

Q 583

Q 85

Q 77

Q 63

Q 71

Q 73

Q 74

Q 68

Q 70

79 85

Q 55

Q 68

Q 73

Q 77

Q 76

Q 73

Q 75

Q 75

Q 71

Q 71

Q 71

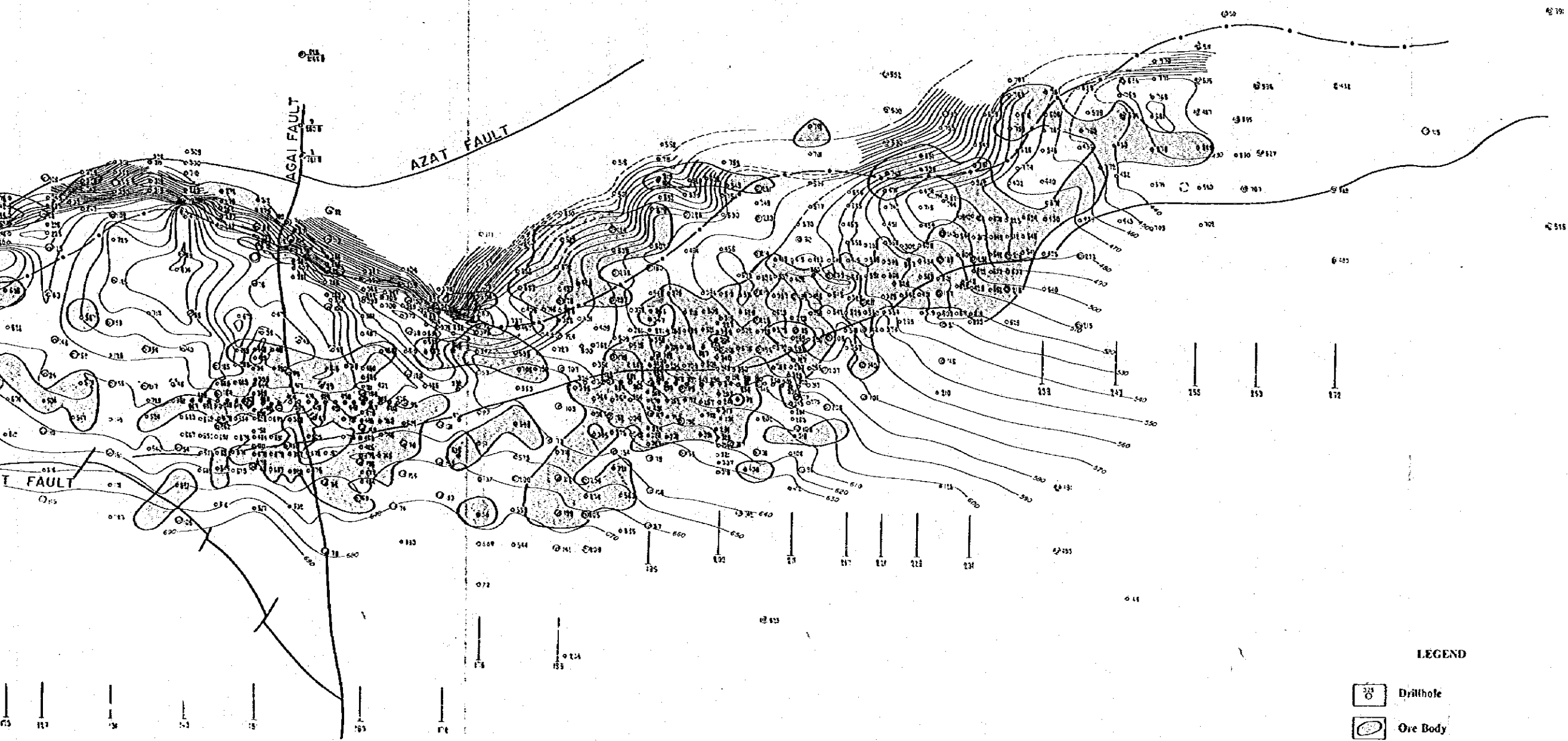
Q 61

Q 72

Q 72

Q 73

Q 73



LEGEND




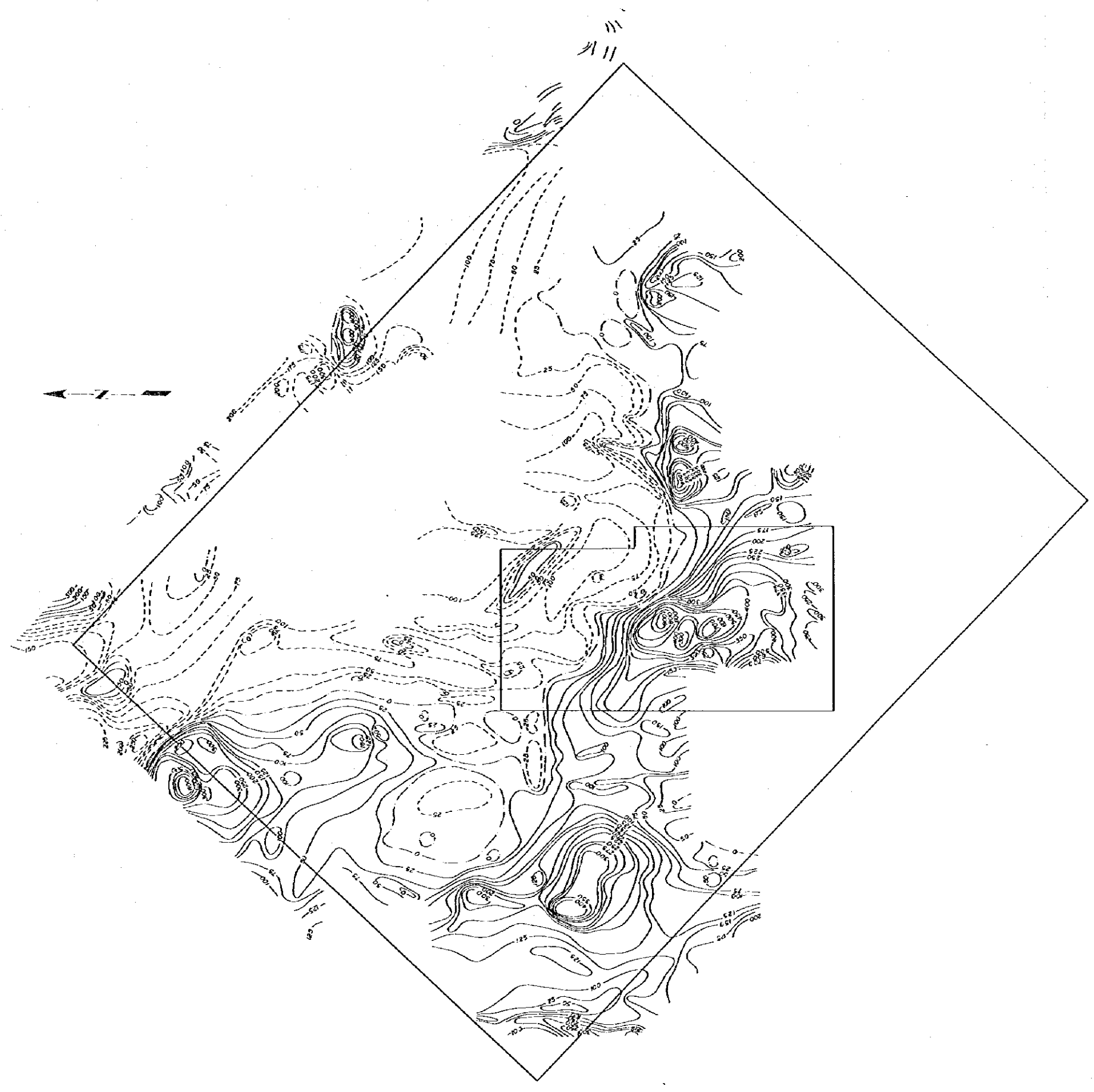
-  Drillhole
-  Ore Body
-  Meridian Line & No.

Plate III-1-4-5 Compiled Map of the Previous Data in the Zhaman-Aibat Area (Scale 1:25,000)

Magnetic Map in the Samarsky Area



Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.
Центральная точка - Сымонова островья	Исчислен в 1954 г.г.

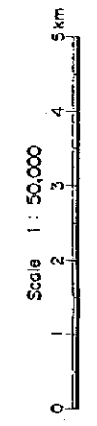
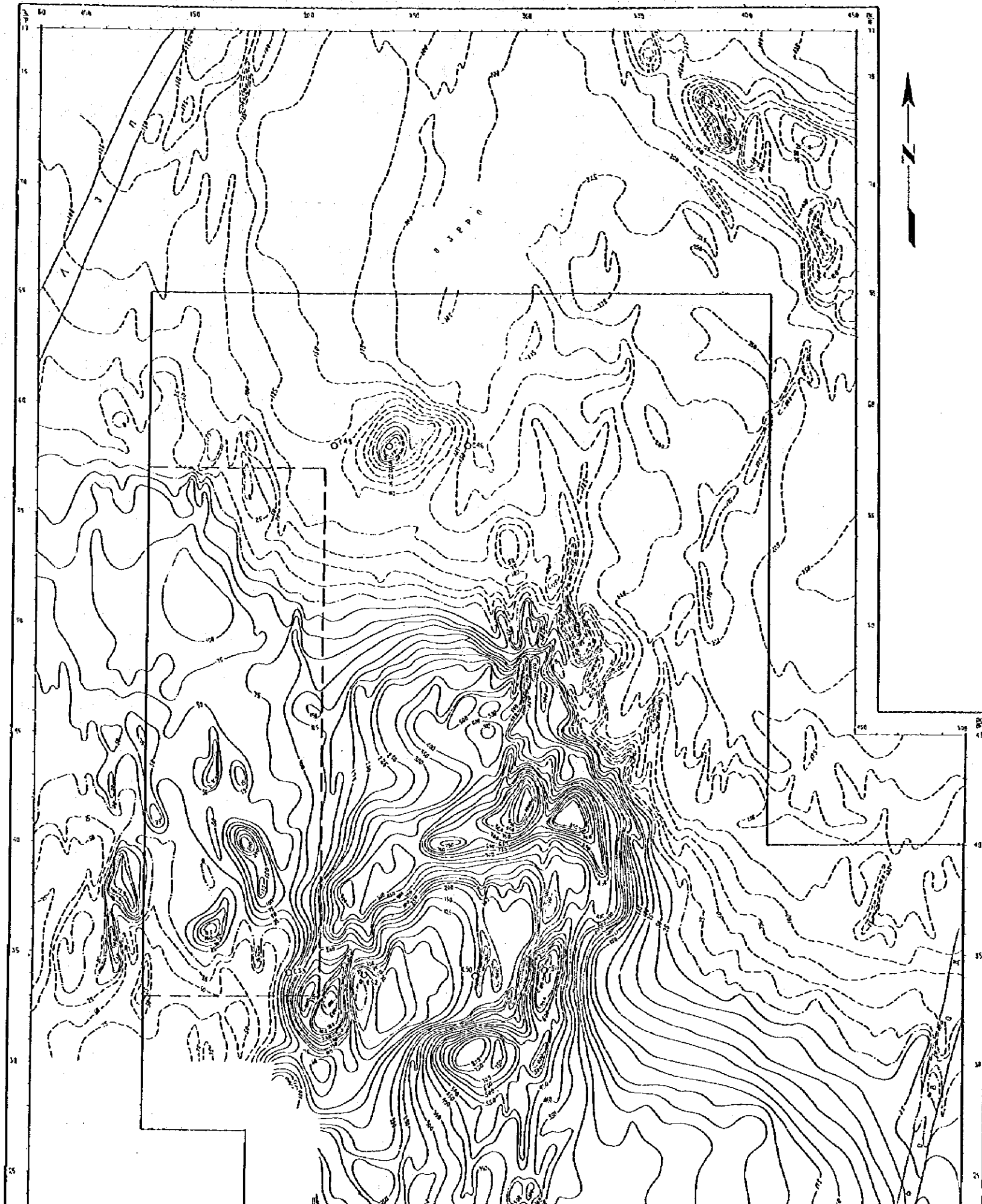
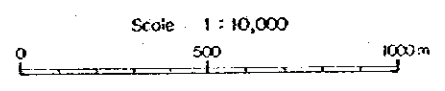
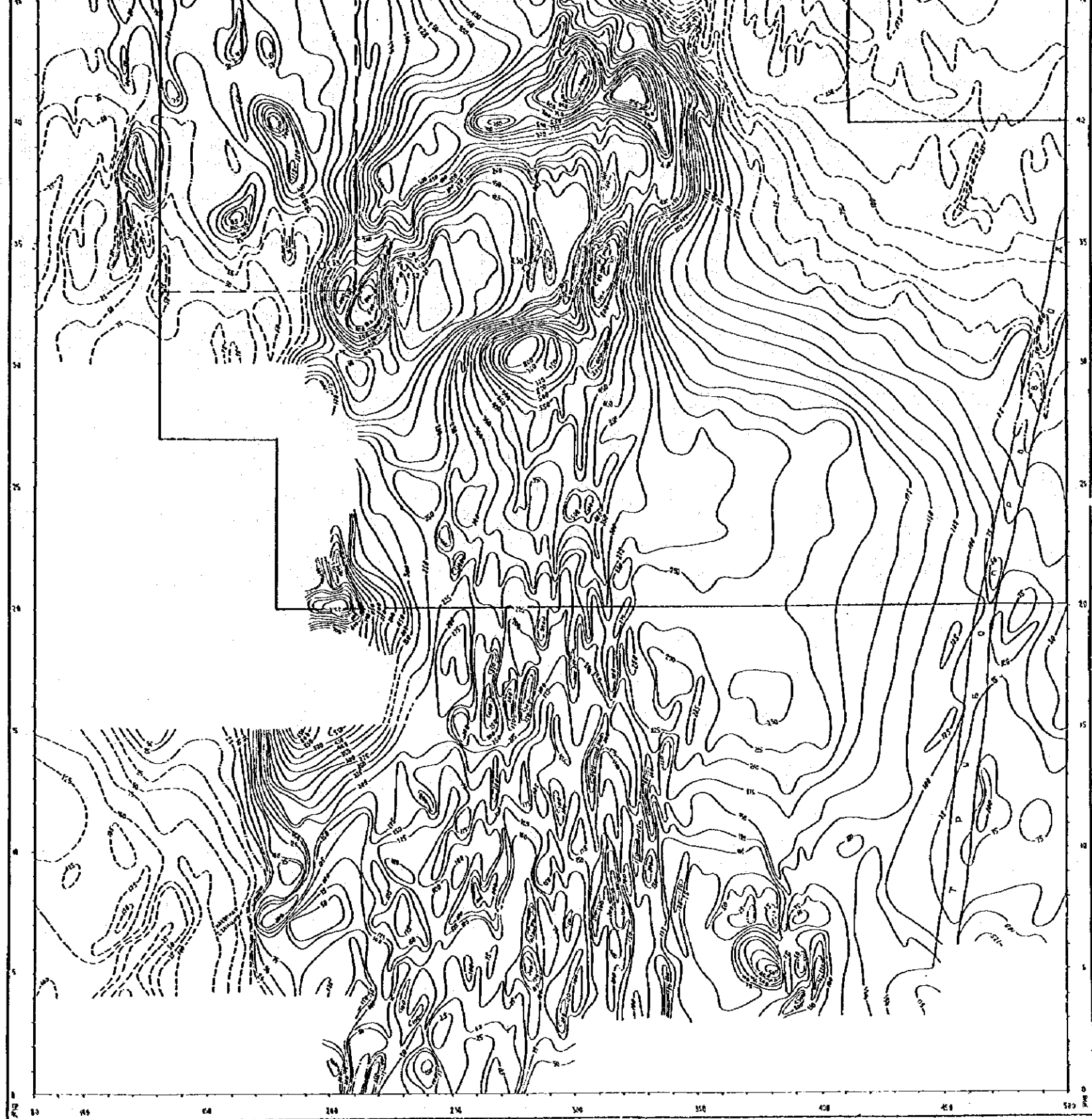


Plate III-2-2-1 Magnetic Map in the Samarsky Area  
Originally Prepared by Central Research Geophysical Expedition

# Magnetic Map in the Samarsky Deposit Area





Условные обозначения:  
Изолинии в Га, в нТл

- Изолинии
- Кухелье
- Вертикальные
- Контуры работ масштаба 1:2000, 1933 г.
- Участок проектируемых работ

Орды Самарский поискового взрещения

Шкала расщепления интенсивности магнитного поля в нТл

200	150	100	50	0	50	100	150	200
-----	-----	-----	----	---	----	-----	-----	-----

