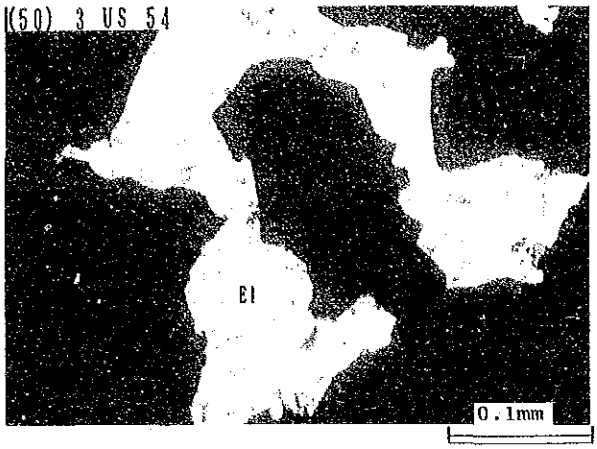
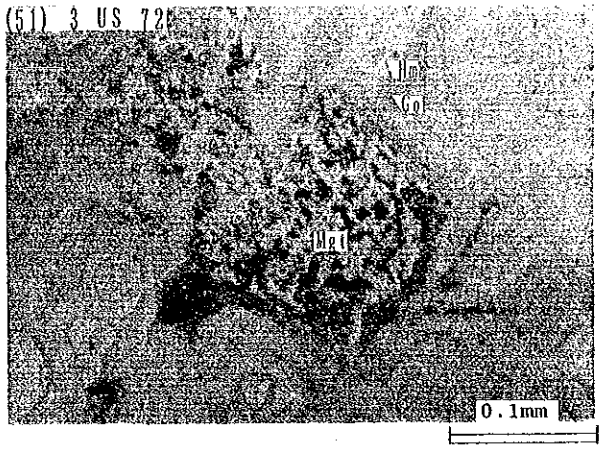
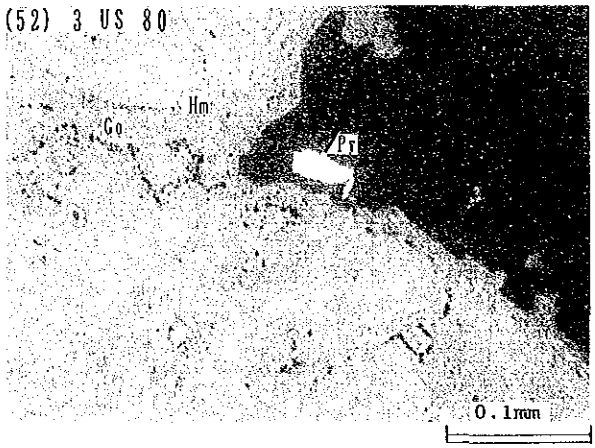
(50) 3 US 54



(51) 3 US 72



(52) 3 US 80



ABBREVIATION

Asp	: Arsenopyrite	Hl	: Hollandite
Bn	: Bornite	Hm	: Hematite
Ccp	: Chalcopyrite	Mcs	: Marcasite
Ccp-des	: Chalcopyrite-desease	Mgt	: Magnetite
		Mo	: Molybdenite
Chp	: Chalcophanite	Pb-Carb(?)	: Pb-Carbonate(?)
Cv	: Covelline	Py	: Pyrite
El	: Electrum	Sp	: Sphalerite
Gn	: Galena	Tet	: Tetrahedrite
Go	: Goethite	Wf	: Wolframite
Hh	: Hydrohetaerolite		

(1)
Sample No. : 3DN27
Locality : Delger-Munh
Observation note :
Sample from Pb-Zn quartz vein with strong alteration such as silicification. Galena, epidote and sericite are observed with naked eye. As primary ore minerals, only galena is recognized, which is replaced by cerussite (?) along its cleavage and fissure. Very minute grains of galena are scarcely preserved within the replacing mineral. As secondary ore mineral, occur fine-grained aggregates of covelline, possibly derived from chalcopyrite. As gangue minerals, cerrusite (anglesite?) occurs with quartz, epidote, sericite and some other.

(2)
Sample No. : 3DS43
Locality : Tsagaan-Chuluut Hud.
Observation note :
Sample from gold-quartz vein with somewhat oxidation. No primary ore minerals can be observed. Under the microscope, no primary ore mineral is recognized. As secondary mineral, goethite and other Fe-O-H mineral occur. Quartz is dominant gangue mineral.

(3)
Sample No. : 3DS44
Locality : Tsagaan-Chuluut Hud.
Observation note :
Sample from gold-quartz vein, with strong oxidation and leaching. Similar to 3DS45. As primary ore mineral, several tiny grains of pyrite occur as disseminations. As secondary minerals, abundant goethite is present, forming a characteristic closed band. Quartz is dominant gangue mineral.

(4)
Sample No. : 3DS45 (Two photomicrographs)
Locality : Tsagaan-Chuluut Hud.
Observation note :
Sample from gold-quartz vein with oxidation and leaching. As primary ore mineral, relatively large electrum is observed to occur in quartz matrix. It has string form, irregular form and rectangular form. Secondary minerals as goethite are present. Quartz is dominant gangue mineral.

(5)
Sample No. : 3DS46
Locality : Tsagaan-Chuluut Hud.
Observation note :
Sample from gold-quartz vein with strong alteration and leaching. No primary ore mineral can be seen. Due to strong leaching, no primary ore mineral is observed under the microscope. Gold is absent. As secondary mineral, goethite occurs. As gangue minerals, quartz is predominant with some sericite and chlorite(?).

(6)
Sample No. : 3DN10
Locality : Tsav
Observation note :
Sample from Pb-Zn vein, but rich in chalcopyrite. As primary ore minerals, chalcopyrite is dominant, in which fine-grained pyrite with euhedral to subhedral form and sphalerite occur as inclusion along with euhedral quartz. Galena is closely associated with chalcopyrite. Small amounts of galena, euhedral pyrite and sphalerite are impregnated in the matrix. Gangue minerals consist of quartz, calcite and sericite.

