can be improved by the formation of secondary magnesite spinels during the manufacturing process because these minerals have a stable crystalline lattice and a melting temperature above 2100°. The same result may be achieved when the phase composition of these materials approaches the state of equilibrium. High quality refractories call for the use of chromite and magnesite powders and the application of a high temperature annealing above 1750°. The usual briquette-

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ACCESSION NR: AP4015330

making technique should be followed in the production of crown or converter refractories. However, the common method of producing the magnesite-chromite refractories out of coarse chromite ore powders for lining furnace crowns is undesirable. This technique results in the formation of phases which do not occur in the state of equilibrium and which have low melting points. Moreover, the secondary spinels produced in this way have inferior properties in comparison to those of magnesium spinels formed during the production of periclase-spinel refractories. It is concluded that the production of high quality crown refractories and of the magnesium-chromite materials containing periclase-spinels (melting point above 2100C) requires the use of the enriched Kimpersaysk ore and of magnesite powder with a minimum content of impurities. Orig. art. has: 3 tables.

ASSOCIATION: Institut metallurgii i obogashcheniya AN KazSSR (Institute of Metallurgy and Ore Treatment AN Kazakh SSR)

SUBMITTED: 00 DATE ACQ: 10Feb64 ENCL: 00

SUB CODE: MM NO REF SOV: 009 OTHER: 005

Card 2/2

ZUBAKOV, S.M.

Changes in the properties of chromium spinelid during the interaction with magnesium oxide. Trudy Inst. met. i obog. AN Kazakh. SSR 5:141-148 '62. (MIRA 15:11)
(Spinel group)

ZUBAKOV, S.M.; YUSUPOVA, E.N.

Composition and properties of chromites from new Kazakhstan deposits. Ogneupory 27 no.10:449-453 '62. (MIRA 15:9)

1. Institut metallurgii i obogashcheniya AN Kazakhskoy SSR.
(Kazakhstan--Chromite)

ZUBAKOV, S.M.

Properties of chromium spinels in chromites and chrome-magnesite refractories. Trudy Inst. met. i obogashch. AN Kazakh. SSR 4:98-108 '62. (MIRA 15:8)

(Spinel group) (Refractory materials)

ISHMUKHAMEDOV, N.K.; ZUBAKOV, S.M.

Interaction between open-hearth furnace hearth linings and the components of the charge and products of open-hearth smelting. Izv. AN Kazakh. SSR. Ser. met., obog. i ogneup. no.3:105-113 '61. (MIRA 15:1)

(Refractory materials) (Liquid metals)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, S.N., kand.tekhn.nauk

Composition and structure of spinellids in heat-resistant chrome-magnesite refractory materials. Vest. AN Kazakh. SSR 17 no.10: 16-22 O '61. (MIRA 14:10)

(Refractory materials)
(Spinel group)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V., polkovnik

Victory of Leningrad. Tekh. i vooruzh. no.1:10-11 Ja '64.
(MIRA 17:6)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V.A.; KRASNOV, I.I.; SHANTSER, Ye.V.

Resolutions of the joint plenum of the Permanent Commission on the Study of the Quaternary System (Interdepartmental Stratigraphic Committee), the Commission on the Study of the Quaternary Period of the Academy of Sciences of the U.S.S.R., and the Section of the National Geologists' Committee on Geochronology and Climatology of the Quaternary Period, February 13-16, 1959. Biul. Kom. chetv. per. no.25:116-128 '60. (MIRA 14:1)
(Geology, Stratigraphic)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

SOV/20-120-1-44/63

AUTHORS: Zauyer, V. V., Zubakov, V. A.