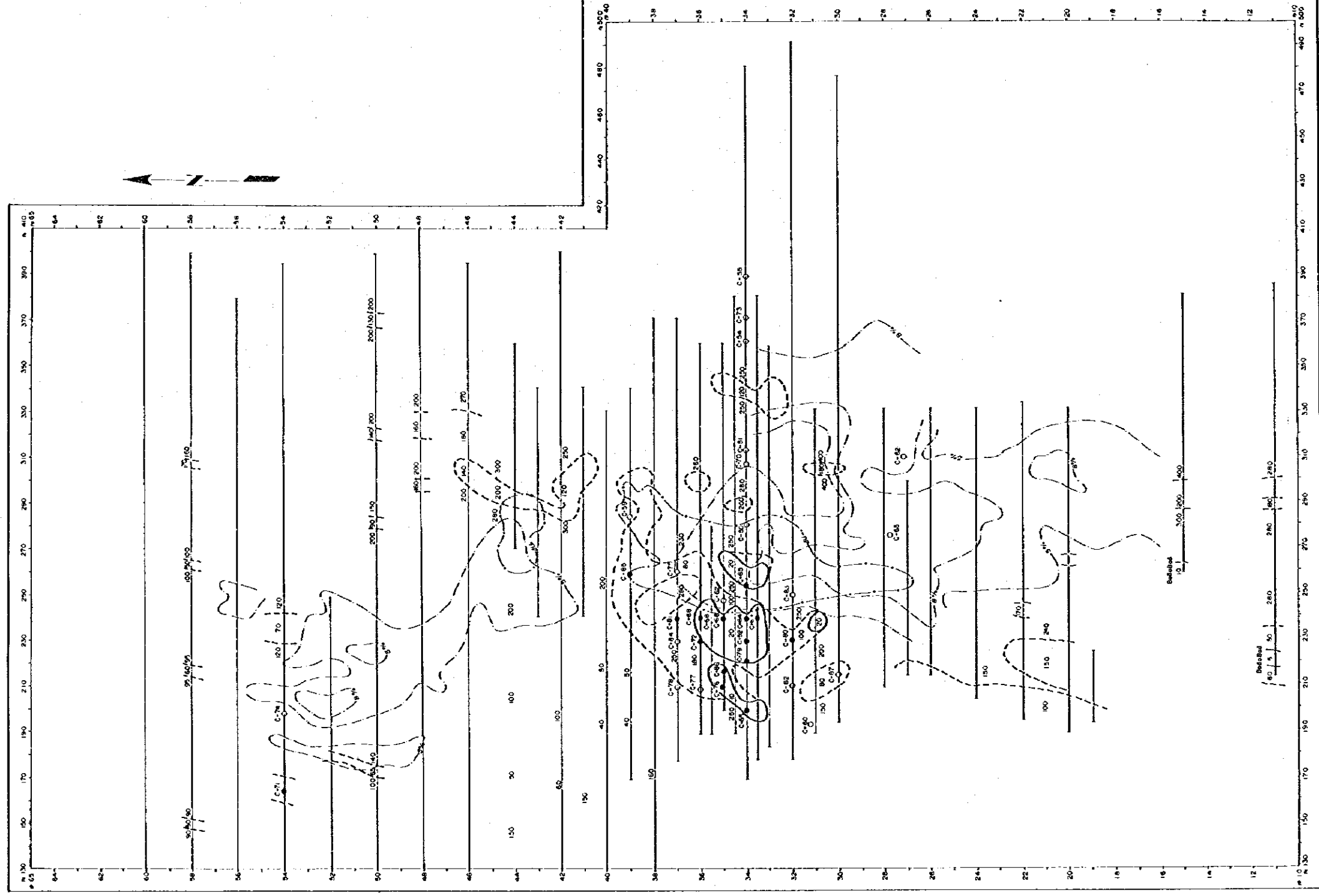
Центральная поисково- съемочная экспедиция	Ответственный исполнитель
Приложение Лист 1	КАРТА ИЗОЛИНИЙ вТ Участок Самарский
Масштаб 1:10 000	
Составил: нач. партии Чертил: техник в хат.	А.Г. Сидоркина А.М. Сидорова

Plate III-2-2-2 Magnetic Map in the Samarsky Deposit Area (Scale 1:10,000)  
Originally Prepared by Central Research Geophysical Expedition

Б-2-2-2



# The Result of Electric Surveys in the Samarsky Area (Scale 1:10,000)



- LEGEND**
- The Anomaly of SP ( Spontaneous Potential ) Method, (mV), data in 1962
  - The Anomaly of IP ( Induced Polarization ) Method, (%), data in 1972
  - The Electrical Conductive Zone from a Well Logging
  - The Conductive Anomaly of IP Method
  - Profiles of Electric Survey
  - Boreholes of Exploration drilling
  - Ore and Ore-free

Plate III-2-2-3 The Result of Electric Surveys in the Samarsky Area (Scale 1:10,000)

Originally Prepared by Central Research Geophysical Expedition

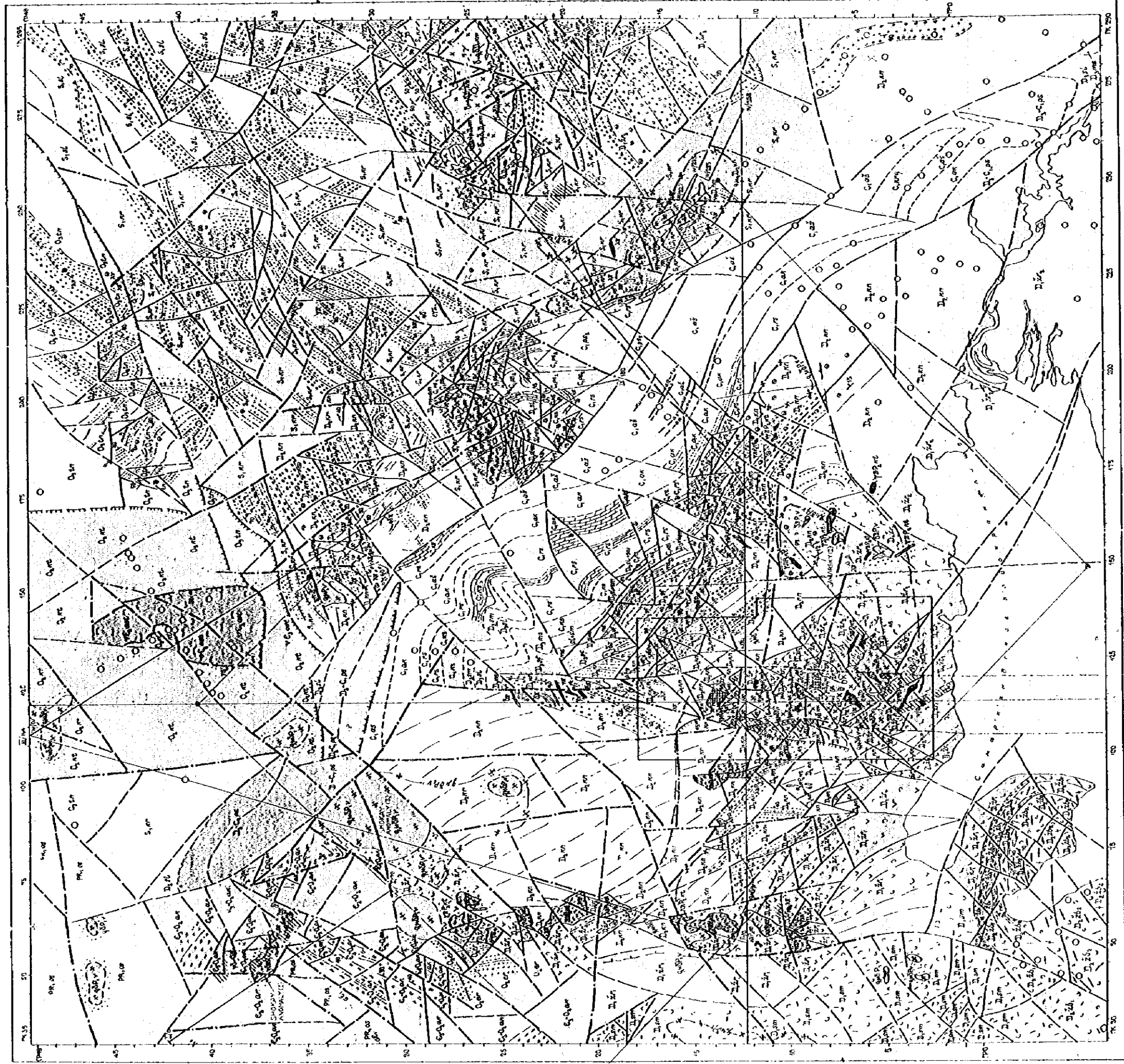


Схема обозначения листов

A	B	A	B
1	2	3	4
A	B	A	B
5	6	7	8

Начальные обозначения см. приложении лист:

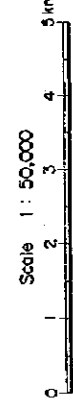
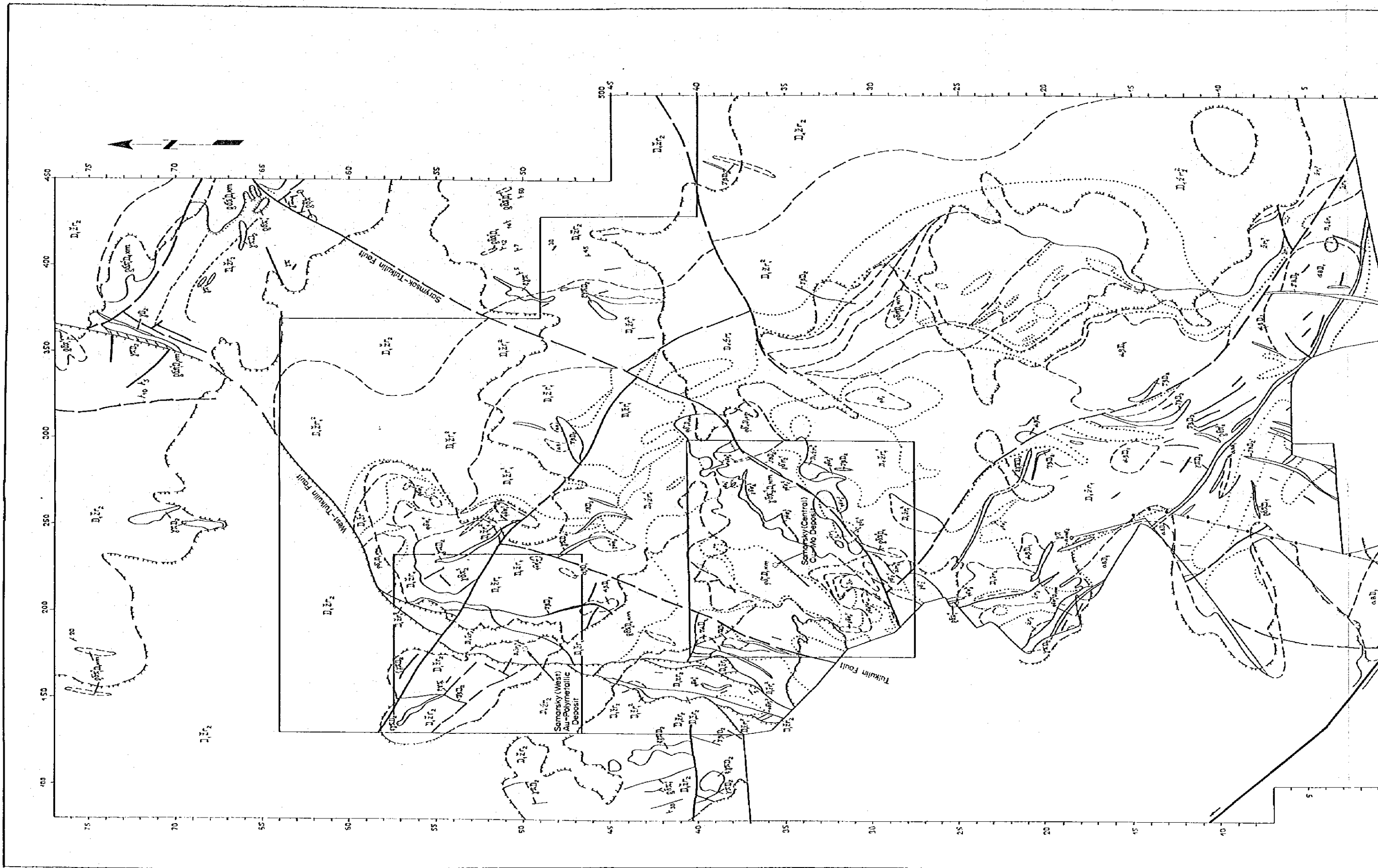
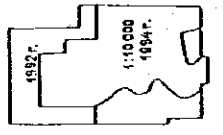
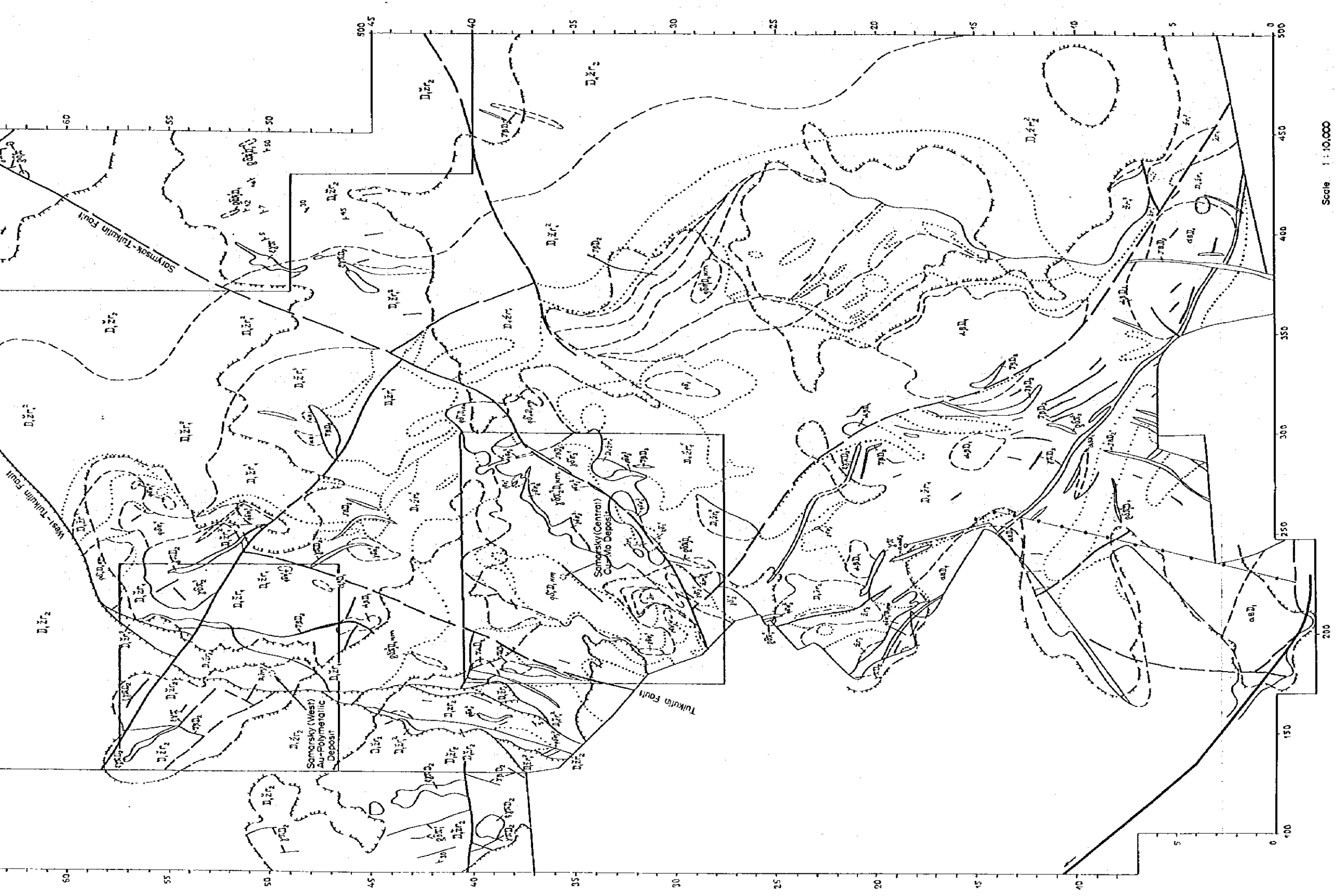


Plate III-2-3-1 Geological Map in the Samarsky Area (Scale 1:50,000)  
Originally Prepared by Central Prospecting Survey Expedition, 1994

Центральная поисковая съёмочная экспедиция	Отчет о региональных геологических работах масштаба 1:50000 на площади листов М-40-СВ-2, Г, 22-А, Б, В, Д, Е, Г, Ж, З, И, К, Л, М, Н, О, П, Р, С, Т, У, Ф, Ц, Ч, Ш, Щ, Э, Ю, Я на 1990-1994 гг. Самарская ГСЭП
Приложение лист 1	Геологическая карта палеозойского фундамента Масштаб 1:50000
Масштаб 1:50000	Составитель: А. И. Лисков
Составитель: А. И. Лисков	Год издания: 1994
Издательство: Геологическое	Издательство: Геологическое
Издательство: Геологическое	Издательство: Геологическое

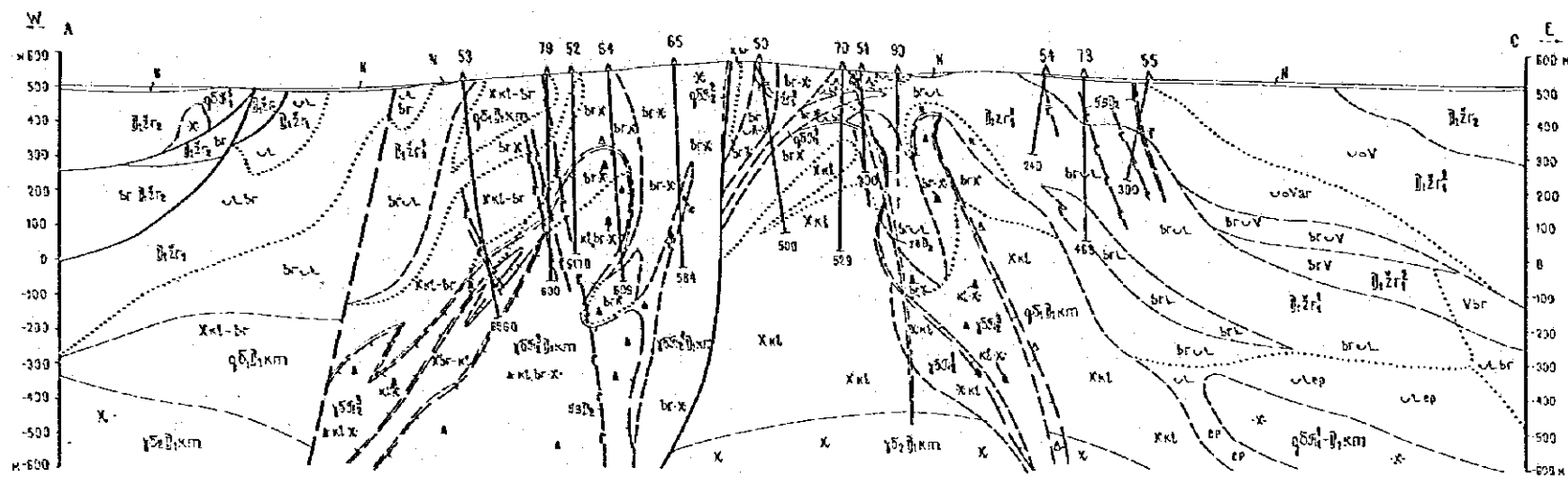




Scale 1:10,000  
0 500 1000 m

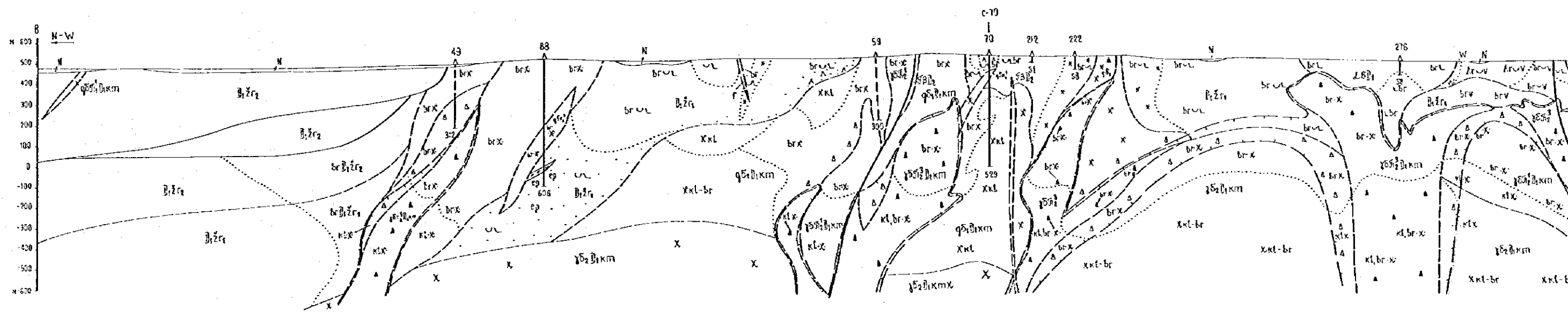

Plate III-2-3-2 Geological Map in the Samarsky Area (Scale 1:10,000)