(7)
Sample No. : 3DN13
Locality : Tsav
Observation note :
Sample from Pb-Zn quartz vein with well-developed banded structure, being similar to 3DN15 and 3DS10. Mn-bearing calcite (rhodochrosite?) is characteristic. As primary ore minerals, sphalerite is dominant. Unlike the samples (3DN15 & 3DS10), lattices and dots of chalcopyrite are very few in sphalerite. Chalcopyrite desease is also observed in sphalerite. Pyrite and galena are closely associated with sphalerite. Veinlets of galena and chalcopyrite sometimes occur in sphalerite. Ag-bearing tetrahedrite-series is intergrown with pyrite and galena and also with Ag-bearing (polybasite) minerals. Marcasite occurring as veinlets in associated with pyrite. Gangue minerals consist of quartz, Mn-bearing calcite and chlorite.

(8)
Sample No. : 3DN15 (Two photomicrographs)
Locality : Tsav
Observation note :
Sample from Pb-Zn quartz vein with well-developed banded structure, being similar to 3DN13 and 3DS10 and rich in galena and sphalerite. As primary ore minerals, light-colored sphalerite is predominant, with close association of galena, Ag-bearing tetrahedrite-series and chalcopyrite. Chalcopyrite occurs also as desease, dots, emulsion and veinlets. Pyrite occurs as euhedral crystal, sometimes accompanying marcasite. Ag-bearing minerals (pyrargyrite, polybasite) are closely associated with Ag-bearing tetrahedrite-series, chalcopyrite and galena. Gangue minerals consist mainly of quartz and Mn-bearing calcite.

(9)
Sample No. : 3DS02
Locality : Tsav
Observation note :
Sample from Pb-Zn quartz vein. Due to strong oxidation, galena and sphalerite are not observed with naked eye. Probably, galena is replaced by cerussite (anglesite?), because in spite of the absence of galena, this specimen is very heavy. Under the microscope, small grains of galena are scarcely preserved, as primary ore mineral with jalpaite. Covelline occurs as secondary mineral, forming very fine-grained aggregates. Gangue (Ore?) minerals consist mainly of cerussite.

(10)
Sample No. : 3DS04
Locality : Tsav
Observation note :
Sample was taken from Pb-Zn quartz vein. However, this is a siliceous ore with minor chalcopyrite impregnations without any galena and sphalerite. Primary ore mineral is scarcely preserved. Goethite occurs as cubic pseudomorph after pyrite. Small amounts of chalcopyrite, pyrite and galena are impregnated in quartz matrix. Goethite shows a characteristic texture, closed band or concentric-like. Gangue minerals consist mainly of quartz.

(11)
Sample No. : 3DS05
Locality : Tsav
Observation note :
Sample from Pb-Zn-quartz vein, being rich in galena with some sphalerite, chalcopyrite and pyrite. As primary ore minerals, sphalerite is predominant. Dots, emulsions and lattices of chalcopyrite tend to occur in the margin rather than the center of sphalerite, closely associating with pyrite, chalcopyrite and galena. Chalcopyrite desease is also observed in sphalerite. Inclusions of galena and pyrite occur in sphalerite. Pyrite is mostly euhedral to subhedral. Pyrite and sphalerite inclusions in chalcopyrite and galena and chalcopyrite inclusions in pyrite are also found. Galena (±sphalerite) cutting pyrite is associated with a few gold (electrum) grains. As gangue minerals, euhedral to subhedral quartz is dominant.

(12)
Sample No. : 3DS10 (Two photomicrographs)
Locality : Tsav
Observation note :
Sample from Pb-Zn quartz vein, with well-developed banded structure. Apparently similar to that from Miocene Pb-Zn-Mn veins of Japan. As primary ore minerals, euhedral of subhedral sphalerite is predominant with sub-ordinate amounts of galena. Tetrahedrite-series, euhedral arsenopyrite, subhedral pyrite, chalcopyrite occur in small amounts. Arsenopyrite and pyrite are partly replaced by marcasite. Minute grains of tetrahedrite-series, chalcopyrite, galena and pyrite inclusions and chalcopyrite desease are also observed in sphalerite. Gangue minerals consist mainly of quartz, Mn-bearing calcite and chlorite.

(13)
Sample No. : 3DY01
Locality : Tsav
Observation note :
Sample from Pb-Zn-quartz vein with extensive oxidation. Though galena and sphalerite are not observed, a large specific gravity of this specimen indicate the possible presence of replacement mineral such as cerrusite or anglesite. Primary ore minerals are scarcely preserved. A minor amount of galena is present as tiny grains within cerussite or anglesite. Pyrite is rare. Secondary covelline occurs as minor aggregates. As gangue minerals, quartz is present. Smithsonite may exist as an oxidation product of sphalerite.

(14)
Sample No. : 3DY03 (Two photomicrographs)
Locality : Tsav
Observation note :
Sample from Pb-Zn-quartz vein, rich in galena, sphalerite, chalcopyrite and pyrite. As primary ore minerals, galena is most abundant, occurring as interstice-fillings, veinlets and inclusions in sphalerite and pyrite. Exsolution-like textures displayed by chalcopyrite such as lattice, dots or emulsions are observed in sphalerite. Euhedral to subhedral pyrite and chalcopyrite are closely associated with galena and sphalerite. Gangue minerals consist mainly of quartz and sericite.

(15)
Sample No. : 3DN39
Locality : Ulaan
Observation note :
Sample from breccia pipe with well-developed brecciated structure. Ores composed of sphalerite, galena, pyrite and chalcopyrite fill the interstices of altered quartzite brecciated, along with purple fluorite. As primary ore minerals, sphalerite is predominant, closely associating with galena. Euhedral arsenopyrite with rhombic form occurs surrounding sphalerite, along with pyrite. Dots and lattices of chalcopyrite (±pyrrhotite) tend to occur in the margin rather than in the center of sphalerite. Small amounts of pyrite, chalcopyrite and sphalerite are impregnated in silicate matrix. As gangue minerals, quartz and fluorite are observed.

(16)
Sample No. : 3DN40
Locality : Ulaan
Observation note :
Sample from breccia pipe, with strong epidotization. Sphalerite and galena are seen. As primary ore minerals, sphalerite is predominant, occurring as space-fillings and networks. Galena occurs as networks and veinlets in silicate matrix and is closely associated with sphalerite. Galena is also present as inclusion in sphalerite. Small amounts of chalcopyrite (dots, lattices, emulsion), pyrite and pyrrhotite occur as inclusions in sphalerite. As gangue minerals, epidote is predominant. Others are mainly quartz and actinolite.