TITLE: Palinological Motivation of the Stratigraphic Subdivision of Quaternary Deposits of the Osinovskiy District in the Yenisey Valley (Palinologicheskoye obosnovaniye raschleneniya chetvertichnykh otlozheniy Osinovskogo rayona doliny r. Yenisey)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 120, Nr 1, pp. 162-165 (USSR)

ABSTRACT: The part of the Yenisey valley between the Osinovskiy rapids and the village of Sumarokovo is essential in the elaboration of quaternary stratigraphy. With bore-holes and drills a valley with a ground line of 25 m below sea level was disclosed. The valley is filled with a substance of sea-, sea—alluvial- and glacial sediments (the geological investigations were carried out by S. A. Kovalev, A. A. Lazarev, S. V. Epshteyn and V. A. Zubakov). The horizon of the moraine of maximum glacierization subdivides this substance into two suites: a lower of "dovecolored loams" and an upper - Sanchugovskaya. Into this the recent Yenisey valley is cut. The valley has four upper river terraces (Ref 1). Palinologic-

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Palinological Motivation of the Stratigraphic Subdivision of Quaternary Deposits of the Osinovskiy District in the Yenisey Valley

al examinations of 500 samples of all four horizons of the quaternary deposits yielded the following results: a) the spore-pollen complexes were the most perfect in the sea deposits. As a rule, the alluvial deposits had a very limited spore-pollen complex. The test results of surface layers and of the bottom-land-alluvion were utilized for the interpretation of palinological spectra reflecting the recent vegetation of the region. The spectra proved typical for wood. Pinus Sibirica (Ropr) Mayr is predominant. The preglacial sediments contain only few pollen grains of "dark" coniferous woods, ferns, and moss spores. The lower part of the "dove-colored loams" is of moraine-like character in parts and contains a few pollen of Betula sp. . They may therefore be considered to belong to the time of the old glacierization (Q_1^2). The upper part of the latter suites is palinologically sufficiently characterized. Here the spectra contain all components: trees, herbaceous plants, spores of ferns and mosses. In the lower part spectra with predominant pollen of herbaceous plants, in the upper - with spores of moss - are prevalent. There are few spectra where tree pollen predominate. Thus there are three interglacial horizons in the sections

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Palinological Motivation of the Stratigraphic Subdivision of Quaternary Deposits of the Osinovskiy District in the Yenisey Valley

of the Osinovskiy district: One middle inter-glacial, Samburgskiy and Kazantsevskiy, and four glacial: Dem'yanskiy, Samarovskiy, Yeniseyskiy and Zyryanskiy. There are 1 table and 3 references, which are Soviet.

ASSOCIATION: Leningradskiy filial Gidroproyekta (Leningrad Branch of the Gidroproyekt); Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut (All-Union Scientific Institute of Geological Research)

PRESENTED: October 14, 1957, by V. N. Sukachev, Member, Academy of Sciences, USSR

SUBMITTED: October 13, 1957

1. Geology--USSR 2. Geophysical prospecting--USSR

Card 3/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V.A.

Glacial history of Alaska in the light of pleistocene geochronology. Izv. AN SSSR. Ser. geog. no.3:3-17 My-Je '65.
(MIRA 18:6)

1. Vsesoyuznyy geologicheskiy institut (VSEGEI).

ZUBAKOV, V.A.

Correlation of glaciation and Pleistocene marine transgressions in the Arctic part of eastern Siberia and the northwestern part of North America. Sov. geol. 8 no.6:54-75 Je '65.
(MIRA 18:8)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V.A.

Critical review of the present status of a problem in the taxonomic rank of Quaternary sediments. Trudy VSEGEI 102:80-103 '64.
(MIRA 18:2)

GANESHIN, G.S.; ZUBAKOV, V.A.; POKROVSKAYA, I.M.; SELIVERSTOV, Yu.P.; CHEMEKOV, Yu.F.; EPSHTEYN, S.V.; YAKOVLEVA, S.V.

Scale, content, and terminology of stratigraphic subdivisions of the Quaternary system. Sov. geol. 4 no.8:3-15 Ag '61. (MIRA 16:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.

(Geology, Stratographic)

ZUBAKOV, V. A.

Formulation of the problem of the lower boundary of Quaternary sediments. Trudy Kom. chetv. per. 20:143-145 '62.
(MIRA 16:1)

(Geology, Stratigraphic)

ZUBAKOV, V.A.; KRASNOV, I.I.

Principles of stratigraphic division of the Quaternary system and plan of its general scale. Mat. VSEGEI. Chet. geol. i geomorf. no.2:28-71 '59. (MIRA 14:5)
(Geology, Stratigraphic)

ZUBAKOV, V.A.

Geomorphological structure of the middle and lower Yenisey Valley. Mat. VSEGEI. Chet. geol. i geomrof. no.2:114-131 '59. (MIRA 14:5)
(Yenisey Valley--Geology, Structural)

ZUBAKOV, V.A.