Originally Prepared by Joint Stock Company "Kuznitskaya"



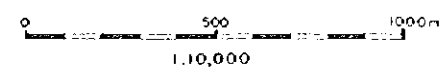
Border of copper ore with Cu content > 0.5%

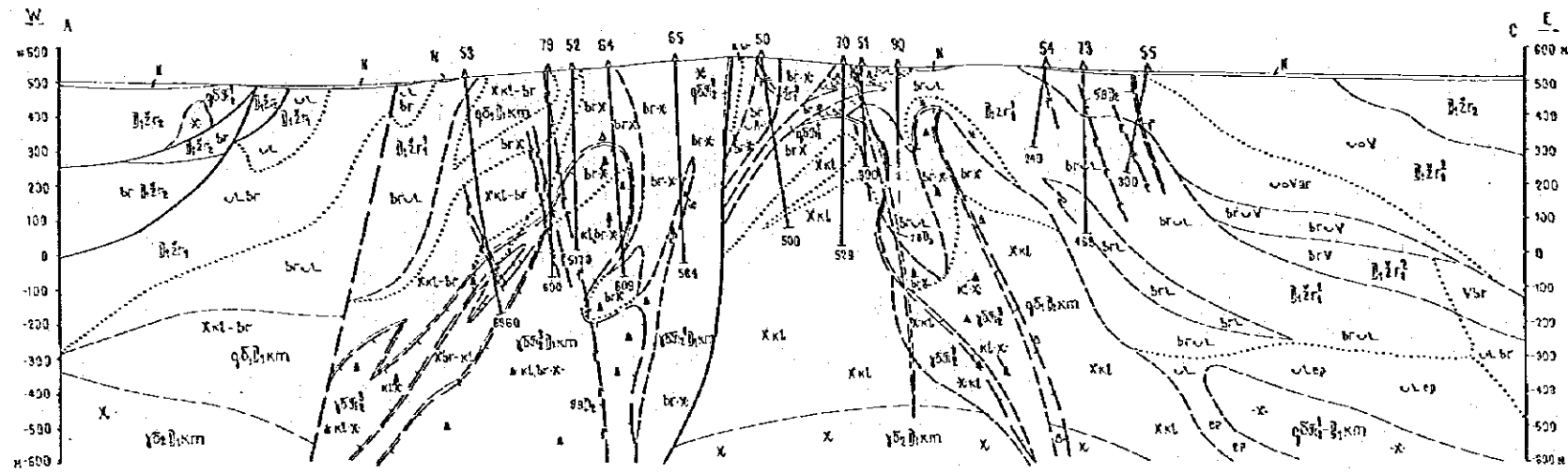
Geological cross-section at line A-C  
Scale 1:10000 Compiled by Evdokimov IV



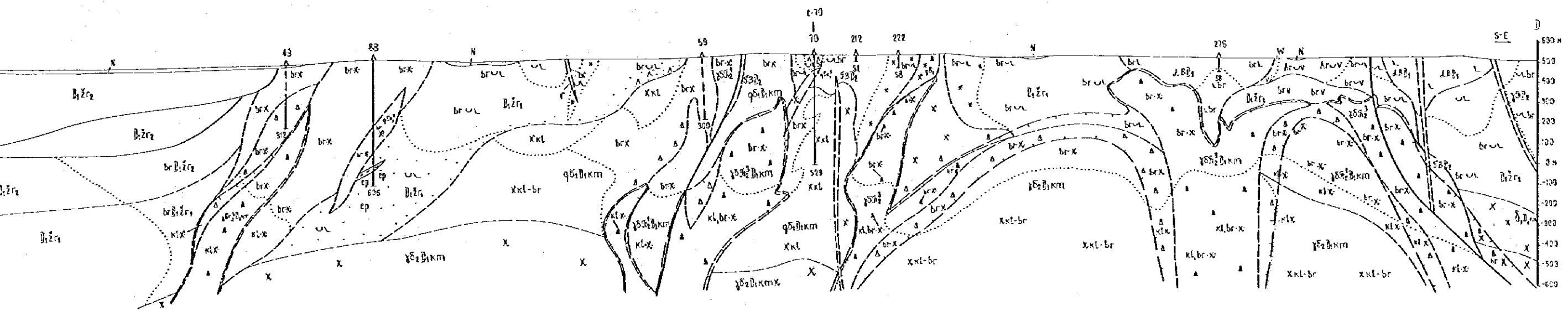
Assumed border of copper ore w

Geological cross-section at line B-W  
Scale 1:10000 Compiled by Evdokimov IV

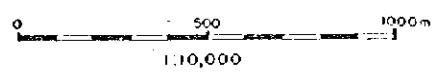


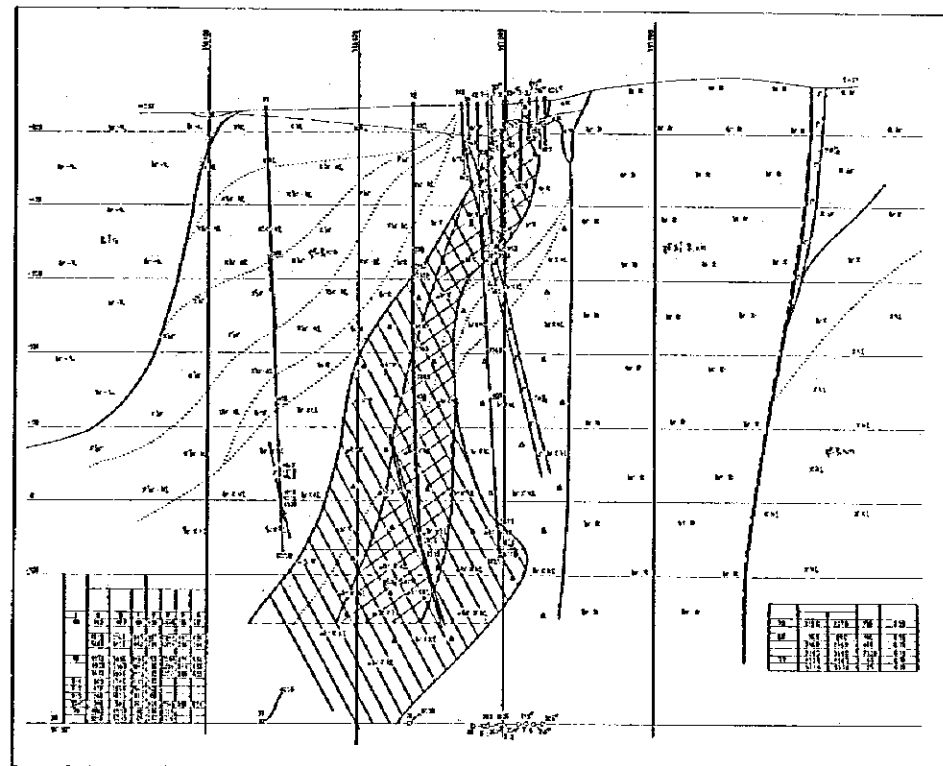
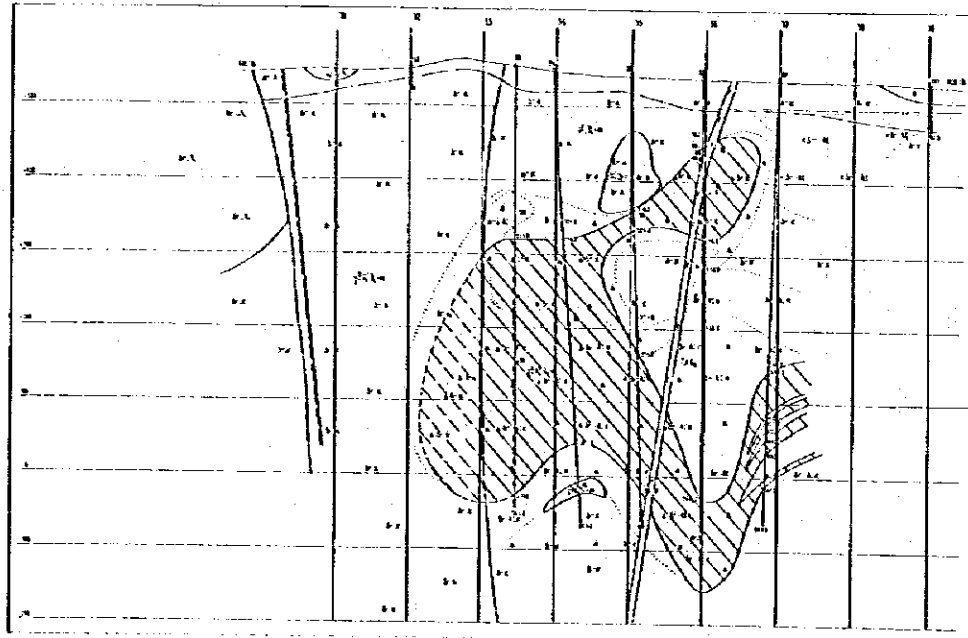


Border of copper ore with Cu content > 0.5%  
 Geological cross-section at line A-C  
 Scale 1:10000 Compiled by Evdokimov IV



Assumed border of copper ore with Cu content > 0.5%  
 Geological cross-section at line B-C-70-D  
 Scale 1:10000 Compiled by Evdokimov IV

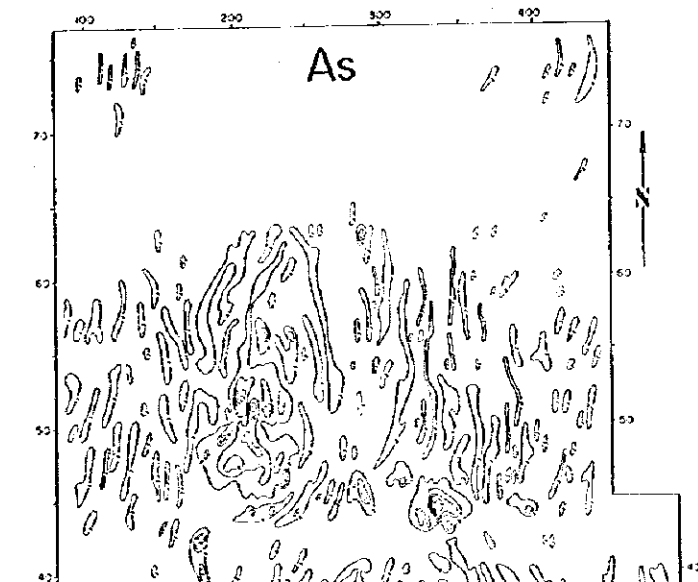
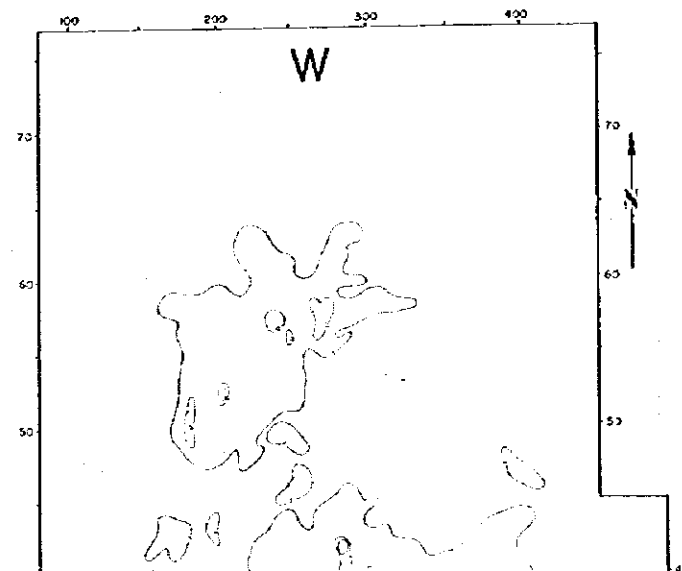
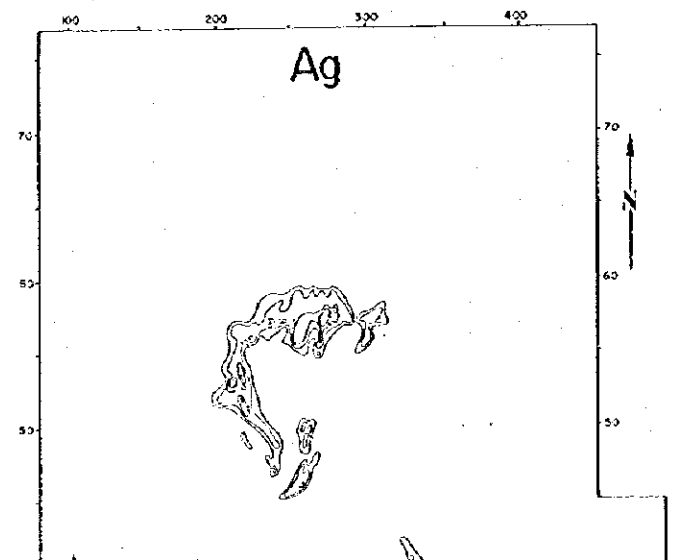
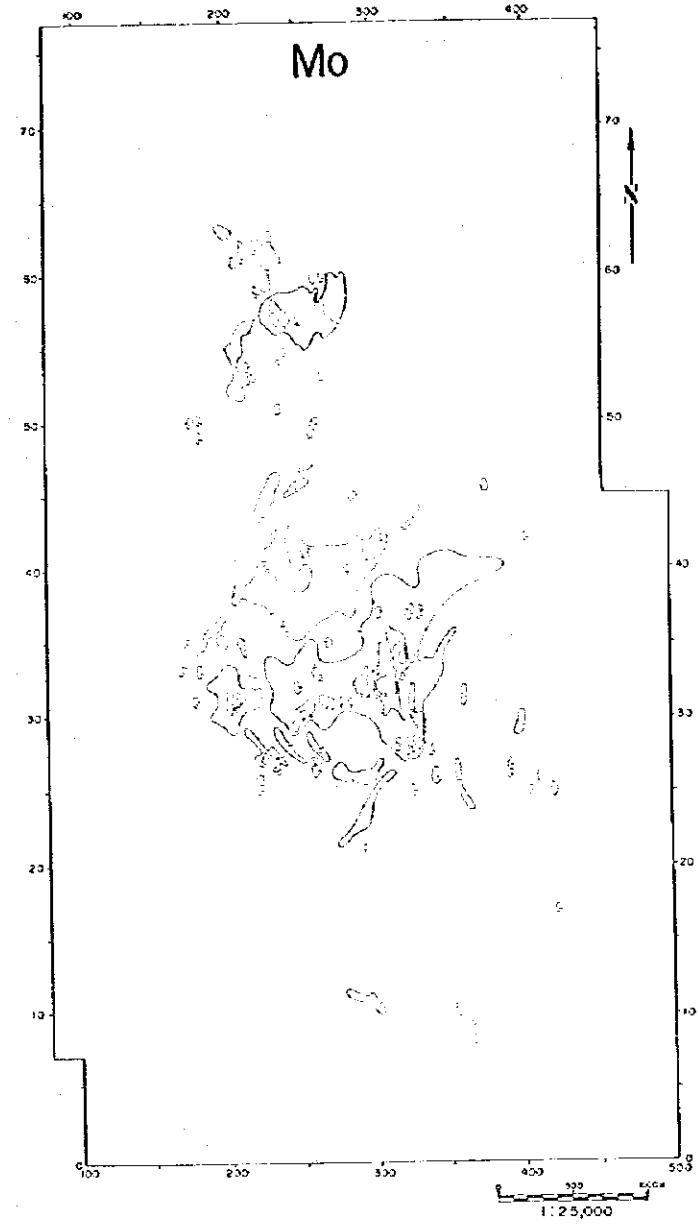
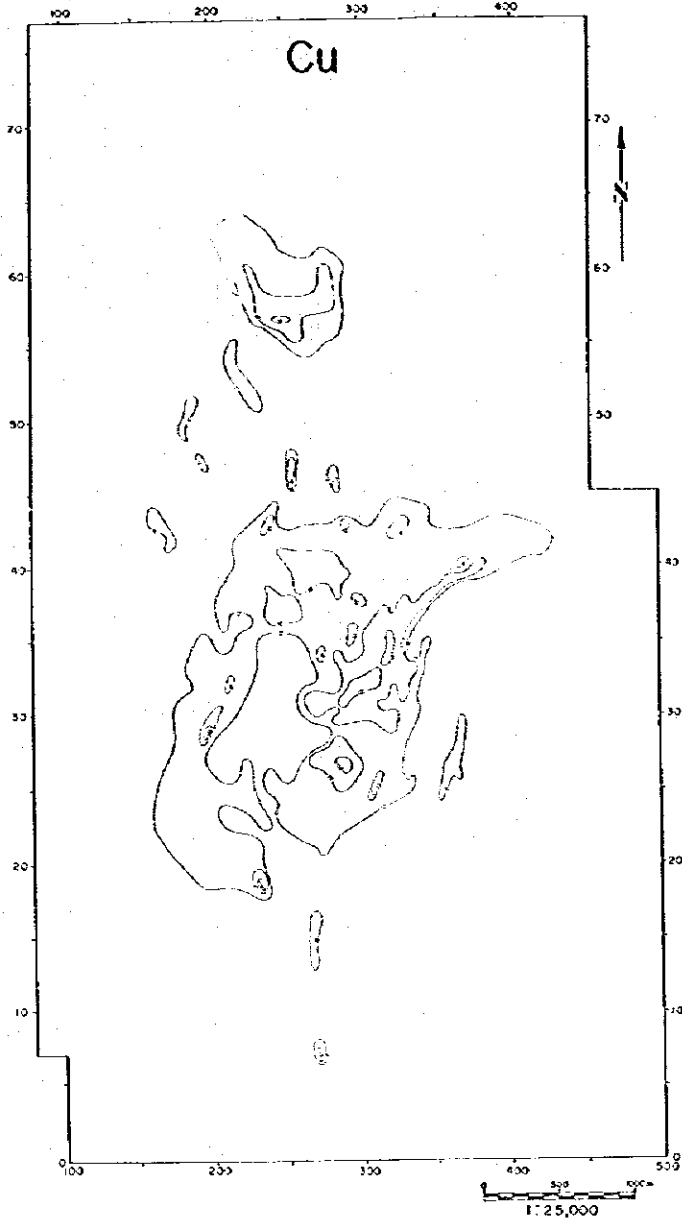
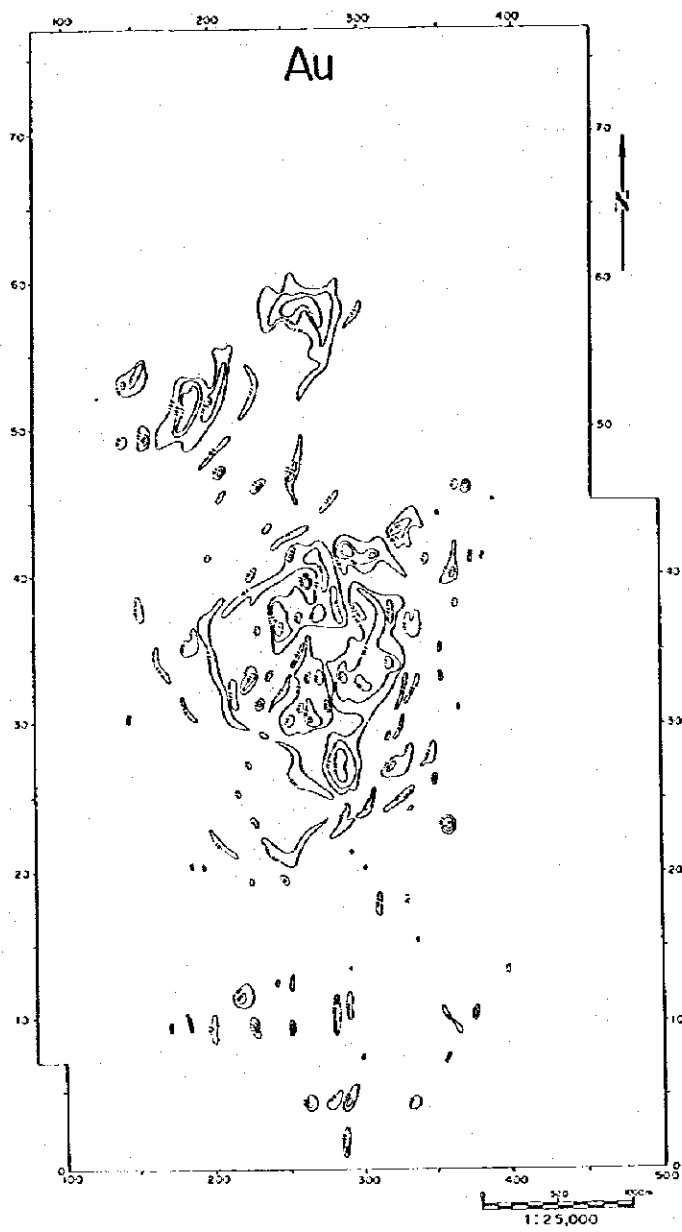




