No. 33

REPORT

ON

THE MINERAL EXPLORATION

IN

VANUA LEVU

THE REPUBLIC OF FIJI

PHASE III

FEBRUARY 1998

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

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PREFACE

In response to the request by the Government of the Republic of Fiji, the Japanese Government decided to conduct a mineral exploration project in Vanua Levu and entrusted the survey to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

The survey conducted during this fiscal year is the third-phase of a three-phase project to be completed in 1998. JICA and MMAJ sent a survey team to the Republic of Fiji headed by Mr. Osamu Miyaishi from 23 June to 25 September 1997.

The team exchanged views with the officials concerned of the Government of the Republic of Fiji and conducted a field survey in Vanua Levu. After the team returned to Japan, further studies were made and a report on the third phase of the exploration project was prepared.

We hope that this report will be useful for the development of the Republic of Fiji and contribute to the promotion of friendly relations between our two countries.

We wish to express our deep appreciation to the officials concerned of the Government of the Republic of Fiji for close cooperation extended to the Japanese team.

February 1998

Kimio Fujita
President,
Japan International Cooperation Agency

Hiroaki HIYAMA
President,
Metal Mining Agency of Japan

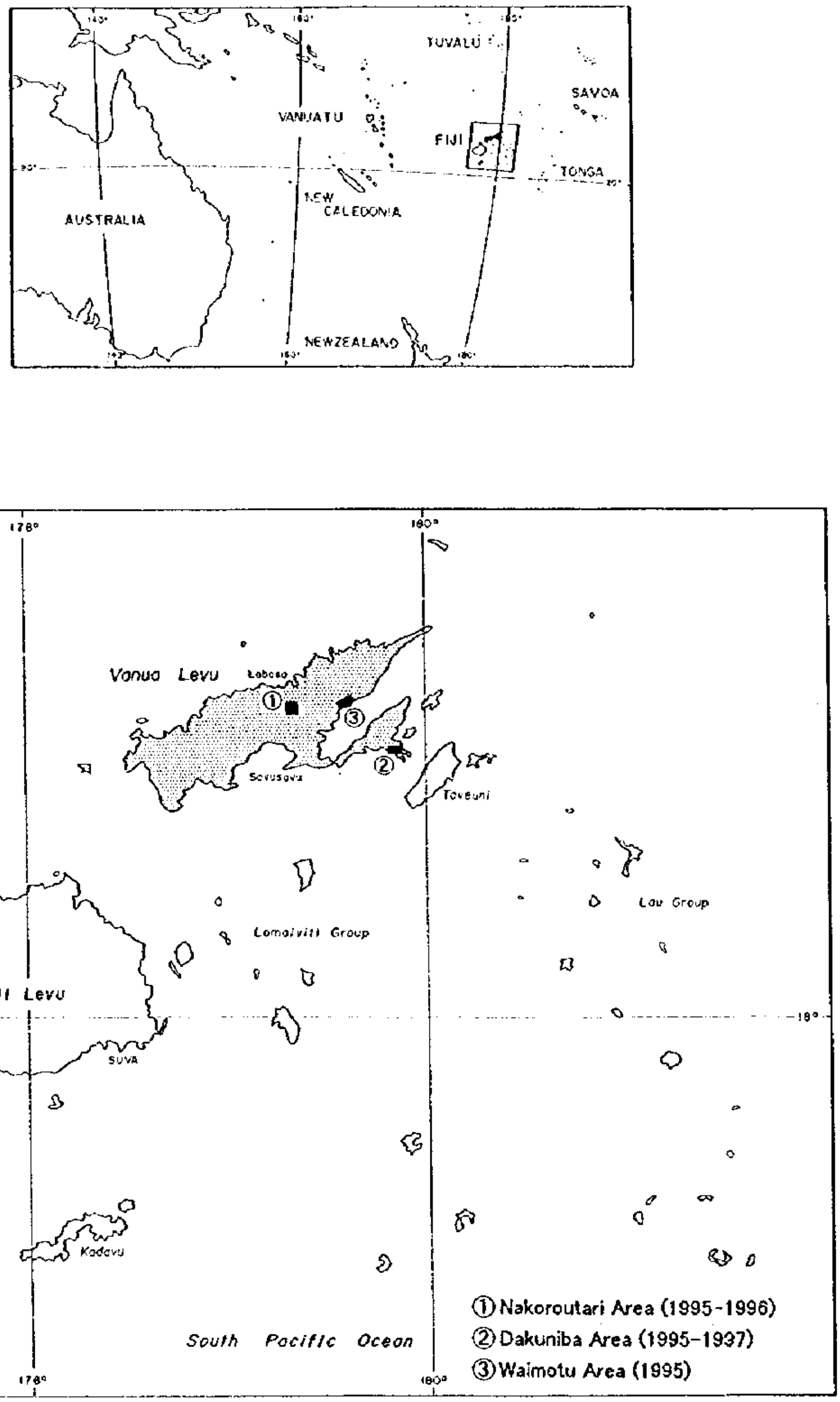

Fig. 1-1 Index Map of the Survey Area

SUMMARY

During the third year of the Vanua Levu mineral exploration project, drilling was carried out in the Dakuniba Area. Three holes were drilled. One hole was 300 m long, and the other two 400 m and thus a total length of 1,100 m was drilled.

The target for the drilling carried out this year—1997—was the confirmation of the extent of the gold mineralization intersected by drill hole MJFV-5, and this was accomplished by the three holes drilled during this third year, namely MJFV-7, -8, and -9. All three holes encountered argillized zone accompanied by silicified breccia. The existence of this zone in these drill holes was inferred from the results of the investigation of surface outcrops and trenches, and drilling at MJFV-4, -5, and -6 carried out during the previous year. The geological conditions and mineralization clarified by the drilling are summarized below.