Present status of the study of the Pleistocene glaciation in Siberia. Trudy VSEGEI 64:5-26 '61. (MIRA 15:6)
(Siberia--Glacial epoch)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V.A.

Paleogeographic conditions governing the Pleistocene glaciation of the Yenisey Valley. Trudy VSEGEI 64:71-86 '61. (MIRA 15:6)
(Yenisey Valley--Paleogeography)
(Yenisey Valley--Glacial epoch)

BOYTSOVA, Ye.P.; VITTENBURG, P.V.; GANESHIN, G.S.,; GROMOV, V.I.,; ZUBAKOV, V.A.; IVANOVA, I.K.; KRASNOV, I.I.; LUNGERSGAUZEN, G.F.,; NIKIFOROVA, K.V.; POKROVSKAYA, I.M.; CHEMEKOV, Yu.F.; EPSHTEYN, S.V.; YAKOVLEVA, S.V.

Sergei Aleksandrovich IAkovlev; obituary. Biul.Kom.chetv.per. no.23:97-101 '59. (MIRA 13:5)
(IAkovlev, Sergei Aleksandrovich, 1879-1957)
(Geology)

ZUBAKOV, V.A., Cand Geol-Min Sci--(diss) "Stratigraphy of the quaternary deposits of the River Yenisey valley within the limits of the glacier zone in the sector between the River B. Kan estuary and Plekhino station (60-68° North Latitude)." L'vov, 1959. 19 pp (Min of Geology and Conservation of Mineral Resources. All-Union Sci-Res Geol Inst), 100 copies

ARKHIPOV, S.A.; ZUBAKOV, V.A.; LAVRUSHIN, Yu.A.

Glacial-aqueous deposits in the Yenisey region of the West Siberian Lowland. Dokl.AN SSSR 112 no.1:107-108 Ja '57. (MLRA 10:2)

1. Predstavleno akademikom N.S.Shatskim.
(Siberia, Western--Geology, Stratigraphic)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R002065520003-8"

ZUBAKOV, V.A.

Stratigraphy of quaternary deposits in the Yenisei region of Siberia. Dokl. AN SSSR 119 no.4:763-765 Ap '58. (MIRA 11:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut. Predstavleno akademikom I.P. Gerasimovym.
(Yenisei Valley--Geology, Stratigraphic)

FRUNZE, M.V.; ZUBAKOV, V.Ye., podpolk.,red.; SCROKIN, V.V., tekhn.red.

[Selected works] Izbrannye proizvedeniia. Moskva, Voen.izd-vo M-va obor.SSSR. Vol.2. 1957. 499 p. (MIRA 10:12)
(Russia--Army--History) (Military art and science)

MOROZOV, V.P., kandidat voyennykh nauk, polkovnik; ZUBAKOV, V.Ye., podpolkovnik, redaktor; SOROKIN, V.V., tekhnicheskiy redaktor

[West of Voronezh; brief military historical outline of the offensive operations of the Soviet armed forces in January and February 1943] Zapadnee Voronezha; kratkii voenno-istoricheskii ocherk nastupatel'nykh operatsii sovetskikh voisk v ianvare-fevrale 1943 g. Moskva, Voen. izd-vo Ministerstva obor. SSSR, 1956. 199 p. (MLRA 10:4)
(World War, 1939-1945)

ZUBAKOV, V.A.

Basic features and characteristics of Pleistocene glaciation in Siberia. Mat. VSEGEI Chet. geol. i geomorf. no.4:141-152 '61. (MIRA 17:5)

ZUBAKOV, V.A.

Correlation of the Sanchugovka (Boreal) sea drift the Yenisey and glaciation as revealed by the stratigraphic scale. Inform.sbor. VSEGEI no.6:71-75 '59. (MIRA 13:12)
(Yenisey Valley--Geology, Stratigraphic)

ZUBAKOV, V.A.; KRASNOV, I.I.

Special opinion on part 4 of the general resolution. Sov. geol. 3 no.4:151-152 Ap '60. (MIRA 13:11)

(Geology, Stratigraphic)

ZUBAKOV, V. A.