Scale 1 : 5,000  
 0 100 200 300 400 500m

Plate III-2-3-4 Geological Cross-Section along the N-S, and E-W line (Scale 1:5,000)

Б  
 1  
 2  
 3  
 4





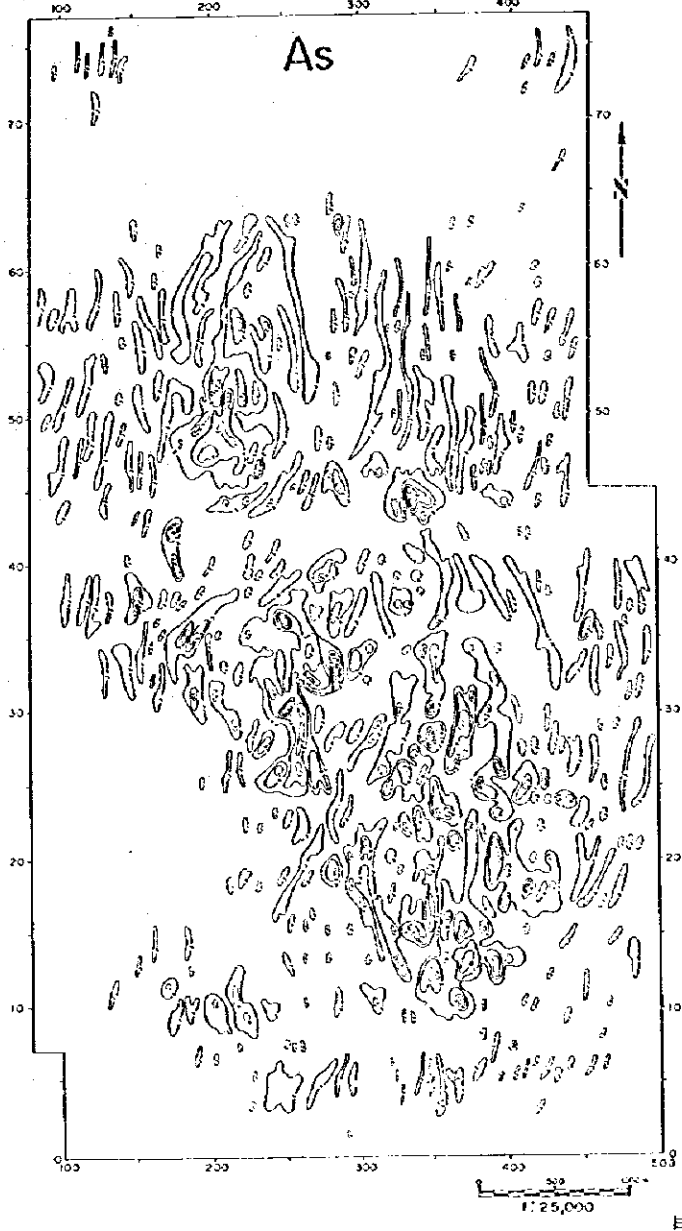
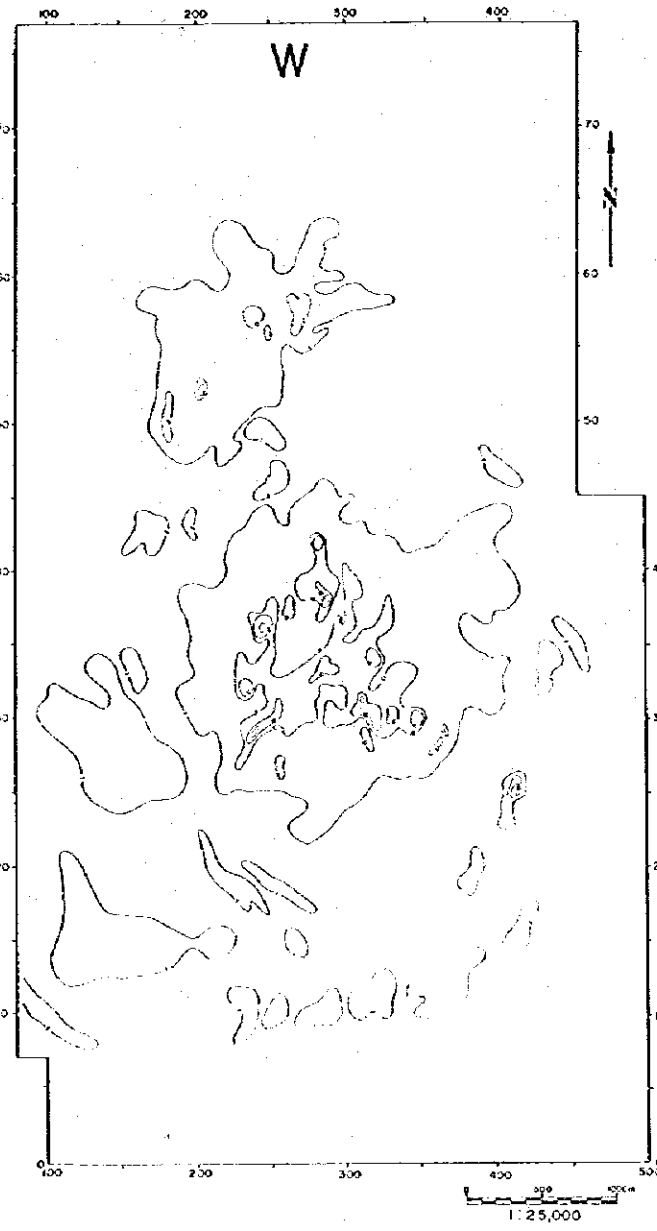
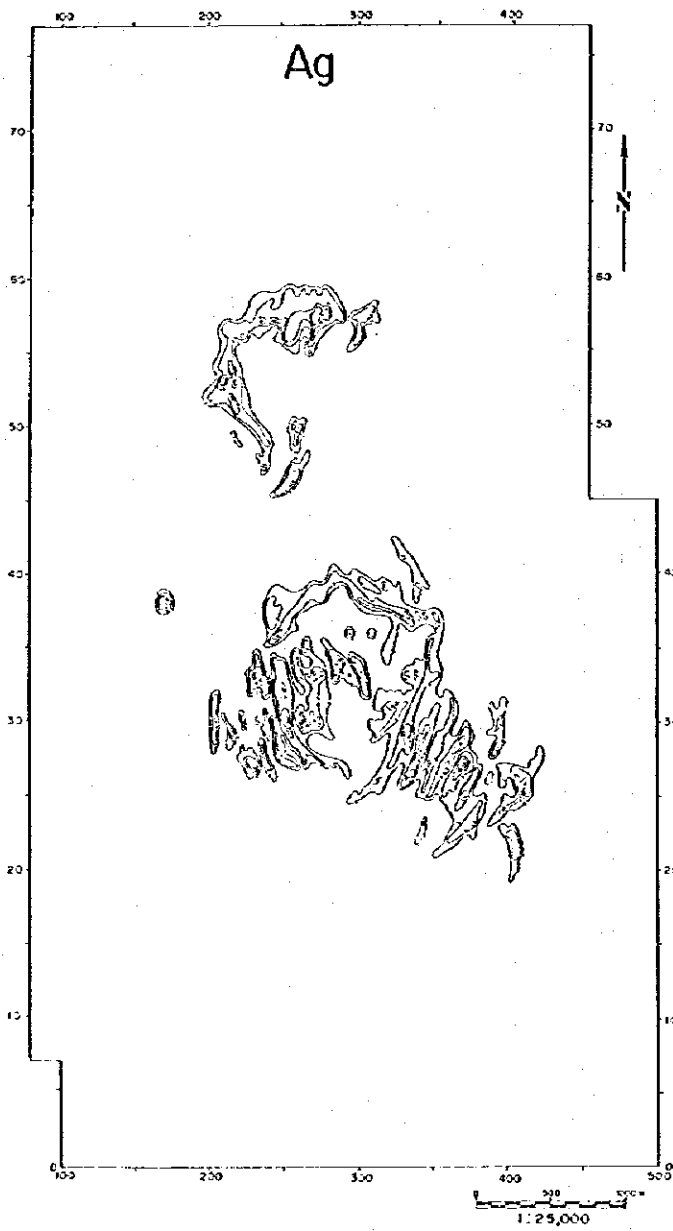
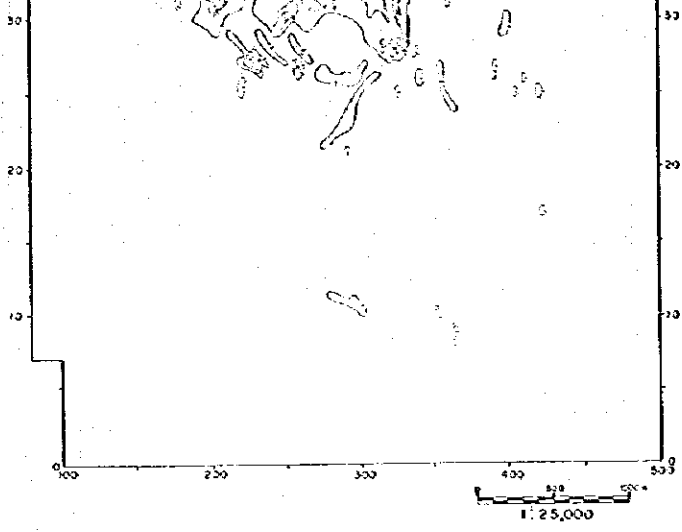
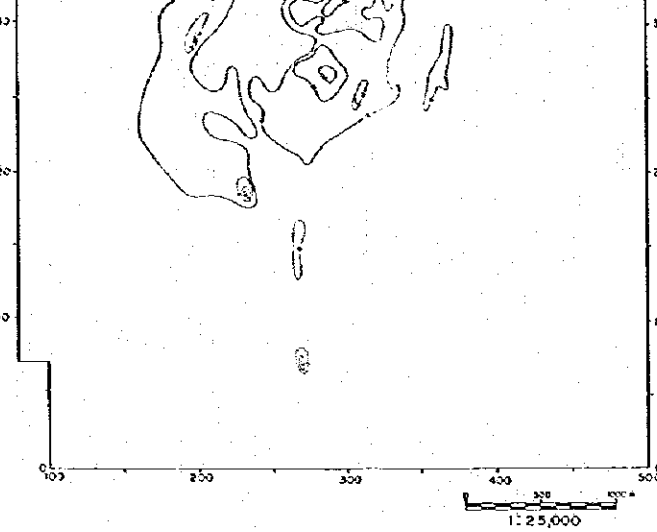
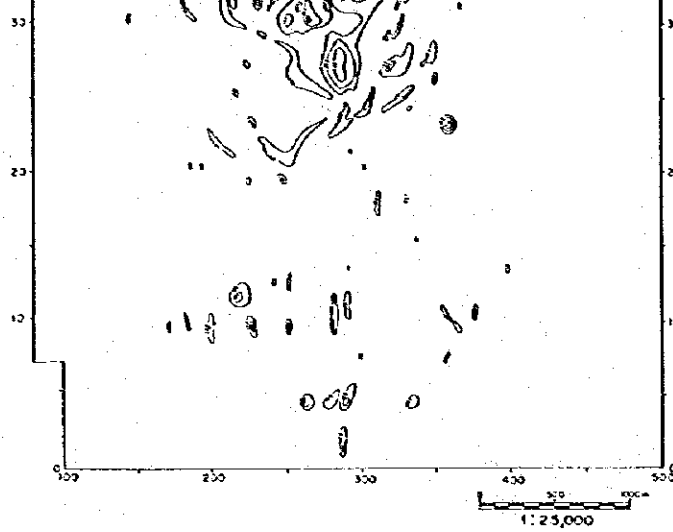
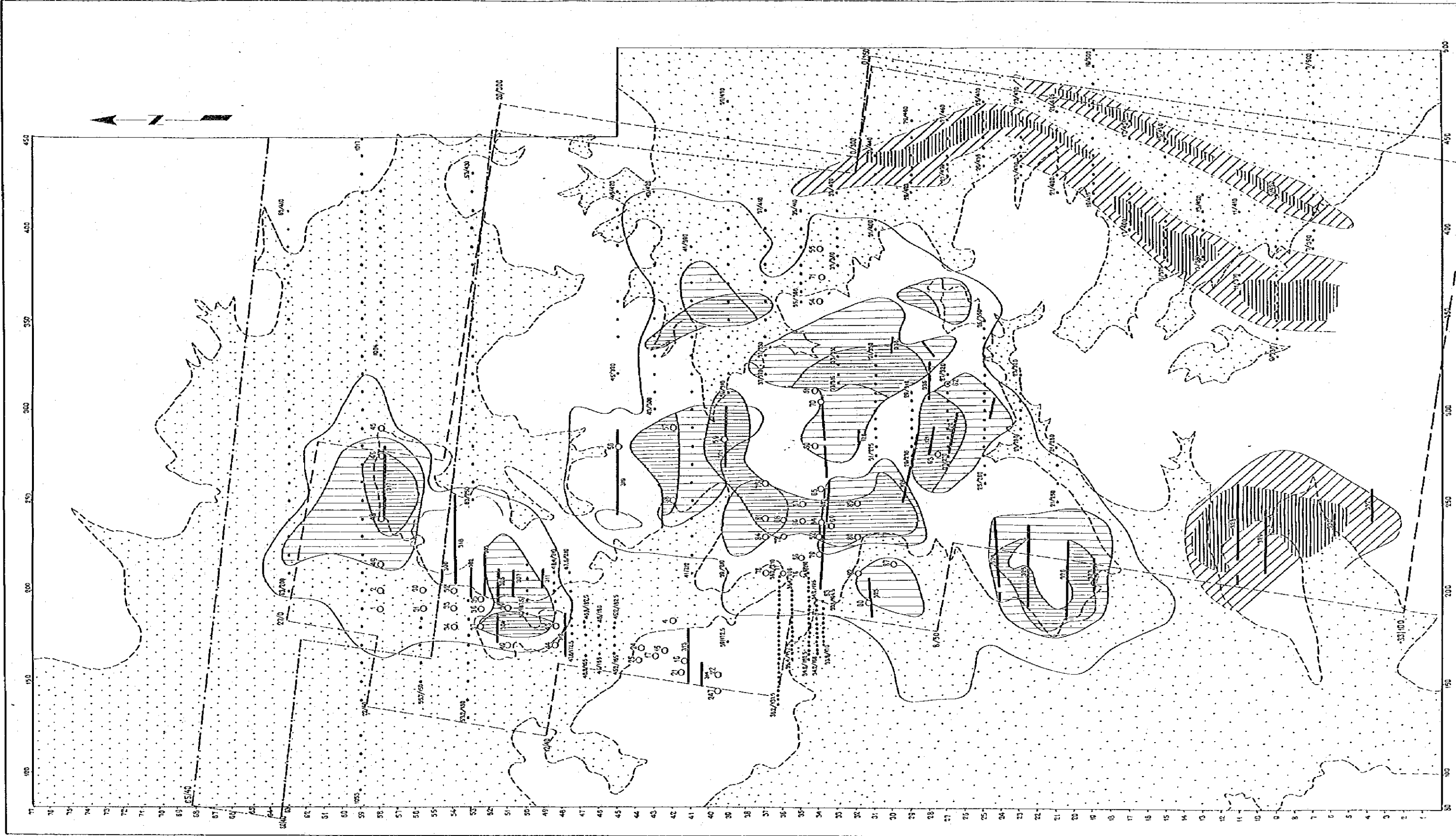


