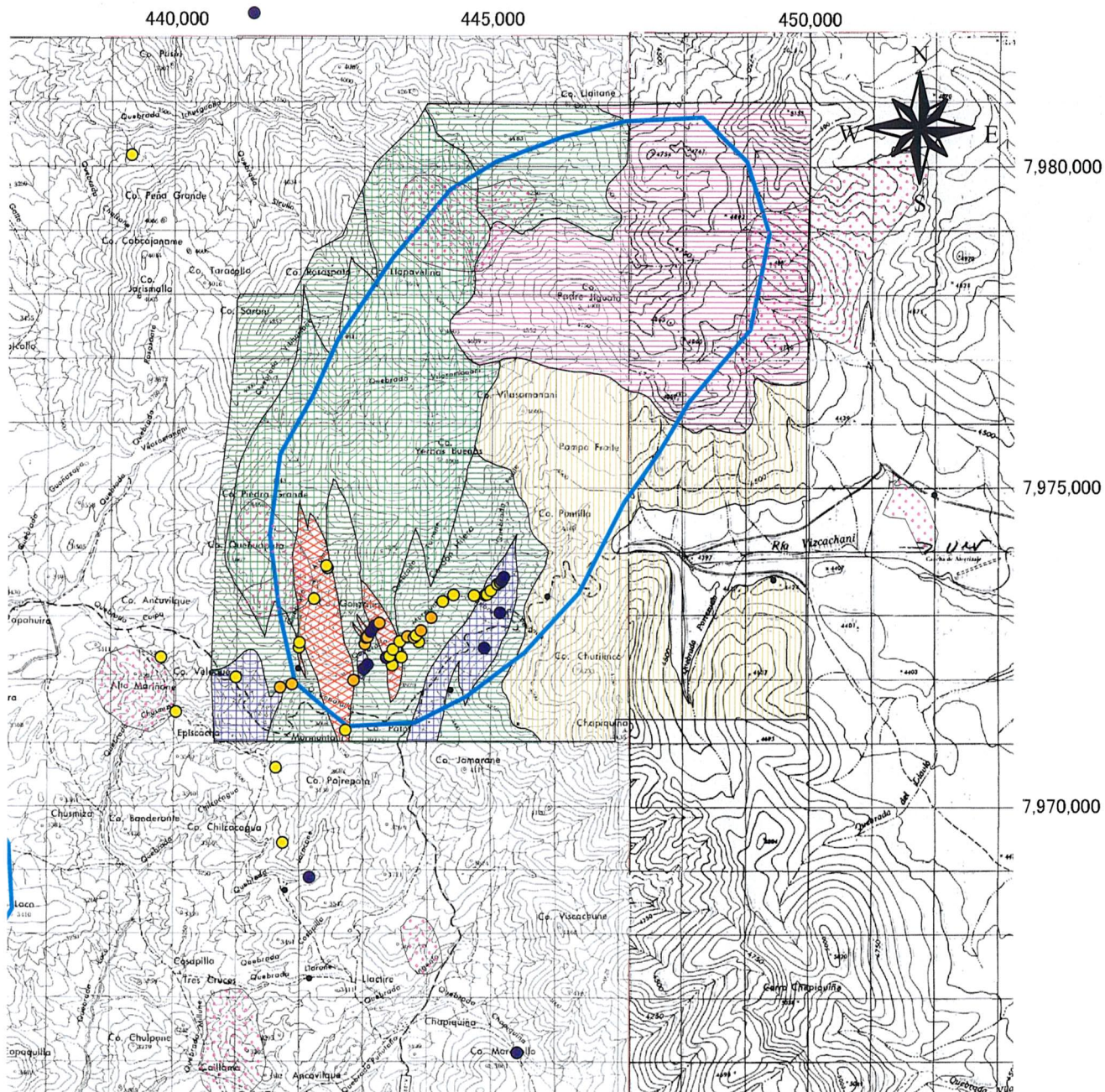


- Mineralization**
- Pyritization
 - Cu-oxide
 - Cu-sulfide
 - Molybdenite
 - Oxidation
 - Native sulfur
 - Barite-limonite vein
 - none
- Geomap_Putre_S**
- Qal (Recent sediments)
 - Qv (Quaternary-Tertiary volcanics)
 - Qvr (Quaternary-Tertiary ignimbrite)
 - Kv(s) (Cretaceous volcanics)
 - Intrusive rocks
 - Qp (Quartz porphyry)
 - Di, Dip (Diorite, Diorite porphyry)
 - Tgd (Tertiary granodiorite)

