Chapter 2 Sautbay District

2-1 Geology and Ore Deposits in Sautbay District

The geology of Sautbay district is composed of sediments of the Karashakh Formation and the Kokpatas Formation -- both the Proterozoic. The Karashakh Formation forms the core of the Sautbay Anticline while the Kokpatas Formation forms its wings (Fig. II-1-1-1).

The Karashakh Formation, more than 500m in thickness, is made up of green rocks of volcanic origin and schists associated with, quartzite, dolomite and limestone.

The Kokpatas Formation has the base composed of dolomite and limestone beds, 100-150m thick, which intercalate sandstone, slate and quartzite and is overlain by thick sandstone accompanied by slate, quartzite, schist, limestone and dolomite. The upper part of the formation is composed of sandstone and slate rarely intercalating dolomite and chert. The total thickness of the Kokpatas Formation reaches 1,000m or more. The relationship between the formation and the underlying Karashakh Formation is conformable and presumed to be partially interfingering.

Stocks and dikes of granodiorite, aplite, diorite, lamprophyre, etc. of the Late Carboniferous ~ Early Permian intrude into the Proterozoic.

The folding system in the district is represented by the Sautbay Anticline. The Sautbay stock of granodiorite which controls the occurrence of skarn accompanied by tungsten mineralization is situated in the core of the fold.

The horizon including carbonate rocks which controls the ore correspond to the upper part of the Karashakh Formation or the lower part of the Kokpatas Formation, the extent of mineralization in the section reaching 500m.

The main type of the mineralization is a tungsten-bearing skarn deposits. Not merely the Sautbay deposit -- the major deposit in the district -- but the Burgut deposit and Saghinkan deposit situated in the surrounding areas fall within this type, as well.

1) Sautbay deposit

The Sautbay deposit is situated 15km east of the Kokpatas Expedition base. Since 1985, exploration and evaluation of this district, including the Burgut ore deposit, have been conducted while the full scale prospecting was commenced in 1993.

The deposit is situated in the contact zone east of the Sautbay granitic stock. The ore bodies are divided into two types: stratiform or stratiform-stockwork skarn ore bodies along carbonate rocks; and, stockwork ore bodies in granitic intrusive rocks, skarn, quartzite and hornfels.

11 skarn ore bodies of different thicknesses and lengths (Nos. 1-9, 20 and 21) have been confirmed by drilling (Fig. II-2-1-1).

The main skarn ore body (No.1 ore body) is stratiform, dipping 40-80° east. Its thickness varies from 1 to 50m, averaging 15m.

The main mineral components of the ore are hornblende-clinopyroxene skarn accompanied by scheelite and hornblende-clinopyroxene-pyrrhotite skarn. The ore usually contains quartz, pyrite, pyrrhotite and chalcopyrite. No oxide zone is visible.

Stockwork ore bodies develop mainly in granitic stocks, which consist of quartz and small quantities of feldspar in vein or veinlets. These veins occur intruding into skarn beds and contact metasomatite. The stockwork mineralization in granitic rocks at the Sautbay deposit is too weak to have a certain economic value.

The ongoing Uzbek exploration work is expected to continue till 1998. Ore reserve estimation and feasibility study on the development by open pit (up to 150m below the surface) and underground mining (up to 600m below the surface) were effected in 1993.

During the first fiscal year of this survey, the existing data regarding the Sautbay and Burgut deposits were collected, on the basis of which ore reserves were calculated with a computer to evaluate the deposits. The calculation indicates that, at a cutoff grade of 0.05% WO_3, the total ore reserves of the both deposits came to 25,885,000t, averaging WO_3 0.27% and Au 0.24g/t. Compared to the Sarydjoy Report elaborated by the Uzbek side, the calculation results are generally similar as far as the planned open pit area is concerned but a wide discrepancy is seen in the total ore reserves of the Sautbay and Burgut deposits (Table II-2-1-1).

Table II-2-1-1 Comparison of Ore Reserves Estimation Results by MMAJ(1995) and Sarydjoy Team(1993)(on the Whole Area Basis)

Area	Reported by	Reserves (t)	WO_3 (%)	Au (g/t)	WO_3 (t)	Au (kg)
Open pit of Sautbay deposit	Sarydjoy(1993)	2,606,250	0.38	0.16	9,960.5	411.4
	MMAJ(1995)	2,621,000	0.35	0.13	9,173.5	340.7
Sautbay,Burgut deposits	Sarydjoy(1993)	39,539,352	0.43	0.34	168,701.5	13,530.7
	MMAJ(1995)	25,885,000	0.27	0.24	70,631.7	6,335.1

2) Burgut deposit (W)

The Burgut deposit, 0.5km southeast of the Sautbay deposit, is situated at the contact zone of the granitic stock extending in the WNW-ESE direction (Fig. II-2-1-1). Gold and tungsten occur in skarn which develop selectively in siliceous-clastic sediments. It has been known by drilling that the mineralized zone extends 600m in strike and 340m in dip while the ore body is 2.1-13.8m thick.

Most part of the ore body is of clinopyroxene and clinopyroxene-garnet skarn, situated at various levels. The Nos. 10-19 ore bodies have been confirmed by drilling.

Ore reserves of the Burgut deposit was estimated in 1993, together with those of the Sautbay deposit. In the first fiscal year of this survey, the ore reserves of the both deposits were calculated.

The two deposts are currently under exploration by core drilling.

3) Saghinkan deposit(W)

The Saghinkan deposit is adjacent (1km west) to the Sautbay deposit (Fig. II-1-1-1). Presence of the Saghinkan deposit had been inferred in the course of the magnetic anomaly processing.

Mineralization is recognizable in sedimentary rocks mainly of the Karashakh Formation which is intruded by the Sautbay stock, between the depths of 110m and 400m (Fig. II-2-1-2). The surface portion is covered by Mesozoic-Cenozoic sediments of 30-50m in thickness.

14 skarn ore bodies have been confirmed, which are stratiform, almost conformable with the host rock. The deposit is 1-40m thick, continuing almost horizontally over

460-960m.

The Uzbek exploration in the district has been completed, evaluation of which was concluded toward the end of 1994. Ore reserves were calculated under the categories of C_2 and P_1. The deposit may be classified into a medium size deposit.

Category of reserves	Ore reserves (mil.t)	Grade WO_3(%)	Contents WO_3(thou.t)
C_2	9.62	0.35	33.32
P_1	3.09	0.23	7.15
C_2+P_1	12.71	0.32	40.47

Cut off grade : WO_3=0.10%

(after V.A.Aleksashechkin;1993)

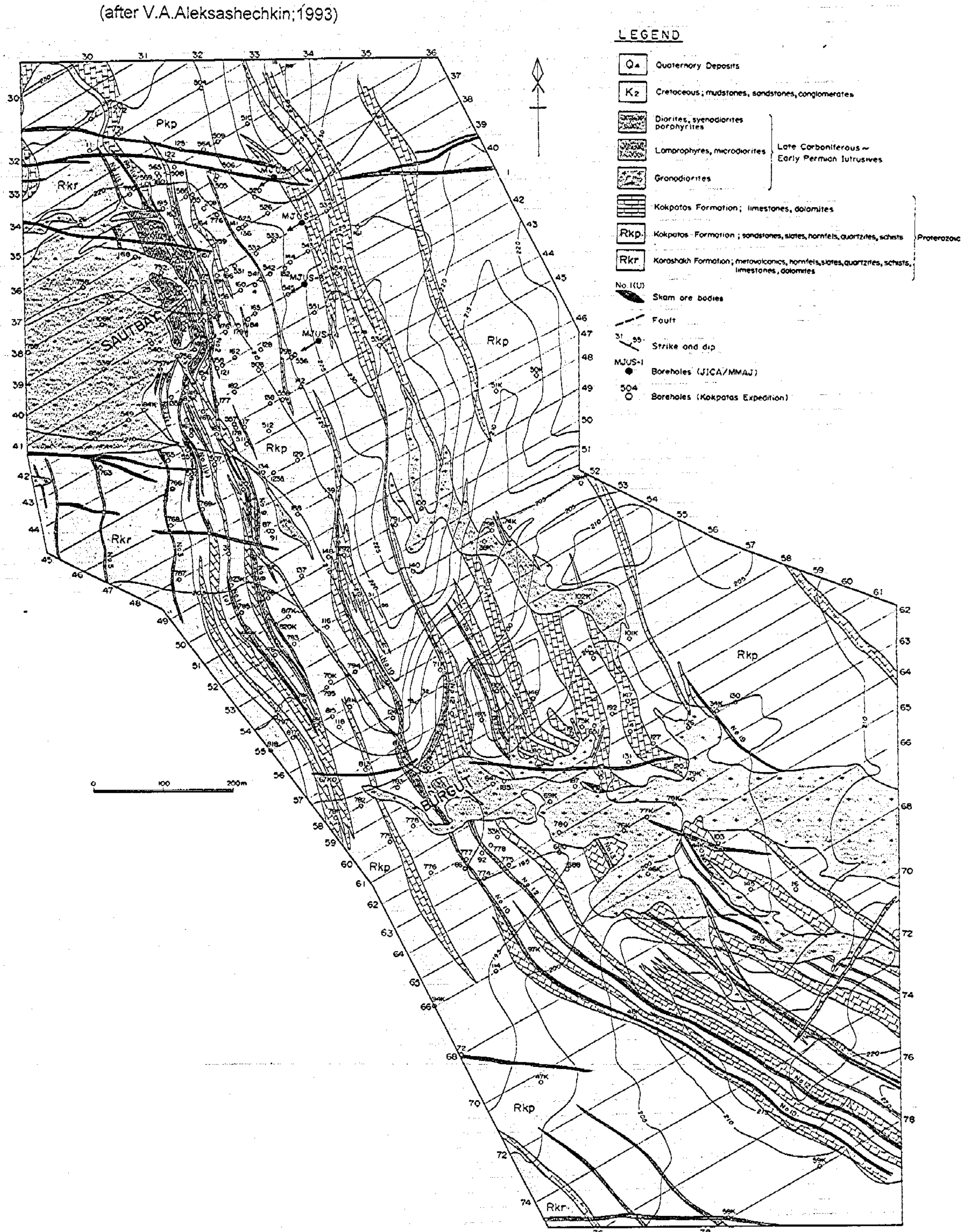


Fig. II−2−1−1 Geological Map of the Sautby District

(after T.P.Radajeva,H.B.Khan,O.G.Kim;1994)

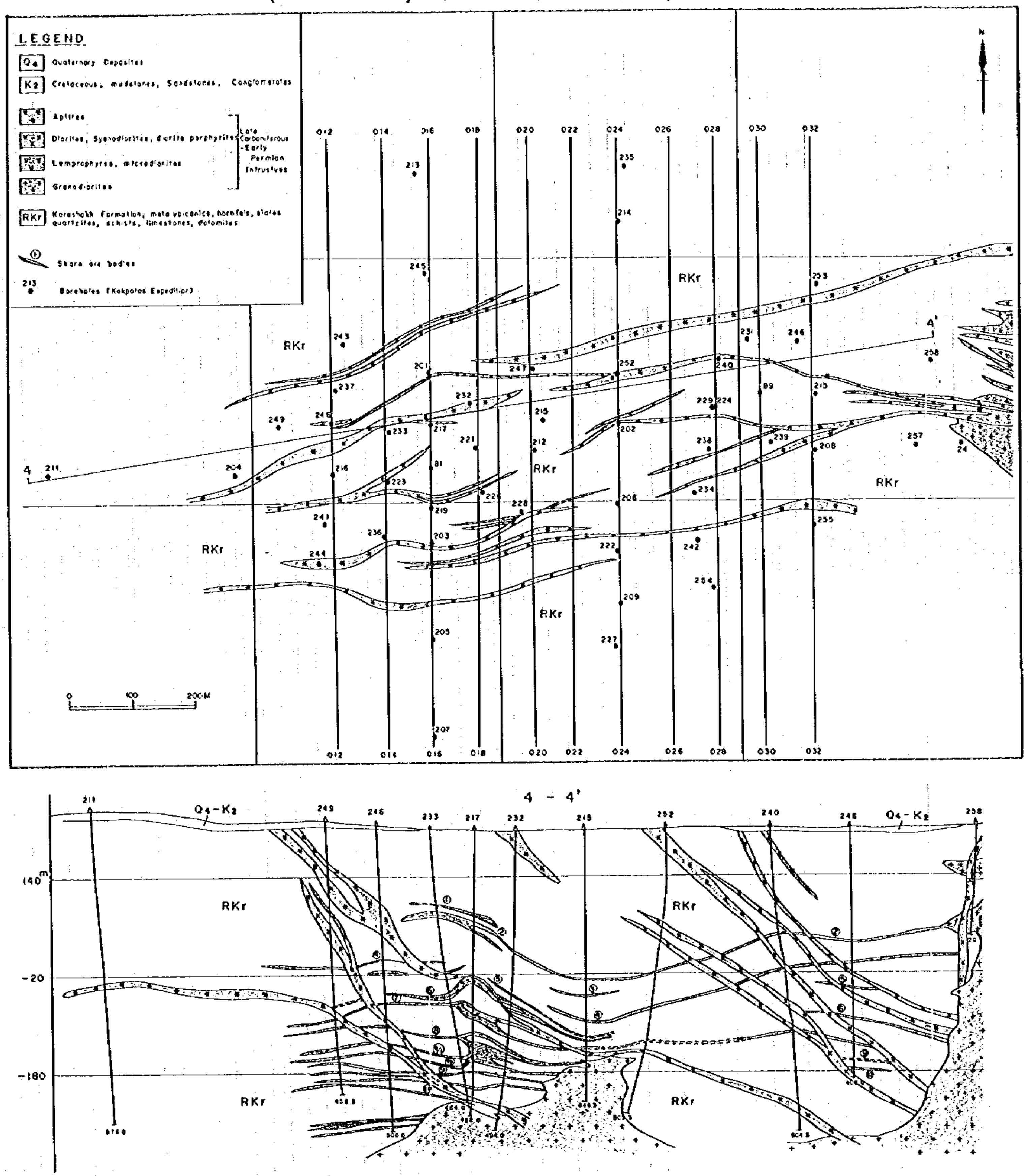


Fig. II-2-1-2 Schematic Geological Map and Cross Section of the Saghinkan Deposit

2-2 Ore Reserve Estimation of Saghinkan Deposit

2-2-1 Purpose

The purpose of the ore reserve estimation is to re-evaluate Saghinkan deposit based on the data collected last year, and to provide useful information for further investigation planning.

2-2-2 Estimation Methodology

1) Software

MicroLYNX Plus of Lynx Geosystem Inc. in Canada, was used in the reserve estimation of Saghinkan deposit.

MicroLYNX is a project-oriented system designed to aid geologists and engineers in exploration, mine evaluation and mine planning, and is widely used around the world. The main functions or features are as follows:

① A project-oriented program to manage more than one project in a computer system.

② Entry of drillhole data including assay and geological information, editing where necessary.

③ Graphics display and plotting of drillhole data in section and plan to assist in the interpretation of the spatial nature of the mineralization.

④ Statistical and geostatistical analyses of grade variables to determine the distribution and variability of grade within the deposit.

⑤ Definition of geology, in section or plan, for control of ore reserve modelling.

⑥ Generation of ore reserve models, and interpolation of grades of target components

⑦ Calculation of geological reserves based on the interpolated grades.

⑧ Visual display and plotting of the model in section or plan to assist in the mining design.

⑨ Designing of open pit or underground tunnel, calculation of mineable reserves.

⑩ Updating the reserve models to reflect the more abundant data available during mining.

2) Estimation area

Saghinkan Deposit is about 1km west of Sautbay deposit whose reserve was estimated in 1994. The coordinate system created by Uzbekistan side was used in our calculation. Fig. II-2-2-1 shows the ore reserve calculation area of 1,100m by 1,100m, from 84,900 to 86,000m along Axis X and from 70,300 to 71,400m along Axis Y respectively in the coordinate system.

3) Assay data

Based on the information collected, Core drilling of 3,456m and trenching survey of 1,152m^3 were carried out in Saghinkan deposit by 1994. The depth of drillholes are up to 400~500m below the surface. 49 holes were used in our reserve estimation (Fig. II-2-2-1). Samples for analysis have been collected from the cores at the interval of below 2m.

WO_3 and Au are primary components of the deposits, and were selected as the estimation targets. There are very few or no data available for other components. The sample numbers for WO_3 and Au are 5,186 and 5,819 respectively.

4) Definition of ore zones

According to the report of Kokpatas Expedition, 18 ore bodies have been identified in Saghinkan deposit.

As to the definition of ore zones, 9 geologic sections attached in the report were adopted with few correction on them. The intervals between sections are 80~160m. The ranges of a section in positive and negative directions, within which geologic interpretation will be considered to be the same as that of the section, were considered to be equal to halves of the distances between the section and adjacent sections in both directions respectively. Individual geologic codes were assigned to all of the ore bodies for identification.

5) Variogram

All of the samples should have the same size (length in this case) in geostatistical analysis. Therefore the assay data were composited before the calculation of variograms. Compositing is a procedure in which sample assay data are combined by computing a weighted average over longer intervals to provide a smaller number of data with greater length for use in reserve esitmation. Compositing is usually a length-weighted average.

The length of composites used in our calculation is 2.5m, and the compositing process is as follows: ① assigning geologic codes to assay data based on the geologic cross sections and their ranges, ② computing composites by length-weighted average method according to the geologic codes.

The number of analysis data available is very small. It is impossible to calculate variograms on individual ore body basis. Therefore, We tried to analyze geostatistically all of the data within orebodies together to examine the charateristics of grade distributions in 3-dimensional space.

Although the shapes of orebodies are different, most of them are in the shape of plates on the whole, striking NW-SE and dipping north gently. An new axis system for ore bodies was defined for further explaination as shown in Fig. II-2-2-2.