(17)
Sample No. : 3DN41
Locality : Ulaan
Observation note :
Sample from breccia pipe. A trace amount of pyrite is seen along with galena and actinolite. Under the microscope, trace amounts of euhedral pyrite and acicular to columnar galena are observed as primary ore minerals. Gangue minerals consist of subhedral actinolite and octahedral garnet and quartz.

(18)
Sample No. : 3DN42
Locality : Ulaan
Observation note :
Sample from breccia pipe with well-developed brecciated structure. Small

amounts of chalcopyrite, pyrite and fluorite occur as disseminations. Euhedral to subhedral pyrite occurs as dominant ore mineral, accompanying sphalerite, galena and chalcopyrite. Sphalerite, galena and chalcopyrite also occur separately. Trace amounts of secondary covelline occur along the margin of chalcopyrite. Sphalerite inclusions are observed in pyrite and chalcopyrite. As gangue minerals, quartz and fluorite are present.

(19)
Sample No. : 3DS17
Locality : Ulaan
Observation note :
Sample from breccia pipe with strong chloritization and epidotization. pyrite, sphalerite and galena are seen. Primary ore minerals consist mainly of euhedral to subhedral pyrite and sphalerite, filling interstices of biotite and actinolite. Galena occurs as inclusions in both sphalerite and pyrite and also in the matrix. Chalcopyrite is observed only as inclusion in pyrite. Gangue minerals consist of biotite, chlorite, epidote and actinolite.

(20)
Sample No. : 3NS2 (Two photomicrographs)
Locality : Yuguzer
Observation note :
Sample from wolframite series greisen with some molybdenite. Primary ore minerals consist of columnar wolframite series and molybdenite, occurring as disseminations in the interstice of quartz and muscovite. As gangue minerals, quartz is predominant, with some muscovite.

(21)
Sample No. : 3RS12
Locality : Lugiingol
Observation note :
Sample from carbonatite deposit. Hematite and pyrite are seen. Under the microscope, hematite (with somewhat curved twin) is predominant. pyrite, euhedral to subhedral, occurs in fissures in hematite and also in the matrix. As gangue minerals, calcite is dominant.

(22)
Sample No. : 3SY01
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit with extensive silicification. Chalcopyrite veinlets and disseminations are seen, with secondary phase such as malachite. As primary ore minerals, very small amounts of chalcopyrite are observed, of which margin is sometimes replaced by covelline and chalcocite. Euhedral to subhedral pyrite occurs separately. As gangue minerals, quartz is predominant.

(23)
Sample No. : 3SY03
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit with strong silicification, similar to

3SY01. Chalcopyrite disseminations are observed. Under the microscope, main primary ore mineral is chalcopyrite, occurring as impregnations. Inclusions of bornite and sphalerite are observed in chalcopyrite. Minor chalcopyrite dots are included in sphalerite. Tiny grains of covelline occur along fissure in chalcopyrite and its margin. Hematite occurs as columnar form and also as pseudomorph after magnetite. Molybdenite occurs separately. Gangue minerals consist mainly of biotite and quartz.

(24)
Sample No. : 3SY05
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit with strong alteration. Chalcopyrite disseminations are observed. Primary ore minerals, though very small in amounts, consist of chalcopyrite with trace sphalerite, which occurs as impregnations and veinlets. In part, hematite is observed. Gangue minerals consist mainly of quartz and biotite.

(25)
Sample No. : 3SY08
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit with extensive silicification. Chalcopyrite is seen as impregnations. As primary ore minerals, chalcopyrite is predominant, occurring as disseminations and veinlets. Minor grains of bornite and sphalerite are included in chalcopyrite. Very tiny dots of chalcopyrite are present in sphalerite. Chalcopyrite is partly replaced by fine-grained covelline. Gold is not recognized in this polished section. As gangue minerals, quartz is predominant.

(26)
Sample No. : 3SY12 (Two microphotographs)
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Apparently, this chalcopyrite-rich specimens seems to be taken from Cu veins. As primary ore minerals, chalcopyrite is predominant, occurring as disseminations and veinlets. In chalcopyrite, euhedral pyrite and bornite are sometimes included. Chalcopyrite and bornite are partly replaced by covelline. Sphalerite is associated with chalcopyrite and sometimes contain minor inclusions of chalcopyrite. As gangue minerals, quartz is predominant with some mica (muscovite).

(27)
Sample No. : 3SY14
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Impregnations of chalcopyrite and bornite are observed. As primary ore minerals, chalcopyrite is predominant, occurring as disseminations and veinlets. Bornite and/or minute grain of covelline and chalcocite is present within or surrounding chalcopyrite. Gangue minerals consist mainly of quartz and biotite.

(28)
Sample No. : 3SY15
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Chalcopyrite veinlets and disseminations, as well as secondary malachite, are observed. As primary ore minerals chalcopyrite is predominant, occurring as impregnation and veinlets. Along fissures in chalcopyrite and its margin, covelline is formed. In part, hematite is observed. Gangue minerals consist of quartz and biotite.

(29)
Sample No. : 3SY20
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Impregnations of chalcopyrite are seen. As primary ore minerals, small amounts of chalcopyrite are disseminated, in which bornite is included. Chalcopyrite is partly replaced by fine-grained covelline. Columnar to acicular hematite is recognized. As gangue minerals, quartz and biotite are observed.

(30)
Sample No. : 3SY22
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Veinlets and disseminations of chalcopyrite are observed. As primary ore minerals, chalcopyrite is predominant, occurring as impregnations and veinlets, accompanying bornite. In place, graphic texture displayed by chalcopyrite and bornite is recognized. Hematite occurs separately. Bornite and chalcopyrite are partly replaced by covelline and chalcocite. Gangue minerals consist mainly of quartz and biotite.

(31)
Sample No. : 3SY24
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit with silicification. Chalcopyrite and secondary minerals such as malachite are seen. As primary ore minerals, subhedral to irregularly-formed chalcopyrite occurs as disseminations and veinlets. Chalcopyrite is partly replaced by fine-grained covelline. Gangue minerals consist exclusively of quartz.