14-57-7-14516

Translation from: Referativnyy zhurnal, Geografiya, 1957, Nr.7, pp 40-41 (USSR)

AUTHOR: Zubakov, V.A.

TITLE: Stratigraphy and Nature of the Glacial Deposits in the Valley of the Middle Yenisey River (K voprosu o stratigrafii i kharaktere lednikovykh otlozheniy doliny srednego techeniya r. Yeniseya)

PERIODICAL: V sb: Materialy po chetvertich. geol. i geomorfol. SSSR. Moscow, Gosgeoltekhizdat, 1956, pp 146-168

ABSTRACT: The author offers data on exposures in the Oplyvnyy and Zaval'nyy yary (Banks) which lie along the course of the Yenisey River below the mouth of the Podkamennaya Tunguska River. The following are among the deposits of the Oplyvnyy Bank (100 m to 115 m terrace of the Yenisey): 1) a blanket layer of alluvial loam and sand (5 m to 10 m, Q_3^2); 2) an upper esker

Card 1/3

Stratigraphy and Nature of the Glacial Deposits (Cont.)

(20 m to 25 M, Q_3^2); 3) intermoraine sands (8 m, Q_3^1); 4) a lower moraine ("Samarovskiy" Bank -- 15 m to 20 m, Q_2) belonging to a period of maximum glaciation which occurred during a pronounced uplift of the Western Siberian Plain. Among the glacial deposits the upper esker contains layers of lacustrine origin. This esker constitutes an independent "Yenisey" horizon. It was deposited on the bottom of the small fresh-water lakes which joined the sea in the zones where the glacier was forming a water-filled basin. The Yenisey depression subsided unevenly and produced the Yenisey basin during the Boreal Transgression. The transgression was contemporary with the "tazovskiy" mountain glaciation in the northwestern part of the Central Siberian Plateau and with a stationary glaciation of the Western Siberian Plain. The mountain glaciation left deposits of two facial types: 1) the Tazovskiy type, which formed on land; 2) the Yenisey type, which was deposited in the arctic basin. The disappearance of this Yenisey-Tazovskiy glaciation (late Quaternary) coincided with a regression which allowed the Yenisey River to cut through the layers

Card 2/3

Stratigraphy and Nature of the Glacial Deposits (Cont.)

of glacial deposits. The author includes a composite section of the Quaternary glacial deposits in the Vorogovo-Komsa section of the Yenisey River valley, and a chart correlating his section with the stratigraphical sections of Western Siberia and the European USSR compiled by other authors. A bibliography of 17 titles is included.

Card 3/3

D. A. Timofeyev

20-119-4-37/60

AUTHOR: Zubakov, V. A.

TITLE: The Stratigraphy of the Quaternary Deposits of the Glacier Zone of Yenisey Region of Siberia
(Stratigrafiya chetvertichnykh otlozheniy lednikovoy zony Priyeniseyskoy Sibiri)

PERIODICAL: Doklady Akademii Nauk SSSR, Vol 119, Nr 4, pp. 763 - 765 (USSR)

ABSTRACT: The scheme of V. N. Saks (Reference 1) can be arbitrarily varied and completed on the strength of the most recent investigations. Essentially new was a glacial inter-horizon, Yeniseyskiy, which lies between the Samarovskaya and Zyryanskaya moraines; furthermore, the southern boundary of the Sanchugovskaya (northern) transgression in the Yenisey-valley was displaced by 6° to the south of Plakhino to 62° northern latitude (Reference 4). The quaternary deposits are in the zone mentioned in the title from 20 - 30 to 200 - 250 m thick. In the last case they fill an old erosion-tectonic Yeniseiyskaya depression. A complete stratigraphic column with mainly marine and lake facies is exposed in this

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The Stratigraphy of the Quaternary Deposits of the Glacier Zone of Yenisey Region of Siberia

region. A replacement of alluvial horizons by marine-lake and glacial horizons speaks of repeated marine ingressions into the Yenisei Valley which was filled with an ice cover. Three buried valley-complexes can be detected: a pre- (al N - Q_1^1), central-inter-(alQ_2^{1-2}) and I new-inter-glacier-complex (alQ_3^1). The recent Yenisey Valley is younger in its lower course than in its upper course. In the mass of these sediments visually 9 lithological-stratigraphic units can be separated (figure 1) which are described in detail. The suite of "grey--blue loams" (sizyye suglinki) and the Sanchugovskaya suit can be subjected to finer division already on the strength of the climatic characteristics (figure 1, also reference 4). The right part of the correlation scheme corresponds to the complex of the alluvial sediments of the recent Yenisey-Valley. The left part corresponds to the marine sediments. The whole mass of the quaternary sediments is divided into 10 paleoclimatic