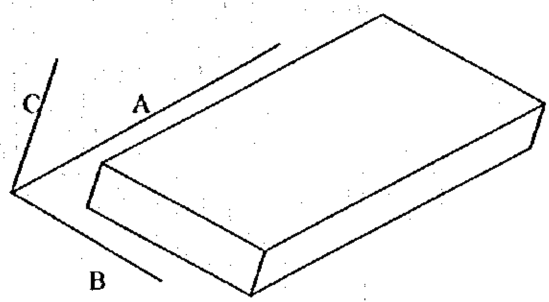


Fig. II-2-2-2 Definition of 3 Axes for Ore Bodies

Axis A: along the strike of ore bodies, NW-SE

Axis B: dip of ore bodies, -15° to the horizontal plane

Axis C: vertical to the plates of ore bodies, +75° to the horizontal plane

Distributions of variables in geological units(for example, Au grade in a deposit) in nature show various characteristics. Some of them are isotropic, others are anisotropic. Anisotropy is expressed geostatistically by the existing of different variograms in different directions. Even the same data set will produce different variograms according to the computing conditions(distance between pairs of samples, angles within which pairs of samples will be found, etc.). Therefore, while doing variogram analysis, it is very important to change conditions to compute various variograms, and then select most typical ones from them.

Many variograms were calculated for Saghinkan deposit. No meaningful variograms , however, were obtained, perhaps due to the bad continuity of orebodies and the limited number of the data. Figs. II-2-2-3 thru II-2-2-8 show several variograms of WO_3 and Au.

6) 3-D block model

In order to estimate the grades of WO_3 and Au in the deposit, a 3-dimensional block model was created. The model covers an area shown in Table II-2-2-1. 10m was adopted as the block size in the X, Y, Z directions. Most of the ore bodies, however, are very thin, and a block of 10x10x10(m) is too large to present the ore bodies. Therefore, The primary block was subdivided into smaller ones. The size of a subblock is 5x1x1(m) along X, Y, Z directions respectively as shown in Table II-2-2-1.

Table II-2-2-1 Attributes of the 3-D Block Model

Direction	Minimum	Maximun	Range (m)	Block size (m)	Block number	Subblock size(m)
Axis X	84900	86000	1100	10	110	5
Axis Y	70300	71400	1100	10	110	1
Axis Z	-350	240	590	10	59	1

7) Kriging interpolation

Kriging interpolation is a geostatistical estimation procedure which uses limited data to estimate grades of components within a block or whole deposit by minimizing the estimation error(Kriging error) based on the geostatistical characteristic of the components in the deposit. In another word, the grade estimated by Kringing interpolation method is most close to the "true value" in the deposit.

Kriging interpolation is a process that relies on the development of geostatistical analysis, variogram. In this case, no meaningful variograms were obtained for both WO_3 and Au. It is impossible to estimate ore reserve by Kriging interpolation without variogram parameters. However, Saghinkan deposit is situated very close to Sautbay deposit, and since the origins of the two deposits can be considered to be similar, it is possible to apply the variogram parameters of Sautbay deposit to the interpolations of Saghinkan deposit.

Therefore, the variogram parameters of Sautbay deposit were used in the estimation of Saghinkan deposit. It is assumed that the 3 axes A,B,C defined in Sautbay deposit correspond to the 3 axes A,B,C shown in Fig.II-2-2-2. The same search distances as those of Sautbay deposit were adopted, that is, 100m along Axes A and B, 20m along Axis C for WO_3, and 130m along Axes A and B, 20m along Axis C for Au.

In addition, the interpolation was controlled by geology, that is, only the data which belong to the same ore body were used in the interpolation of the block.

Figs. II-2-2-9 thru II-2-2-16 show the estimated grade distributions of WO_3 and Au in some sections and plans.

8) Summarization of reserves

The reserves and average grades in case of cutoff grades at 0.05, 0.08, 0.1, 0.2, 0.3, 0.4, 0.5% WO_3, were calculated from the gades of blocks interpolated by the Kriging method.

2-2-3 Estimation Result

Table II-2-2-2 shows the estimation result of Saghinkan deposit by the method described above.

The total reserve of Saghinkan deposit is 16,320 thou.tons by the cutoff grade of 0.05%(WO_3). The average grade of WO_3 is 0.24%, and the WO_3 content is about 40 thou.tons. On the other hand, the average grade of Au is only 0.02g/t, too low to evaluate.

Table II-2-2-2 Ore Reserve Estimation Result of Saghinkan Deposit

Cutoff (WO3%)	Reserves (t)	WO3 (%)	Au (g/t)	WO3 (t)	Au (kg)
0.05	16,320,000	0.24	0.02	39,660	363
0.08	15,170,000	0.26	0.02	38,900	317
0.10	13,944,000	0.27	0.02	37,830	304
0.20	6,963,000	0.40	0.02	27,800	150
0.30	3,775,000	0.53	0.03	20,090	99
0.40	2,325,000	0.65	0.03	15,160	76
0.50	1,665,000	0.73	0.03	12,200	53

Table II-2-2-3 shows the comparison of ore reserve estimation results by MMAJ and Kokpatas Expedition on individual ore body basis. The cutoff grade is 0.1%WO_3. Kokpatas Expedition reported a total reserve of 12,710 thou.tons with average grade of 0.32%, and WO_3 content of about 40 thou.tons, but we estimated the reserve as 13,944 thou.tons with average grade of 0.27% and WO_3 content of about 38 thou.tons.

The following difference might be considered as the primary reason why the results are different. As described previously, geologic sections attached in the report of Kokpatas Expedition were used in the definition of ore zones in our calculation. Kokpatas Expedition method excluded ore bodies from the calculation which are beyond about 50m from data point in the case of Category C_2. In Kriging interpolation, blocks, whose average grades need to be interpolated, are limited by search distances. In this case, the search distances for WO_3 along Axes A and B were 100m, longer than that of Kokpatas Expedition, which produced a larger reserve. Since blocks near data points usually have relatively high grades, the average grade estimated by Kokpatas Expedition is higher than that we estimatedd on the whole.

Table II-2-2-3 Comparison of Ore Reserve Estimation Results by MMAJ(1996) and Kokpatas Expedition(1994) (on Individual Ore Body Basis)

Ore body	MMAJ(1996)				Kokpatas Expedition(1994)			
	Reserves		WO3	WO3	Reserves		WO3	WO3
	(t)	(%)	(%)	(t)	(t)	(%)	(%)	(t)
1	790,000	5.7	0.24	1,890	1,470,000	11.6	0.21	3,120
2	2,079,000	14.9	0.21	4,360	2,180,000	17.2	0.23	4,950
3	1,033,000	7.4	0.37	3,850	790,000	6.2	0.55	4,340
4	1,760,000	12.6	0.38	6,610	1,370,000	10.8	0.40	5,490
5	517,000	3.7	0.16	850	470,000	3.7	0.23	1,090
6	2,508,000	18.0	0.21	5,200	1,510,000	11.9	0.28	4,260
7	2,257,000	16.2	0.35	7,970	2,010,000	15.8	0.45	9,080
8	1,681,000	12.1	0.20	3,380	1,540,000	12.1	0.28	4,370
8-1	262,000	1.9	0.42	1,090	180,000	1.4	0.36	650
8-2	156,000	1.1	0.22	340	100,000	0.8	0.29	290
8-3	54,000	0.4	0.50	270	30,000	0.2	0.57	170
9	448,000	3.2	0.26	1,170	330,000	2.6	0.25	810
10	215,000	1.5	0.18	380	170,000	1.3	0.21	350
11	66,000	0.5	0.52	340	140,000	1.1	0.28	390
12	57,000	0.4	0.11	60	200,000	1.6	0.32	640
13	58,000	0.4	0.12	70	150,000	1.2	0.12	180
14	0	0.0	0.00	0	70,000	0.6	0.41	290
Total	13,944,000	100.0	0.27	37,830	12,710,000	100.0	0.32	40,470

The brief summary of the ore reserve esitmation result of Saghinkan deposit is that although the reserve is more, and the average grade is lower than those of Kokpatas Expedition, this is due to the difference in the calculation range, and the two results can be considered to be basically the same.

2-2-4 Conclusive summary and considerations

Saghinkan deposit was re-evaluated by using the data collected last year.

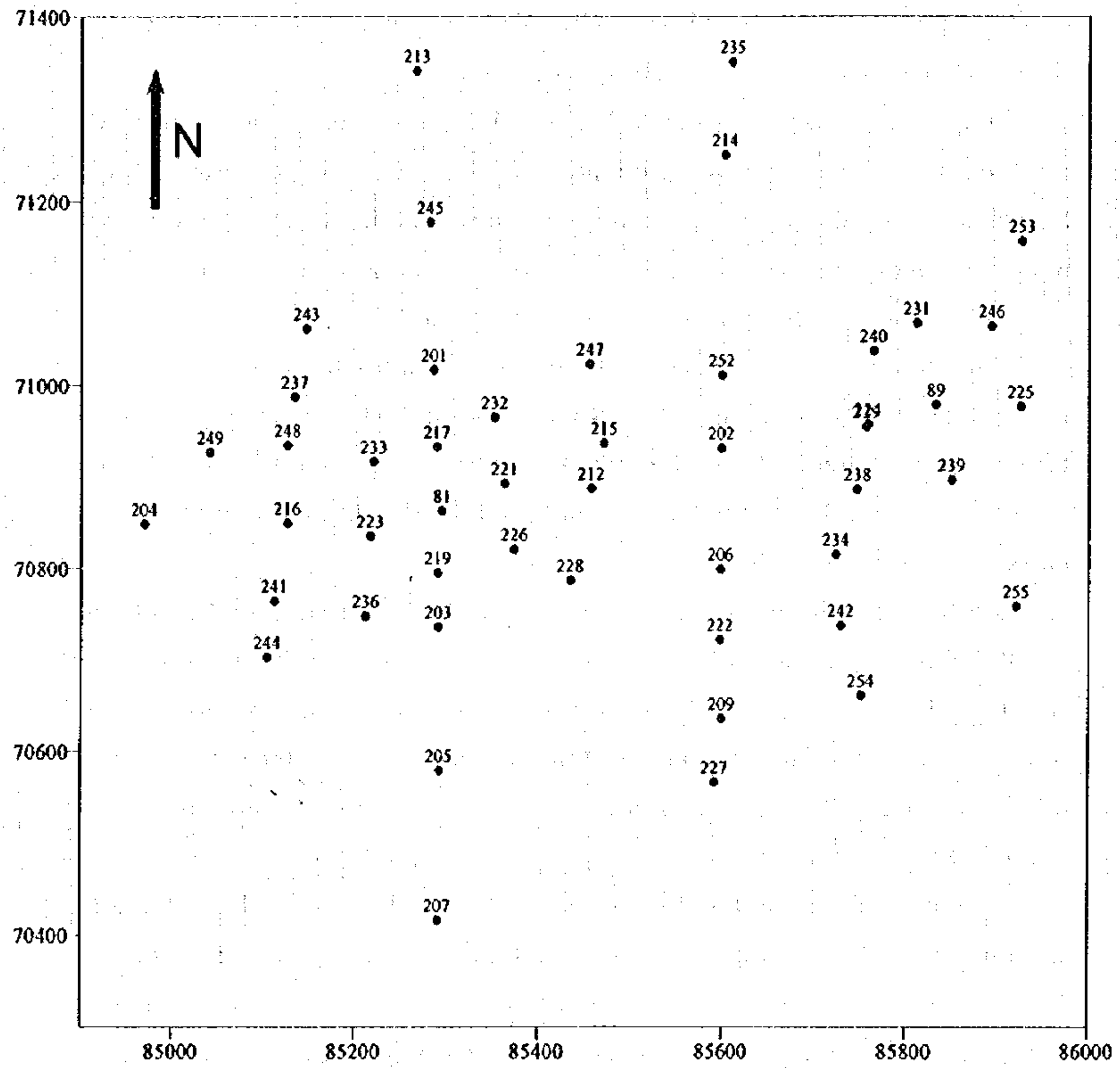
The analysis data of drilling cores drilled by 1994 were used in the estimation, and the target components are WO_3 and Au. Geological sections attached to the report of Kokpatas Expedition were used in ore body definition.

In order to get some information about the characteristics of the distribution in 3-D space, the data were analyzed geostatistically. No reasonable variograms were obtained. Saghinkan deposit, however, is situated very close to Sautbay deposit, and since the origins of the two deposits can be considered to be similar, it is possible to apply the variogram parameters of Sautbay deposit to the interpolations of Saghinkan deposit.

Therefore, reserve of Saghinkan deposit was estimated by Kriging interpolation method using variogram parameters of Sautbay deposit. The total reserve is 16,320 thou.tons by the cutoff grade of 0.05%(WO_3). The average grade of WO_3 is 0.24%, and the WO_3 content is about 40 thou.tons. On the other hand, the average grade of Au is only 0.02g/t, too low to evaluate.

Kokpatas Expedition reported a total reserve of 12,710 thou.tons (by the cutoff grade of 0.1%WO_3) with average grade of 0.32%, and WO_3 content of about 40 thou.tons , but we estimated the reserve as 13,944 thou.tons (by the same cutoff grade) with average grade of 0.27% and WO_3 content of about 38 thou.tons. This is due to the difference in the calculation ranges. The result we obtained can be considered to be basically the same as that of Kokpatas Expedition.

The ore grade of the skarn type ore body which has been mined since 1980 in the western countries (USA, Canada, Australia, South Korea, Turkey and etc.) is more than WO_3 0.5% in the deposit of open pit mining and more than 1% in case of underground mining. Ore bodies of Saghinkan deposit are 110～400m deep. Taking into consideration that underground mining would be the main mining method, the ore grade of Saghinkan deposit is considerably lower than those of western countries.