Plate III-2-3-5 Distribution of Geochemical Anomalies in the Samarsky Area (Scale 1:25,000)

Originally Prepared by Alexander V. Pokusayev (1955)



The legend to prognostic map using  
geochemical data

Scale 1 : 20,000

-331030

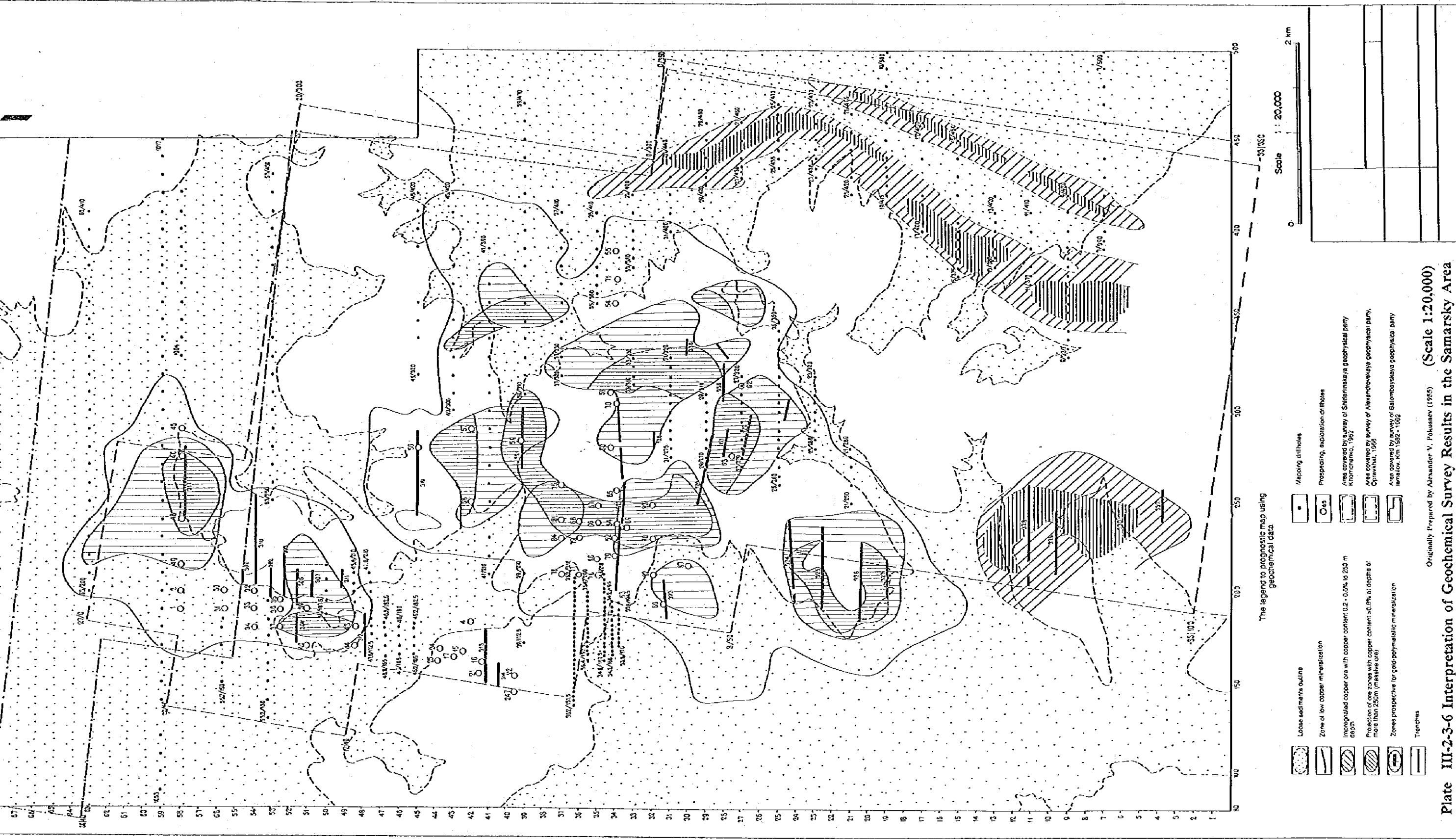
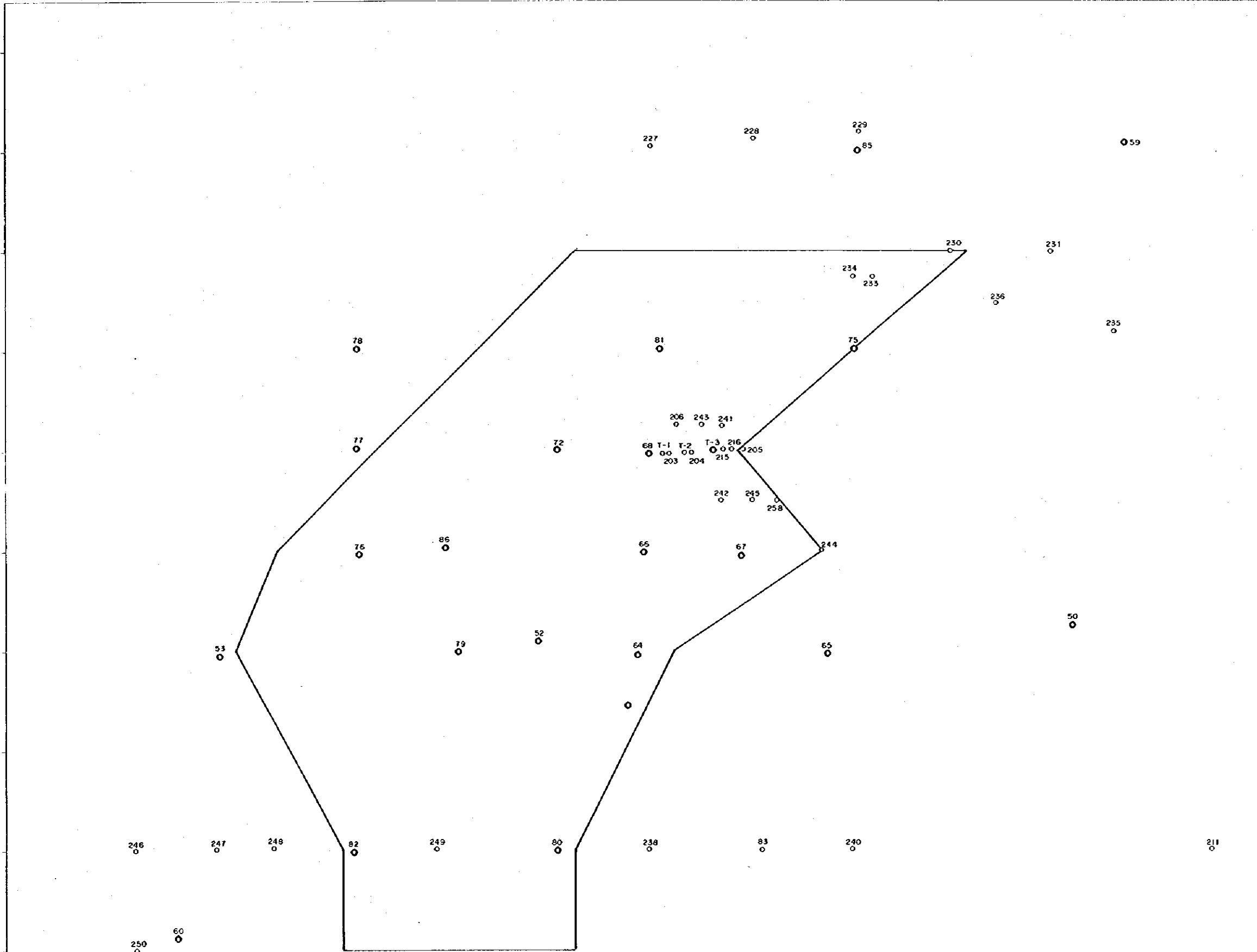


Plate III-2-3-6 Interpretation of Geochemical Survey Results in the Samarsky Area (Scale 1:20,000)

Originally Prepared by Alexander V. Pokusev (1965)





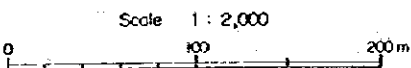
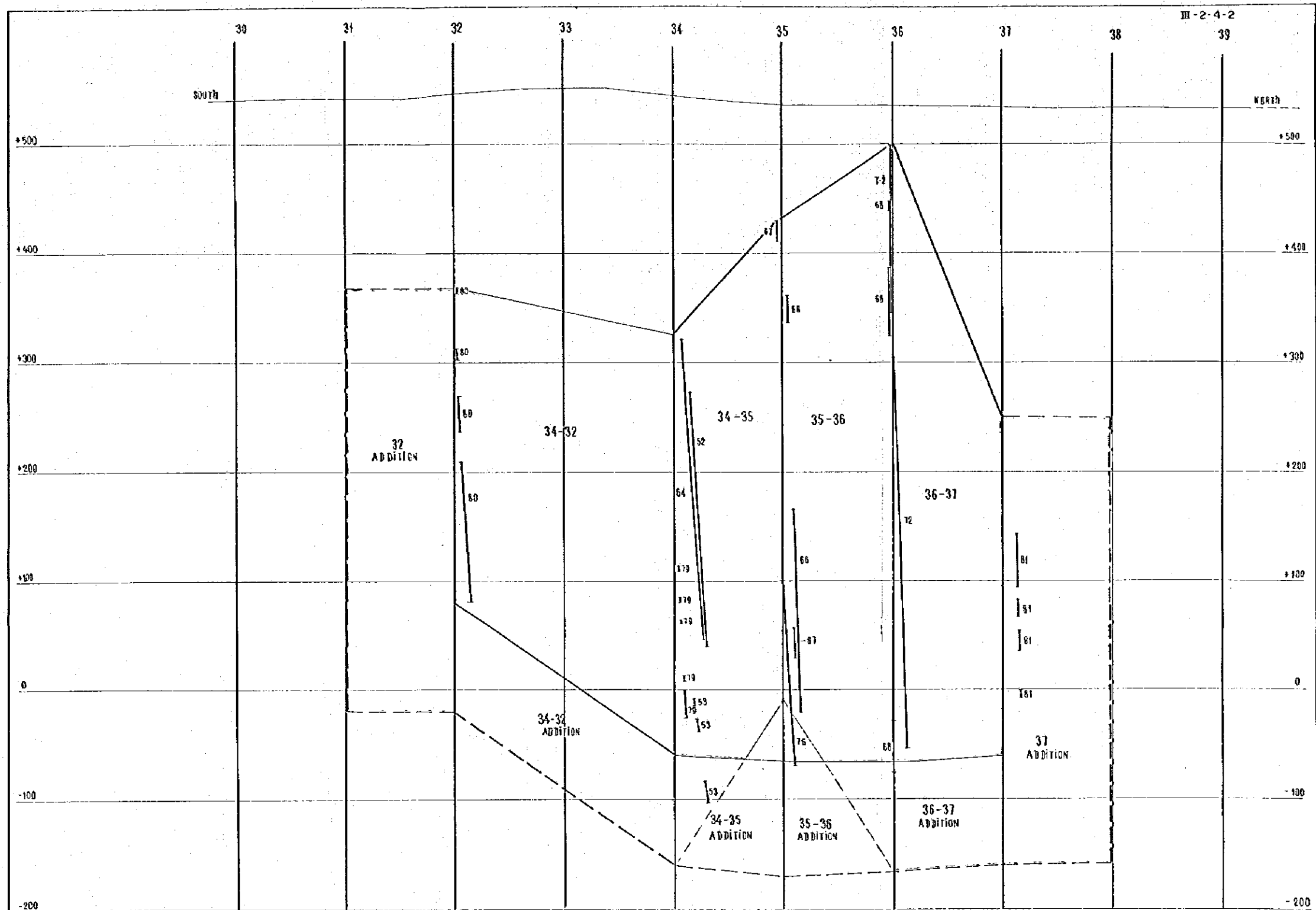
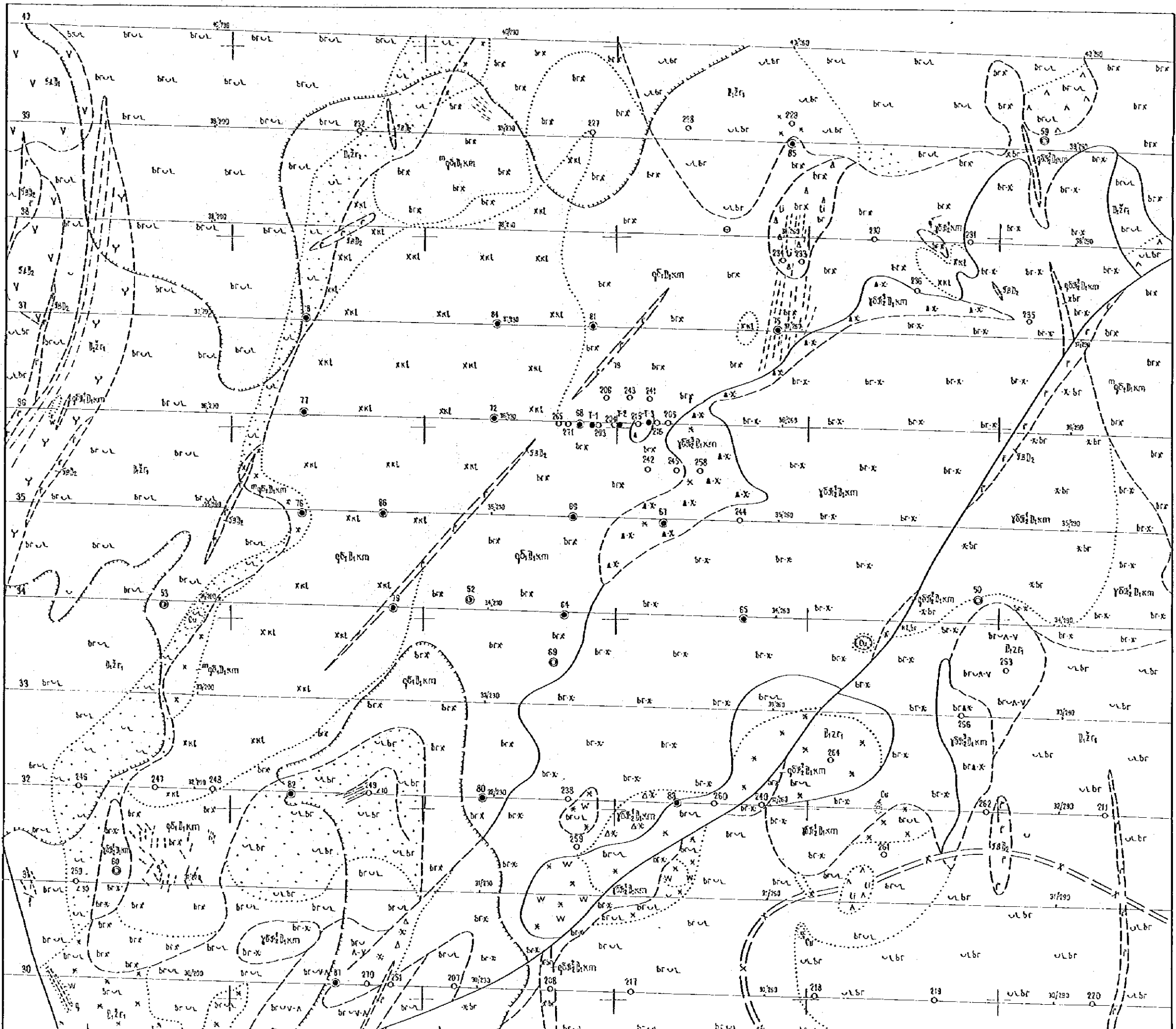


Plate III-2-4-2 Ore Blocks in the Samarsky Copper-Molybdenum Deposit (cross-section) (Scale 1:2,000)