0 1 2 km

Fig. 2-1-49 Mineralization Map of the Area to the South of Putre



- Alteration**
- Silicification
 - Acid alteration
 - Sericitization
 - Propylitization
 - Potassic alteration
 - Tourmalinization
 - none
- Alteration zone (from TM images)**
- Semi_detailed_survey_area
- Geomap_Putre_S**
- Qal (Recent sediments)
 - Qv (Quaternary-Tertiary volcanics)
 - Qvr (Quaternary-Tertiary ignimbrite)
 - Kv(s) (Cretaceous volcanics)
 - Intrusive rocks
 - Qp (Quartz porphyry)
 - Di, Dip (Diorite, Diorite porphyry)
 - Tgd (Tertiary granodiorite)

0 1 2 km

Fig. 2-1-50 Distribution Map of Alteration Minerals at the Area to the South of Putre

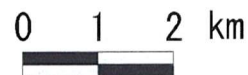
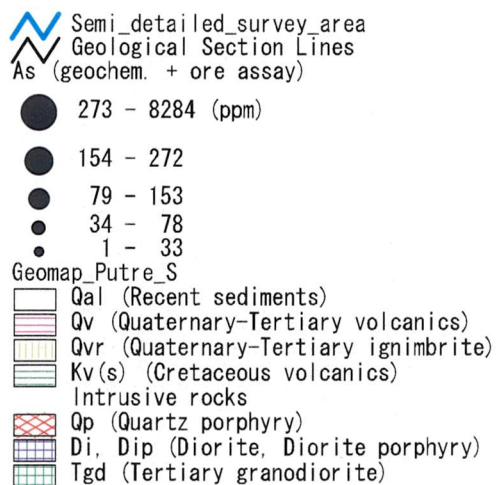
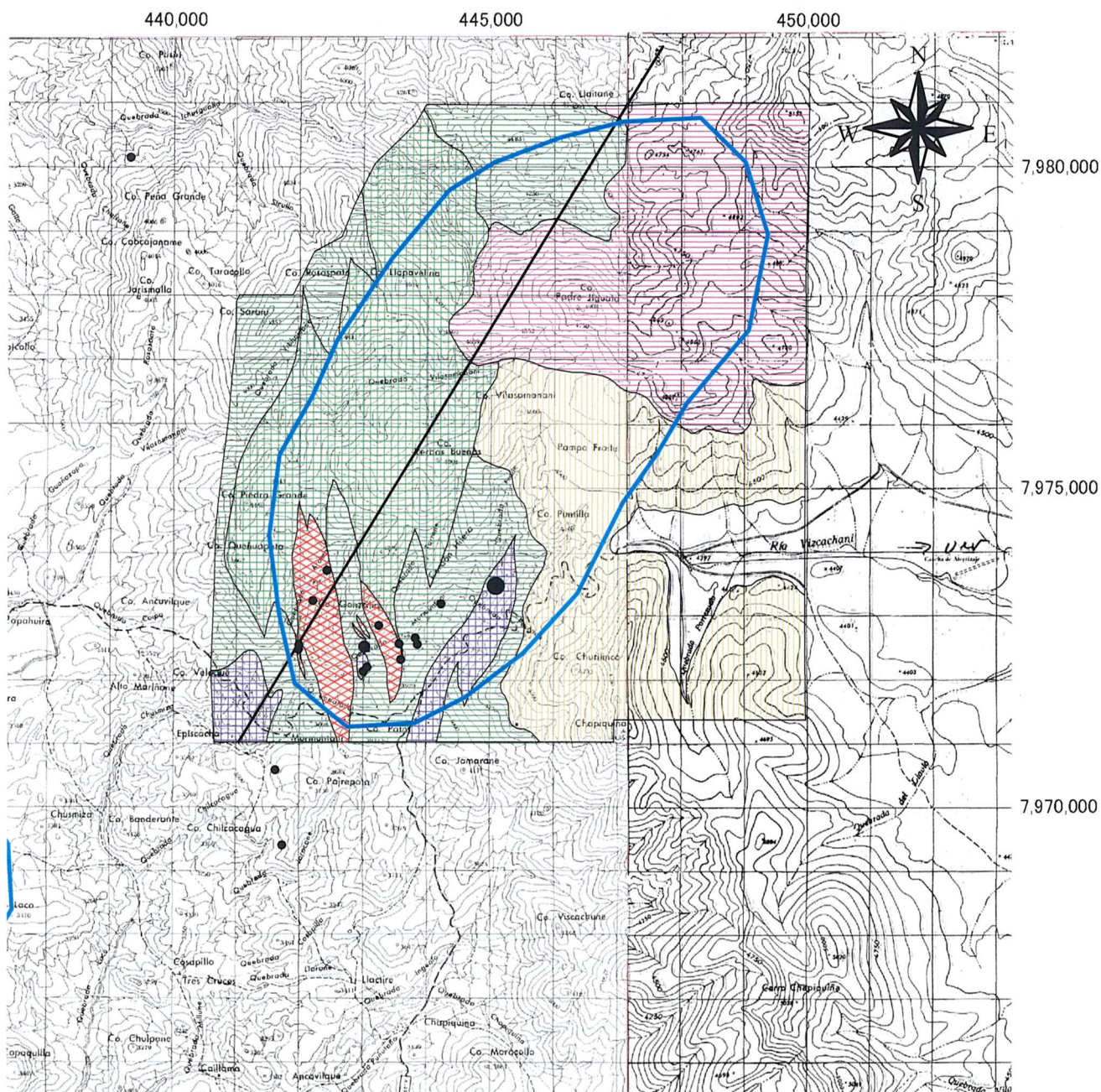