ig. II −2−2−1 Location Map of the Drillholes Used in the Ore Reserve Estimation

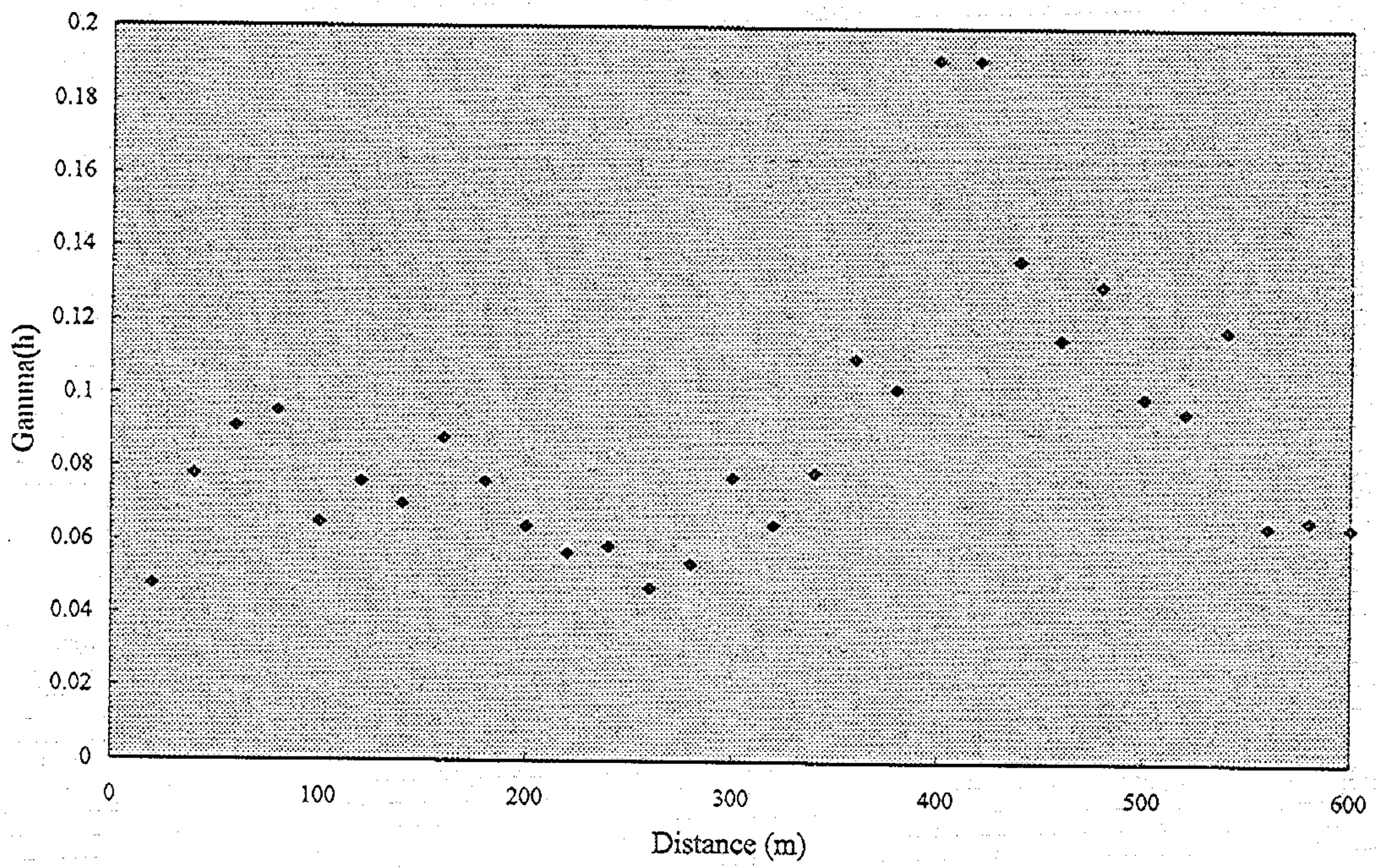


Fig. II −2−2−3　　Global Variogram of WO_3

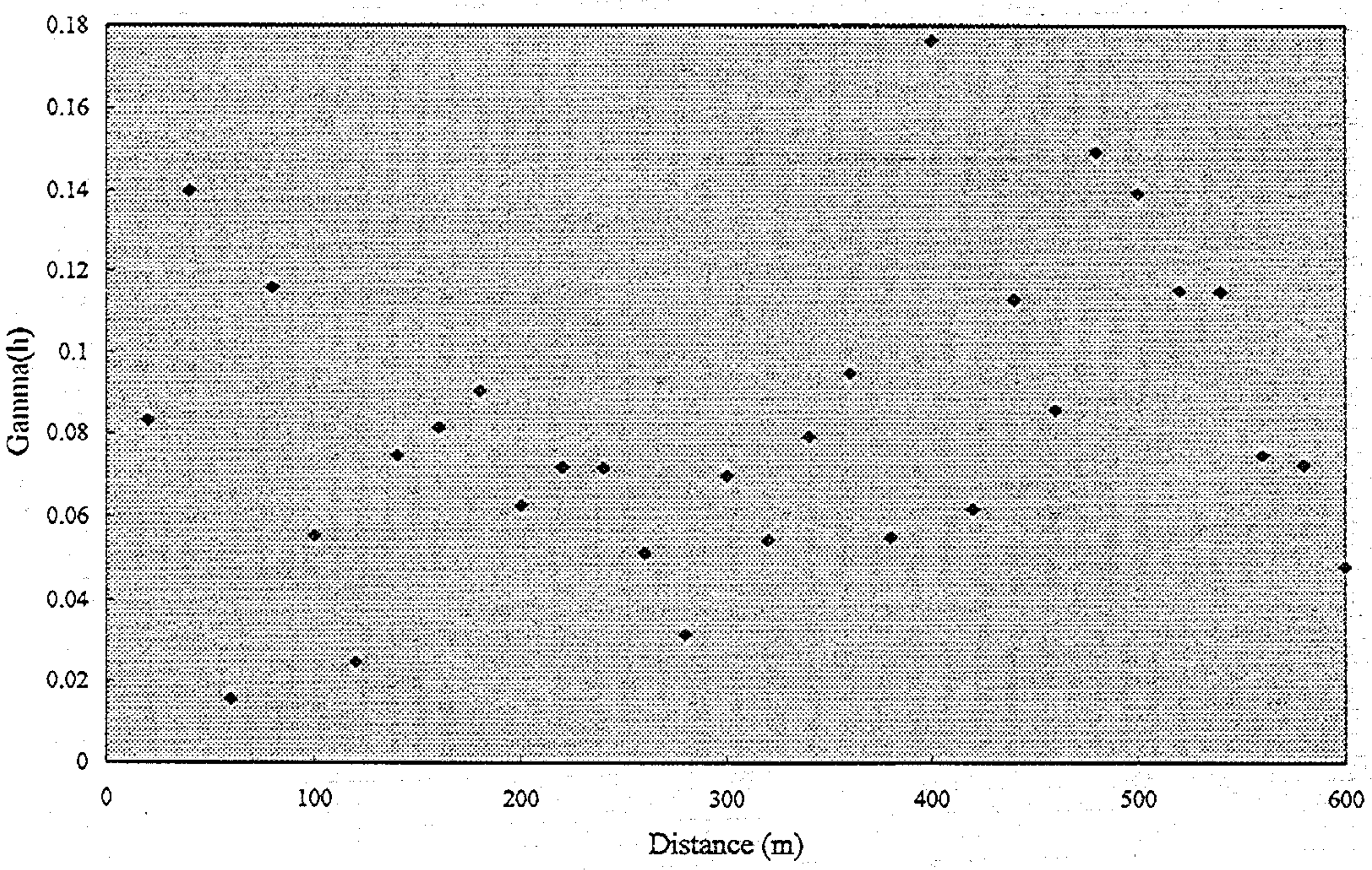


Fig. II－2－2－4　Variogram of WO_3 along Axis A

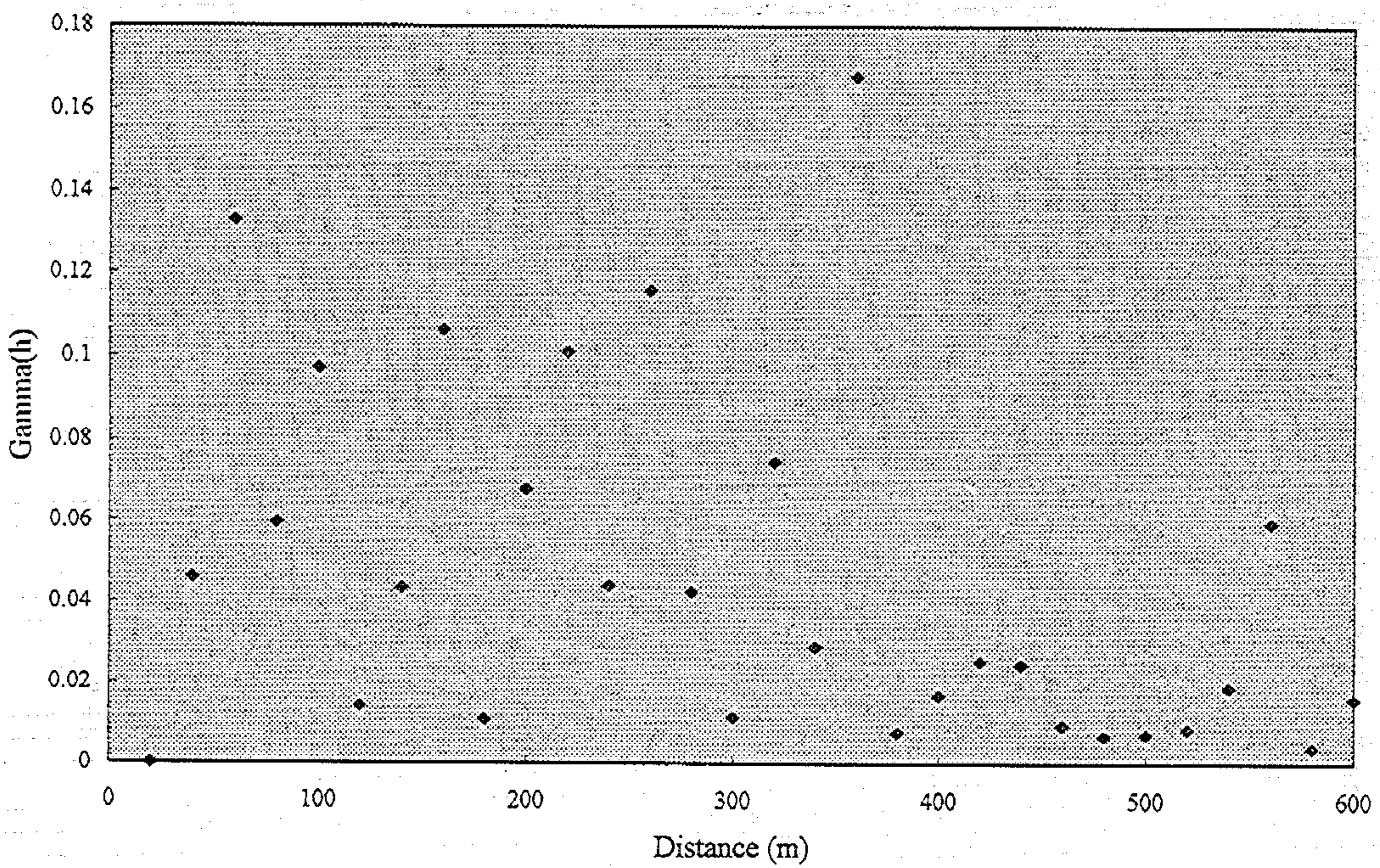


Fig. II—2—2—5　Variogram of WO_3 along Axis B

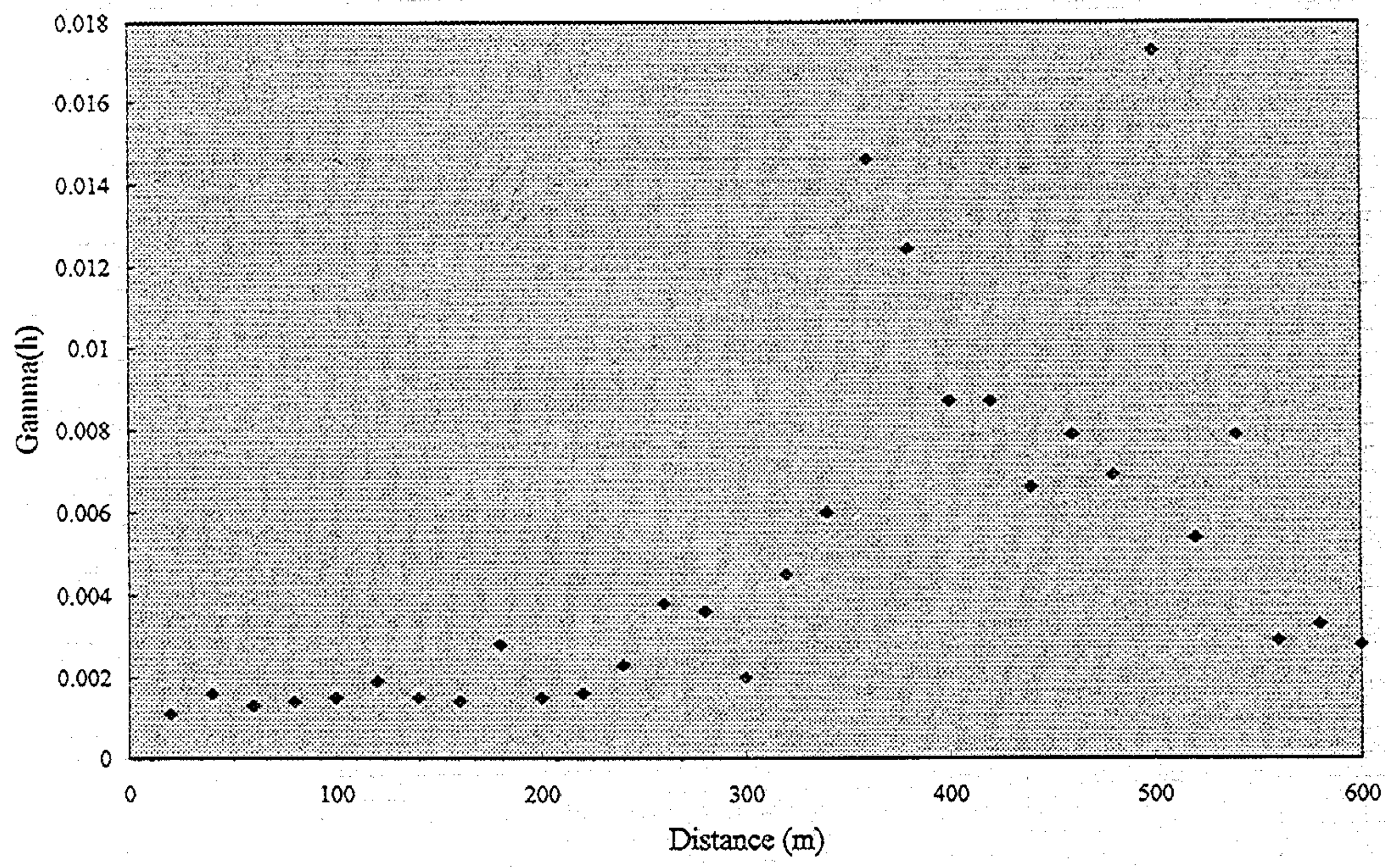


Fig. II−2−2−6　Global Variogram of Au

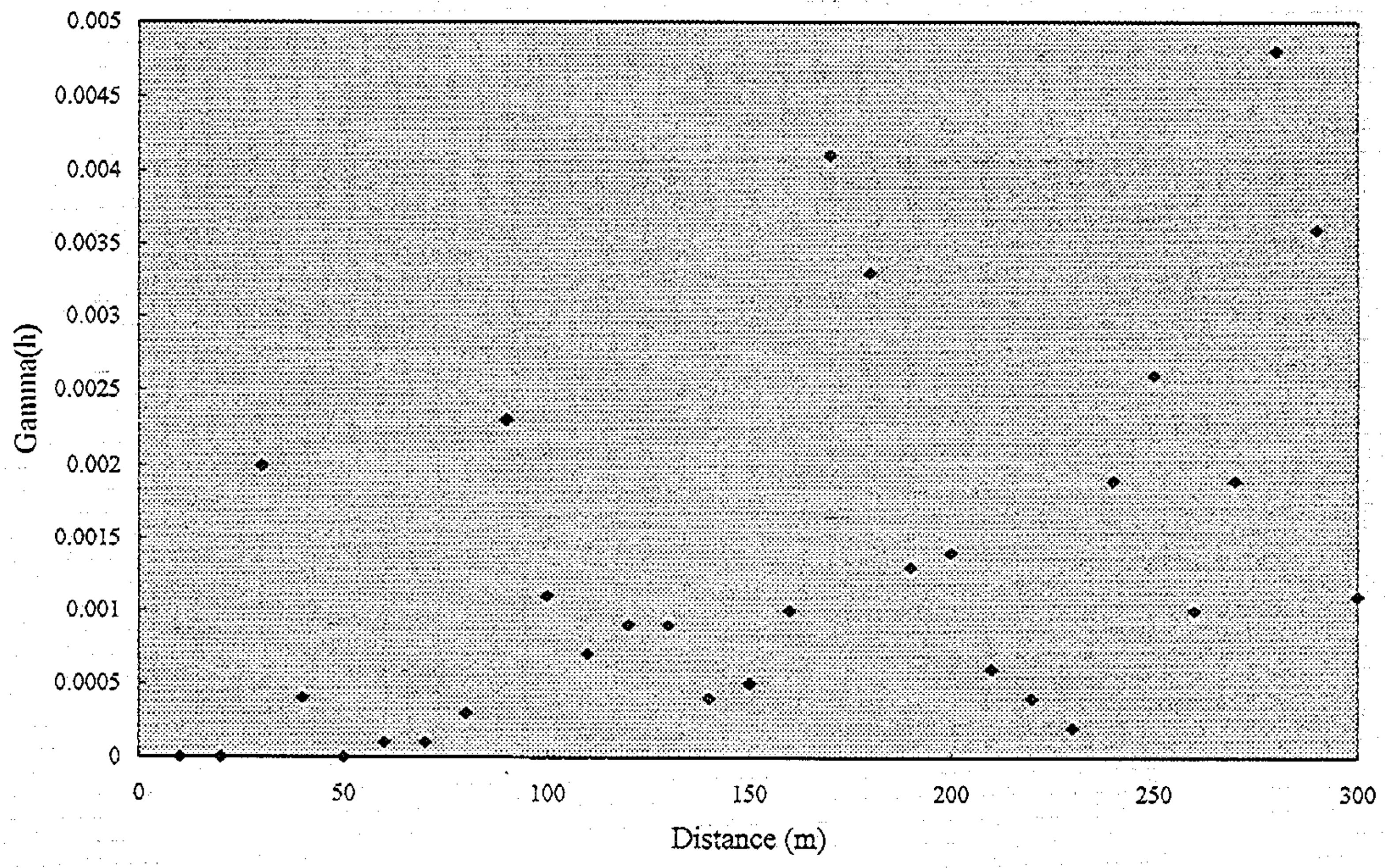


Fig. II−2−2−7　Variogram of Au along Axis A

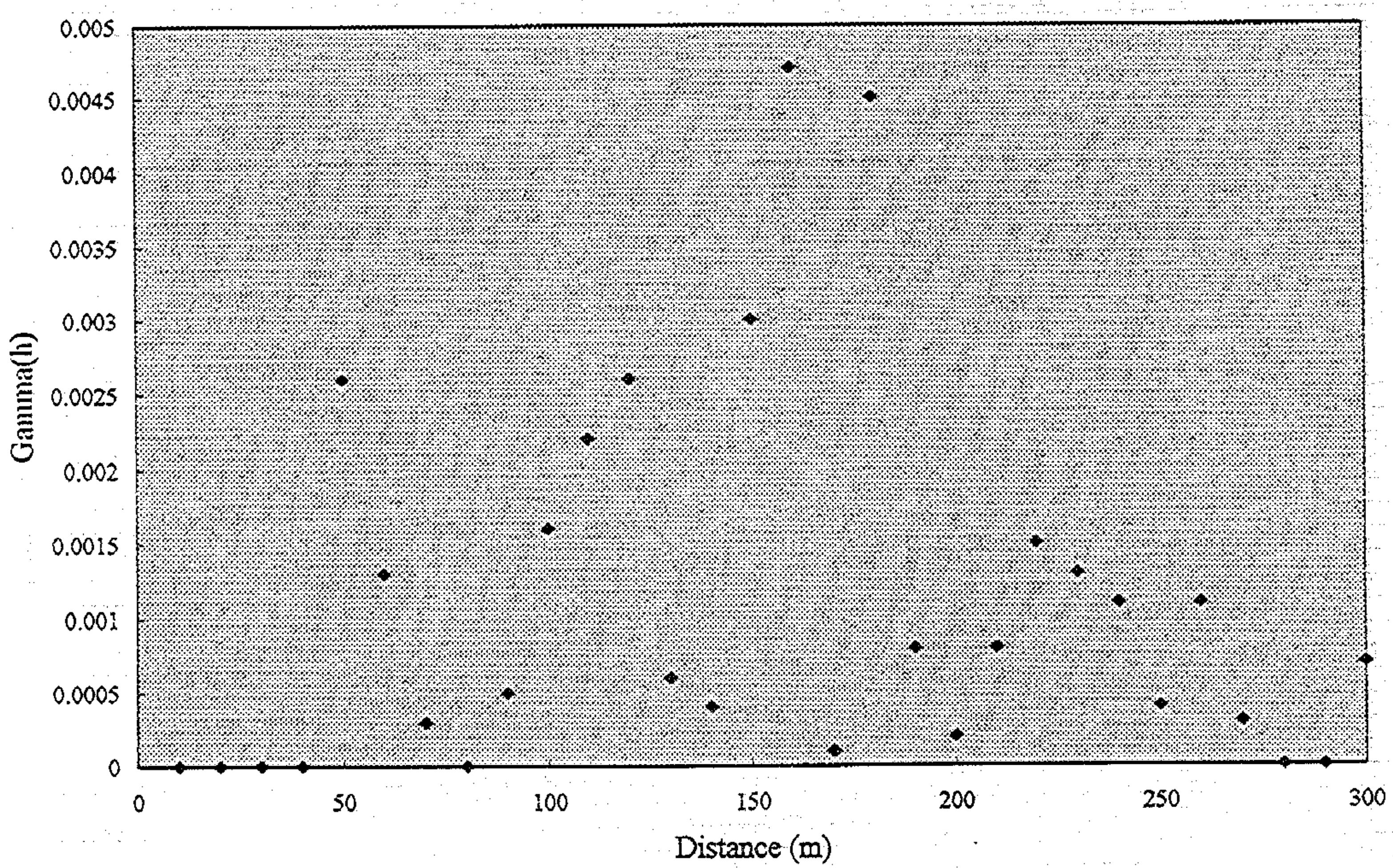


Fig. II−2−2−8　　Variogram of Au along Axis B

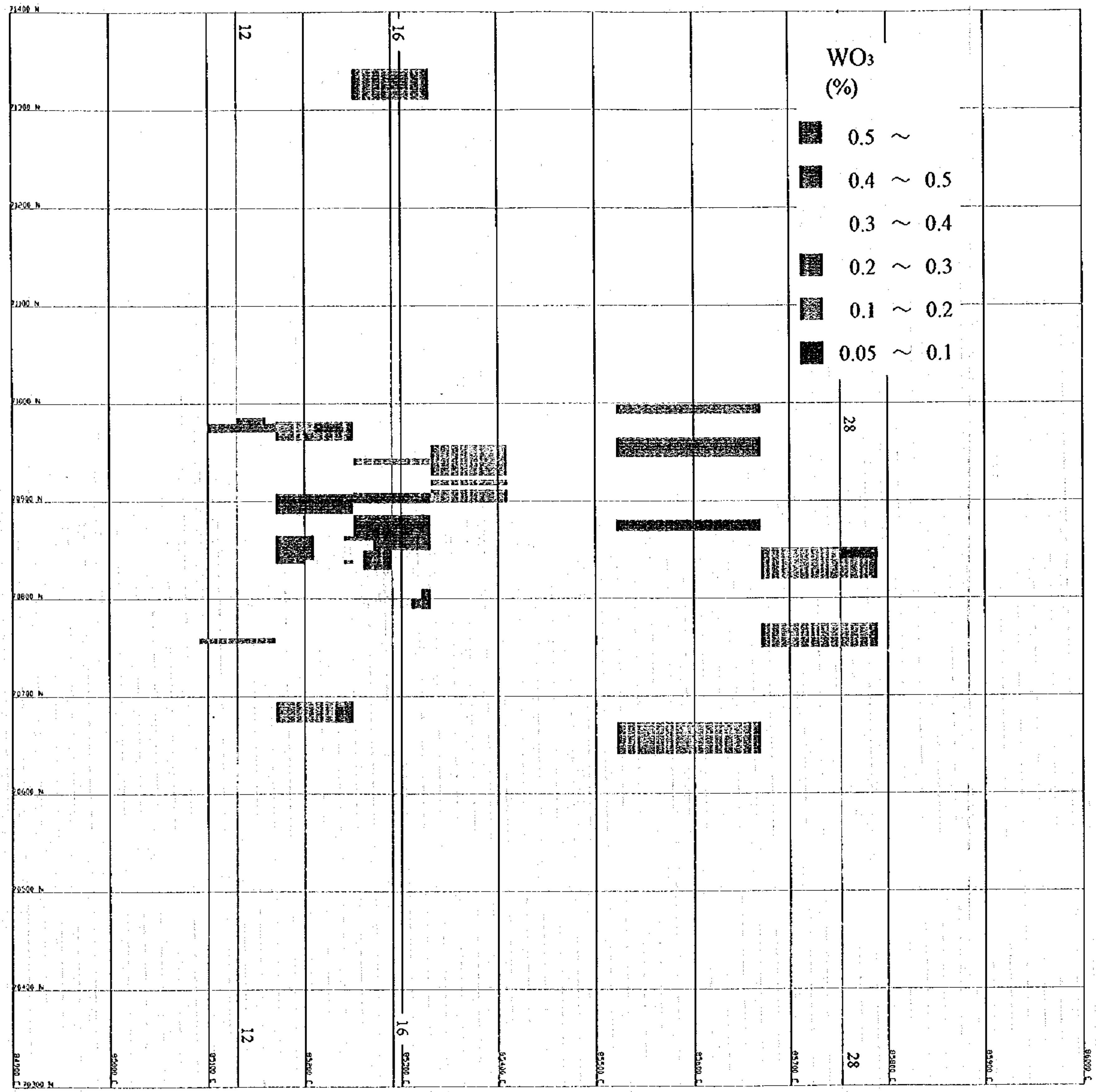


Fig. II−2−2−9 Estimated Grades of WO_3 at the Level of −70m

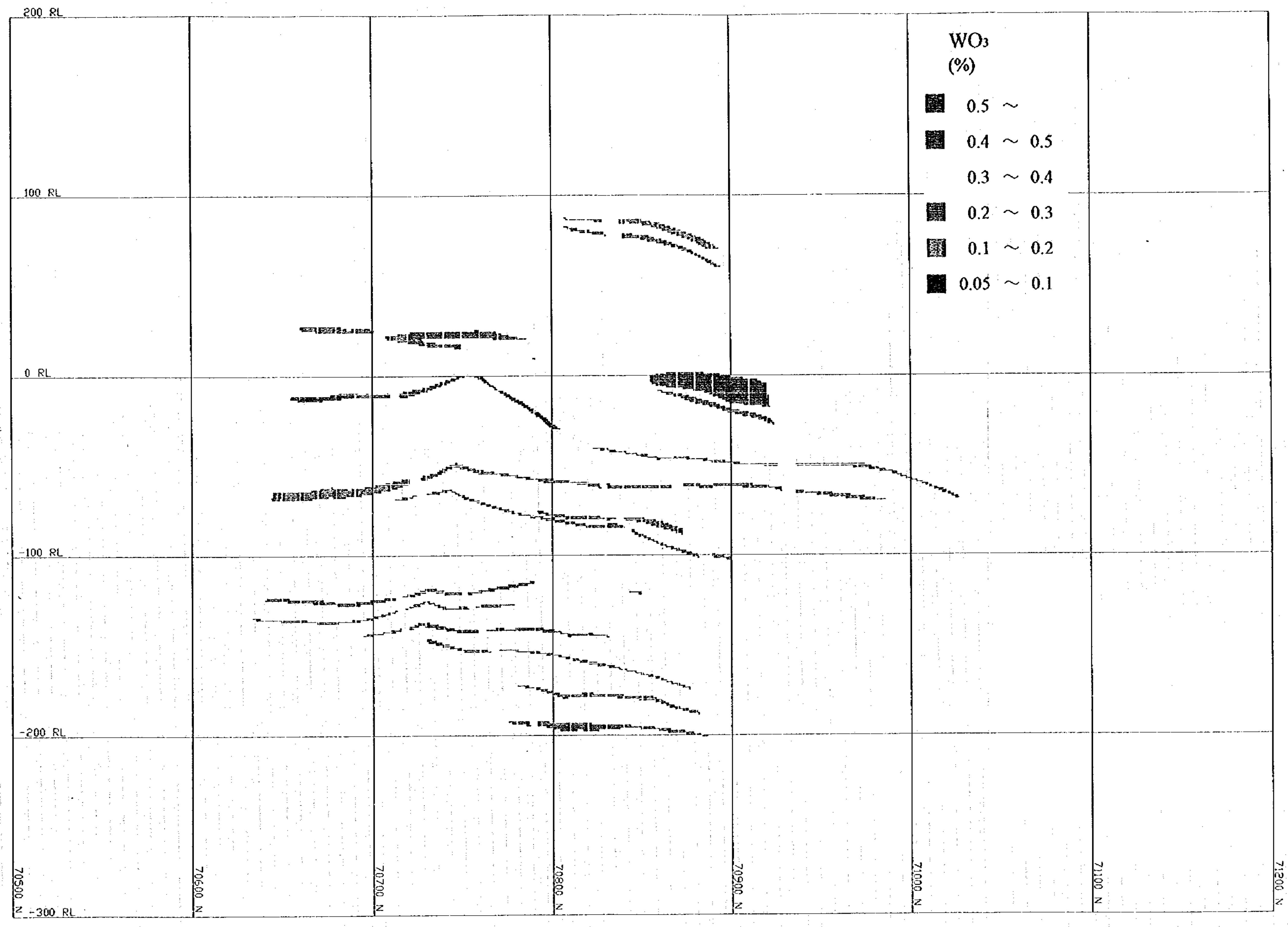


Fig. II−2−2−10 Estimated Grades of WO_3 along Line 12−12

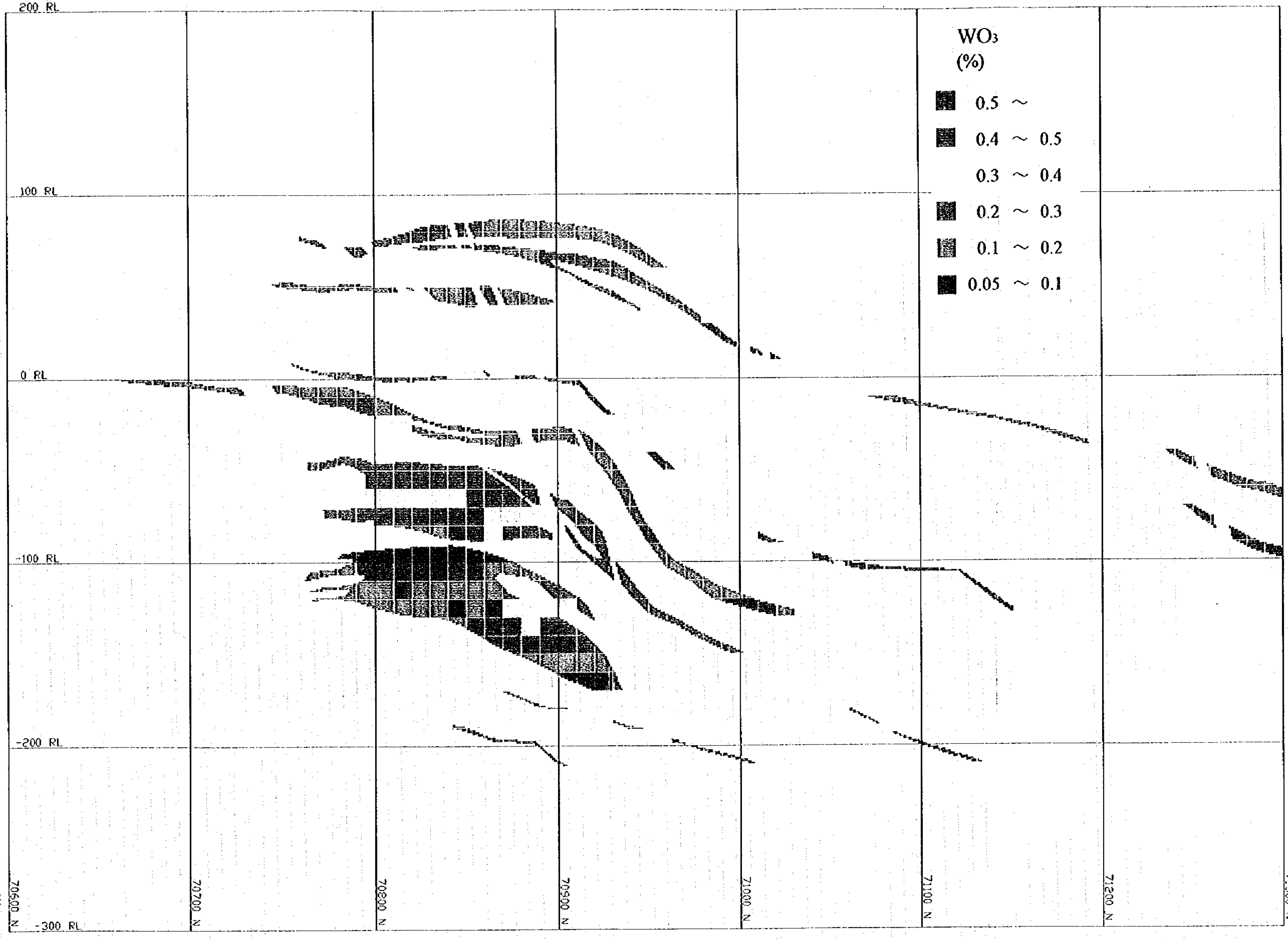


Fig. II−2−2−11 Estimated Grades of WO_3 along Line 16−16

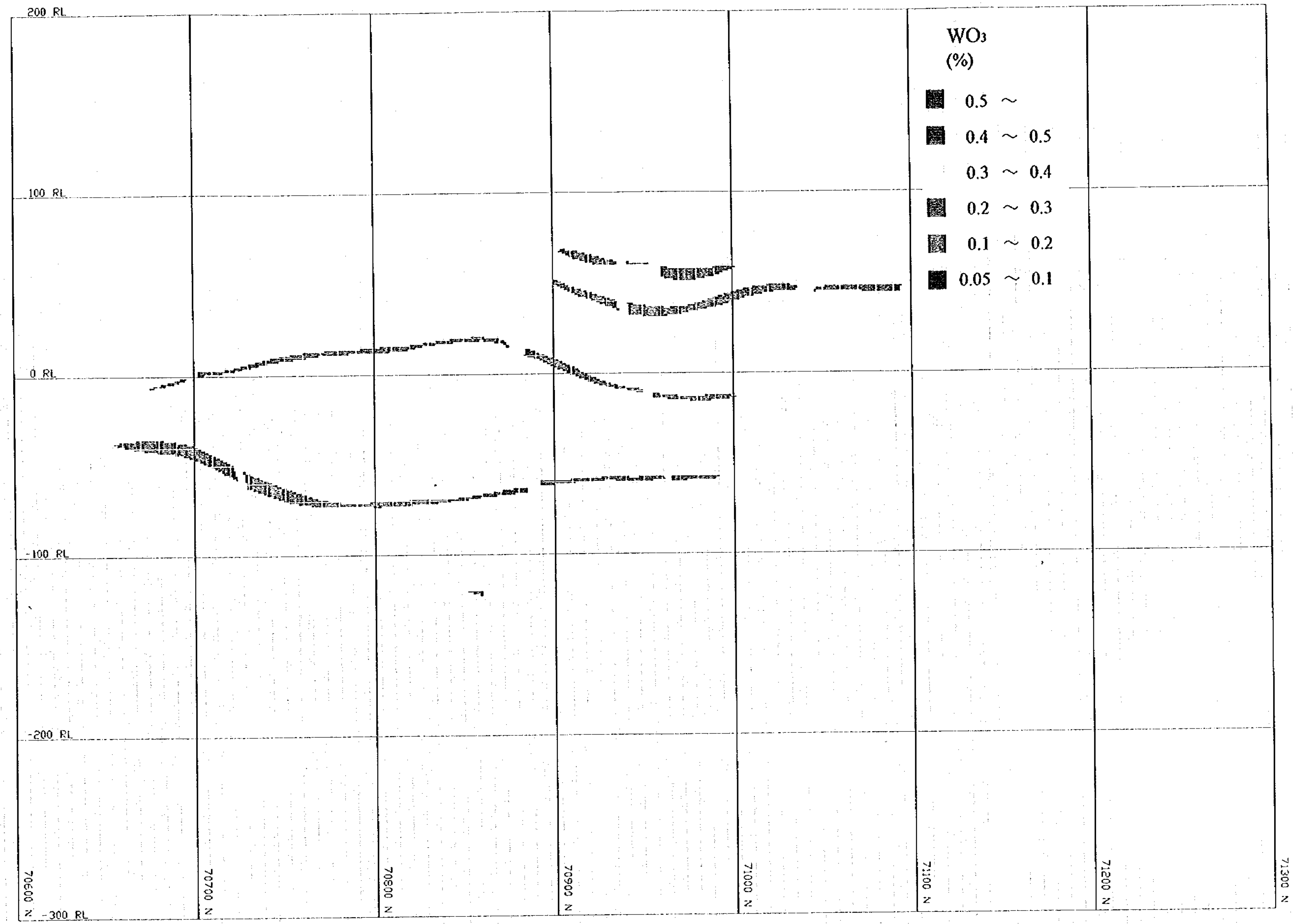


Fig. II−2−2−12 Estimated Grades of WO_3 along Line 28−28

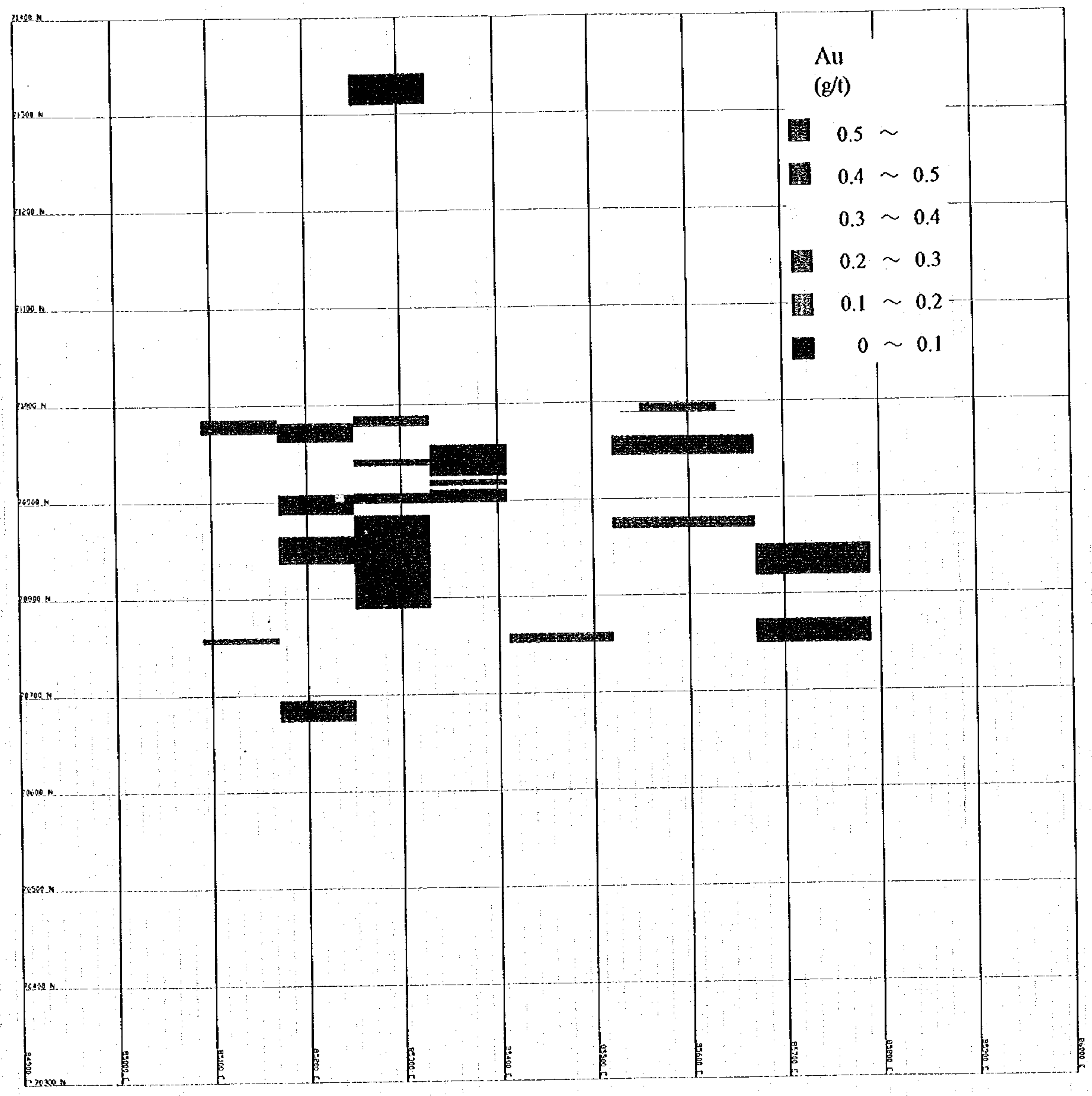


Fig. II−2−2−13　Estimated Grades of Au at the Level of −70m

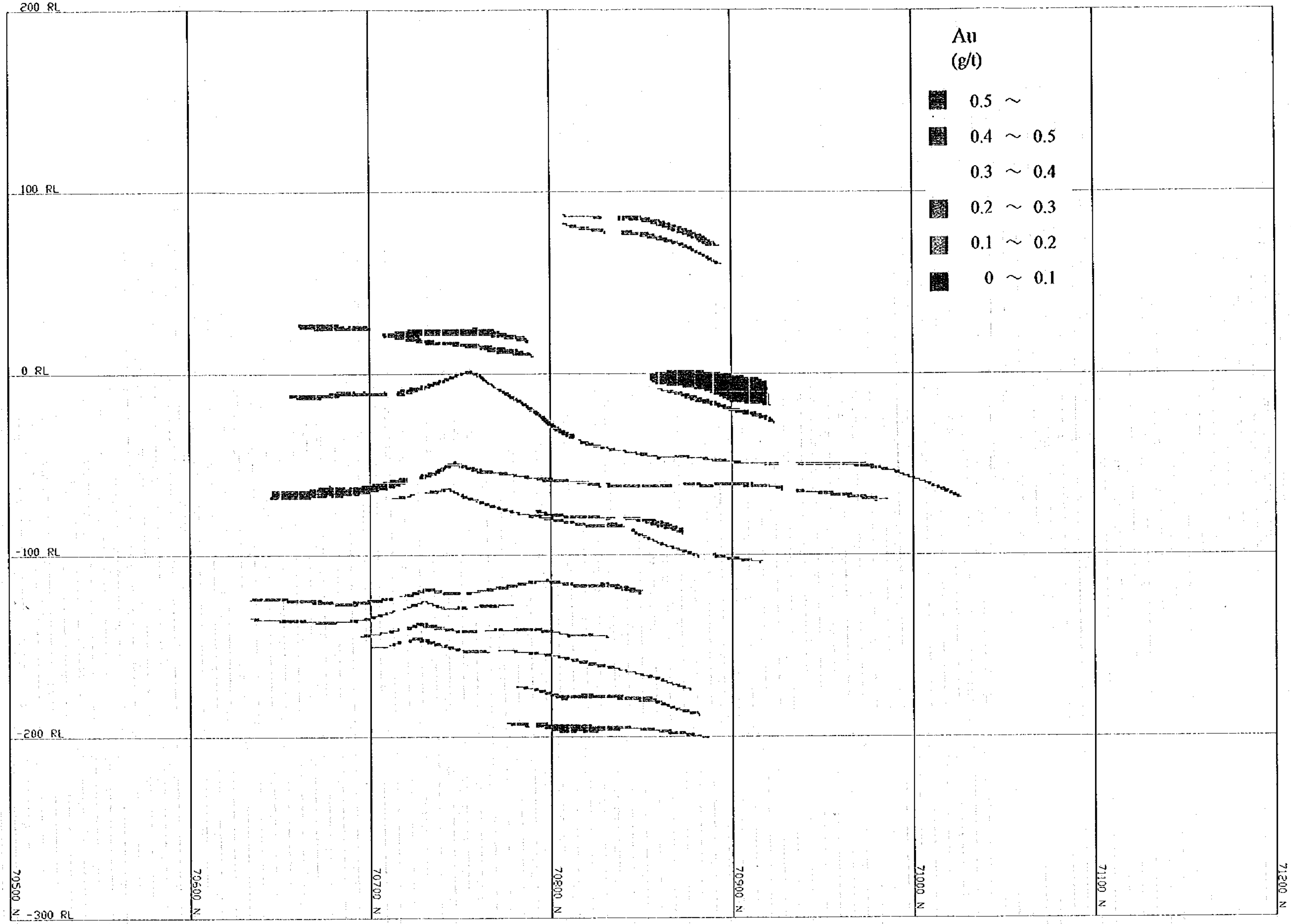


Fig. II－2－2－14　　Estimated Grades of Au along Line 12－12

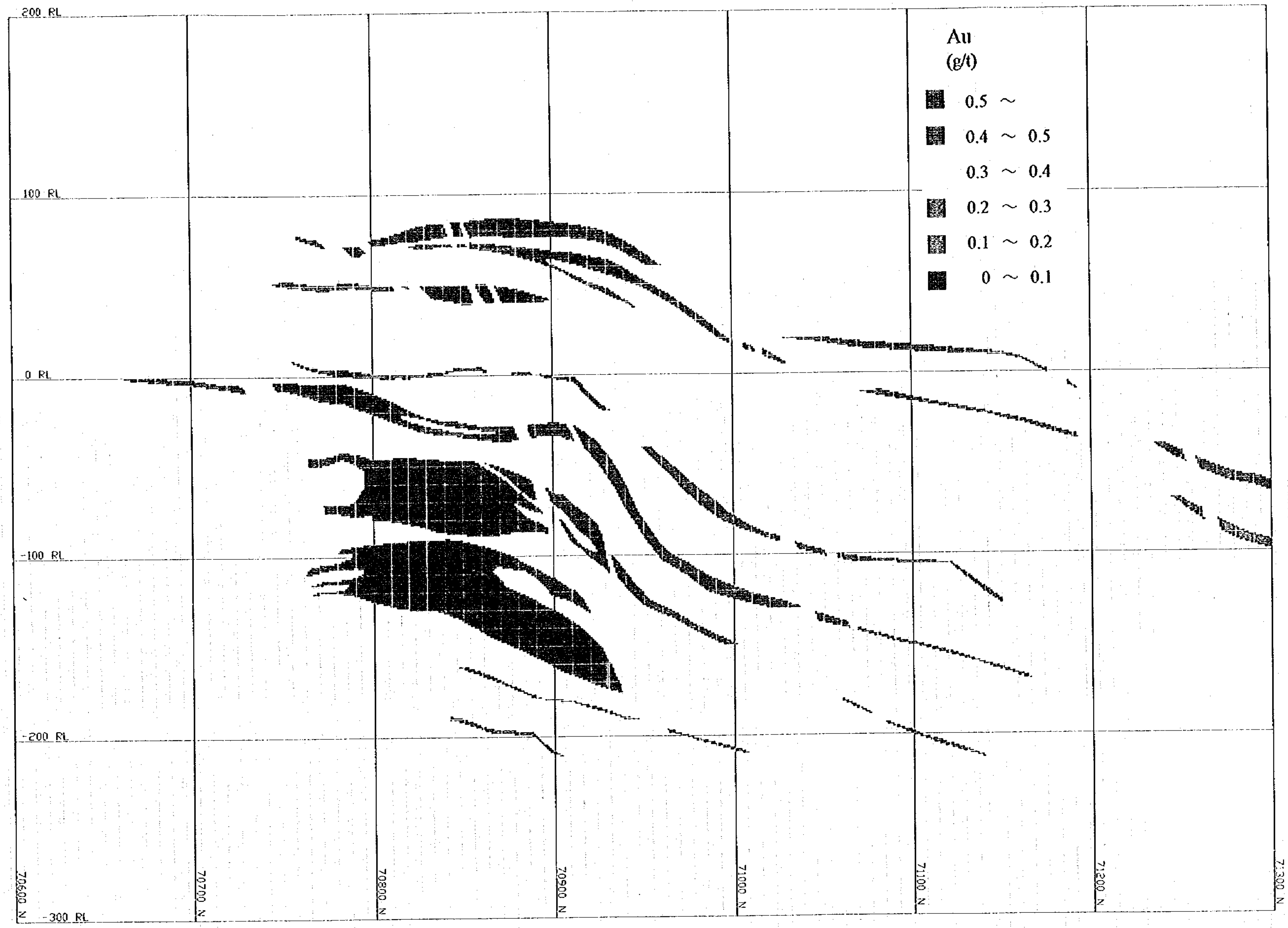


Fig. II−2−2−15 Estimated Grades of Au along Line 16−16

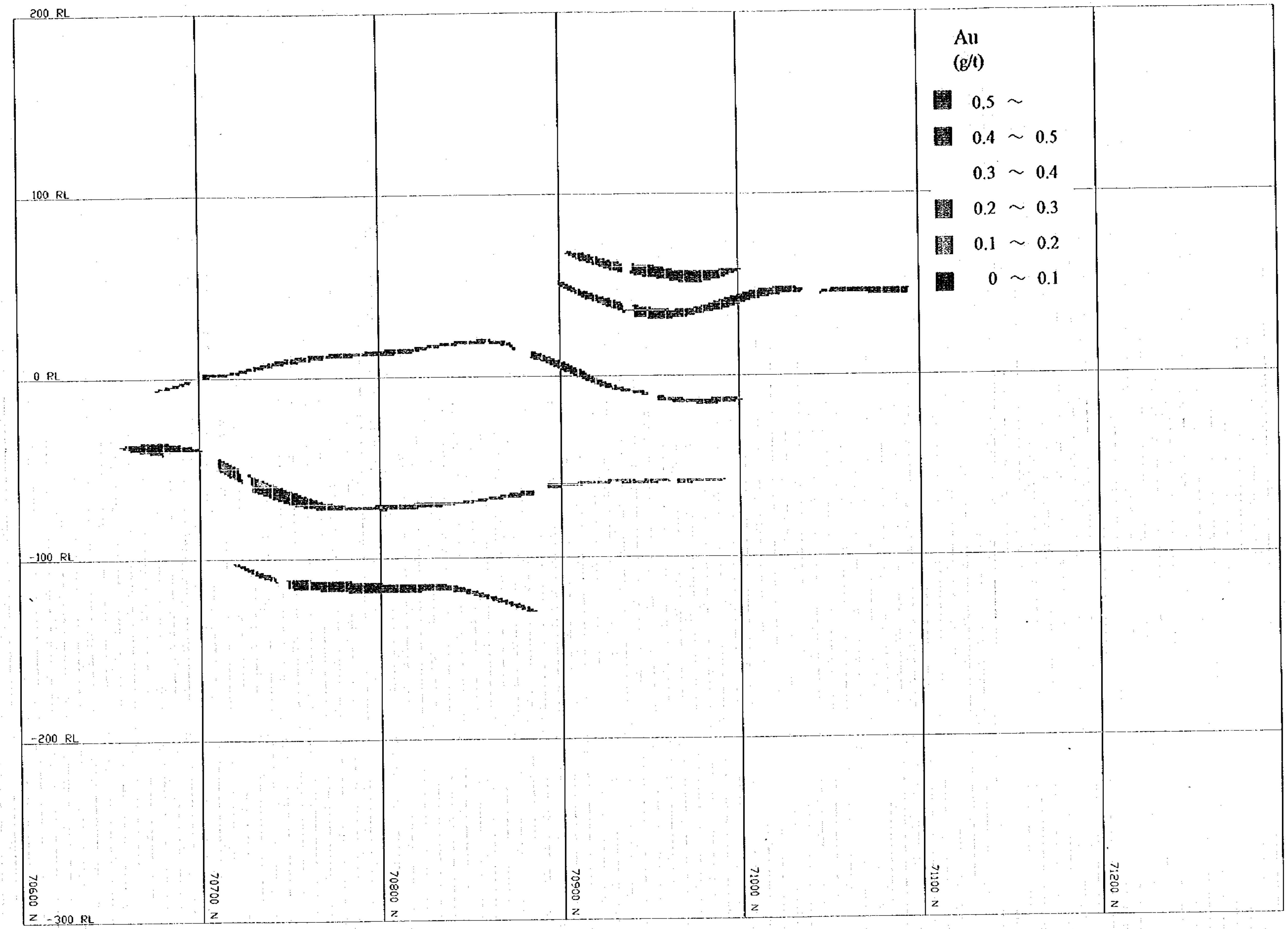


Fig. II－2－2－16　Estimated Grades of Au along Line 28－28

2-3 Drilling Survey

2-3-1 Purpose of survey

Regarding the Sautbay-Burgut deposits (W), ore reserve caculation and evaluation of the deposits were done in the preceding year. In the second year, drilling survey was carried out with a view to clarifying mineralization in the lower part under the planned open-pit mining site and to ascertain its continuity to the deeper area.

2-3-2 Methods of survey

1) Survey work

With the personnel and equipment arranged by the Samarkand Geology, drilling work of four drillholes totaling 1,509.9m was performed. To supervise the operation, a drilling engineer was sent from Japan.

The locations of the respective drillholes are shown in Fig. II-2-1-1.

Three drilling machines -- two of the Russian-made SKB-4100 (drilling cap. ϕ 76mm : 350-400m and ϕ59mm : 500m) and one of the SKB-4110 (drilling cap. ϕ 76mm : 350-400m and ϕ59mm : 500m) -- were used for the work.

The drilling operation was performed in two 12-hour shifts, with one foreman and one worker per unit, in principle. For the transportation of drilling machines and supplies, road construction, drilling site leveling and preparations, buldozers were used.