The Stratigraphy of the Quaternary Deposits of the Glacier Zone of the Yenisey Region of Siberia)

stages. They are described in detail with their fauna. There are 1 figure and 4 Soviet references.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut (All-Union Geological-Scientific Research Institute)

PRESENTED: June 17, 1957, by I. P. Gerasimov, Member, Academy of Sciences, USSR

SUBMITTED: March 29, 1957

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ZAUER, V.V.; ZUBAKOV, V.A.

Palynological data on stratigraphic correlation of Quaternary deposits of the Osinovo region in the Yenisey Valley. Dokl. AN SSSR 120 no. 1:162-165 My-Je '58. (MIRA 11:7)

1. Leningradskiy filial Gidroproyekta i Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut. Predstavleno akademikom V.N.Sukachevym.

(Osinovo region--Palynology)

ZUBAKOV, V.A.

Time relations of glacial stages and interstadials of Last Glaciation (according to C^{14} data). Dokl. AN SSSR 152 no.4: 941-944 O '63. (MIRA 16:11)

1. Predstavleno akademikom V.N. Sukachevym.

ZUBAKOV, V.A.; ZAUYER, V.V.

Materials on the paleontological characteristics of a key section of Quaternary sediments in the Yenisey Valley of Siberia. Trudy VSEGEI 90:97-116 '63. (MIRA 17:5)

ZUBAKOV, V.A.

Geological synchronization and climatic stratigraphy. Sov.geol. 6 no8:49-65 Ag '63. (MIRA 16:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.
(Climatology) (Geology,Stratigraphic)
(Geological time)

ZUBAKOV, V.A.

Stratigraphy and character of glacial deposits in the middle Yenisey Valley. Mat.VSEGEI Chet.geol.i geomorf. no.1:146-168 '56. (MIRA 10:10)

(Yenisey Valley--Geology, Stratigraphic)

ZUBAKOV, V.A.

Glacial-marine deposits of West Siberia and the distribution boundaries of the Sanchugov transgression along the Yenisey River. Dokl. AN SSSR 115 no.6:1161-1164 Ag '57. (MIRA 11:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut. Predstavleno akademikom D.V. Nalivkinym.
(Yenisey Valley--Geology, Stratigraphic)

AUTHOR: Zubakov, V. A. SOV/2o-12o-5-45/67

TITLE: The Correlation of Quaternary Deposits of the Glacial and Extraglacial Zone of the Part of Siberia Adjoining the Yenisei River (Korrelyatsiya chetvertichnykh otlozheniy lednikovoy i vneledni kovoy zon Priyeniseyskoy Sibiri)

PERIODICAL: Doklady Akademii nauk SSSR, Vol. 12o, Nr 5, pp. 1o93 - 1o94 (USSR)

ABSTRACT: During the years 1954-1957 the author had the opportunity to compare the Quaternary cross sections from Krasnoyarsk to the mouth of the Yenisei River (2000 km). He succeeded in setting up a uniform diagram of the stratigraphy of the ocean transgressions and of the two zones in question (Table 1). The stratigraphic division was based on the concept of the climatical phase. Distinctive changes of the zonal distribution over a distance of several hundred kilometers were regarded as being caused by a relieving of climatic phases. It must be emphasized that the stratigraphic, i.e. the climatic and stratigraphic, boundaries do not at all always coincide with the lithologic boundaries of the facies and the steps of the alluvial terraces. The author divides the palaeogeographical development of the mentioned district into ten

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primary stages: phases I - X. There were 4 glaciations and 3 interglacial periods; during the latter the ice receded towards the north. Equally three important ocean transgressions took place. The Pliocene floral relics completely disappeared even before the 1st (Dem'yanskoye) glaciation. Habitates of the stone age man were found in the phases V, IX, and X. There are 1 table and 16 references, 16 of which are Soviet.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut (All-Union Scientific Research Institute of Geology)

PRESENTED: February 1, 1958, by V. N. Sukachev, Member, Academy of Sciences, USSR

SUBMITTED: January 31, 1958

The Correlation of Quaternary Deposits of the Glacial and Extraglacial Zone of the Part of Siberia Adjoining the Yenisei River SOV/20-120-5-43/67

1. Geology--USSR 2. Glaciers--Geology

Card 3/3

ZUBAKOV, V.A.