(32)
Sample No. : 3SY32
Locality : Tsagaansuvraga
Observation note :
Sample from porphyry copper deposit. Small amounts of chalcopyrite are impregnated. As primary ore minerals, impregnations of rectangular, irregular or granular chalcopyrite are recognized. Chalcopyrite is in part replaced by covelline. Cube-formed hematite pseudomorph after magnetite is observed. Gangue minerals consist of quartz and biotite.

(33)
Sample No. : 3TS02
Locality : Arin-Nuul
Observation note :
Sample from porphyry copper-molybden deposit. Small amounts of chalcopyrite and molybdenite occur as impregnations. As primary ore minerals, pyrite is the most abundant, with some molybdenite and chalcopyrite. Molybdenite also occurs as columnar to acicular crystal. Discrete grains of chalcopyrite are accompanying trace amounts of pyrite and sphalerite. Gangue minerals consist mainly of quartz and biotite.

(34)
Sample No. : 3TS07
Locality : Arin-Nuul
Observation note :
Sample from porphyry copper-molybden deposit. Chalcopyrite and molybdenite are impregnated. As primary ore minerals, subhedral chalcopyrite occurs. Chalcopyrite is accompanying euhedral pyrite in or near its grain. Molybdenite occurs surrounding chalcopyrite and also as veinlets in close association with biotite. Chalcopyrite is replaced by fine-grained covelline along its fissure and margin. Gangue minerals consist mainly of quartz and biotite.

(35)
Sample No. : 3TS33
Locality : Salaa
Observation note :
Sample from Zn-magnetite skarn. Neither sphalerite nor magnetite is found in this specimen. Under the microscope, euhedral pyrite occurs with columnar to acicular molybdenite. Molybdenite also occurs separately. As gangue minerals, quartz is predominant.

(36)
Sample No. : 3TS34
Locality : Salaa
Observation note :
Sample from Zn-magnetite skarn. Neither sphalerite nor magnetite is found in this specimen. Primary ore minerals consist mainly of euhedral pyrite, accompanying columnar to acicular Mo. Mo occurs also separately. As gangue minerals, quartz is predominant.
(37)
Sample No. : 3TN04
Locality : Salhiit core strage
Observation note :
Sample from Zn-magnetite skarn with abundant garnet. Small amounts of magnetite are recognized in this specimen. As ore minerals, hematite (±goethite) is present in small amounts. They were originally magnetite. As gangue minerals, green garnet is predominant, with some quartz and vesuvianite (?).

(38)
Sample No. : 3TS44
Locality : Salhiit
Observation note :
Sample from Zn-magnetite skarn. As primary ore minerals, euhedral to subhedral grains of magnetite and their aggregates are observed. They have been subjected to oxidation to form very tiny grains of goethite as veinlets and networks. Colloform-like textures are seen in the alteration product. Magnetite is somewhat anisotropic. Gangue minerals consist mainly of garnet and quartz.

(39)
Sample No. : 3TS38
Locality : Salhiit core strage
Observation note :
Sample from Zn-magnetite skarn. Sphalerite is not found. As primary ore minerals, euhedral to subhedral magnetite occurs as large single grains or as their aggregator. Magnetite is replaced by hematite along the cleavage, fissure and margin. Hematite also occurs as acicular crystal in the matrix. Pyrite is rarely observed in magnetite. As gangue minerals, garnet is predominant with some clinopyroxene and quartz.

(40)
Sample No. : 3TS40
Locality : Salhiit core strage
Observation note :
Sample from altered granite in the vicinity of Zn-magnetite skarn. As ore minerals, euhedral to subhedral magnetite, as well as granular one, is predominant. Due to oxidation along the cleavage and margin of magnetite, hematite is formed. Part of magnetite is of igneous origin, while other magnetite and sulfides (pyrite and chalcopyrite) are of hydrothermal origin. Gangue minerals consist of igneous components, quartz, K-feldspar and plagioclase.

(41)
Sample No. : 3TS43
Locality : Salhiit core strage
Observation note :
Sample from Zn-magnetite skarn. Ore minerals consist exclusively of hematite, which is classified into two types; well-crystallized one and poorly crystallized one. The former seems to be of primary origin, while the later of a alteration product. In part, hematite pseudomorph after magnetite is observed. Gangue minerals consist mainly of euhedral to subhedral garnet, with some clinopyroxene, quartz and vesuvianite.

(42)
Sample No. : 3TN01
Locality : Tumurtiin-Ovoo
Observation note :
Sample from Zn-magnetite skarn. As primary ore minerals, euhedral to subhedral magnetite is dominant. Along the cleavage, fissure and its margin, magnetite is replaced by hematite. As gangue minerals, euhedral garnet and quartz are observed. Wolframite-series is not recognized in this polished section.

(43)
Sample No. : 3TS14
Locality : Tumurtiin-Ovoo
Observation note :

Sample from Zn-magnetite skarn. Abundant magnetite and garnet are seen. As primary ore minerals, euhedral to subhedral magnetite and its aggregates are predominant. Hematite occurs as replacement along the cleavage, fissure and its margin, and also as acicular crystals in the silicate matrix. Minute chalcopyrite-containing sphalerite inclusions is rare in magnetite. Hematite networks are sometimes observed to replace magnetite. Gangue minerals consist mainly of euhedral to subhedral garnet, with some clinopyroxene, quartz and vesuvianite.

(44)
Sample No. : 3TS15
Locality : Tumurtiin-Ovoo
Observation note :

Sample from Zn-magnetite skarn. As ore minerals, sphalerite is the most abundant, occurring as aggregates. Euhedral to subhedral grains of magnetite occur in sphalerite matrix or gangue matrix. Euhedral to subhedral pyrite occurs surrounding sphalerite, and also as inclusion in sphalerite. Pyrite is also present in silicate matrix. Minor chalcopyrite is found as inclusions in pyrite and sphalerite. Hematite occurs as networks in garnet and also as inclusions in sphalerite. As gangue minerals, hydrothermally altered garnet with euhedral to subhedral form is abundant, with some quartz, clinopyroxene and vesuvianite.