The wireline method was applied to the drilling operation in an effort to improve core recovery and work progress.

For the surface soil drilling, single diamond bits and metal bits of ϕ112mm or ϕ 76mm were used, while, after reaching the rock, ϕ73mm casing pipes were inserted and installed. Afterwards, the drilling continued with the SSK-59 wireline diamond bits as the final diameter. Mud water preparation was not done at the drilling site but at a mud water plant of the Kokpatas Expedition and conveyed to the site by a 8m^3 tank truck.

The work lasted for 154 days from July 11 thru December 11, 1995. The drilling length and core recovery by borehole were as follows:

Table II-2-3-1 Quantity of Drilling Works and Core Recovery in the Sautbay District

Hole No.	Programmed length (m)	Length (m)	Length of Core (m)	Core recovery (%)
MJUS-1	352	352.0	331.1	94.1
MJUS-2	420	426.5	404.65	94.9
MJUS-3	380	381.4	366.2	96.0
MJUS-4	350	350.0	312.3	89.2
Total	1,502	1,509.9	1,414.25	93.7

The drilling efficiency, working time, consumptions of drilling articles and diamond bits are shown in Tables II-2-3-2 thru II-2-3-5, respectively. The main equipments used, results of the works and progress record are listed in Appendix 3-1 thru Appendix 3-3.

2) Drilling operation

Particulars of the drilling operations performed are shown in Table II-2-3-6 below.

Table II-2-3-6 Results of Drilling Works in the Sautbay District

Hole No.		MJUS-1	MJUS-2	MJUS-3	MJUS-4
Direction Dip		S 60° W -75°	S 60° W -75°	S 60° W -75°	S 60° W -75°
Bit	φ 112mm	—	7.0m	—	—
	φ 76mm	17.0m	5.4m	60.3m	4.5m
	φ 59mm	335.0m	414.1m	321.1m	345.5m
Casing	φ 108mm	16.0m	9.0m	19.0m	12.0m
	φ 89mm	31.0m	27.0m	64.0m	21.0m
	φ 73mm	94.0m	76.0m	118.0m	67.0m

2-3-3 Results of survey

The drilling of the lower part of the No.1 ore body seized a thick skarn ore body containing scheelite at the drillholes MJUS-3 and -4 but, at MJUS-1, no strong indication of tungsten mineralization was found while, at MJUS-2, regular-grade tungsten mineralization was confirmed.

From these results, it was ascertained that, in the southeastern side of MJUS-2, the mineralization continues for 400m or more in the vertical direction.

The survey results are shown in the geological cross sections along the drillholes (Figs. II-2-3-1 thru -4).

1) MJUS-1 : (Direction S60° W ; inclination -75° ; drill length 352.0m)

