

PART II RESULTS OF THE
PAHSE III SURVEY

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Chapter 1 Background of the phase III survey

1-1 Results of Phase I and II surveys

(1) Zalturbulak area

The Terektinsky Uplift area is located in the western end of Central Kazakhstan Devonian volcano-plutonic belt. This belt is believed to have a greater potential for economic copper-molybdenum mineralization as, over the last decade, porphyry copper-molybdenum-gold deposits such as Samarsky and Koktasjal have been found. In the Terektinsky Uplift area, the existence of porphyry system has been expected as many copper and gold manifestations were detected in the area. More than fifty mineral manifestations were explored in phase I and II survey. As the results of synthetic study of phase I and II survey, the Zalturbulak and Akmola areas were selected as the promising area for porphyry system.

The Phase I survey in Zalturbulak area was focused on evaluating the potential of the known mineralization occurrences by geological mapping and geophysical IP method. As the results of IP survey, possible porphyry systems have been identified at two locations in Central Zalturbulak prospect; one in the northeastern (West Aktau) and another in western parts (Western Zalturbulak).

Drilling survey (2 holes x 350m) and short drilling survey (50 holes) in order to confirm geology and geochemistry under soil cover were carried out in the phase II survey. High IP anomalous zone in Aktau West was confirmed to be a disseminated pyrite zone by deep drilling (MJTA-1). From the occurrence of sulfides and the geology of MJTA-1, diorite porphyry was considered to be responsible for the mineralization of the area. The diorite body distributed on the surface is bleached to white due to alteration comprising quartz and sericite. In this alteration zone, rock samples indicate relatively high gold and copper values and commonly contain chalcopyrite and bornite under microscope.

The other zone of high chargeability in the western part may also suggest a porphyry copper system. The surface geochemistry of this zone indicates elevated concentrations of copper and molybdenum in rocks.

(2) Akmola area

In Akmola area, geological mapping in phase I survey revealed that the area is characterized by a large quartz-sericite alteration zone (2.3km × 1.6km) surrounded by chlorite zone, which overprint a series of small stocks and breccia pipes.

Detailed geological mapping and geochemical survey using 70 short drillholes were carried out in phase II survey. As the results of these surveys, a sizeable area of relatively high molybdenum values in rocks was outlined in the central and northeastern part of the area, partly overprinting the zone of the anomalous area of copper values. Geological mapping also made clear that quartz porphyry stocks intruded into medium grained granite are located in the center of quartz-sericite alteration zone and the stockwork quartz with disseminated pyrite>calcopyrite widely distributed within the quartz porphyry stocks.

These features indicate that porphyry type mineralization may be concealed at a certain depth below surface.

1-2 Selection of drilling sites

Drilling survey focusing on porphyry system were carried out in Phase III.

(1) Zalturbulak area

1) Aktau West prospect

Two sites in overprinted high Au and Cu geochemical anomaly (Au>100ppb, Cu>300ppm) were selected for the inclined drilling survey. The sites are located in the marginal parts of the IP anomaly, as the center of IP anomaly may indicate the pyrite halo of a porphyry system.

2) Western Zalturbulak prospect

The center of the overprinted Cu and Mo geochemical anomaly was selected for the drilling survey.

(2) Akmola area

Mo anomaly zone and Au + Cu anomaly zone in the center of quartz-sericite alteration zone were selected for drilling sites. A sizeable area of relatively high copper and molybdenum outlined in the northeastern part of the area also picked up for two drilling sites.

Chapter 2 Drilling Survey

Central Zalturbulak prospect and Akmola area were selected as promising areas for porphyry type deposits on the basis of the results of Phase I and II surveys. The drilling survey was carried out in these two areas to confirm the occurrences of mineralization. The survey consists of two aspect; one is drilling works and the other is core observation and laboratory works. Drilling works is described in 2-1 and the results of core observation and various laboratory works are in 2-2 respectively.