Fig. 2-1-51 (2) Geochemical Anomaly Map in the Area to the South of Putre (As)

System, Quaternary System and intrusive bodies.

The Upper Cretaceous System is composed of basaltic~rhyolitic lava and is intruded by Tertiary intrusive bodies. These intrusive rocks are granodiorite, diorite, diorite porphyry, and quartz porphyry. The K-Ar ages of these rocks are; 13.7 ± 0.5 Ma for whole-rock diorite, 17.1 ± 0.5 Ma (biotite), 14.1 ± 0.6 Ma (whole rock), for diorite porphyry, 13.7 ± 0.7 Ma (whole rock) for quartz porphyry. This result indicates intrusive activities in Miocene. The Upper Cretaceous System and the above intrusive rocks are overlain unconformably by Upper Tertiary-Quaternary System.

The Upper Tertiary-Quaternary System is composed of lower layer consisting of ignimbrite (rhyolitic welded tuff • tuff breccia), and unconformably overlying basaltic~andesitic lava.

Quaternary System consists of alluvium.

In this area, sericitized-silicified zones are widely developed in the above intrusive bodies and the Upper Cretaceous units nearby. Also kaolinized and silicified zones are developed in the Upper Tertiary-Quaternary formations. Pyrite dissemination is developed in the former alteration zones and limonite dissemination in the latter.

Zn-As anomalies were detected by rock geochemical survey.

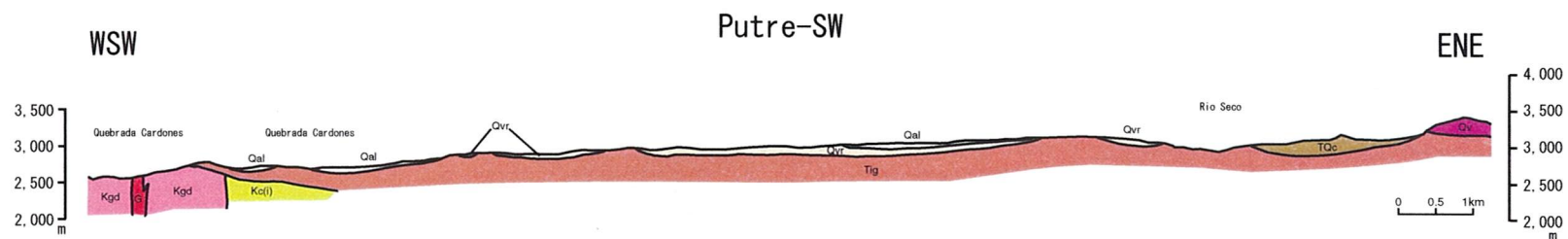
The above alteration-mineralization zones are located within intermediate airborne magnetic intensity zones, overlapping zones of medium wavelength low magnetic anomaly and short wavelength high magnetic anomaly zones and the vicinity.