At this drillhole, it was aimed to examine mineralization of the No.1 ore body from the surface to the depth of 350m thereby clarifying the continuity of the mineralization to the deeper area.

(1) Geology

Excepting the near-surface portion, the drillhole is composed of sandstone, quartzite, slate, phyllite and limestone of the Kokpatas Formation, into which granodiorite dikes intrude in the part deeper than 320m.

Between 267.9m and 280.0m, a conspicuous fracture zone is observed, which consists of prominently mylonitic sandstone and limestone accompanied by fault breccia and clay. The fracture zone caused a jamming accident on November 15.

(2) Mineralization

As shown in Fig. II-2-3-1, none of conspicuous skarn-type ore bodies were observed; however, a part of the skarn at a horizon presumed to be the No.1 ore body(U), is accompanied by weak tungsten mineralization. Indications of the mineralization are shown in Table II-2-3-7.

2) MJUS-2: (Direction S60° W ; inclination -75° ; drill length 426.5m)

The drilling was intended to survey mineralization of the No.1 ore body from the surface to the depth of 400m, with a view to ascertaining the continuity to the deeper area.

(1) Geology

Except for the near-surface portion, the drillhole is dominated by sandstone, quartzite, slate, phyllite and limestone of the Kokpatas Formation, into which granodiorite and diorite dikes intrude in tho part deeper than 328m. At the depth of 420.7m, the drilling entered a granodiorite body presumed to be the footwall of the ore deposit.

(2) Mineralization

As shown in Fig. II-2-3-2, a number of skarn ore bodies accompanied by tungsten mineralization were found at a horizon presumed to be a lower extension of the No.1 ore body. Indications of the mineralization at this deillhole are shown in Table II-2-3-7.

3) <u>MJUS-3</u> : (Direction S60° W ; inclination -75° ; drill length 381.4m)

It was aimed to examine the mineralization of the No.1 ore body from the surface to the depth of 320m so that the continuity to the deeper area might be ascertained.

(1) Geology

Except the near-surface portion, the drillhole is composed of slate, sandstone, quartzite and limestone of the Kokpatas Formation. Between 350.4m and 359.6m near the bottom, quartzite presumably pertaining to the Karashakh Formation is confirmed. Porphyrite, diorite and granodiorite dikes intrude into these rocks in the area deeper than 195m. At the depth of 370.0m, the drilling entered granodiorite body at the footwall of the deposit.