Stratigraphy and paleogeography of the Pleistocene in the Yenisey Valley. Trudy VSEGEI 66:135-150 '61. (MIRA 15:4)
(Yenisey Valley--Geology, Stratigraphic)
(Yenisey Valley--Paleogeography)

ZUBAKOV, V.A.

Rhythmicity of geological development and the stratigraphic classification. Geog.sbor. no.15:179-187 '62. (MIRA 15:12)
(Geology,Stratigraphic)

ZUBAKOV, V.A.

New paleolithic site in the Yenisey Valley. Inform.sbor. VSEGEI no.52:113-120 '62. (MIRA 15:11)
(Bol'shaya Murta District--Stone age)

ZUBAKOV, V. D.

V. D. ZUBAKOV, "Theory of an optimum receiver to detect signal bunches in a correlated normal noise background." Scientific Session Devoted to "Radio Day", May 1958, Trudrezervizdat, Moscow, 9 Sep. 58

An optimum receiver to detect signal bunches is determined by the method of checking statistical hypotheses. Cases are analyzed of detecting incoherent signal bunches in an interference background, correlated only within the limits of the period of sending the signals and coherent signal bunches in an interference background correlated both within the limits of a period and from period to period of the sending. The probabilities of false alarms and of correct detection are calculated.

AUTHOR: Zubakov, V.D. SOV/109-3-12-3/13

TITLE: Optimum Detection in the Presence of Correlated Noise (Optimal'noye obnaruzheniye pri korrelirovannykh pomekhakh)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol 3, Nr 12, pp 1441 - 1450 (USSR)

ABSTRACT: The problem considered is of importance in radar communication and is formulated as follows. The input signal applied to the receiver is in the form:

$$f(t) = m(t) + n(t) \qquad (1) ,$$

The signal consists of the useful signal $m(t)$ and noise $n(t)$; the noise may contain various types of components (e.g. the receiver noise, the reflection from randomly distributed reflectors, etc). The useful signal is a function of time and depends also on a number of known and unknown parameters. The noise is regarded as a random process having a known distribution density $p(n)$. Two types of detection are possible: 1) simple detection when the signal has known parameters, and 2) complex detection when the signal is in the form $m(t,\theta_1, \theta_2...)$, where θ_1 and $\theta_2...$ are unknown parameters. The general theory

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Optimum Detection in the Presence of Correlated Noise

shows that an optimum receiver which (for the simple detection which, for a given observation interval (0, T) and a given probability of a false alarm F) gives a maximum probability of correct detection D , should determine the so-called probability coefficient Λ and compare it with a threshold value Λ_n . The probability coefficient is expressed by:

$$\Lambda = \frac{p_m(f)}{p_o(f)} \qquad (2) ,$$

where $p_m(f)$ is the probability function for a process f in the presence of a useful signal m at the input; $p_o(f)$ is the probability function of the process f in the absence of the useful signal at the input. The optimum solution is now in the following form:

Optimum Detection in the Pressure of Correlated Noise

if $\Lambda \geqslant \Lambda_{\Pi}$, it is assumed that $f = m + n$, (3).

if $\Lambda \geqslant \Lambda_{\Pi}$, it is assumed that $f = n$.