(45)
Sample No. : 3TS16
Locality : Tumurtiin-Ovoo
Observation note :

Sample from Zn-magnetite skarn, containing trace amounts of magnetite. Ore minerals are very few also under the microscope. Acicular and granular hematite (goethite) occurs in fissure in garnet and between its grain-boundary. Colloform band-like textures are observed in veinlets. Sphalerite with pyrite inclusions is very rare, occurring as an inclusion in garnet. Gangue minerals consist exclusively of euhedral to subhedral garnet. Between its grain-boundary, later silicates are formed.

(46)
Sample No. : 3TS17
Locality : Tumurtiin-Ovoo
Observation note :

Sample from Zn-magnetite skarn. This specimen is magnetite skarn with strong oxidation. As ore minerals, euhedral to subhedral magnetite and its aggregates are predominant. Magnetite is partly or totally replaced by fine-grained hematite along its cleavage, fissure and margin. As gangue minerals, garnet is the most abundant, with some clinopyroxene, quartz and calcite.

(47)
Sample No. : 3TS24 (Two microphotographs)
Locality : Tumurtiin-Ovoo
Observation note :

Sample from Zn-magnetite skarn, being very different in appearance and mineral assemblage from other Zn-magnetite skarn. Specularite-like phase is seen with naked eye. Under the ore microscope, however, no hematite (specularite) is observed. Magnetite is present in trace amounts, with three other phases, of which have strong pleochroism and all have strong unisotropism. Mangetite, stibnite, bournonite and boulangerite are observed under the microscope.

(48)
Sample No. : 3TS30
Locality : Tumurtiin-Ovoo
Observation note :

sample from Zn-magnetite skarn. Reddish brown veinlets are seen. As ore minerals, euhedral to subhedral magnetite and its aggregates are predominant. Sphalerite occurs closely associated with magnetite and also separately in silicate matrix. Magnetite is partly replaced by hematite along its cleavage, fissure and margin. Part of magnetite is completely replaced by hematite. Gangue minerals consist mainly of greenish garnet, with some clinopyroxene and quartz.

(49)
Sample No. : 3US09
Locality : Mushgia-Hudak
Observation note :

Sample from strongly weathered carbonatite. This specimen contains large octahedral "magnetite". As ore minerals, so-called martite(hematite pseudomorph after magnetite) is predominant, which was originally magnetite with octahedral habit. Goethite is also associated with hematite. So gangue minerals, fine-grained apatite is recognized.

(50)
Sample No. : 3US54
Locality : Olon-Ovoot
Observation note :

Sample from Au-quartz vein. Gold grains are seen with naked eye. As primary ore minerals, irregularly-formed or granular gold (electrum) up to 0.4mm long is observed exclusively, occurring as disseminations in quartz matrix. EPMA analysis indicate that they are of Au-rich, Au93-95%, Ag7-5% (atomic). Secondary Fe-hydroxide is recognized.

(51)
Sample No. : 3US72
Locality : Olon-Ovoot
Observation note :

Sample from Au-quartz vein. This specimen may be of part of strongly altered igneous (or sedimentary?) rock rather than the vein. As ore minerals, martite (hematite pseudomorph after magnetite) with goethite are observed, which was originally euhedral magnetite. In part, magnetite is scarcely preserved.

(52)
Sample No. : 3US80
Locality : Olon-Ovoot
Observation note :

Sample from Au-quartz vein. Gold is not seen with naked eye. As ore minerals, hematite mixed with goethite, showing a characteristic banded structure, is observed, which was originally euhedral to subhedral magnetite. Pyrite grains are rare. As gangue minerals, quartz is predominant.

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PL. II–1–1 GEOLO
– TAL

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СОВМЕСТНАЯ СОВЕТСКО - МОНГОЛЬСКАЯ
НАУЧНО-ИССЛЕДОВАТЕЛЬСКАЯ ГЕОЛОГИЧЕСКАЯ
ЭКСПЕДИЦИЯ АН СССР И АН МНР

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PL. II–1–1 GEOLOGICAL MAP OF THE UNDAM – TAL AREA