(2) Mineralization

As shown in Fig. II-2-3-3, a number of skarn ore bodies accompanied by tungsten mineralization were seized at horizons that are presumed to be the hanging wall of the No.1 ore body, and the Nos.1 and 3 ore bodies. Especially, between 319.8m and 338.5m, presumably the lower extension of the No.1 ore body and also, between 359.6m and 362.9m, presumably a lower extension of the No.3 ore body, a skarn ore body accompanied by high-grade WO_3 was intersected. Indications of the mineralization at this drillhole are shown in Table II-2-3-7.

4) <u>MJUS-4</u> : (Direction S60° W ; inclination -75° ; drill length 350.0m)

It was aimed to examine mineralization of the No.1 ore body from the surface to the depth of 300m thereby ascertaining its continuity to the deeper area.

(1) Geology

This drillhole consists of slate, sandstone, chert, quartzite and limestone of the Kokpatas Formation. At the depth of 318.2m, the drilling entered granodiorite body at the footwall of the deposit. Between 301.7m and 310.2m, a conspicuous fracture zone was recognized. The fracture zone comprises silicified, skarnized metasomatite, prominently mylonitic, accompanied by fault breccia and clay, into which a quartz vein intrudes at the depth of 303.9-305.3m,

(2) Mineralization

As indicated in Fig. II-2-3-4, a skarn ore body accompanied by prominent tungsten mineralization was captured at a horizon presumed to be the lower extension of the No.1 ore body (U). The skarn ore body represents high-grade WO_3, especially between 309.3m and 315.8m.

Indications of the mineralization are shown in Table II-2-3-7.

2-3-4 Conclusive summary and consideration

The drilling survey performed in this year resulted in confirming the tungsten mineralization in the portions described in the preceding paragraphs. The No.1 ore body has been ascertained to have the maximum true width of about 50m on the surface. As the result of the drilling, tungsten mineralization was recognized at horizons over 40m of true width. It was also confirmed that, although cut by faults, the No.1 ore body is of a structure which strikes NNW-SSE and dips 70° E.

It was also ascertained by the drilling survey that, from the MJUS-2 southeastward, the mineralization continues up to 400m below the surface.

In five locations of the Nos. 1 and 3 ore bodies, WO_3 grades exceed 0.30%. Those of 2.0m or more in true width are listed below:

Drillhole	Depth(m)	Ore body	True width(m)	WO_3 grade
MJUS-3	319.8-338.5	No.1	13.2	0.35%
- do -	359.6-362.9	No.3	2.3	2.31%
MJUS-4	309.3-315.8	No.1	5.0	0.84%

The positional relationship between these shoots and those on the surface appears to indicate that the bonanza plunges in the SSE direction.

In the light of the survey findings, it is highly likely that the tungsten mineralization further continues to the lower part in the SSE direction.

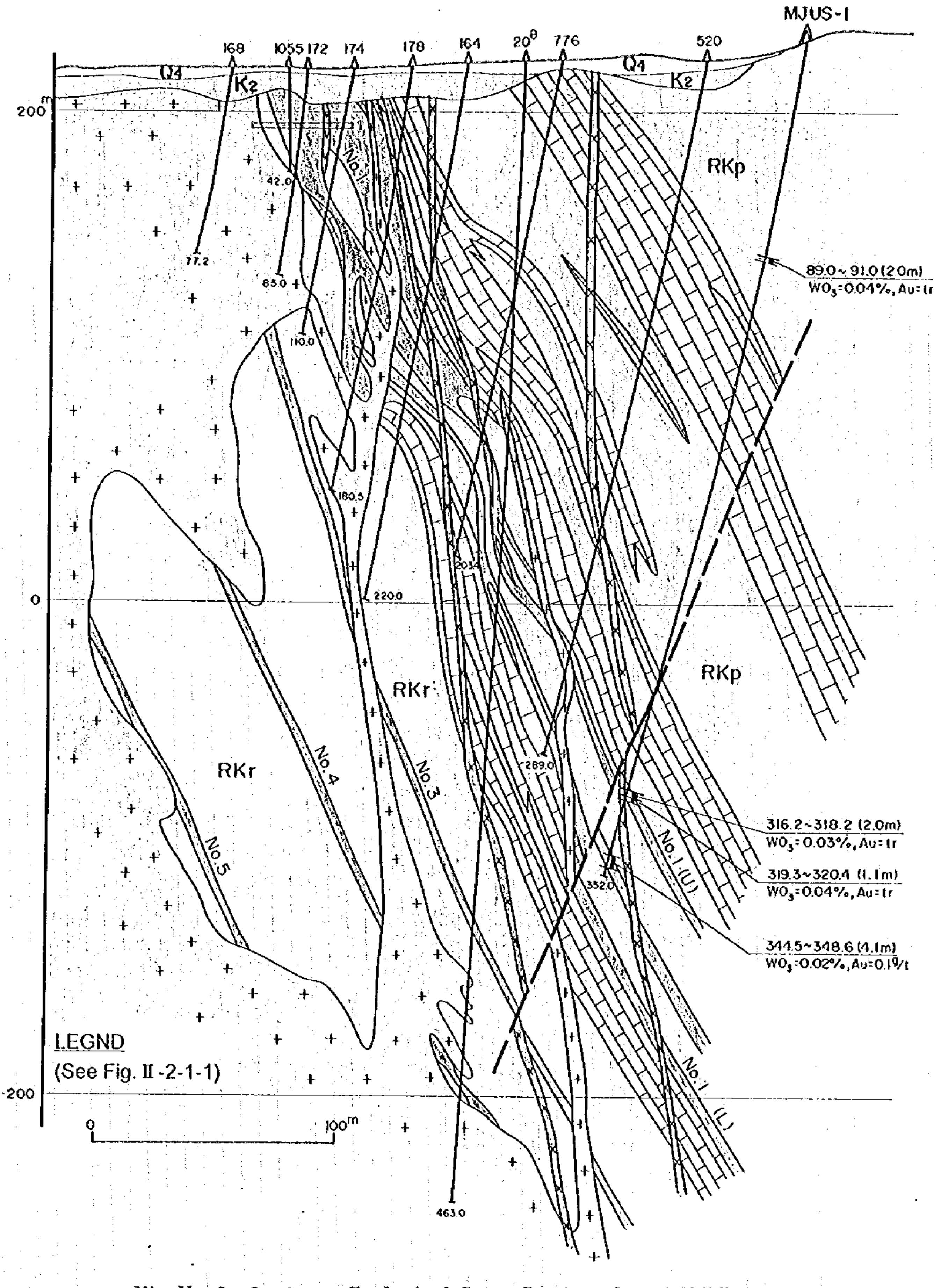


Fig. II−2−3−1 Geological Cross Section along MJUS−1

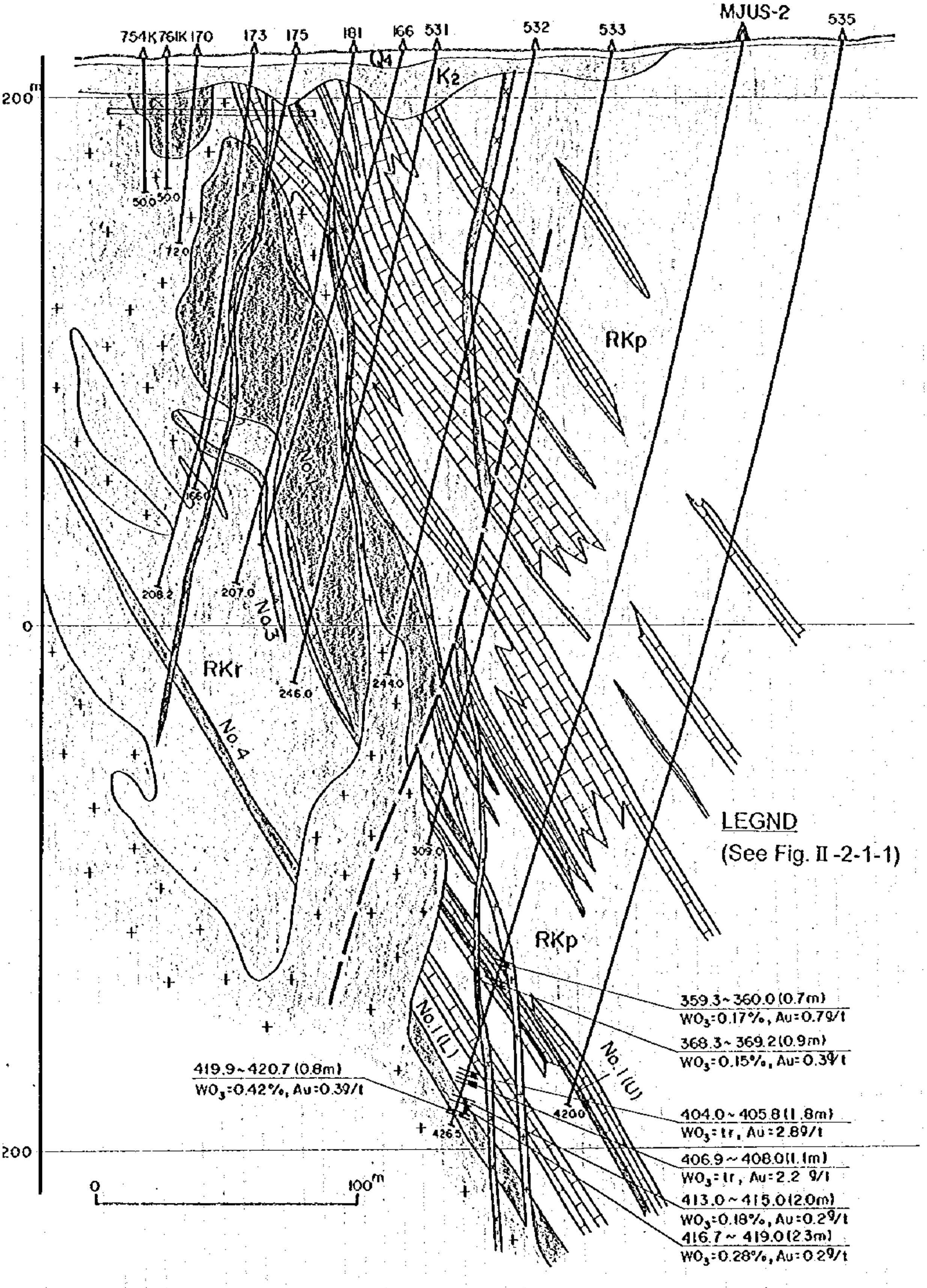


Fig. II −2−3−2 Geological Cross Section along MJUS−2

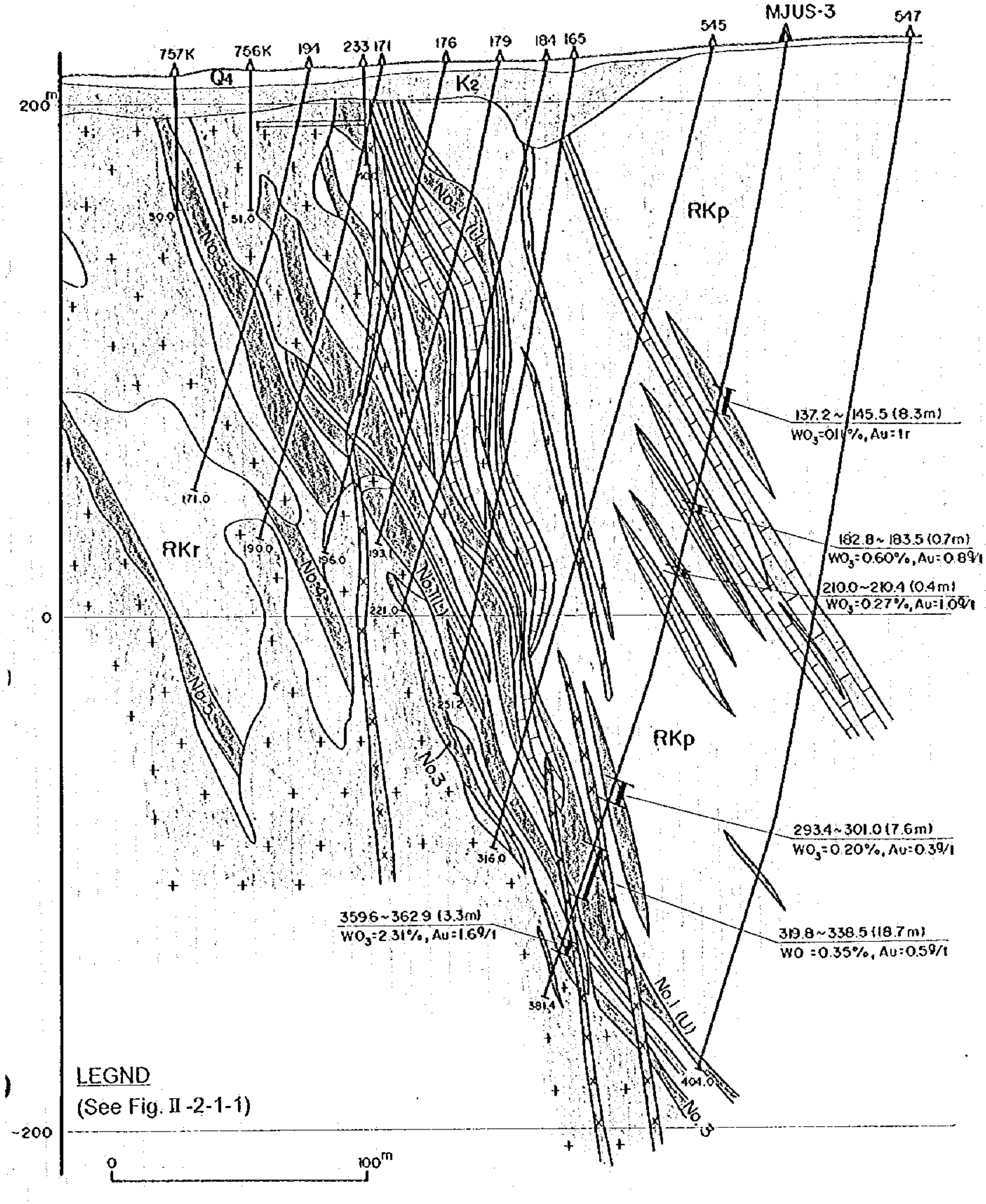


Fig. II−2−3−3 Geological Cross Section along MJUS−3

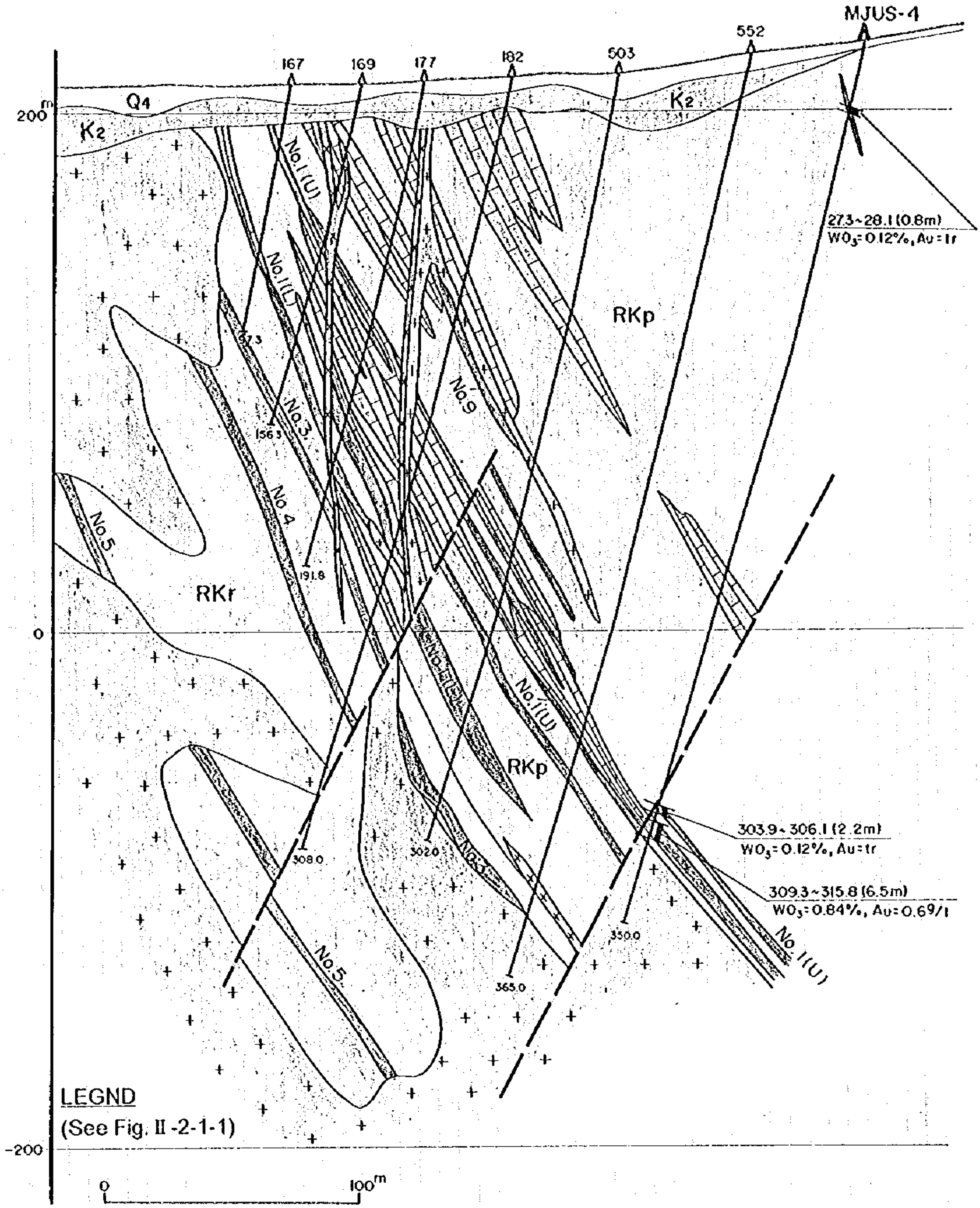


Fig. II−2−3−4 Geological Cross Section along MJUS−4

Table II-2-3-2 Efficiency of Each Drillhole in the Sautbay District

Hole No.	Drilling Machine	Working Period	Drilling Length (m)	Core		Working Day			Efficiency		
				Length (m)	Recovery (%)	Drilling* (day*)	Others (day)	Total** (day**)	m/day*	m/day**	m/working period
MJUS-1	SKB−4110	Oct. 4. '95 ↓ Dec. 11. '95	352.0	331.1	94.0	29.1	36.2	65.3	12.10	5.39	5.10
MJUS-2	SKB−4110	July 11. '95 ↓ Oct. 3. '95	426.5	404.65	94.9	52.2	18.3	70.5	8.17	6.05	5.02
MJUS-3	SKB−4100	Sept. 11. '95 ↓ Nov. 25. '95	381.4	366.2	96.0	43.0	25.0	68.0	8.87	5.61	5.04
MJUS-4	SKB−4100	July 16. '95 ↓ Oct. 7. '95	350.0	312.3	89.2	51.2	20.1	71.3	6.84	4.91	4.17
Total			1,509.9	1,414.25	93.7	175.5	99.6	275.1	8.60	5.49	4.81

* includes drilling and out drilling.