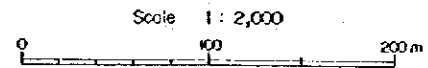
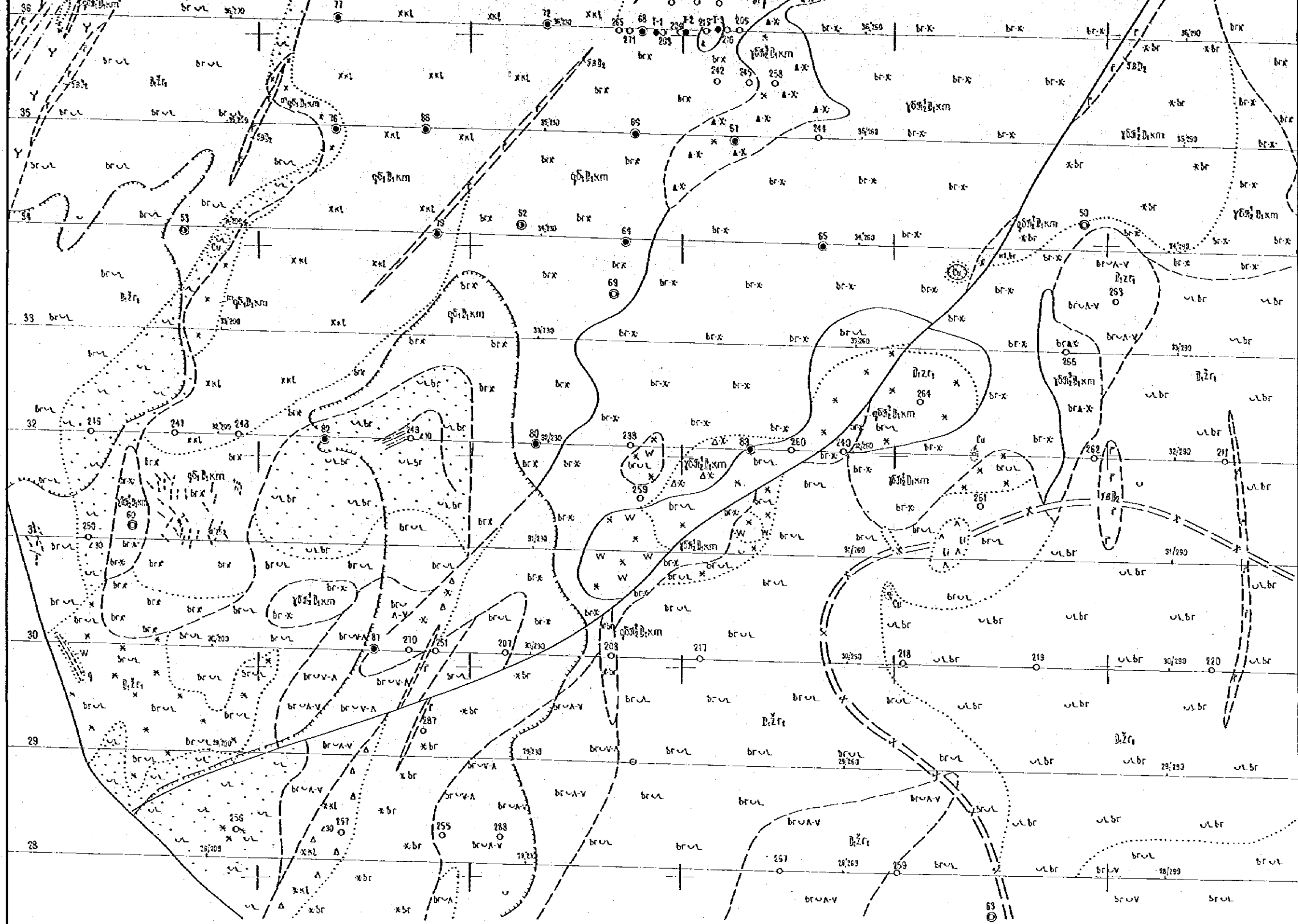
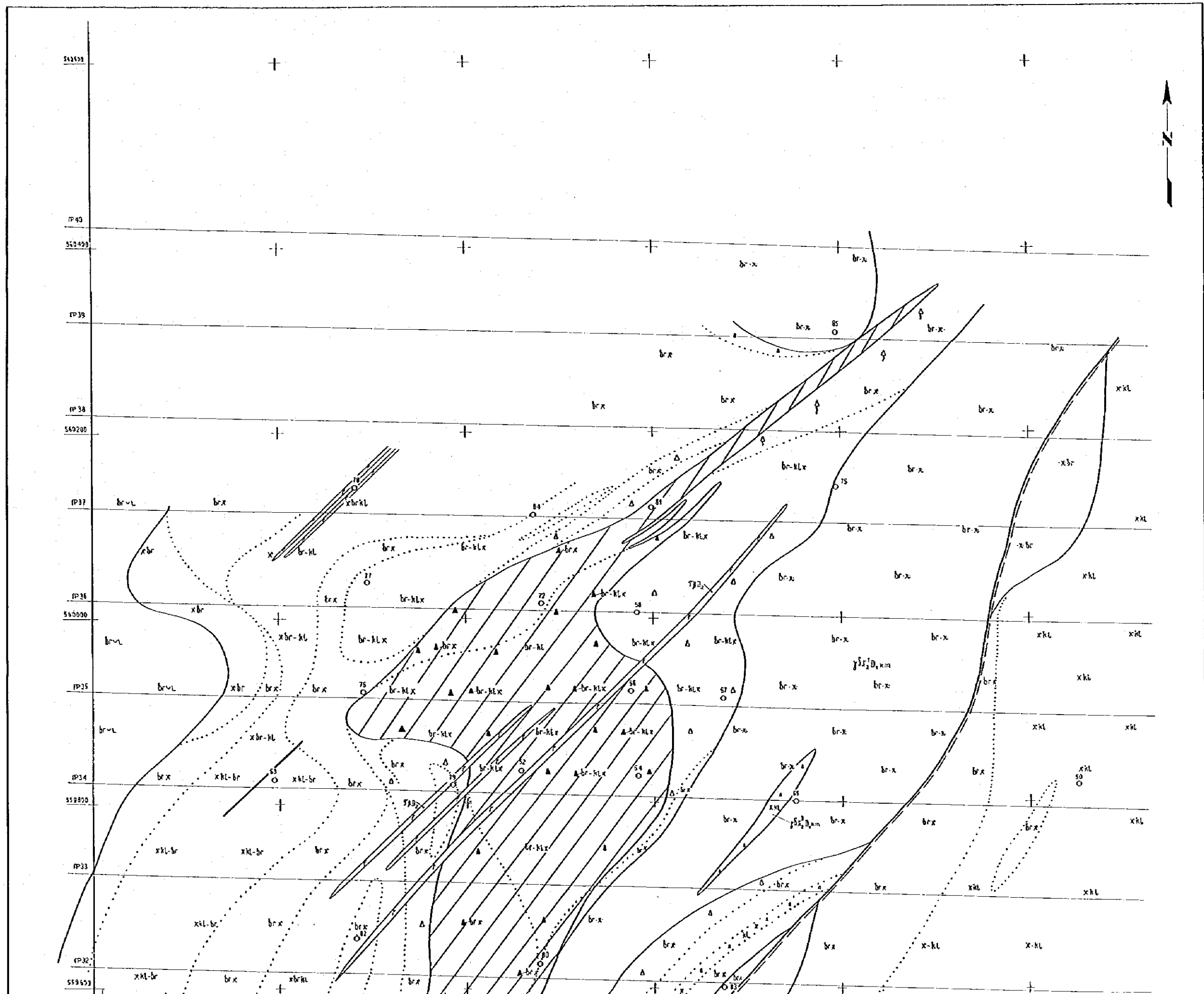



Plate III-2-4-3 Geological Map of the Samarsky Copper-Molybdenum Deposit with Drilling Location (Scale 1:2,000)

Originally Prepared by Karaganda Geological Exploration Expedition

III-2-4-3

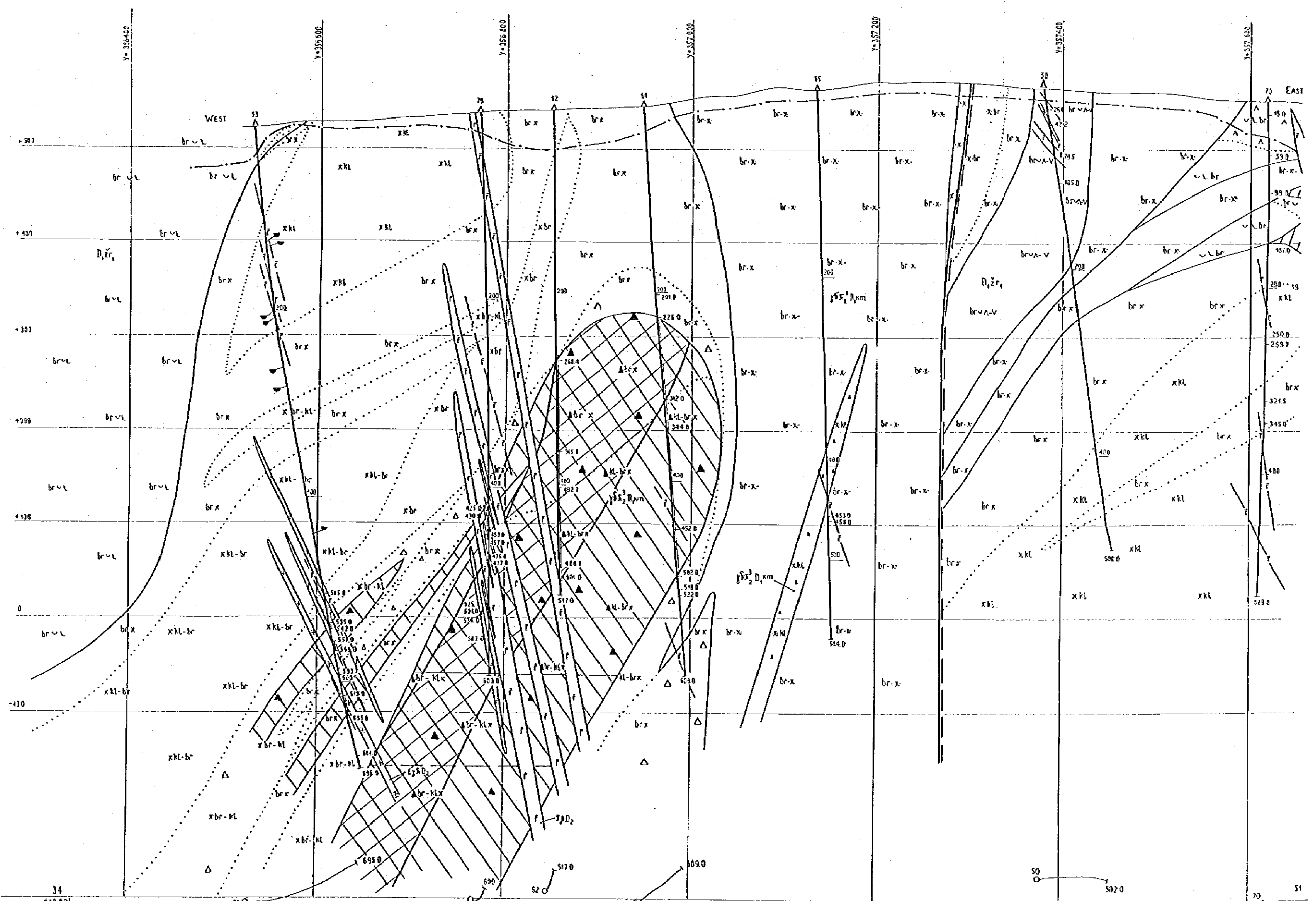






					Cu, %	Mo, %	Au, g/t	Ag, g/t
32	248.4	561.0	232.0	2.03	0.036	0.71	2.67	
	248.4	345.0	26.0	2.30	0.06%		2.25	
	492.7	406.7	84.0	2.59	0.044		3.52	
53	536.0	542.0	6.0	4.55	0.036	0.71	2.67	
	557.0	566.0	9.0	0.55	0.030	0.73	3.97	
	645.0	635.0	20.0	0.55	0.020	0.76	2.71	
64	228.0	582.0	276.0	1.02	0.002		1.01	
	228.0	342.0	88.0	1.85	0.003		0.85	
	344.0	502.0	158.0	0.69	0.002		0.63	
	344.0	452.0	108.0	0.76	0.002		0.73	
	470.0	502.0	32.0	0.77	0.003	0.30	0.50	
51	516.0	522.0	6.0	3.84	0.030	0.19	0.32	
	82.0	38.0	16.0	0.61	0.02	0.72	1.94	
	420.0	126.0	6.0	0.87	1.05	1.63	3.9	
	192.0	134.0	4.0	0.90	1.03	0.4	2.6	
	420.0	154.0	266.0	0.88	0.05	0.8	3.4	
79	425.0	434.0	5.0	3.56				
	453.0	457.0	4.0	0.75				
	475.0	562.0	87.0	2.54				

				Cu, %
53	505.0	536.0	31.0	0.24
	566.0	597.0	26.7	0.34
	635.0	681.0	46.0	0.27
50	78.0	42.2	16.2	0.44
	70.5	103.0	34.5	0.22
54	204.0	228.0	25.0	0.15
	502.0	603.0	107.0	0.33
51	75	52.0	44.5	0.18
	55.0	120.0	22.0	0.16
	194.0	254.0	60.0	0.27
65	453.0	458.0	5.0	0.26
70	15.0	53.0	44.0	0.20
	59.0	157.0	58.0	0.17
	250.0	259.0	9.0	0.23
	321.5	345.0	23.5	0.15
79	419.4	425.0	5.6	0.30
	433.0	438.0	5.0	0.28
	449.0	453.0	4.0	0.24
	457.0	475.0	18.0	0.15
	562.0	566.0	4.0	0.26



	1	2	3	4	5	6	7	8
52	248.4	551.0	232.6	2.03	0.193			2.64
	248.4	551.0	56.8	2.30	0.26			2.25
	402.7	487.7	84.0	2.55	0.34			3.52
51	536.0	542.0	6.8	4.55	0.23	0.71		2.17
	557.0	561.0	4.0	0.59	0.03	0.03		0.97
	615.0	635.0	20.0	0.55	0.02	0.16		2.71
64	228.0	582.0	276.0	0.02	0.02			0.04
	228.0	392.0	86.0	1.15	0.02			0.95
	344.0	582.0	153.0	0.69	0.02			0.63
	344.0	452.0	108.0	0.76	0.02			0.73
	470.0	582.0	32.0	0.77	0.02	0.34		0.50
51	518.0	522.0	4.0	0.84	0.03	0.13		0.32
	82.0	58.0	16.0	0.61	0.01	0.32		1.04
	420.0	426.0	6.0	0.87	0.05	0.33		3.5
	193.0	434.0	4.0	0.90	0.03	2.4		2.6
	420.0	434.0	34.0	0.88	0.03	0.8		2.4
70	425.0	430.0	5.0	0.56				
	453.0	457.0	4.0	0.75				
	475.0	562.0	87.0	2.54				

	1	2	3	4	Cu, %
53	505.0	536.0	31.0		0.24
	556.0	597.0	28.7		0.34
	635.0	687.0	48.0		0.27
59	25.0	42.2	18.2		0.41
	71.5	135.0	34.5		0.22
64	204.0	226.0	25.0		0.46
	592.0	609.0	187.0		0.33
56	75	52.0	44.5		0.48
	98.0	120.0	22.0		0.18
	194.0	254.0	69.0		0.27
65	453.0	458.0	5.0		0.24
70	15.0	59.0	44.0		0.20
	99.0	152.0	58.0		0.47
	250.0	259.0	9.0		0.23
	324.5	345.0	23.5		0.45
73	419.4	425.0	5.6		0.30
	430.0	438.0	8.0		0.28
	448.0	453.0	4.0		0.24
	457.0	475.0	18.0		0.15
	552.0	566.0	4.0		0.26

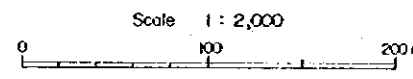
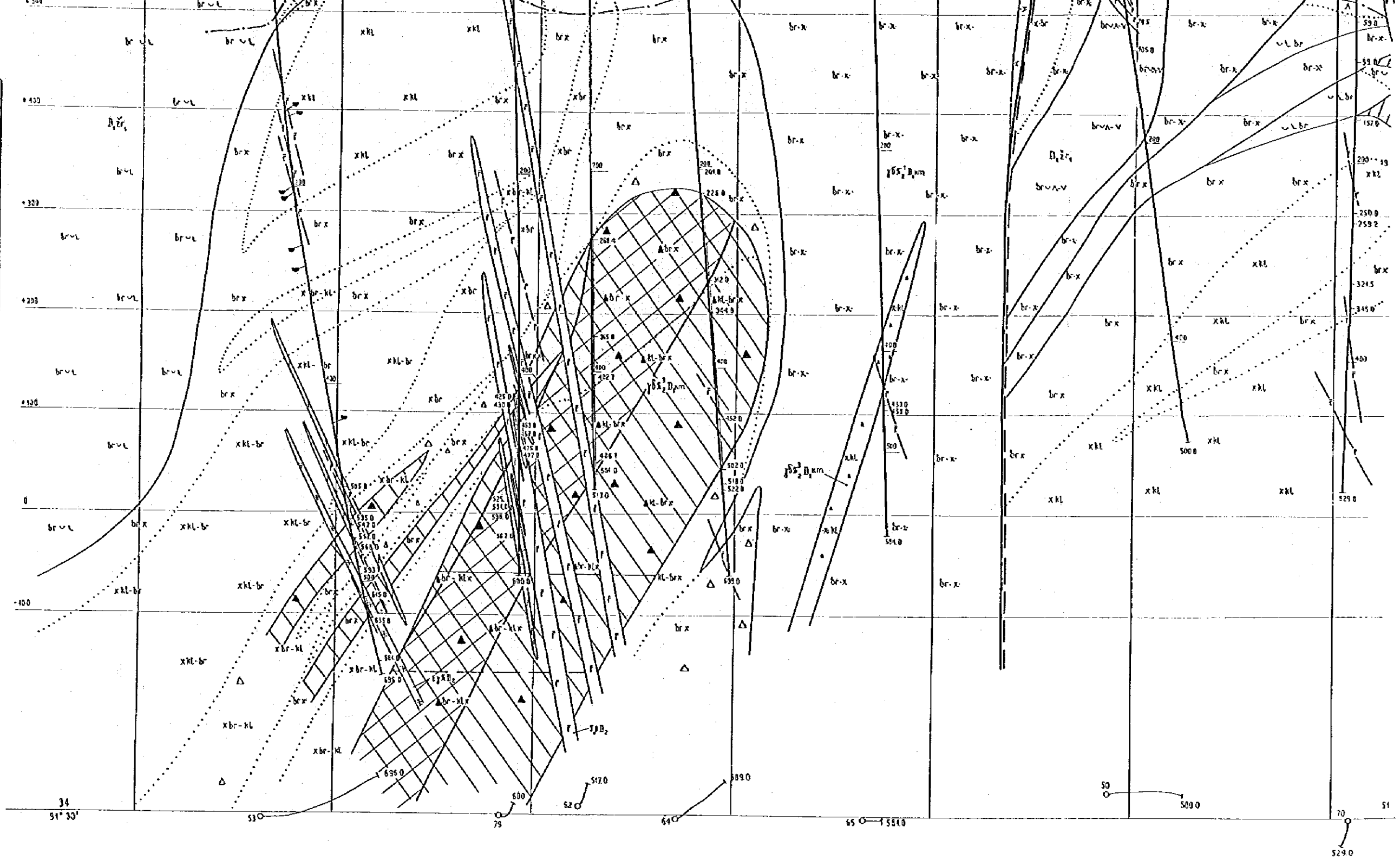