1-2-12 Area to the southwest of Putre

A geological map of this area is shown in Figure 2-1-52 and schematic geological columns in Figure 2-1-53.

The geology of this area is composed of Upper Cretaceous-Lower Tertiary intrusive bodies, Neogene System, Upper Neogene-Quaternary System, and Quaternary System.

The Upper Cretaceous-Lower Tertiary intrusive bodies consist of granodiorite and granite. The K-Ar age determined during the present survey for the two rocks resulted in 65 ± 2 Ma (biotite) for both rocks.



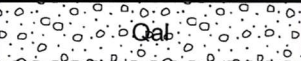




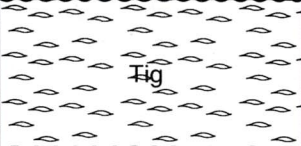
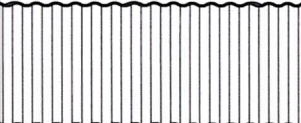

Geologic Time			Columnar Section	Lithology	Intrusives	Mineralization
CENOZOIC	QUATERNARY	HOLOCENE		Alluvium		
	QUATERNARY ~ TERTIARY			Basalt lava		
				Pumice tuff		
				Conglomerate		
	TERTIARY	PLIOCENE ~ MIOCENE		Welded tuff		
		PALEOGENE				
MESOZOIC	CRETACEOUS	LATE				
		EARLY		Sandstone		

Fig. 2-1-53 Schematic Stratigraphic Columns and Profiles of the Area to the Southwest of Putre

Neogene System consists of Miocene-Pliocene ignimbrite (rhyolitic welded tuff).

The Upper Neogene-Quaternary System consists of, from bottom upward, conglomerate, ignimbrite (pumiceous tuff), and basalt lava, and these units have unconformable relation with each other.

The Quaternary System consists of alluvium.

Weak propylitization occurs in the above intrusive rocks in this area, but mineralization is not observed.

Rock geochemical anomalies are not detected in this area.

Geologic features characteristic in other survey areas, in intermediate airborne magnetic intensity zones, and in the overlapping parts of the peripheral zones of medium wavelength high magnetic anomaly and medium wavelength low magnetic anomaly do not occur in this area.

1-2-13 Area to the east of Arica

The sampling sites of this area are shown in Figure 2-1-54, geological map in Figure 2-1-55, schematic geologic columns in Figure 2-1-56, mineral showings in Figure 2-1-57, distribution of altered minerals in Figure 2-1-58, and rock geochemical anomaly distribution in Figure 2-1-59.

The geology of this area is composed of Upper Jurassic System, Lower Cretaceous System, Tertiary System, Quaternary System, and intrusive bodies.

The Upper Jurassic System consists of shale and marble, and skarnization with amphiboles is observed near granodiorite intrusion.

The Lower Cretaceous System consists of sandstone.

The Upper Jurassic and Lower Cretaceous System are intruded by granodiorite bodies. The primary K-Ar ages of intrusion are; 66 ± 2 Ma (biotite) and 68 ± 2 Ma (biotite) and those for alteration are, 57.4 ± 2.1 Ma (whole rock) for kaolinized rocks and 66 ± 2 Ma (whole rock)