Scale 1:1 000 000

СКАЯ
ЧЕСКАЯ

ACADEMY OF MPR

P OF THE UNDAM

В.В.ЯРМОЛЮК
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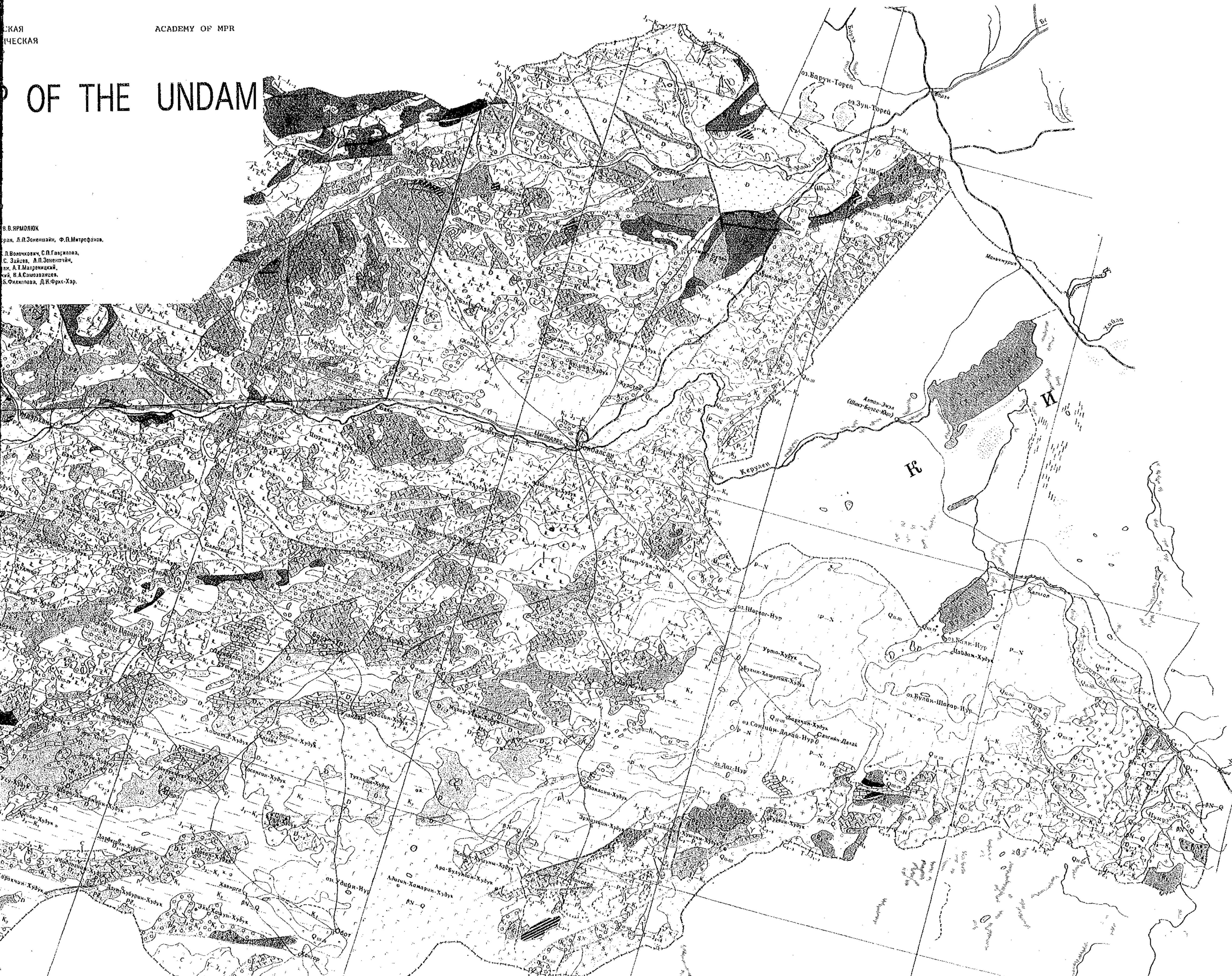
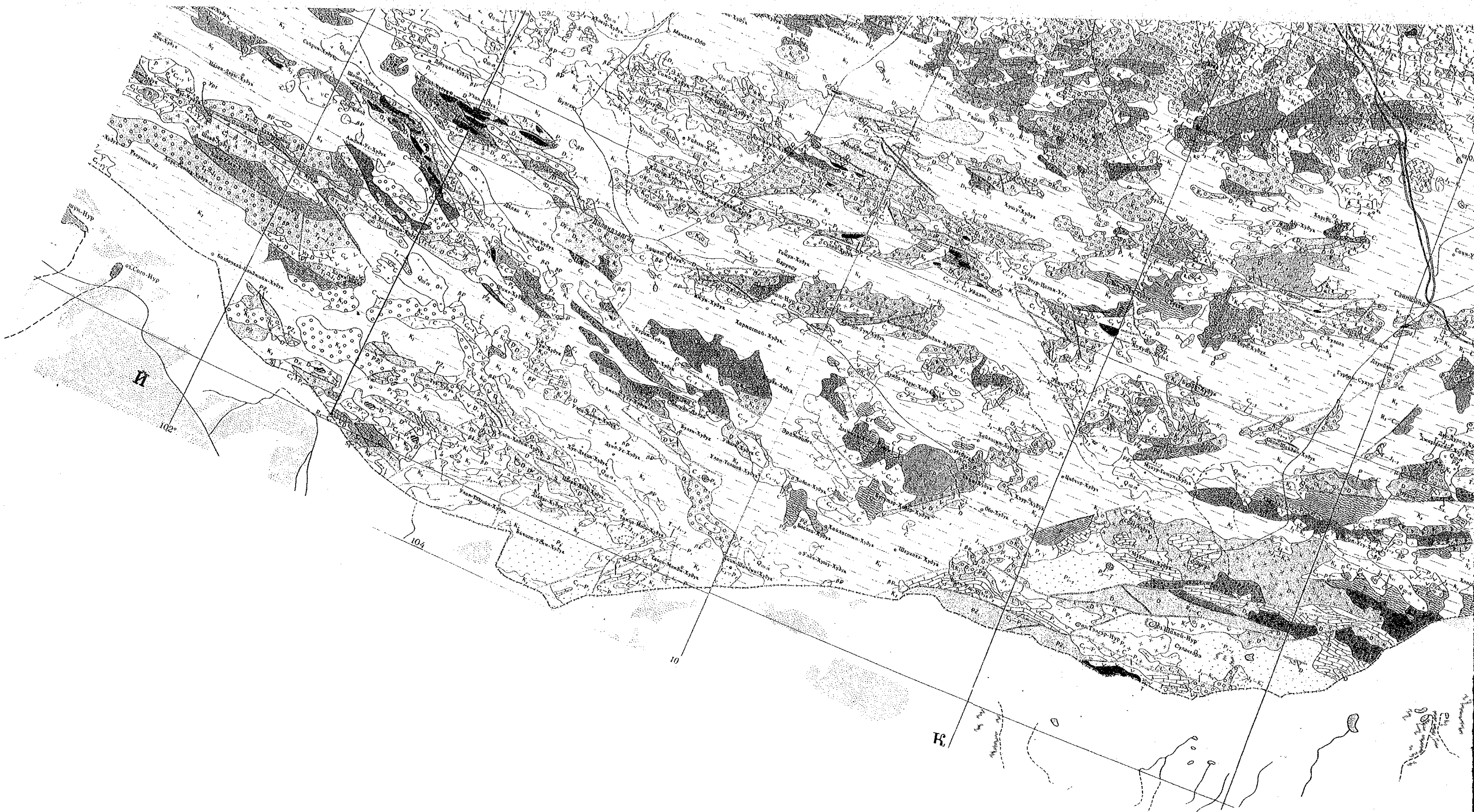
Л.П.Волочкович, С.П.Гаврилова,
С. Зайцев, Л.П.Зоненшайн,
ан, А.Т.Матреницкий,
кий, В.А.Самозванцев,
Б.Филиппова, Д.И.Фрих-Хар.