Plate III-2-4-5 Cross-Section of the Samarsky Copper-Molybdenum Deposit along the E-W Line 34 (Scale 1:2,000)

Originally Prepared by Karaganda Geological Exploration Expedition



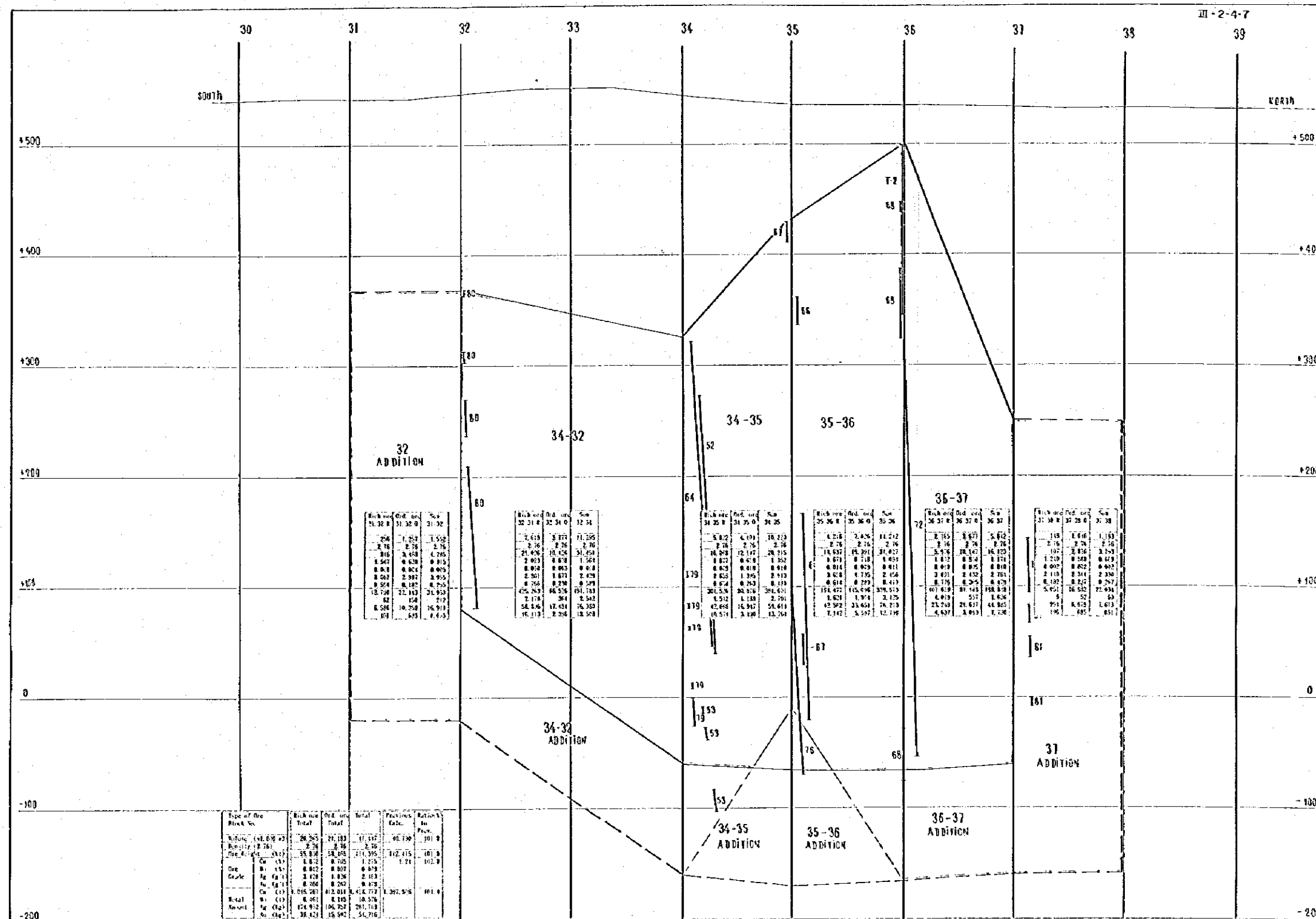
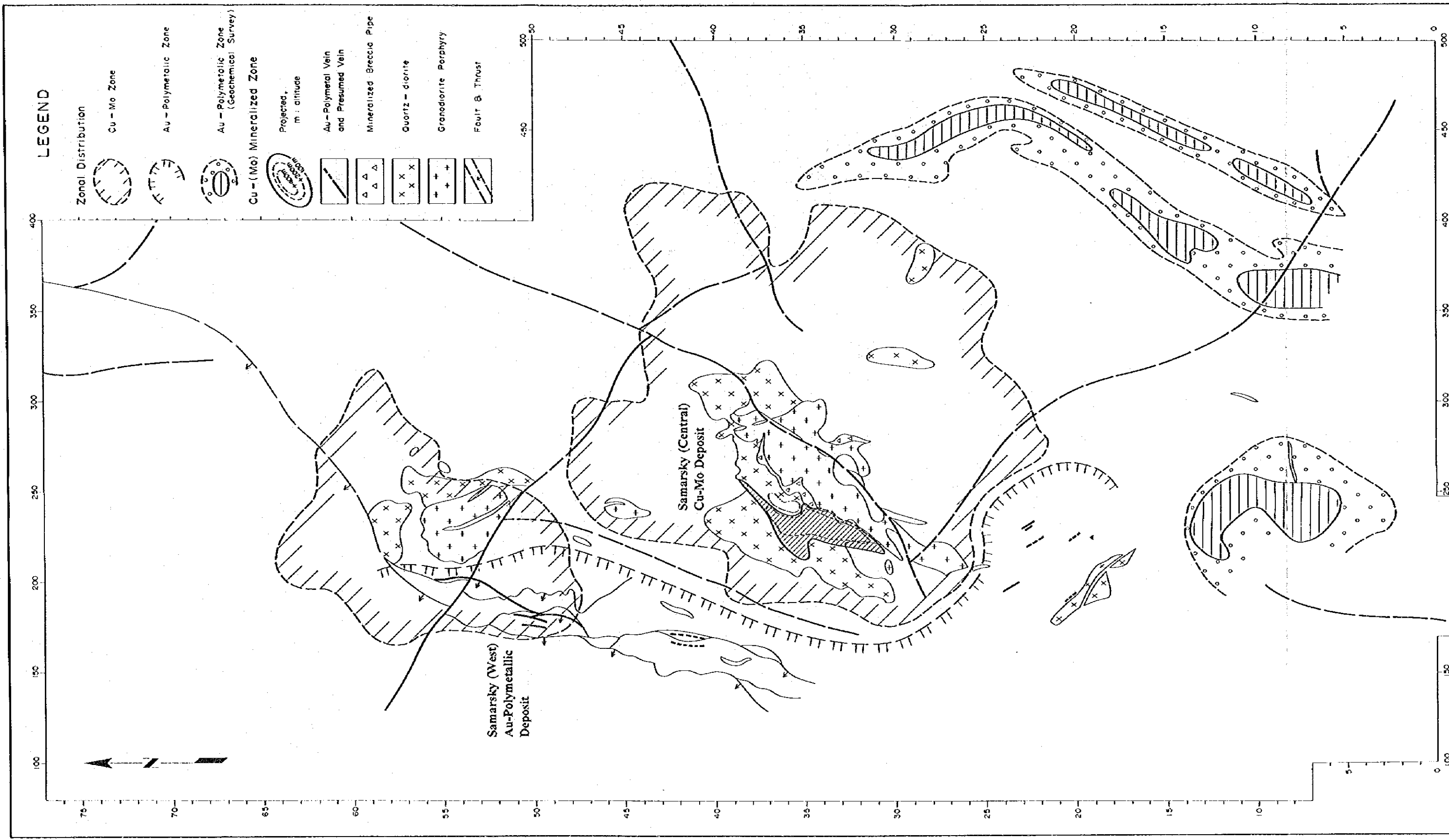



Plate III-2-4-7 Interpretation Map for Result of Ore Reserve Calculation  
of the Samarsky Copper - Molybdenum Deposit (Scale 1:2,000)



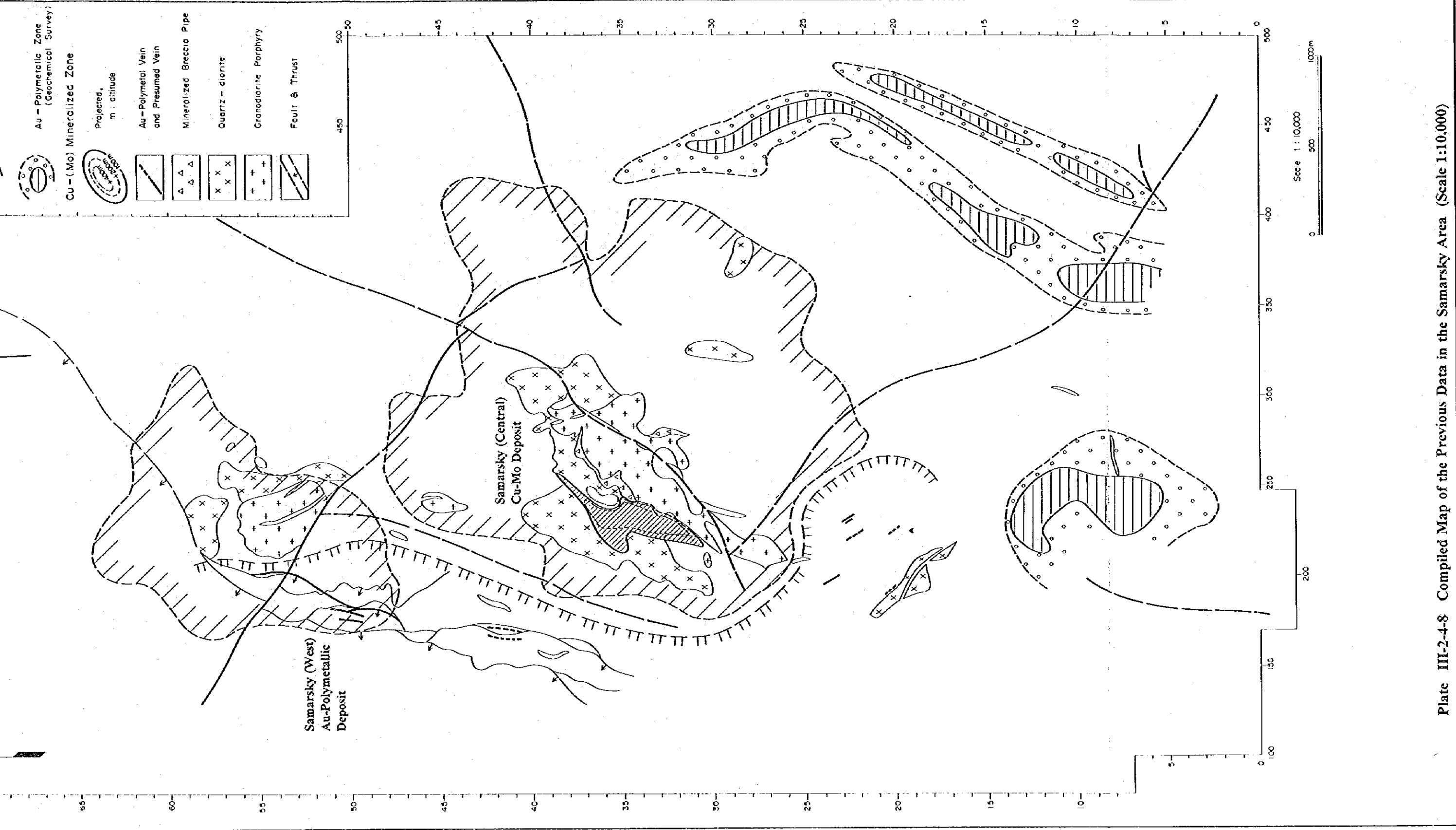


Plate III-2-4-8 Compiled Map of the Previous Data in the Samarsky Area (Scale 1:10,000)



Geochronological Scale				Horizons of Regional Stratigraphic Scheme											
Period	Epoch	Century	Time												
Permian	Early	Late			Bakanas										
					Karuz										
				Kyzyl											
Carboniferous	Early	Late		Balauda											
				Dainin											
				Yagovkin											
				Ishim											
				Rusakov											
				Kassin											
				Sinovin											
				Sulzher											
				Meysler											
				Devonian	Middle	Auliel.		May							
Hydant															
Tukhin															
Early	Em		Kazakh												
								Late	Sardzh		Akan				
												Early	Lunanzhai		

**Kotas (Maylyz) complex**  
Minor intrusions and dykes of granite porphyry (g1), rhyolite porphyry (r1), rhyodacite porphyry (r2)

**Manybay complex**  
Minor intrusions and dykes of sub-alkaline gabbro (g1), gabbro-diorite (g1r), diorite (d1)

Minor intrusions and dykes of quartz monzodiorite (qm), diorite (d), monzodiorite (m), diorite porphyry (dp), granodiorite (gd), granodiorite porphyry (gdp)

**Kuvshin-Brachy Syncline (Subzone of shallow sedimentation)**

**Astakhov Syncline (Subzone of abyssal sedimentation)**

**Devonian Volcanic Belt**

**Orogenic Volcanic - Tectonic Structures**

**Shiderin Depression**

**Devonian Formations:**  
 C1 krg Karagarda Formation - Sandstone, aleurolite, argillite, coaly aleurolite and argillite, beds of coal (>200m)  
 C1 o5 Asthyarik Formation - Sandstone, aleurolite, coaly argillite, beds of coal (400-500m)  
 C1 ox Alkudai Formation - Aleurolite, argillite, sandstone with interlayers of lutite (400m)  
 C1 xs Rusakov Formation - Limy aleurolite, marl, (50-100m)  
 C1 ksv Kassin Formation - Limestone (50-150m)  
 D3 sm Sinovin Formation - Limy aleurolite, marl (80-100m)  
 D3 sf Sulzher Formation - Marl, limy aleurolite limestone (100-200m)  
 D3 ms Meysler Formation - Limestone, limy sandstone, aleurolite, conglomerate (50-200m)

**Devonian Formations:**  
 D3 sf Sophin Formation - Speckled aleurolite, sandstone, gravelite, conglomerate (400-600m)  
 D2 kn Konyz Formation - Interlayering of red-coloured, rarely grey-coloured, tuffaceous, volcanogenic polymictic sandstone, gravelite aleurolite, conglomerate, rarely tuff of andesitic-dacite (>1000m)

**Kokkulukubin Complex**

**Middle Devonian Intrusive Formations:**  
 Fourth Phase - Granite porphyry (g4)  
 Third Phase - Dyke of diorite porphyry (d3), lamprophyry (l3)  
 Second Phase - Quartz monzodiorite (qm2), quartz monzodiorite (qm2), porphyrite (p2), beresite (br), silicified rock (sr)  
 First Phase - Monzodiorite (m1), porphyrite (p1), beresite (br), silicified and sericitized rock (s1, etc.)

**Middle Devonian Sub-Volcanic Formations:**  
 Rhyolite porphyries (r1, r2)

**Zhelandybulak Formation**

Upper Sub-Formation - Lava and tuff of trachyhyolite, rhyolite ignimbrite (>300m)  
 Lower Sub-Formation - Fine clastic and ash tuff of rhyolite composition (>400m)

**Karamendin Complex**

**Early Devonian Sub-Volcanic Formations:**  
 Third Phase - Dyke of granite porphyry (g3), microdiorite (md), lamprophyry (l3)  
 Second Phase - Granodiorites (gd), quartz monzodiorites (qm), beresite (br), silicified and sericitized rock (sr)  
 First Phase - Quartz diorite (qd), diorite (d), beresite (br), silicified rock (s)  
 Early Phase - Gabbro, trachybasalt norite

1 Andesitic Basalt (d1-x) 2 basalt (d1)  
 3 andesitic-dacite (d1-x) 4 andesite (d1)

**Zharsoy Formation**

Upper Sub-Formation - tuff sandstone, aleurolite, conglomerate, horizon of andesite, sandstone and gravelite (500-600m)  
 Middle Sub-Formation - breccia, tuff of moderately acid composition with interlayers of conglomerate, breccia, tuff of andesitic dacite, sandstone, aleurolite, gravelite, conglomerate (500m)  
 Lower Sub-Formation - pyroclastic tuff, rarely lava of porphyritic andesitic basalt, bands of pebble tuff, horizons of tuff of andesitic-dacite (>500m)