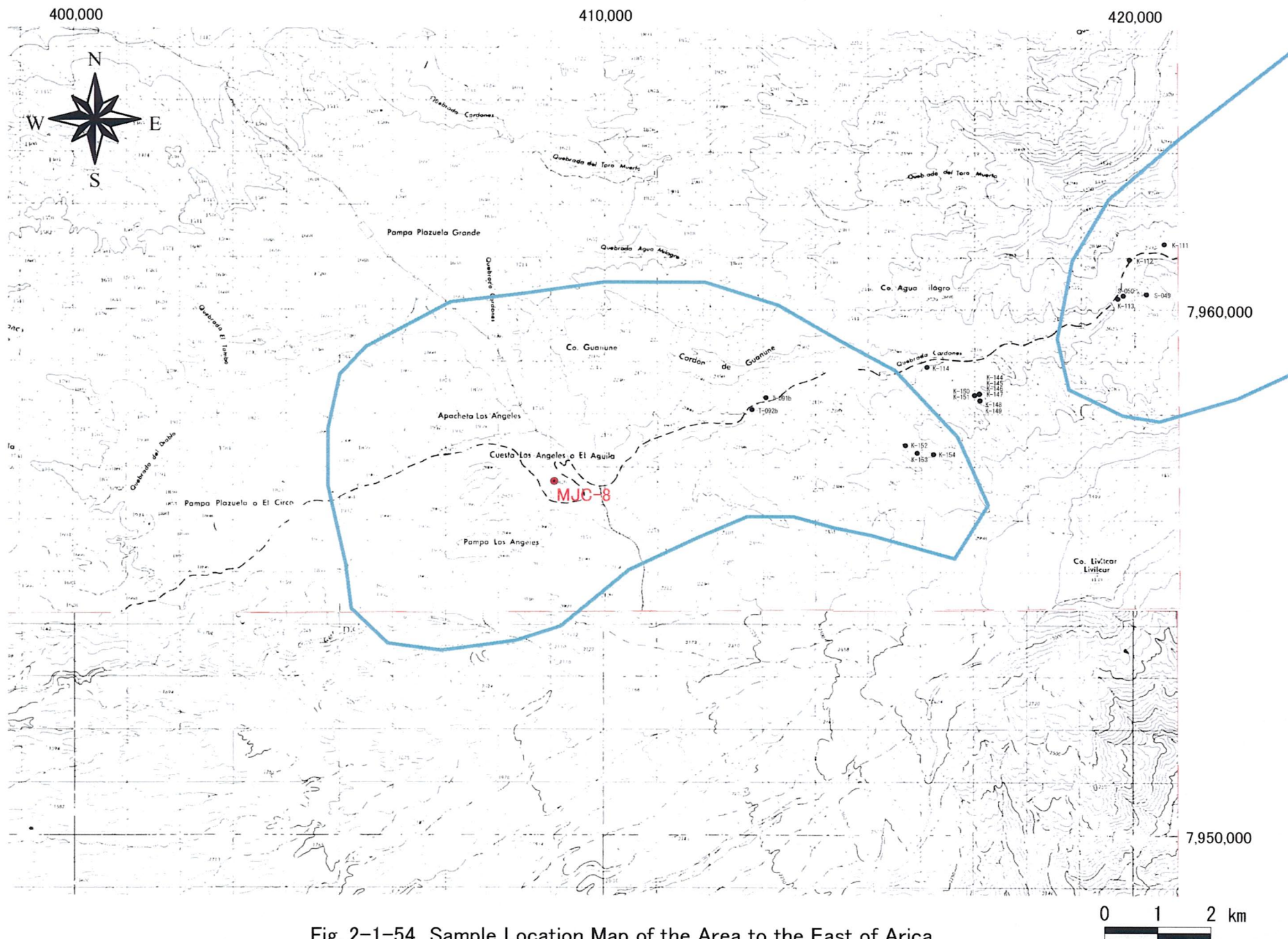


Fig. 2-1-54 Sample Location Map of the Area to the East of Arica

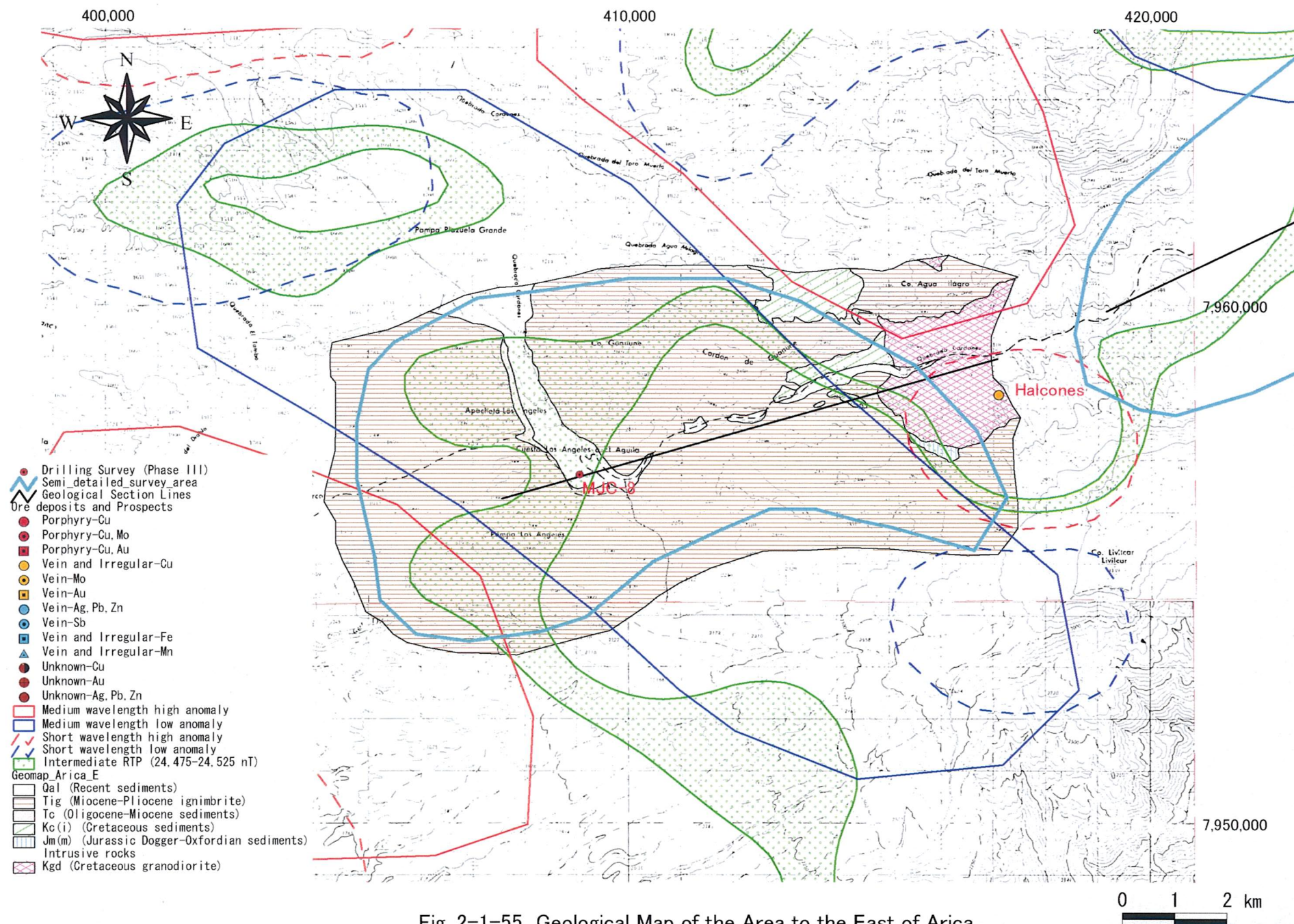
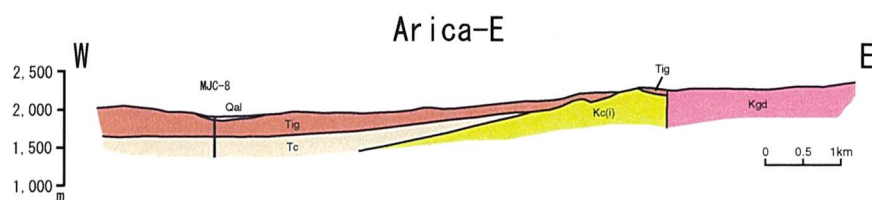


Fig. 2-1-55 Geological Map of the Area to the East of Arica



Geologic Time		Columnar Section	Lithology	Intrusives	Mineralization
CENOZOIC	QUATERNARY	HOLOCENE	Qal	Alluvium	Vein type (Cu, Pb), Skarn (contact metamorphism)
	TERTIARY	PLIOCENE ~ MIOCENE	Tig	Welded tuff Pumice tuff	
		MIOCENE ~ OLIGOCENE	Tc	Conglomerate	
		EARLY			
MESOZOIC	CRETACEOUS	LATE		Granodiorite (Kgd) ↑ Granite (G) ↑	Vein type (Cu, Pb), Skarn (contact metamorphism)
		EARLY	Kc(i)	Sandstone	
	JURASSIC	LATE	Jm(m)	Alternation of marble and shale	