MJFV-7 penetrated argillized zones with quartz breccia and silicified breccia at depths of 226.60-228.00 m (1.40 m thick), 249.90-253.70 m (3.80 m), and 259.10-260.20 m (1.10 m). The grade was 0.41g/t Au, 0.47g/t Au, and 0.27g/t Au, respectively. Of the above gold-bearing horizons, the grade at 227.50-227.60 m (0.10 m thick) and 251.05-251.20 m depths (0.15 m thick) was 2.3g/t Au and 3.1g/t Au respectively, exceeding 1 g/t Au.

MJFV-8 confirmed the existence of the mineralized zone at three horizons. The zone encountered at the depth of 116.80-130.30 m (13.50 m thick) was a clay vein including a silicified zone. The grade was 0.23g/t Au at depths of 116.80-117.25 m (0.45 m thick), 0.55g/t Au of 118.10-118.60 m (0.50 m), 0.64g/t Au of 122.10-123.80 m (1.70 m), 0.32g/t Au of 124.30-124.70 m (0.40 m), 0.63g/t Au of 125.10-127.70 m (2.60 m), and 1.9g/t Au of 128.15-129.25 m (1.10 m). The altered zone at 141.45-141.70 m (0.25 m thick) and 142.60-143.00 m depths (0.40 m thick) contained 0.47g/t Au and 0.47g/t Au respectively. The gold content of the silicified zone at 279.90-280.70 m depth (0.80 m thick) was less than 0.08g/t Au.

In MJFV-9, there are many quartz-calcite veins between 87.20 and 93.35 m depth, and gold content of 1.01g/t Au, 0.46g/t Au, and 0.34g/t Au was confirmed at 87.20-87.30 m (0.10 m thick), 88.10-88.45 m (0.35 m thick), and 90.70-94.75 m (4.05 m thick) respectively. The interval at 93.75-94.05 m (0.30 m thick) showed particularly high gold content of 2.3 g/t Au, the highest value of MJFV-9.

The major ore zones encountered by the three drill holes (MJFV-7, -8 and -9); namely the three zones at 226.60-260.20 m depth of MJFV-7, silicified argillized zone at 116.80-130.30 m depth of MJFV-8, and the quartz-calcite veinlet zone at 87.20 to 95.35 m depth of MJFV-9 were confirmed to be continuous to the quartz breccia-bearing silicified breccia clay zone encountered in MJFV-5 with a

WNW-ESE strike. Thus, the continuity of the mineralized zone inferred from the results of the second year survey to exist for 700 m from MJFV-4 to -6 was confirmed in the subsurface part of the area. The assay results of these cores, however, are lower than that of MJFV-5. The gold grade distribution above indicates that the ore resources delineated during the second and third years are small. However, since widespread gold mineralization was confirmed in the Nagagani Creek Area, it is believed that the other parts of the present survey area has sufficient mineral potential for further exploration.