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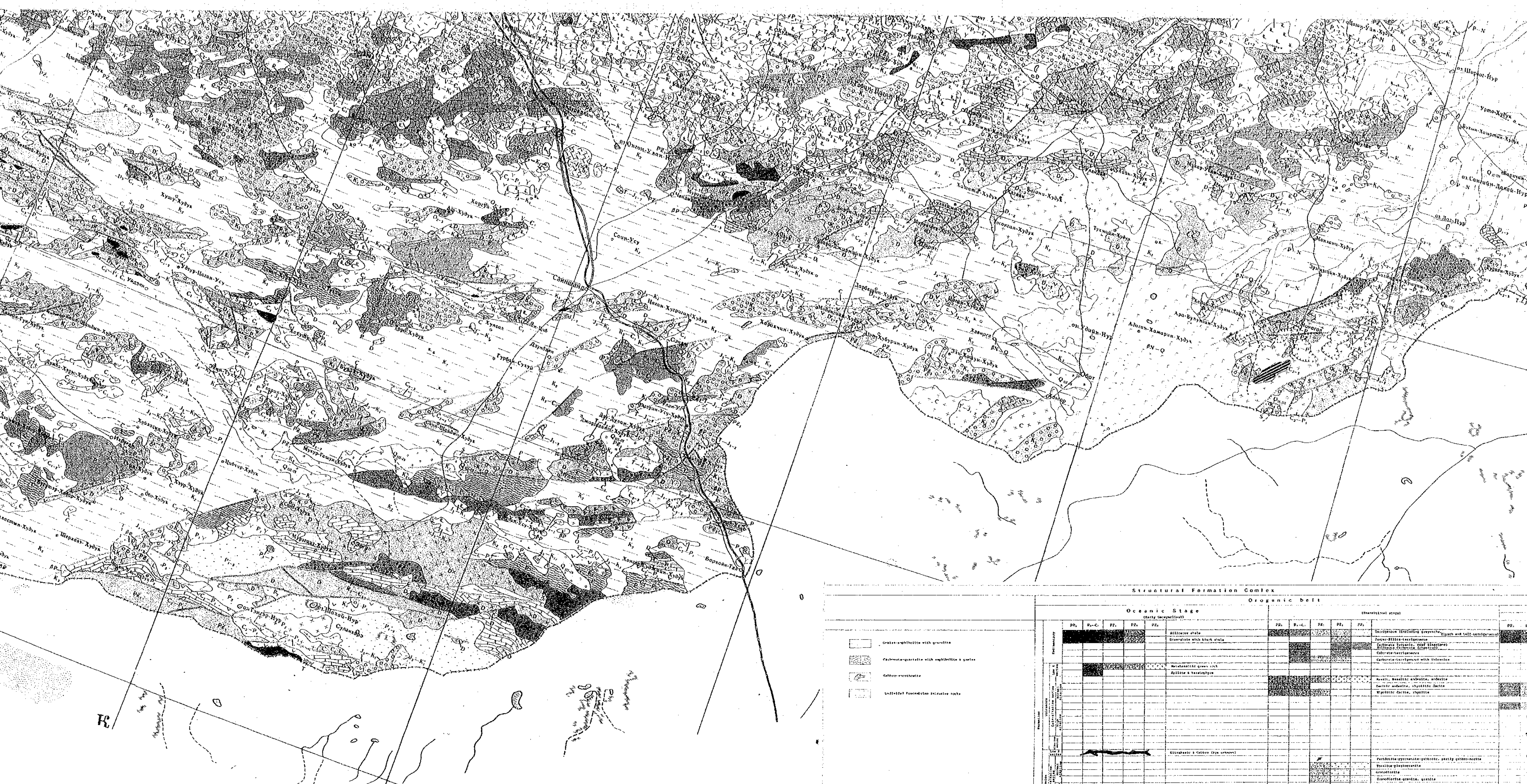
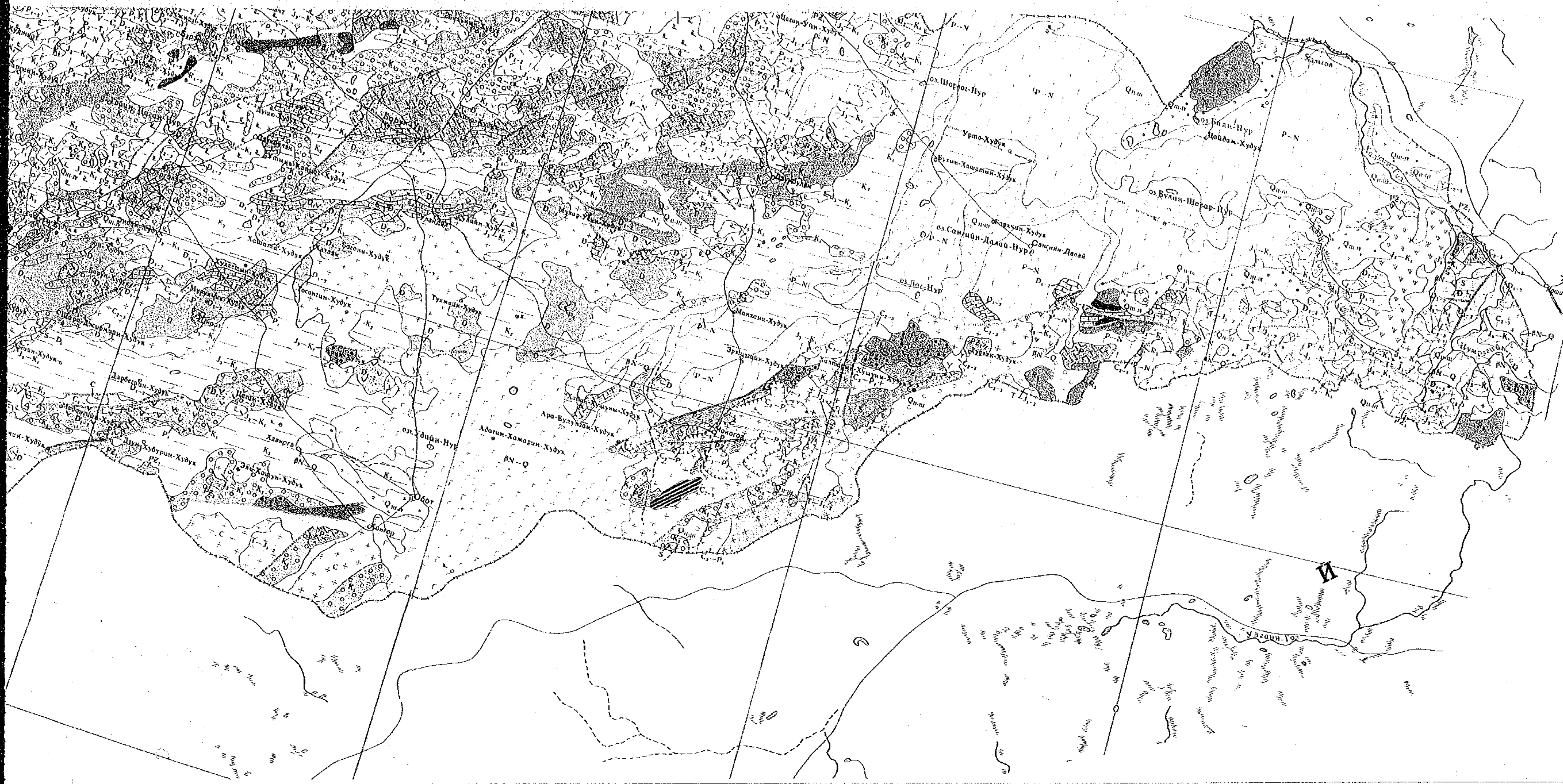
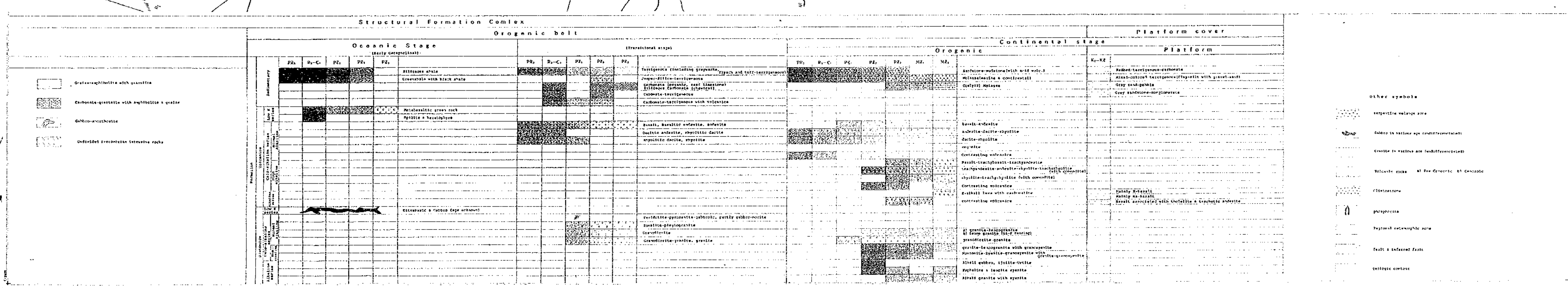