2-1 Drilling works

(1) Outlines

MJTA-3 & MJTA-4 and MJTA-5 were drilled in West Aktau and Western Zalturbulak respectively in order to confirm the existence of ore body in the area of geochemical anomalous zone. In Akmola area, Mo-Cu geochemical anomalous zone and intense quartz-sericite alteration zone were selected as four exploration drilling sites. Drilling sites are shown in Figure II-2-1-1 and Figure II-2-1-2. The depth and inclination of each drillholes are shown in Table I-1-2-1, and time schedule of drilling survey is shown in appendix.

(2) Survey method

1) Drilling progress

The drilling progress of MJTA-3 to MJTA-9 are shown in Appendix 2 There were no major interruptions caused by problems, such as sloughing in the drillholes, mechanical breakdown. The average daily drilling rate of vertical drillholes and inclined drillholes were 32.0m and 28.0m respectively. The overall core recovery as a percentage of total length of drillholes was calculated to be as high as 98%.

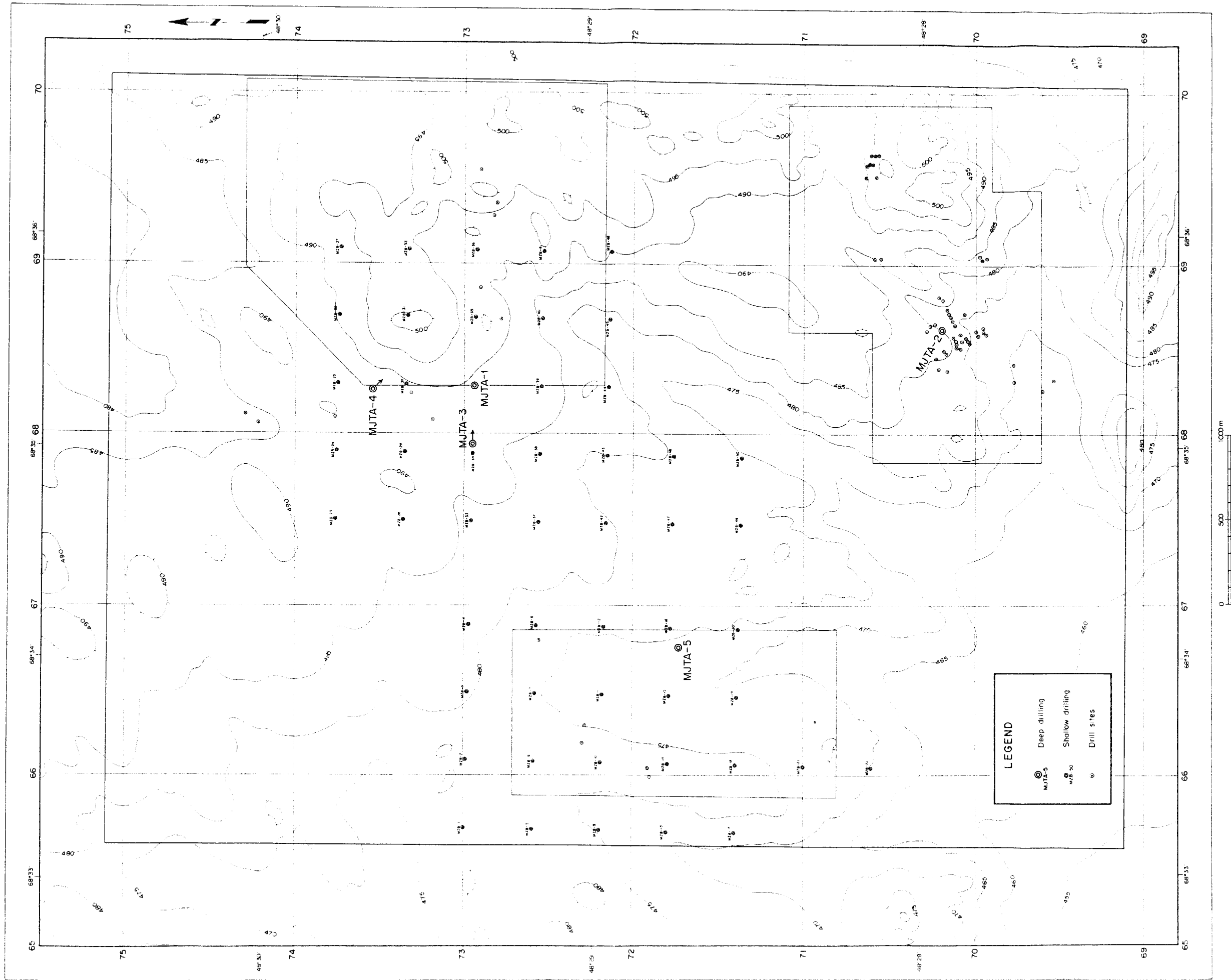


Figure II -2-1-1 Drilling Sites Map, Zalturbulak Area

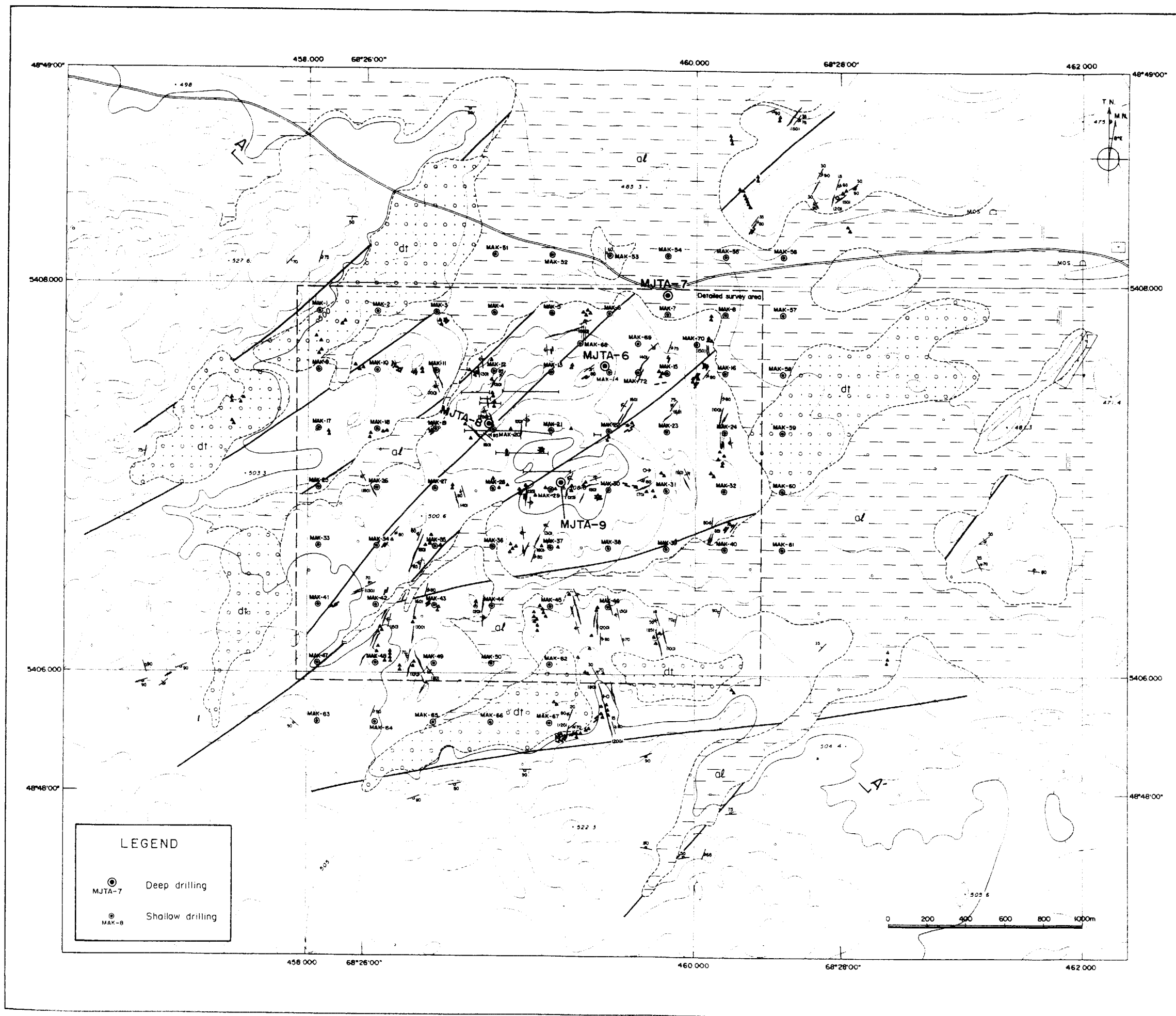


Figure II -2-1-2 Drilling Sites Map, Akmola Area

(b) Drilling works and drilling team

The drilling works were conducted by the drilling team of the Geophysical International under the supervision of the Japanese survey team. The drilling survey team consisted of one drilling operator, one to two assistant operator and four workers working in two shifts of 12 hours over a periods of drilling survey.