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PART I OVERVIEW

Chapter 1 Introduction

1-1 Background and Objectives

In response to the request by the Government of the Republic of Fiji to conduct mineral exploration in Vanua Levu, the Japanese Government dispatched a mission to discuss the details of the project. As a result of the consultation between the Mineral Resources Department (MRD) of the Ministry of Lands, Mineral Resources & Energy, and Metal Mining Agency of Japan, an agreement was reached for cooperative exploration in Vanua Levu. The "Scope of Work" (SW) was signed by the representatives of both governments in August 1995. The objective of this project is to explore and assess the mineral potential of the survey area through geological survey, geochemical exploration, geophysical exploration and drilling during three year period from 1995 to 1998.

The survey carried out during Fiscal 1997 is, thus, the third phase of the project.

The first phase of this project was carried out in Fiscal 1995. The objective of that phase was to clarify the geological environment and thereby understand the occurrence and conditions of ore deposits of Vanua Levu Island. The work carried out included; compilation of available geological information and data concerning the whole island (areal extent 6,000 km^2), geological survey of the three areas, Nakoroutari, Waimotu and Dakuniba Areas, and geophysical survey in the Nakoroutari Area.

The second phase was carried out during Fiscal 1996. The objective of this phase was the exploration of the promising zones which were extracted by the first phase survey. The second phase comprised drilling of both three localities within the Nakoroutari Area and the Dakuniba Area, respectively.

The third phase was carried out during Fiscal 1997. The objective of this phase was the exploration of the mineralization zone which was encountered by the MJFV-5 drill holes during the second phase survey. The third phase comprised drilling at three localities within the Dakuniba Area.

1-2 Conclusions of the Second Phase Survey and Recommendations for the Third Phase

1-2-1 Conclusions of the Second Phase Survey

Gold showings were confirmed in all three drilling (MJFV-4, -5, -6) in this area. In MJFV-5, 2.20 m wide zone with 11.3 g/t Au was confirmed at depth of 121.45-123.65 m, and within this mineralized zone, 122.75-123.35 m depth contained 27.6 g/t Au with a width of 0.60 m. It is highly possible that this vein is continuous to that encountered at 190.40 m depth in MJFV-4 (0.90 m wide, 4 samples average 0.451 g/t Au).

Many quartz veinlets were encountered in MJFV-6. MJFV-5 is at a distance of about 550 m and the correlation between the ores of these two drill holes is difficult, but they lie within a WNW-ESE trending mineralized zone which is inferred on the surface. The veins confirmed in MJFV-6, aside from the above are many quartz veinlets in the shallow (55-96 m) part, and pyrite dissemination-silicification-argillization zone in the deeper parts (near 225-300 m). Although these are low grade to barren, they are very interesting.

As above, gold mineralization, and the associated fissure system and alteration were clarified by the three holes drilled during the second phase survey. These agree largely with the strike and dip of the mineral showings on the surface, confirming the continuation of the mineral showings into the deeper subsurface zones. The mineralization confirmed at MJFV-5 was promising and it was necessary to clarify the extension of the veins laterally and vertically toward MJFV-6.

1-2-2 Recommendations for the Third Year

In MJFV-5, a promising gold mineralization zone was encountered at depth of 121.45 to 123.65 m. The width and gold values of the samples indicated that the potential of ore emplacement of this zone is continuous to the outcrop to the surrounding area. However, geologic knowledge that had been clarified by the first and second phases survey was not enough to judge the continuity of the mineralization zone. Further drilling near the MJFV-5, therefore, was recommended to clarify the details of the gold mineralization in the area.

1-3 Outline of the Third Phase Survey

1-3-1 Survey Area

The island of Vanua Levu is approximately 180 km east-west, 35 km north-south and approximately 5,500 km^2 in areal extent. It is located at latitude 16°07'S to 17°01'S and longitude 178°'29'E to 179°57'W, and is approximately 2,800 km east of the eastern coast of Australia, approximately 2,000 km north of New Zealand and approximately 2,000 km south of the equator.

The major population centers are developed along the coast, namely Labasa, Savusavu and Nabouwalu. Entrance to Fiji is via air and usually through the international airport at Nadi on Viti Levu. Flight from Viti Levu to Vanua Levu by commercial airplane takes 25 to 55 minutes via either Nadi or Nausori near Suva. Existing roads circle the island except for the northeastern part. The majority of the main roads between Labasa and Savusavu, and Labasa and Nabouwalu is paved.

1-3-2 Objective of the Survey

The survey for the present fiscal year (1997) was carried out with the objective of clarifying the geologic conditions and the mineral occurrences of the Dakuniba Area by drilling.