Fig. 2-1-56 Schematic Stratigraphic Columns and Profiles of the Area to the East of Arica

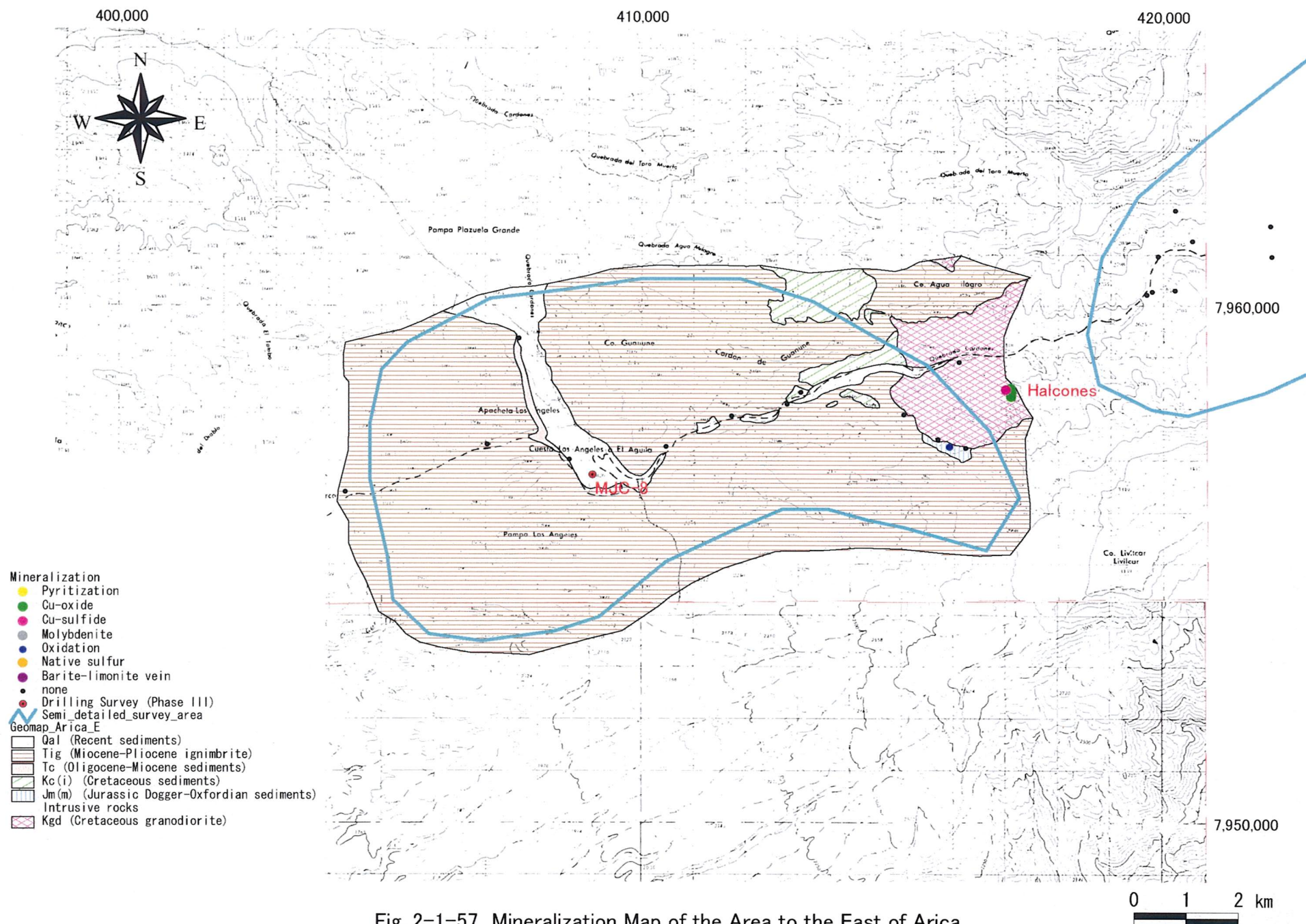


Fig. 2-1-57 Mineralization Map of the Area to the East of Arica