** includes drilling, out drilling, regain of accident, preparation, dismount/mobilization and others.

Table II-2-3-3 Working Time of Diamond Drilling in the Sautbay District

Hole No.	Working Period		Number of Workers		Working						
	Period	(day)	Foreman (man)	Worker (man)	Drilling (hour)	Out Drilling (hour)	Regain of Accident (hour)	Preparation (hour)	Dismount/ Mobilization (hour)	Others (hour)	Total (hour)
MJUS-1	Oct. 4. '95 ↓ Dec. 11. '95	69	196	196	457	242	845	24	—	—	1.568
MJUS-2	July 11. '95 ↓ Oct. 3. '95	85	211.5	217.5	740.5	512	295.5	64	80	—	1.692
MJUS-3	Sept. 11. '95 ↓ Nov. 25. '95	75.7	204	232	591	442	543	24	32	—	1.632
MJUS-4	July 16. '95 ↓ Oct. 7. '95	84	214	234	720	509	384	48	24	27	1.712
Total	—	313.7	825.5	879.5	2.508.5	1.705	2.067.5	160	136	27	6.604

Table II-2-3-4 Consumable Drilling Articles in the Sautbay District

Item	Specifi-cation	Unit	Quantity							
			MJUS-1	MJUS-2	MJUS-3	MJUS-4				Total
Cement		kg				500				500
Bentonite		kg		5,800		3,850				9,650
Clear mud		kg	2,300							2,300
Polyacrylicamide		kg	200	1,230		730				2,160
N1 mud water		m^3	222	361	393	398				1,374
N4 mud water		m^3	52	138		18				208
Diamond bit	76mm	pc	1	1	15	4				21
Diamond bit	59mm	pc	37	63	55	79				234
Diamond reamer	76mm	pc	1	1		3				5
Diamond reamer	59mm	pc	1	14	3	9				27
Metal crown	132mm	pc			3					3
Metal crown	112mm	pc		5	4	1				10
Metal crown	93mm	pc		5	5	1				11
Metal crown	76mm	pc	8	1	4	9				22
Core box	56~58mm	pc	2	1	8					11
〃	36~40mm	pc	45	61	47	45				198

Table II-2-3-5 Drilling Meterage of Diamond Bits in the Sautbay District

Size	Number of bits(pcs)	Drilling meterage by drillhole (m)							Total	Efficiency m/bit
		MJUS-1	MJUS-2	MJUS-3	MJUS-4					
φ 76mm	1	5.5							5.5	5.50
	1		2.4						2.4	2.40
	15			45.5					45.5	3.03
	4				4.5				4.5	1.13
Sub total	21	5.5	2.4	45.5	4.5				57.9	2.76
φ 59mm	37	335.0							335.0	9.05
	63		418.9						418.9	6.65
	55			321.1					321.1	5.84
	79				345.5				345.5	4.37
Sub total	234	335.0	418.9	321.1	345.5				1,420.5	6.07
Grand total	255	340.5	421.3	366.6	350.0				1,478.4	5.80

Table II-2-3-7 Major Mineralized Zones Caught by Drillings in the Sautbay District

Hole No.	Depth (m)	True width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Bi (%)	Mo (%)	WO_3 (%)	Remarks
MJUS-1	89.0- 91.0 (2.0)	1.3	tr		0.05	tr	tr	0.04	Skarnized phyllite
	316.2-318.2 (2.0)	1.3	tr		tr	tr	tr	0.03	Skarnized quartzite
	319.3-320.4 (1.1)	0.7	tr		tr	tr	tr	0.04	Skarn
	344.5-348.6 (4.1)	2.6	0.1		tr	tr	tr	0.02	Skarnized quartzite and limy slate
MJUS-2	359.3-360.0 (0.7)	0.5	0.7	tr	tr	tr	tr	0.17	Skarn
	368.3-369.2 (0.9)	0.7	0.3	tr	tr	tr	tr	0.15	Skarn
	404.0-405.8 (1.8)	1.4	2.8	tr	tr	tr	tr	tr	Slate with skarn
	406.9-408.0 (1.1)	0.8	2.2	tr	0.03	tr	tr	tr	Skarn
	413.0-415.0 (2.0)	1.5	0.2	tr	tr	tr	tr	0.18	Skarnized limestone and chert
	416.7-419.0 (2.3)	1.8	0.2	tr	0.05	tr	tr	0.28	Skarn and skarnized limestone
	419.9-420.7 (0.8)	0.6	0.3	tr	0.10	tr	tr	0.42	Skarn
MJUS-3	137.2-145.5 (8.3)	5.9	tr		0.02	tr	0.03	0.11	Skarnized quartzite
	182.8-183.5 (0.7)	0.5	0.8	tr	tr	tr	tr	0.60	Skarnized limestone
	210.0-210.4 (0.4)	0.3	1.0	tr	0.01	tr	tr	0.27	Silicified and skarnized metasomatite
	293.4-301.0 (7.6)	5.4	0.3	tr	tr	tr	tr	0.20	Skarn, skarnized sandstone and limestone
	319.8-338.5 (18.7)	13.2	0.5		tr	tr	tr	0.35	Skarn and skarnized limestone
	359.6-362.9 (3.3)	2.3	1.6	1.9	0.08	tr	tr	2.31	Silicious skarn
MJUS-4	27.3- 28.1 (0.8)	0.6	tr	tr	0.03	tr	tr	0.12	Quartz-Pyrite vein
	303.9-306.1 (2.2)	1.7	tr	tr	0.03	tr	tr	0.12	Quartz vein and silicified metasomatite
	309.3-315.8 (6.5)	5.0	0.6	tr	0.06	tr	tr	0.84	Skarn

Chapter 3 Bulutkan District

3-1 Geology and Ore Deposits in the Bulutkan District

The geology in the Bulutkan district is composed mainly of sediments of the Proterozoic Kokpatas Formation. The Kokpatas Formation, more than 1,000m thick, consists of slate and sandstone accompanied by quartzite-chert lenses, limestone and dolomite. Stocks and dikes of the Late Carboniferous ~ Early Permian syenodiorite, diorite, granite, porphyrite, lamprophyre, etc. intrude into these rocks(Fig. II-3-1-1).

Covering unconformably the Proterozoic and intrusive rock, the Cretaceous and the Quarternary Systems are distributed. The Cretaceous consists of marine mudstone, sandstone, conglomerates and dolomite whereas the Quarternary comprises continental silt, sand, gravels and gypsum.

Conspicuous faults in this district are with the NW-SE and NNW-SSE trends. Along the north side of a syenodiorite stock, the North Sautbay Fault extends, intersected by a fault with a NNW-SSE trend.

Mineralization has taken place at the intersection of the faults with NW-SE and NNW-SSE trends and at silicified veins and skarn ore bodies containing gold controlled by syenodiorite. Known in this district is the Bulutkan deposit.

1) Bulutkan deposit (Au)

Discovered in 1993, the Bulutkan deposit is situated 5.5km east of the Sautbay deposit, at the north contact zone of the syenodiorite body (Fig. II-3-1-2). The Kokpatas Formation around this deposit is composed of sandstone, slate, quartzite, limestone and dolomite, as well as those metamorphosed from these rocks, such as hornfels, silicified rocks, silicified-skarnized metasomatite and skarn.

Ore shoots of the ore body are in the WNW-ESE direction. Numerous dikes of lamprophyre, syenite, granite, etc. are distributed, intruding in the same direction.

Since the discovery in 1993, the Kokpatas Expedition carried out trenching and non-core drilling, which resulted in confirming that the deposit has a maximum thickness of 30m, an extension of 100m or more and a depth of more than 70m. The non-core drilling results to a depth of 70m indicated that the gold grade ranges from 1 to 420g/t (averaing 6.9g/t) but it is higher in the upper part (Au 3-50g/t) where some samples assay

100g/t or higher. In the lower part, the gold grade varies between 1.5 and 6g/t.

A quick estimation effected in the first year of the survey indicated the ore reserves of 342,000t averaging 6.9g/t, which represents 2.4t of gold.

The three drilling conducted during this fiscal year revealed that the upper part of the ore body is made up of gossan, fine-grained quartz and chalcedony, whilst, in the lower part, skarn accompanied by sulfide veins has undergone gold mineralization. Ferruginous oxidation products develop to a depth of 40m.

The main minerals of the silicified rocks in the upper part are quartz, chalcedony, natrojarosite, goethite, limonite and lepidochrocite, accompanied by pyrrhotite and gypsum. The lower part comprises hornblende-clinopyroxene skarn accompanied mainly by quartz, chlorite, pyrite, marcasite, pyrrhotite, arsenopyrite and chalcopyrite, and small quantities of scheelite, epidote and grossular.

Native gold is recognizable in quartz and chalcedony by macroscopic observation and microscopic observation of the polished sections.

It had been presumed from the past geological surveys on the surface that, in the Bulutkan district, a 600-700m-wide zone containing brecciated and ferruginizated, silicified rocks extends along the north side of the syenodiorite body, besides the mentioned Bulutkan deposit. To clarify the horizontal and vertical extension of the gold mineralization in this zone, trenching, geophysical and drilling surveys were conducted in this fiscal year.

The Uzbek-side exploration is ongoing in the district, which include trenching, drilling, geophysical surveys and prospecting tunneling. The exploration is expected to continue until 1998.

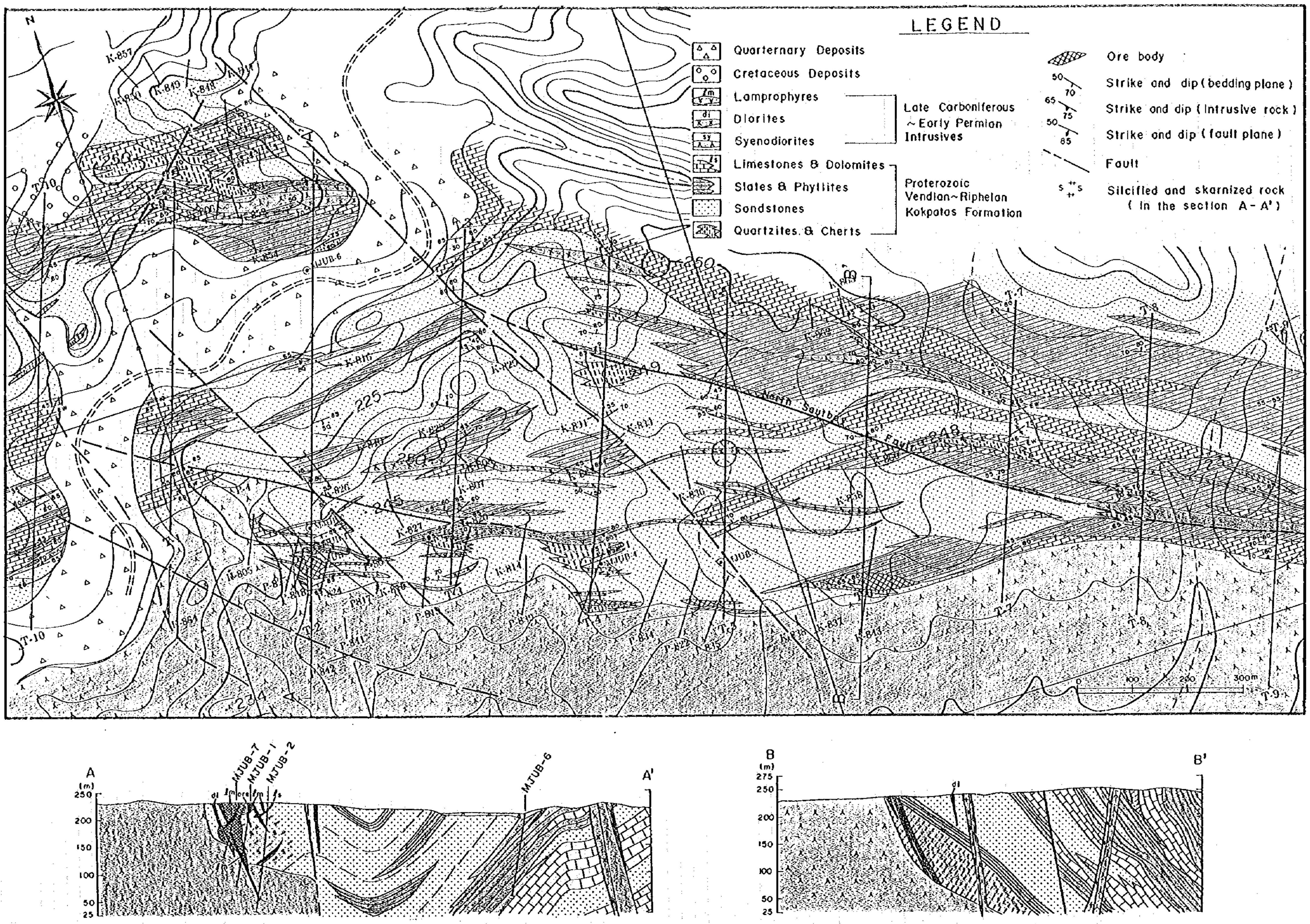


Fig. II-3-1-1 Géological Map and Cross Section of the Bulutkan District

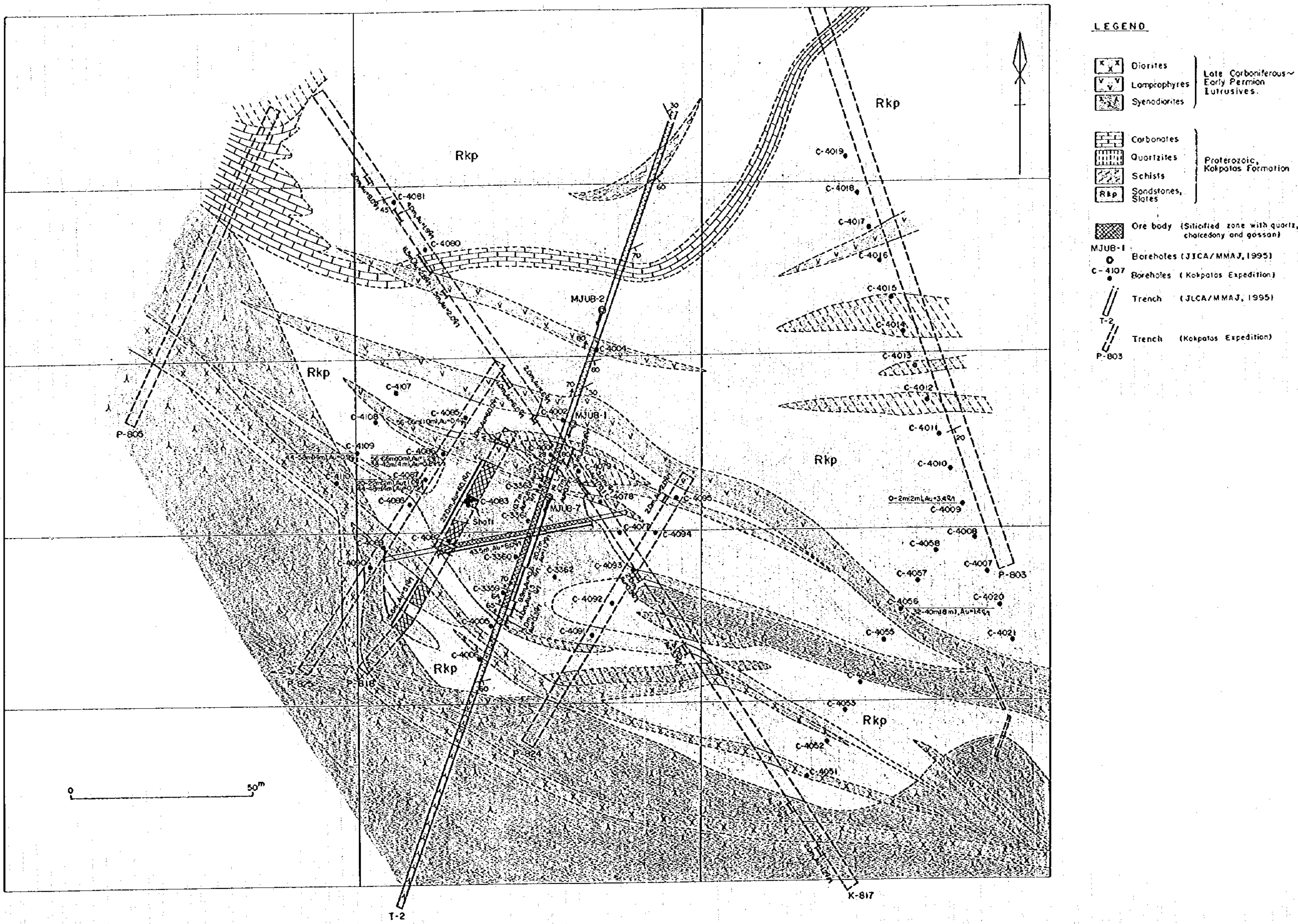


Fig. II−3−1−2 Geological Map of the Bulutkan Ore Deposit

3-2 Trenching Survey

3-2-1 Purpose of survey

The survey was aimed to grasp the metallogenic characters and to examine horizontal extension of the gold mineralization zone.