**Tuzdin Complex - Gabbro, gabbro-chinopyroxenite, labradorite Gabbro norite**

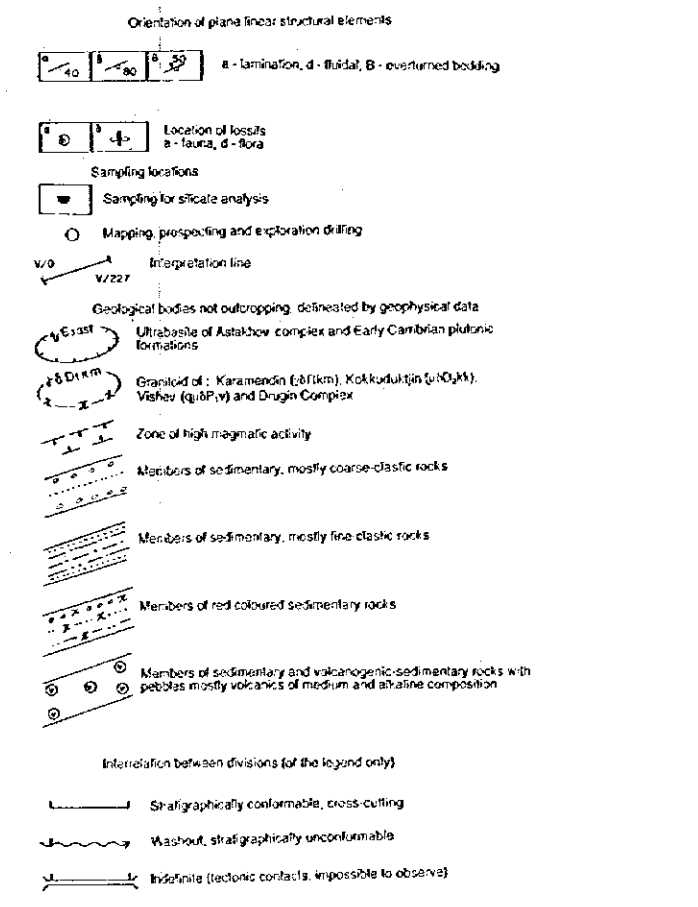
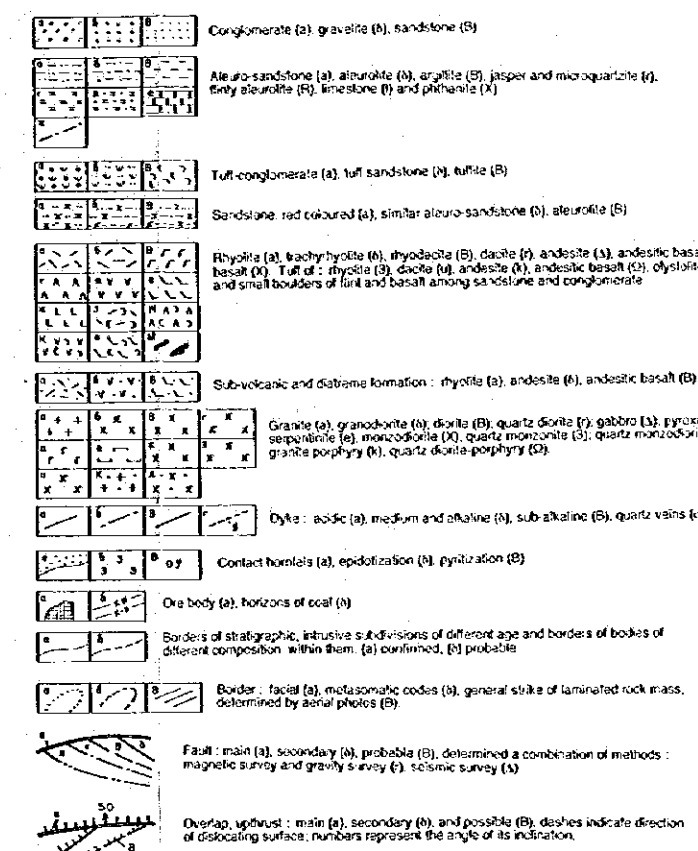
**Geosyncline Structures**

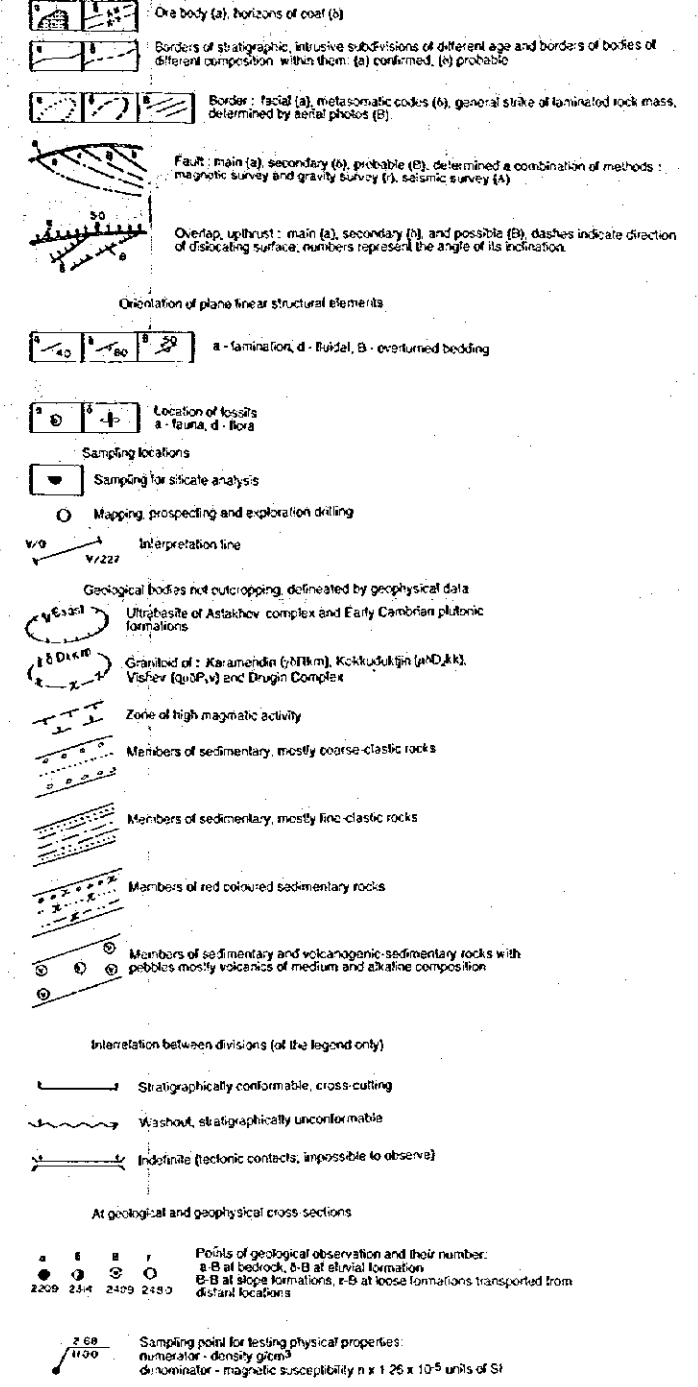
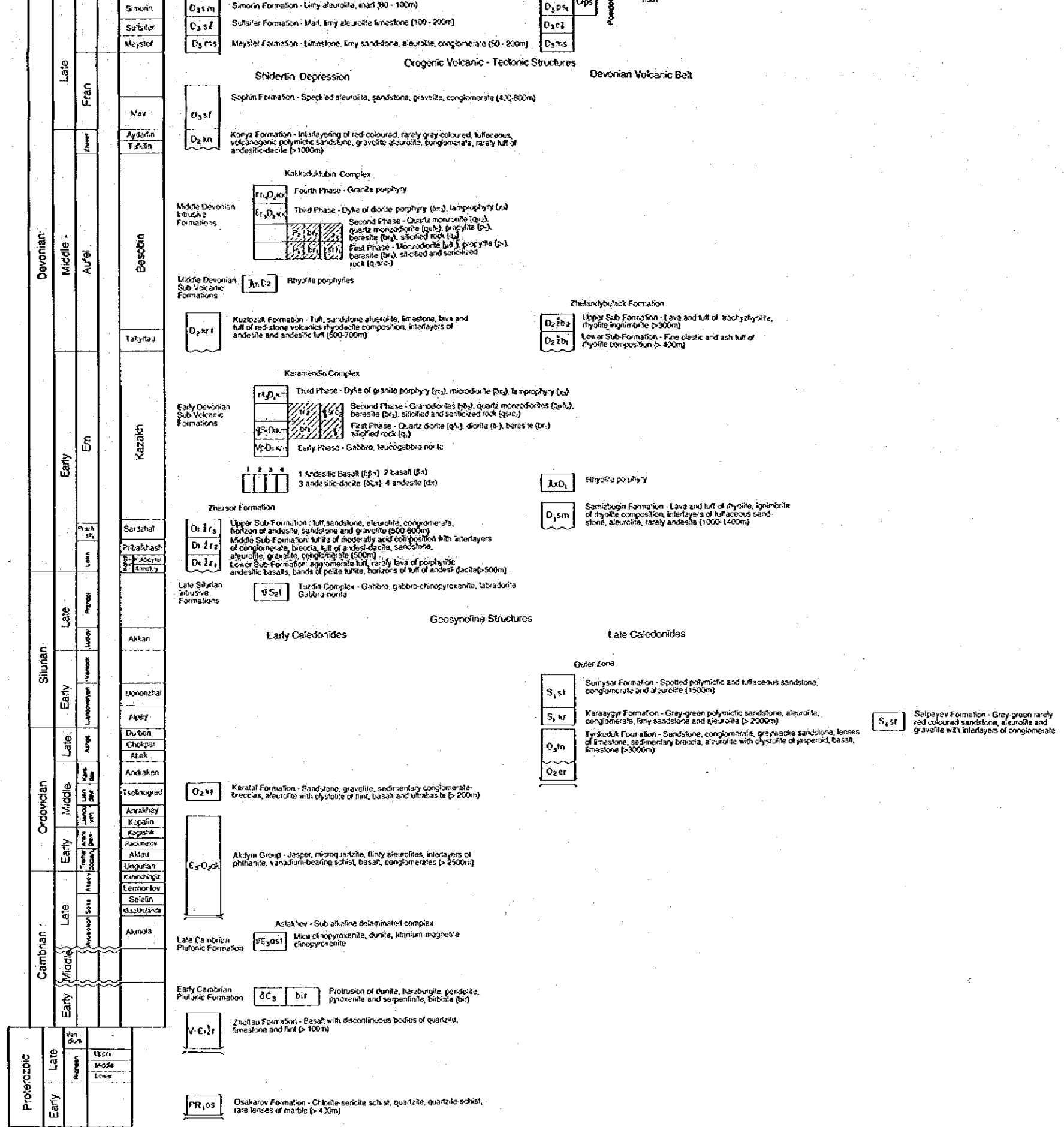
**Early Caledonides**

**Late Caledonides**

**Oymat Zone**

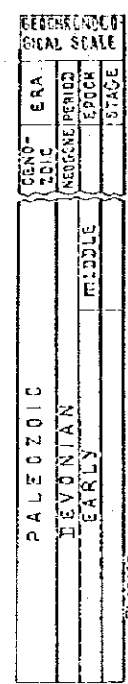
S1 st Sumysar Formation - Spotted polymictic and tuffaceous sandstone, conglomerate and aleurolite (1500m)  
 Karazov Formation - Grey-green polymictic sandstone, aleurolite, ...  
 Salpavay Formation - Grey-green rarely ...





Legend for Plates I-3-3-1 and III-2-3-1





**N** Speckled clay, clay with admixed pebbles, rock debris and gruss (in cross sections only)

**Middle Devonian Post-ore Dike and Subvolcanic Complex**

**D** Dikes and Minor bodies of subalkaline diabase and trachybasalt (rb),  
 subalkaline granite porphyry (rgr)  
 Minor body of trachyandesite (rd)

**KARAMENDIN INTRUSIVE COMPLEX**

**g** Intrusives and dikes additional to the second phase and associated metasomatic formations: granodiorite-porphyry (γδ<sup>α</sup>), quartz-diorite-porphyry biotite-plagioclase-like (qδ<sup>α</sup>), eruptive breccias of granodiorite-porphyry (γδ<sup>α</sup>), beresite (br), potassium feldspar facies (kl).

**qδ<sup>α</sup>** The first phase and associated metasomatic formations: quartz diorite, medium fine grained (qδ<sup>α</sup>), microdiorite and quartz-diorite-porphyry of exocontact facies (mqδ<sup>α</sup>), beresite (br), potassium feldspar facies (kl), propylite (P), secondary quartzite (vk).

**B<sub>1</sub> B<sub>2</sub>** Upper Subformation. Sandstone, aleurolite, gravelite, polymictic conglomerate with horizons of tuffite of acidic composition

**B<sub>1</sub> B<sub>1</sub>** Lower Subformation. Tuff and tefroid of andesite and andesitic basalt composition of different sizing

**a v v** Tuffite of acidic composition aleurolite and aleuropelite-like (a), trachyandesite (v).

**α γ δ** Tuff of andesitic basalt (α), tuff of mixed composition with prevailing fragments of dacite and andesite (γ), automagmatic breccia of granodiorite-porphyry fragments located at fluidal cement of the same composition (δ)

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Diabase, gabbro-diabase (α), quartz diorite medium fine grained, including quartz diorite porphyry in ore zone (β), quartz diorite fine grained (γ), quartz diorite porphyry (δ), granodiorite-porphyry (ε), granite porphyry (ζ), beresite derived from quartz diorite, accompanied by unevenly distributed potassium feldspar (κ).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Beresite derived from quartz diorite (α) beresite derived from tuff and tefroid of andesitic basalt (β), beresite (γ), (composition of initial rocks is shown by corresponding stripes), beresitized quartz diorite (δ), quartz diorite with potassium feldspar (λ), secondary quartzite (ε), hematization (ι).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Eruptive (intrusion) breccia-breccia with different composition of fragments or with different composition of fragments and cementing rocks (α), tectonic pre-ore breccia: fragments of one type are cemented by powdered material of the same composition (β), tourmalinization (γ), veinlet silicification, possible orientation of veinlets (δ), quartz veins (λ), limonitization (ε), local silicification (κ).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Border of subdivisions with different age: confirmed (α), possible (β); faults defined by a combination of features (γ), possible (δ), borders of formations of the same age and different composition (λ), borders of metasomatic facies (ε), horrelets facies (κ).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Contour of hypergenic veinlet copper mineralization (α), impregnation and veinlets of minerals: pyrite (β), galena (γ), sphalerite (δ), chalcopyrite (λ), bornite (ε), carbonate (κ), (δ- on geological columns only).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Border of depressions with Neogene sediments (α), shaft (β), open pit (γ).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Inclination of rock laminations, as measured in drill cores (α), in the area (β); inclination of the contact, as measured by graphical method (γ).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Drill and Drill No.: prospecting drill (α), mapping drill (β), hydrogeological drill (γ), CPSE (previous expedition) prospecting drill (δ), technological drill (ι), CPSE drill completed by Karaganda expedition in 1993 (ε).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** C<sub>2</sub> category reserves contour (α) outlined by prospecting drilling, (β) addition (on cross sections)

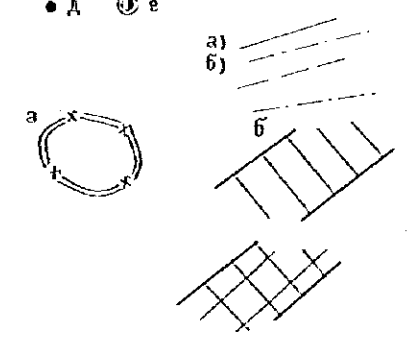
**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** P<sub>1</sub> resources contour (on geological map).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Oxidation zone border (on the cross sections)

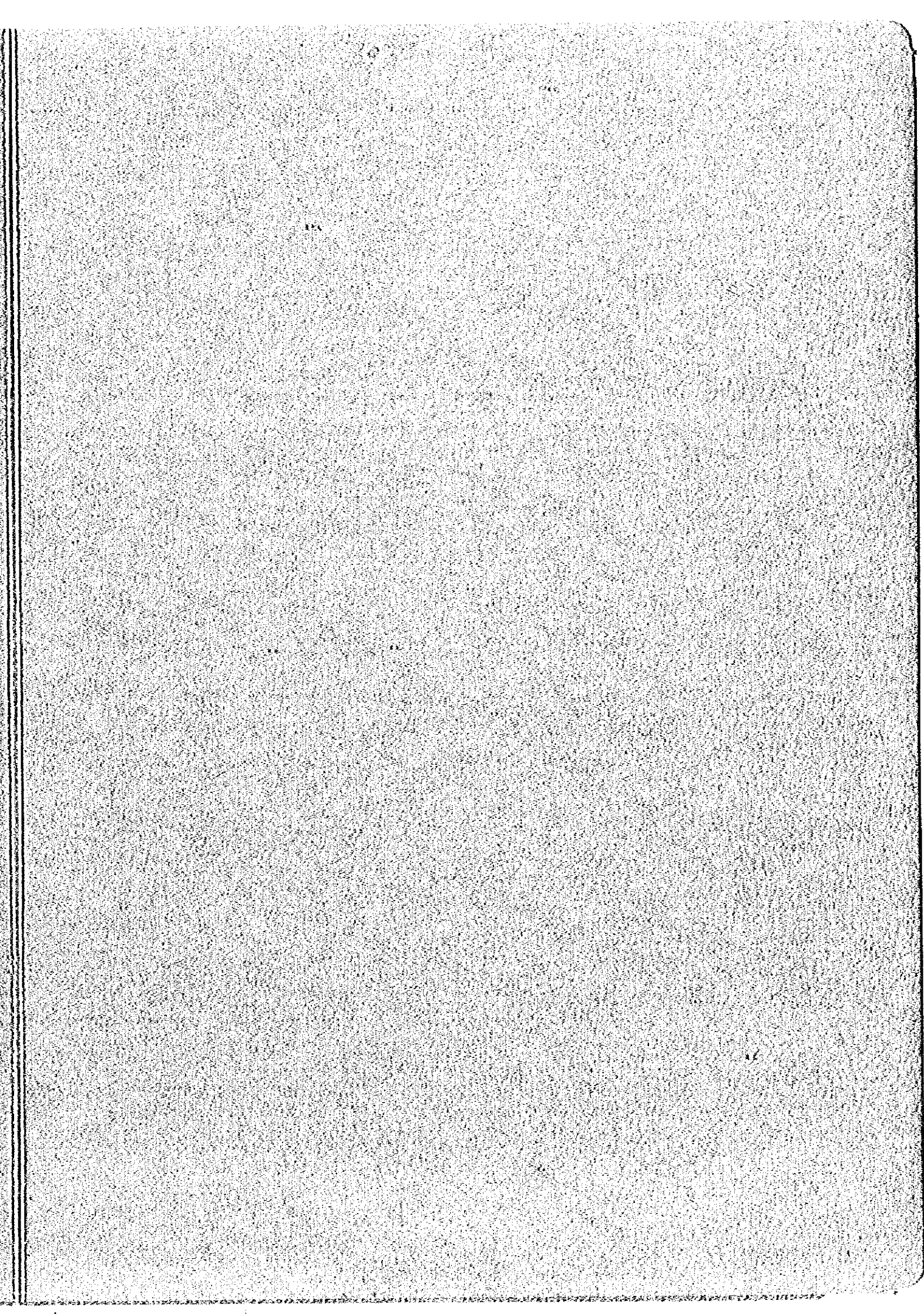
**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Contour of magnetic dome of quartz diorite at the depth of approx. 300 m as per drilling and prospecting data (α).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Contour of copper ore, suitable for operations (cut-off 0.5% Cu) (β).

**α β γ δ ε ζ η θ ι κ λ μ ν ο π ρ σ τ υ φ χ ψ ω** Contour of rich copper ore.



Legend for Plates III-2-3-4, III-2-4-3, III-2-4-4, III-2-4-5 and III-2-4-6





JICA