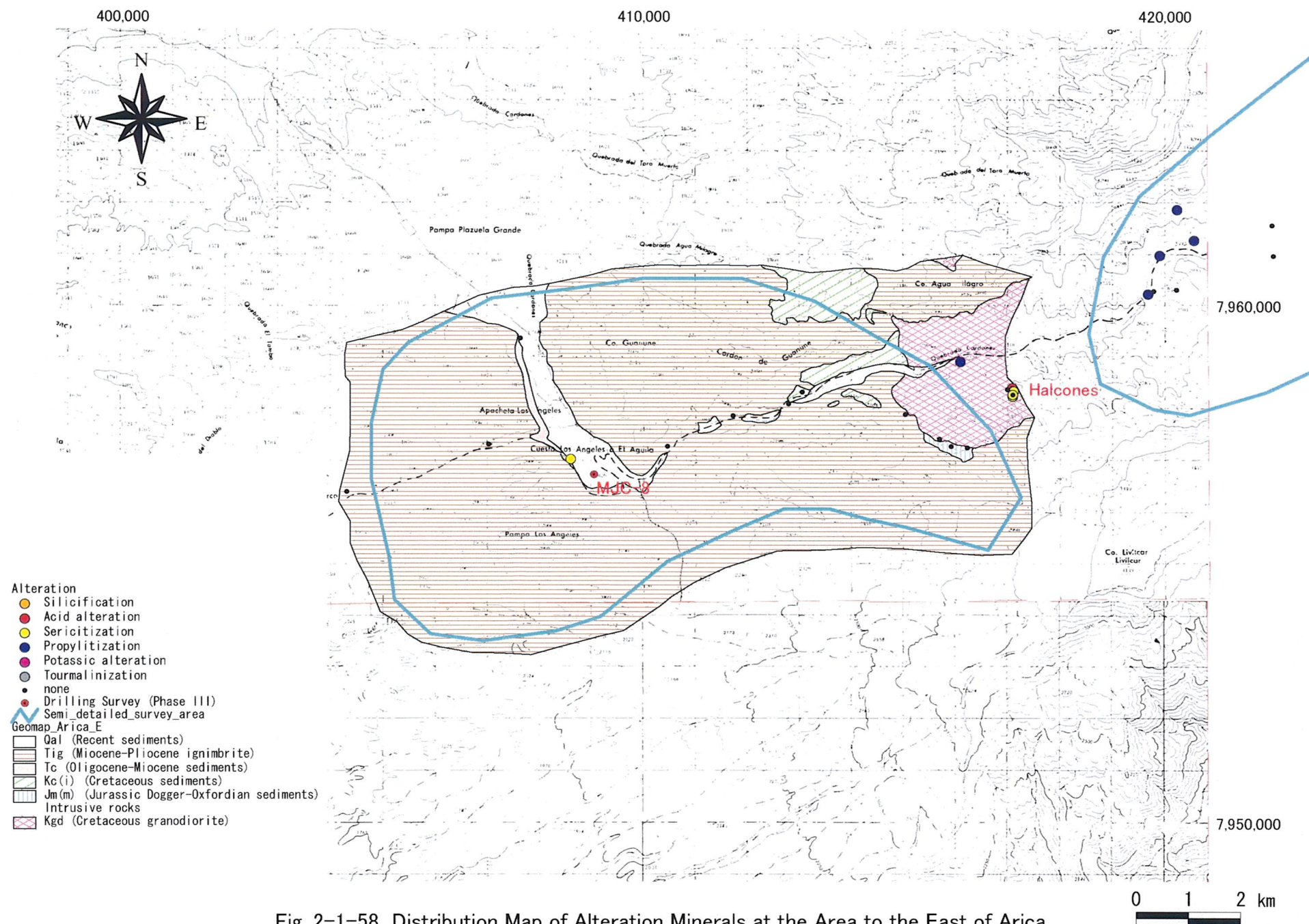


Fig. 2-1-58 Distribution Map of Alteration Minerals at the Area to the East of Arica

Fig. 2-1-59 (1) Geochemical Anomaly Map in the Area to the East of Arica (Au)