3-2-2 Methods of survey

In the area including the Bulutkan deposit and the known showings, 10 trenches were disposed at intervals of 250m in the direction of N20°E in order that they might cross at right angles the presumed strike of the mineralization zone. The trench T-2 was disposed so as to cross the center of the main ore body. Locations of the trenches are shown in Fig. II-3-2-1. The extensions of respective trenches are 500-800m, totaling 6,300m. At each of the trenches, observation and sketching of geology and mineralization, sample collection and laboratory tests were made. Extensions of the respective trenches are shown in Table I-1-3-1 while the laboratory test items and quantities appear in Appendix 2-1.

Trenching were performed with an excavator and manpower. Explosives were used when necessary. The trenches, about 1m wide, were dug to the maximum depth of 2m. Imediately before geological observation, the trench floor was cleaned by manpower.

Since most part of the side walls consists of sand or gypsum beds, or strongly weathered rocks, sketching of the floor was done with a scale of 1/1,000 and that of portions with mineral indications was done with a 1/100 scale. The sketches with 1/1,000 and 1/100 scales are demonstrated in PLs. II-3-2-1 and II-3-2-2, respectively.

The laboratory tests included chemical analysis of ores and rocks, microscopic observation of thin sections of rocks and polished sections of ores, X-ray diffractive analysis and measurement of homogenization temperature of fluid inclusions. As regards ore sample collection, some 10kg of samples were taken from 1~2m-long channels. As regards rock sample collection, 3-5kg of samples were taken from 2~5m-long channels or from several spots, at the trench floor, for analysis. The chemical analyses of ore samples are shown in Appendix 2-6(3) while Appendix 2-7(2) shows those of rock samples. The sampling points of those for the other laboratory test purposes are shown in the trench sketch in PL. II-3-2-1. The microscopic observation of the thin sections of rocks and the photomicrographs are exibited in Appendices 2-2 and 2-3, respectively. The microscopic observation of the polished sections of ores and the photomicrographs are exhibited in Appendices 2-4 and 2-5, respectively. The X-ray diffractive analysis is demonstrated in

Appendix 2-8, while Appendix 2-9 indicates the measurement of the homogenization temperature of fluid inclusions.

3-2-3 Results of survey

Observation findings are incorporated in the geological map with a 1/5,000 scale (Fig. II-3-1-1). The survey area is dominated by the Kokpatas Formation and syenodiorite stock, as well as dikes of lamprophyre, diorite and syenodiorite intruding into them.

At the district, faults develop in the NW-SE and NNW-SSE directions and fractures chiefly in the NW-SE ~ E-W directions. Many of the fracture zones are several decimeters to several meters wide. The main fault is the North Sautbay Fault in the NW-SE direction. Generally, the Kokpatas Formation strikes NW-SE ~ WNW-ESE at the northeast side of the North Sautbay Fault and E-W ~ ENE-WSW at the southwest side of the fault.

Along the faults and fractures, dikes of 20cm to several meters wide and silicification or skarnization alteration of several decimeters to several meters wide are frequently visible. In general, pyrite, limonite and hematite disseminated by diagenesis are recognized in slate and muddy sandstone at this district.

Conspicuous gossan zones observed at the trenches are listed below:

Trench T-1 : 371.6-372.8m

Trench T-2 : 214.5-257.7m

Trench T-3 : 192.2-192.7m

Trench T-4 : 165.0-174.0m

Trench T-5 : 152.2-153.2m, 156.5-163.5m

Trench T-6 : 201.2-201.5m, 211.5-216m, 220.7-223.4m

All these gossan zones strike WNW-ESE in the Kokpatas Formation alongside of the northern periphery of the syenodiorite body.

The main gold mineralization zones confirmed by the chemical analysis of ores are exhibited in Table II-3-2-2. Most mineralization zones strike WNW-ESE in the Kokpatas Formation along the northern periphery of the syenodiorite body. Some of the mineralization zones in the trenches T-2 and T-6 are situated off to the north of the syenodiorite body. They are located by the side of fractures and dikes.

At trench P-819 excavated by the Uzbek to the west of the southern tip of T-3, Au 74.7g/t was confirmed in a 2.0m-long section, while Au 31.0g/t was caught in a 8.0m-long section at P-822.

Anomalies in the rock chemical analysis are indicated in Fig. II-3-2-2. From the probability graphs of analysis values, thresholds by element were found. The thresholds by element are Au 35ppb, Ag 2ppm, Cu 200ppm, Pb 70ppm, Zn 300ppm, As 100ppm, Mo 50ppm. As for Bi and W, most samples were under the detection limits. The anomalies extracted are mostly accompanied by dikes or fractures. Gold anomalies are distributed in T-2, T-3 and T-7, all of which are in the vicinity of the syenodiorite body. At T-1, T-7 and at the southern tip of T-10, anomalies are visible in syenodiorite body near the border with Kokpatas Formation.

Ore minerals of samples collected from trenches are often altered by oxidation to goethite and lepidochrocite.

In the silicified rock samples T-2P6 taken from the Bulutkan ore body at the trench T-2, abundant native gold was recognized in quartz. In the silicified rock samples T-4P3 and T-4P6 taken from the trench T-4 and also in the silicified rock sample T-5P1 from T-5, minute quantities of a mineral, presumably native gold, were recognized in quartz. Besides native gold, pyrite, pyrrhotite, chalcopyrite, sphalerite and titanium minerals were recognized as ore minerals. The ore minerals are often altered to goethite and lepidochrocite due to oxidation.

By the X-ray diffractive analysis, quartz, hornblende, clinopyroxene, calcite, dolomite, ankerite and talc are recognizable as the mineral components of skarn samples. Dikes which have undergone silicification and skarnization comprise quartz and smectite or combinations of sericite and chlorite or kaolinite and feldspar. Natrojarosite is presumed to have been formed by oxidation of pyrite.

The samples for the measurement of homogenization temperature of fluid inclusions were vein or veinlets ~ network quartz or chalcedony(Appendix 2-9). In case of the samples collected from the Bulutkan deposit and the mineral showing zones near the syenodiorite body, the homogenization temperatures are in a range of 150°C-250°C, while samples from skarn or syenodiorite are in a range of 250°C-350°C. Samples from sedimentary rocks in the Kokpatas Formation away from syenodiorite are in a wide range from around 100°C to 300°C or higher.

3-2-4 Conclusive Summary and consideration

Syenodiorite body showing the border in the WNW-ESE direction intrude into the Kokpatas Formation at the Bulutkan district. Generally, at this district, fractures and faults develop in the NW-SE ~ E-W directions, along which dikes of lamprophyre, diorite and syenodiorite intrude abundantly. These dikes, also observable in syenodiorite body, were presumably formed after the intrusion of syenodiorite body. The fractures and dikes are accompanied by silicification and skarnization.

In the Kokpatas Formation, five of the main gold mineralization zones occur along the border with syenodiorite body. The mineralization zones strike WNW-ESE, accompanied by fractures, dikes or silicified rocks. The geochemical anomaly zones are recognized near the main mineralization zones, at small-scale silicification-skarnization zones accompanied by fractures and dikes, and also in syenodiorite body. From these facts, the mineralization at the Bulutkan district is considered to be accompanied by intrusion of syenodiorite body and controled by faults and fractures chiefly in the NW-SE ~ E-W directions. The strongest mineralization is seen in the Kokpatas Formation along syenodiorite body whilst, at zones away from syenodiorite bodies, it presumably extends all over the Bulutkan district along faults and fractures. The homogenization temperatures of fluid inclusions range from 150°C to 250°C or from 250°C to 350°C, depending on samples. The former is presumed to correspond to gold mineralization while the latter to skarnization. Gold mineralization is often observed overlapped with skarnization and is presumed to be accompanied by and related with activities of intrusive rocks. It is interpreted that the high-temperature skarnization was followed by lower-temperature gold mineralization.

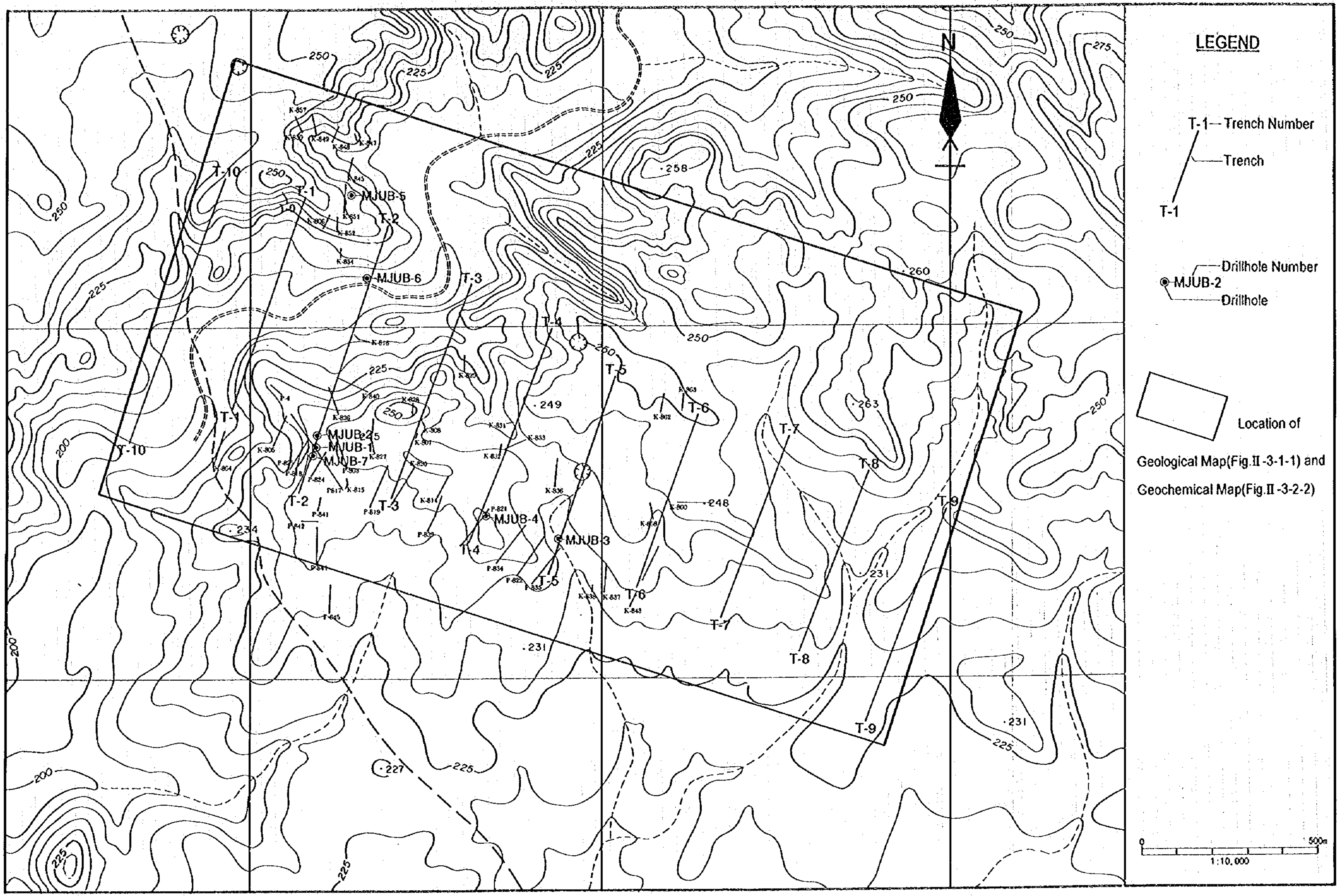
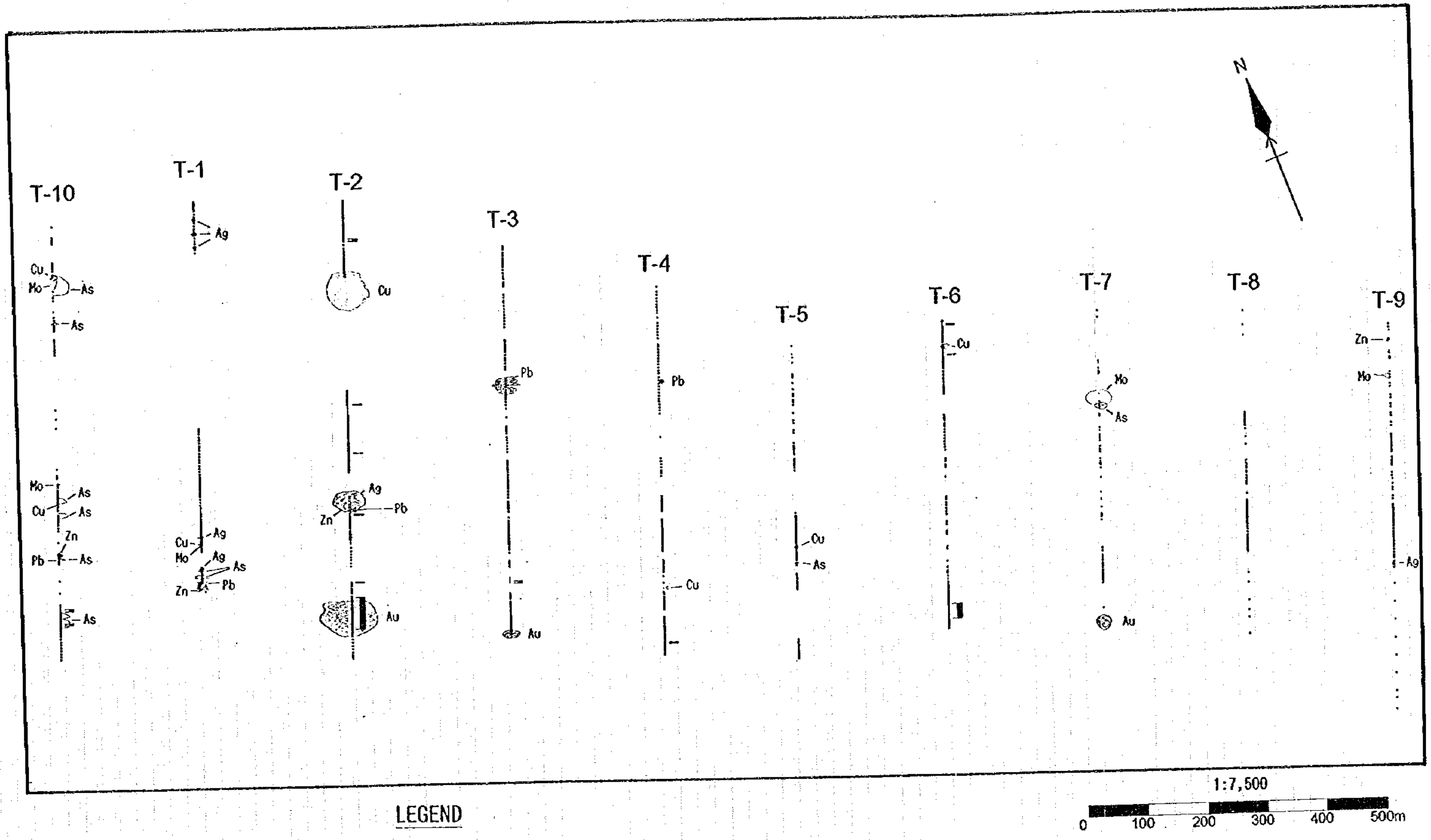


Fig. II－3－2－1 Location Map of the Trenches and Drillholes



LEGEND

Au≧35ppb

Ag≧2ppm

Cu≧200ppm

Pb≧70ppm

Zn≧300ppm

As≧100ppm

Mo≧50ppm

Major Au mineralized zones caught by assay results of the ore samples

+ Sampling point of ore samples

× Sampling point of rock samples

Fig. II−3−2−2 Anomaly Points of the Ore and the Rock Samples(Trenches)

Table II-3-2-1 Major Mineralized Zones Caught by Trenches

Trench No.	Position (m)~(m)	Length (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Remarks
T-2	211.5~214.5	3.0	0.3	1.7	0.04	0.01	tr	0.01	Silicified metasomatite with gossan and sandstone
	214.5~218.5	4.0	1.5	1.1	0.10	tr	tr	0.01	Silicified metasomatite with gossan
	218.5~228.4	9.9	0.6	1.6	0.11	tr	tr	0.04	Silicified metasomatite with gossan and chalcedony
	228.4~248.6	20.2	11.7	1.8	0.09	tr	tr	0.02	Silicified rock with gossan and chalcedony
	249.3~250.0	0.7	2.8	tr	0.03	tr	tr	tr	Silicified rock with chalcedony
	252.1~253.4	1.3	7.0	tr	0.02	tr	tr	tr	Lamprophyre and gossan
	256.0~257.7	1.7	0.7	tr	0.04	tr	0.02	tr	Gossan and quartzite
	260.2~264.3	4.1	2.4	tr	0.04	tr	0.03	0.05	Silicified quartzite
	287.9~290.0	2.1	1.2	tr	0.01	tr	tr	tr	Silicified sandstone with limonite
	401.1~403.7	2.6	0.3	tr	0.01	0.02	0.02	tr	Limestone and silicified sandstone
	507.2~508.2	1.0	0.2	tr	0.02	tr	tr	tr	Sandstone with limonite
	586.3~588.3	2.0	0.5	tr	tr	tr	tr	tr	Silicified sandstone with pyrite
	859.7~863.7	4.0	0.2	tr	0.01	tr	tr	0.01	Silicified rock(slate?)
T-3	253.8~259.8	6.0	0.2	tr	0.02	0.03	0.01	tr	Silicified and skarnized metasomatite with drusey quartz
T-4	171.0~174.0	3.0	0.4	0.7	tr	0.01	tr	tr	Silicified quartzite with drusey quartz
T-6	199.7~206.7	7.0	0.6	tr	0.04	0.01	tr	tr	Silicified quartzite, lamprophyre and silicified rock with gossan
	207.3~224.5	17.2	0.3	tr	0.04	0.02	tr	tr	Silicified rock with gossan and silicified quartzite
	642.5~644.5	2.0	0.2	tr	0.03	0.01	tr	tr	Altered dolomite and quartzite
	692.8~695.0	2.2	0.4	1.2	0.02	0.01	tr	tr	Silicified slate and dolomite
T-10	232.4~235.0	2.6	0.2	tr	0.05	tr	tr	tr	Silicified and skarnized sandstone with gossan
	237.0~239.0	2.0	0.3	tr	0.03	tr	tr	tr	Silicified and skarnized sandstone with gossan and lamprophyre
	253.5~261.0	7.5	0.2	tr	0.03	tr	tr	0.05	Skarnized dolomite and lamprophyre