In the case of a complex detection, this optimum solution is also true, but instead of Λ, it is necessary to employ an averaged quantity $\bar{\Lambda}$, which is expressed by Eq (4); in this, the function $p_m(\theta)$ is the conditional probability that the useful signal m exists and that its parameter θ is contained within an interval $d\theta$. The case of the simple detection is analysed in some detail and it is shown that the parameters F and D are determined by Eqs (45) and (46), respectively. In the case of complex detection, the useful signal is either in the form given by Eq (48) or by Eq (65). The function of Eq (48) represents a signal of a known envelope with an unknown initial high-frequency phase. It is shown that in this case, the quantities F and D are given by Eqs (63) and (64), respectively, while $\bar{\Lambda}$ is expressed by Eq (59). The function of Eqs (65) corresponds to a "packet" of signals which are similar in

 shape, but have unknown random phase parameters which change

independently from signal to signal. It is shown that, in this case, the probability coefficient Λ is given by Eq (68). The author expresses his gratitude to L.A. Vaynshteyn for directing this work. There are 7 references, 3 of which are English and 4 Soviet; two of the Soviet references are translated from English.

SUBMITTED: June 13, 1957

AUTHOR: Zubakov, V.D.

SOV/109-4-1-5/30

TITLE: Detection of Signals in the Presence of Normal Noise and Random Reflections (Obnaruzheniye signala na fone normal'nykh shumov i khaoticheskikh otrazheniy)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 1, pp 28 - 38 (USSR)

ABSTRACT: The article is devoted to the theory of optimum detection of radar signals in the presence of noise and reflections from randomly spaced objects. First, the correlation function of the random reflections is determined. For this purpose, it is assumed that the reflecting objects are in the form of a moving "cloud", and that this results in the Doppler effect in the reflected signal. The effect produces a frequency shift ζ which is expressed by

$$\zeta = \frac{2v_r}{c} \omega ,$$

where v_r is the radial velocity component of the reflecting body and c is the velocity of light. If the radar signal is regarded as stationary and has a spectral density $s_m(\omega)$, the spectral density of the random

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Detection of Signals in the Presence of Normal Noise and Random Reflections

reflections can be written as:

$$S_r(\omega) = \int_{-\infty}^{\infty} S_m(\omega + \zeta) w(\zeta)\, d\zeta \qquad (2)$$

where $w(\zeta)d\zeta$ is the intensity of the reflections from the scatterers, for which the Doppler frequency shift is contained within the interval ζ , $\zeta+d\zeta$. The autocorrelation function of the reflections can be expressed by Eq (3). If the signal is contained within a comparatively narrow bandwidth Ω , the correlation function can be expressed as Eq (8) where the components $R_r^{(1)}$ and $R_m^{(2)}$ are defined by Eqs (5). Finally, the correlation function may be expressed by Eq (12) where ζ is the average Doppler frequency shift which is defined by Eq (10), while $x(\tau)$ is given by Eq (11). If the total interference in the system consists of the random.

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Detection of Signals in the Presence of Normal Noise and Random Reflections

reflections $m_1(t)$ and noise $m_2(t)$, the correlation function is in the form of Eq (18); Here, the term R_{n1} is determined by Eq (12) (or Eq 13) and R_{n2} is a function which rapidly decreases to zero as τ is increased. The signals received by the system can be detected either by means of a simple receiver or by a complex system. In order to analyse the detection procedure, it is assumed that the input signal consists of a useful signal $m(t)$ and an interference $n(t)$; the observation period extends from θ to T and, during this time, HL samplings are made; the number of samplings during one repetition period is H, while the number of periods considered is L. As was shown in an earlier work (Ref 1), for the case of the simple optimum detection, the receiver should form a probability coefficient Λ which is defined by Eq (37). The parameters φ and μ of Eq (37) are defined by Eqs (38) and (41), respectively. The average probability coefficient $\bar{\Lambda}$, taken over all the L periods, can be expressed by Eq (49) provided it is assumed that all

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Detection of Signals in the Presence of Normal Noise and Random Reflections

the values of the initial phase θ are equally probable over an interval from 0 to 2π. Now, the quantities φ can be expressed by Eq (50) or (51) where E and ϑ are defined by Eqs (52) and (53). The above probability coefficient Λ depends on the phase increase $\Delta\theta$. If $\Delta\vartheta$ assumes values defined by Eq (56), the parameter E^2 is defined by Eq (57), while for the values of $\Delta\vartheta$ defined by Eq (58), E^2 is given by Eq (59). If the correlation coefficient $r(\tau)$ can be represented by Eq (60), inverse matrix for the system can be written in the form of Eq (61). For this case, the quantity u is given by Eq (64), while Eq (57) can be written as Eq (65). In the absence of the random reflections Eq (65) can be written as Eq (67), while the signal-to-noise ratio at the output of the receiver is expressed by Eq (68). When the random reflections are very high, E^2 is given by Eq (69) and the signal-to-noise ratio is expressed by Eq (70). Eq (59) can be written as Eq (71) and the signal-to-noise ratio for this case is given by Eq (72). Now, in the absence of the reflection