- Gneiss-amphibolite with granulite
- Carbonate-quartzite with amphibolite & gneiss
- Gabbro-anorthosite
- Undivided Precambrian intrusive rocks

Structural Formation Comlex

Formation			Oceanic Stage (Early Geosynclinal): PR_1	R_3–C_1	PZ_1	PZ_2	PZ_3	Oceanic Stage rocks	Orogenic belt (Transitional stage): PR_1	R_3–C_1	PZ_1	PZ_2	PZ_3	Transitional stage rocks	PR_1
Sedimentary								Siliceous shale						Terrigenous (including greywacke, flysch and tuff-terrigenous)	
								Greenshale with black shale						Jasper-Silica-terrigenous	
														Carbonate (organic, reef limestone) Siliceous Carbonate (chemical)	
														Carbonate-terrigenous	
														Carbonate-terrigenous with Volcanics	
Volcanics	Low K series							Metabasaltic green tuff							
								Spilite & keratophyre							
	Calc-alkaline series	Normal Alkaline												Basalt, Basaltic andesite, andesite	
														Dacitic andesite, rhyolitic dacite	
														Rhyolitic dacite, rhyolite	
		High alkaline													
	Alkaline series														
Plutonics	Low K series							Ultrabasic & Gabbro (Age unknown)							
	Calc-alkaline series	Normal Alkaline												Peridotite-pyroxenite-gabbroic, partly gabbro-norite	
														Tonalite-plagiogranite	
														Granodiorite	
														Granodiorite-granite, granite	
		High alkaline													
	Alkaline series														




Structural Formation Comlex
Orogenic belt
Oceanic Stage
(Early Caledonian)
(Transitional stage)
Continental stage
Orogenic
Platform cover
Platform
Gneiss-amphibolite with granulite
Carbonate-quartzite with amphibolite & gneiss
Gabbro-anorthosite
Undivided Precambrian intrusive rocks
Sedimentary
Volcanics
Plutonics
Formation
Siliceous shale
Greenshale with black shale
Metabasaltic green rock
Spilite & keratophyre
Ultrabasic & Gabbro (age unknown)
Terrigenous (including greywacke, flysch and tuff-terrigenous)
Jasper-silica-terrigenous
Carbonate (organic, reef limestone)
Siliceous Carbonate (chemical)
Carbonate-terrigenous
Carbonate-terrigenous with volcanics
Basalt, basaltic andesite, andesite
Dacitic andesite, rhyolitic dacite
Rhyolitic dacite, rhyolite
Peridotite-pyroxenite-gabbroic, partly gabbro-norite
Tonalite-plagiogranite
Granodiorite
Granodiorite-granite, granite
Molasse (marine & continental)
Coaly(?) Molasse
Basalt-andesite
Andesite-dacite-rhyolite
Dacite-rhyolite
Rhyolite
Contrasting volcanics
Basalt-trachybasalt-trachyandesite
Rhyolite-trachyrhyolite (with comendite)
Contrasting volcanics
Granodiorite-granite
Alkali gabbro, ijolite-urtite
Nephaline & leucite syenite
Alkali granite with syenite
Gray sand-pebble
Gray sandstone-conglomerate
Mainly K-basalt
Mainly Na-basalt
Basalt associated with tholeiite & trachytic andesite
Other symbols
Serpentine melange zone
Gabbro in various age (undifferenciated)
Granite in various age (undifferenciated)
Volcanic rocks a) Pre Cenozoic b) Cenozoic
Clinkerstone
Phosphorite
Regional metamorphic zone
Fault & inferred fault
Geologic contour

PL. II–1–2 GEOLOGIC MAP OF THE TSAV POLYMETALLIC DEPOSIT

M-50-III-48;49;66;67;84;85

SCALE 1:5000

Сечение горизонталей через 2м

1982-1986гг.