(c) Drilling equipment and Transportation

The drilling equipment and the amount of consumed materials used in deep drilling are listed in Appendix 3 and 4 respectively.

The drilling rig, pumps, derrick and other equipment were transported by truck. Water for drilling was transported from pits in Central Zalturbulak zone in Zalturbulak area and ponds nearby in Akmola area by tankers with 5m³ capacity.

(d) Drilling method

MJTA-3 to MJTA-9 were drilled by conventional and wire-line methods. The casing programs are shown in Appendix 2.

2-2 Core observation and laboratory works

(1) Core observation

Drilling core observation was carried out at the school ground of Terktin. Two geologists described the geology, alteration and occurrence of mineralization at the scale of 1/200. At the same time, samples for the various laboratory works were collected and all core pictures were taken.

(2) Supplementary geological survey

In order to compare the occurrences of mineralization zones between drilling cores and surface outcrops, geological survey was carried out during drilling survey terms. Samples for age dating were also collected in this survey.

(3) Laboratory tests and measurements

Many rocks were test in laboratory to check the nature of mineralization zone and geology. Table I-1-2-1 shows the amount of samples for laboratory test.

1) Thin section and polished section

In order to describe the main rock facies and mineral occurrence in mineralization zone, observation of thin section and polished section were carried out.

2) X-ray diffraction

To identify the alteration minerals, X-ray diffraction analysis was carried out. Bulk samples were mainly used for this study. Some samples, which contain a lot of clay, were checked after hydraulic elutriation.

3) Chemical analysis

(a) Au,Ag,Cu,Pb,Zn,Mo and S : Core samples were analyzed for Au,Ag,Cu,Pb,Zn,Mo and S. Basically, cores of three meter length were used for analysis, however cores of more short length were also analyzed in case of the complicated geological and/or intense mineralized /altered sections. Fire Assay method was applied for Au analysis. Atomic absorption method, colormetric analysis and gravimetric method were applied for Ag, Cu, Pb, Zn, Mo and S respectively.

(b) Whole rock chemical analysis :

In order to clarify the chemical characteristics of host rocks of mineralization zone, whole rock chemical analysis was carried out by X-ray fluorescence analysis. The elements analyzed are SiO₂, TiO₂, Al₂O₃, Fe₂O₃, FeO, MnO, MgO, CaO, K₂O, Na₂O₃, P₂O₅ and Cr₂O₃

4) K-Ar Age

A total of five samples of intrusive rocks were submitted for K-Ar Age determination, in order to confirm the age-dating results obtained in the previous two years' investigations. The age determination was made on whole-rock basis.

The results of these tests and measurements are shown in Appendix 5 ~11.