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noise, E^2 is written as Eq (73), while for very high level of the reflection noise, E^2 is given by Eq (74); in particular, for $L = 2$ and $L = 3$, E^2 is defined by Eqs (75) and (76). It is seen, therefore, that an optimum receiver should evaluate two differences: the first difference is formed at $L = 2$, while the second is done at $L = 3$; more complex combinations are formed for larger values of L. For this case, when E^2 is given by Eq (74), the signal-to-noise ratio is expressed by Eq (77). There are 5 references, 3 of which are Soviet and two English.

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TITLE: Detection of Coherent Signals in the Presence of Correlated Noise (Obnaru-zhenlyo kogerentnykh signalov na fone korrelirovannykh pomekh)

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ABSTRACT: In two previous works (Refs 1, 2) the author considered a general theory of the radar detection and the detection of signals with a known Doppler frequency in the presence of random reflections and random noise. Here, only the case of two-period processing of the signals is investigated. It is assumed that an optimum-type receiver is employed. This is shown in Figure 1. The receiver consists of two filters, A and B, and evaluates a quantity E which is defined by:

$$E = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \qquad (12) .$$

Very often, the Doppler frequency of the reflected signal

is not known. Consequently, in order to determine the optimum receiver, it is necessary to find the average probability coefficient; the averaging is done over the unknown parameters, such as the initial phase in the coherent signal train and the Doppler Frequency shift. If the train consists of two coherent signals, the averaging can be done by considering the phase of each signal. The samples of the useful signal can be written as:

$$m_{gk} = e_g \cos(\omega_o t_g - \Phi_g - \vartheta_k) \qquad (14)$$

where the various parameters are defined by Eq (15). The quantities μ and φ which define the probability coefficient Λ (given by Eq 16) are defined by Eqs (17); these formulae are taken from the author's earlier work (Ref 2). The average value of Λ is defined by Eq (18). If $r \simeq 1$, the probability coefficient Λ is in the form of Eq (21) where μ_o and E are given by Eqs (22) and (23). In the absence of a useful signal, the

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distribution of the quantity E is given by Eq (29) and the probability of a false indication is expressed by Eq (30). In the presence of a useful signal the probability of a correct signal detection is expressed by Eq (37); the sub-integral function of Eq (37) is defined by Eqs (36) and (33). The dependence of the function $D(\Delta\vartheta)$ on μ is illustrated in Figure 2, for two values of F. The parameter μ is determined from Eq (34). Figure 3 illustrates the full probability D as a function of μ_o, where μ_o is given by Eq (35). If a semi-optimum processing of the received information is employed, such that a single-channel compensates the random reflections and a quantity defined by Eq (40) is formed, the probability of a false alarm F_1 is given by Eq (43). The probability of a correct detection $D_1(\Delta\vartheta)$ for a given $\Delta\vartheta$ is expressed by Eq (46), while the full probability of a correct detection D_1 is given by Eq (47). The values of $D_1(\Delta\vartheta)$ and D_1 are plotted

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in Figures 2 and 3; the functions are represented by the 'dashed' curves. From the above analysis, it is concluded that in the presence of a strongly correlated noise, the optimum receiver for two coherent signals with an unknown initial phase and Doppler frequency is in the same form as the optimum receiver in the case of known Doppler frequencies. It is also found that for the same probability level of the false alarm $F \simeq 0.5 \times 10^{-5}$ and the probability of a correct detection $D = 0.5$, the reception of a signal with an unknown Doppler frequency requires a signal-to-noise ratio about twice higher than that for the reception of the signal with known Doppler frequencies. On the other hand, comparison of the optimum system with a single-channel coherent system shows that, with known Doppler frequencies, the gain in the signal-to-noise ratio for the two-channel system is approximately 1.7.

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There are 3 figures and 3 references, 2 of which are Soviet and 1 English.

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