In this area, the mineralization occurs within the andesitic rocks of the Natewa Volcanic Group and is observed in the quartz veins and brecciated zones which are controlled by faults (Figs. 1-4 and 1-5). This mineralized zone extends continuously for 3.2 km and gold showings were confirmed by drilling carried out during the work of the previous year, namely by drill holes MJFV-4, -5 and -6. Of these holes, MJFV-5 had the highest gold grade and the major objective of the work during the present year was to confirm the continuity of this gold mineralization.

1-3-3 Survey Methods

The survey for the present year consisted of drilling. It was carried out as follows.

(1) Amount of work

The work carried out during the third phase comprises solely of drilling. The amount of work is shown in Table 1-1.

Table 1-1 Amount of Work

Area	Amount of work			
	Hole no.	Azimuth	Inclination	Drilling length
Dakuniba Area	MJFV-7	S70° W	-45°	400.10 m
	MJFV-8	S70° W	-45°	400.30 m
	MJFV-9	S70° W	-45°	300.90 m
Total	3 holes			1,101.10 m

(2) Drilling method

Drilling was carried out by Radial Drilling (Fiji) Proprietary Ltd., a Fijian corporation. Wire line core drilling was used throughout the survey. PQ, HQ, and NQ bits were used. Also PW, HW, and NW casings were inserted in order to prevent loss of circulation and caving of the drill hole.

(3) Machines used

The model and specifications of the machines such as the drilling rig and pumps, the use of diamond bits, the details of expendable materials are shown in Tables 1-2, 1-3, and 1-4.

(4) Working conditions

The drilling was carried out, as a rule, in two shifts of 12 hours each. In Dakuniba, however, drilling is not allowed on Sundays, and thus the work from 0:00 hrs to 07:00 hrs on Mondays was counted as Sunday work and on subsequent week days work from 07:00hrs to 19:00hrs as the first shift and that from 19:00hrs to 07:00hrs of the following day as the second shift. Also there were days when only one work shift was possible due to dismantlement, mobilization, and other types of work. One work shift consisted basically of one operator and two workers. Also a Japanese geologist and an engineer, one Fijian counterpart geologist, one driver, two to four workers, and a bulldozer driver and a helper constituted the team. The drilling technician and the workers camped in Dakuniba village and commuted on foot or by vehicle. The details of the working hours are summarized in Table 1-5.

(5) Transportation of machinery

Regular ferry from Natovi to Savusavu was used for transportation of drilling equipment between Viti Levu and Vanua Levu Islands. Truck was used from Savusavu to Dakuniba.

The bulldozer that was used for road construction pulled the equipment between the drilling sites within Dakuniba.

(6) Drilling water

Water for drilling in each site was pumped from nearby creeks and sent by pipes to the drilling sites. The distance between the water sources and the drilling sites and the pumped heights are listed in Table 1-6.

Table 1-2 Drilling Machine and Equipment

Drilling Machine Model L-44(1set)

Specifications:	
Capacity	1000m(NQ-WL)
Dimensions(L × W× H)	2,375mm × 1,500mm × 1,750mm
Hoisting Capacity	4,500kg
Spindle speed	Valuable(~1600rpm)
Engine Model "Deutz Mitsui BF619130"	170HP/2,300rpm

Drilling Pump Model John Bean Pump 535(1set)

Specifications	Piston type(3 cylinder)
Piston diameter	78mm
Stroke	65mm
Capacity	Discharge capacity 200 liter/min
Dimensions(L × W× H)	1,800mm ×750mm × 1,050mm (including engine and gear)
Engine Model "Klockner-Humboldt Deutz AG"	34Hp/2,800rpm

Wireline Hoist Model(1set)

Specifications:	L-44 (No. A277B)
Rope Capacity	1,000m
Motor	Hydraulic motor
Hoisting Speed	~100m/min

Mud mixer(1set)

Specifications	Radial make
Capacity	1,500 liter/tank
Motor	Hydraulic motor

Water supply pump(2set)

Specifications	Bean Royal Model 420
Capacity	210 liter/min
Dimensions(L × W × H)	1,700mm × 7,00mm × 1,200mm
Engine Model "Deutz Mag SA., FIL210D"	15HP/2,300rpm

Derrick

Dimensions	2.4m × 6.0m × 2.0m
Weight	6.8 t

Drilling Tools

Drilling rods	PQ-WL 1.5m	40 pcs
	HQ-WL 3.0m	68 pcs
	NQ-WL 3.0m	174 pcs
Casing pipes	PW 1.5m	12 pcs
	HW 3.0m	(PQ-WL rods are used 40 pcs)
	NW 3.0m	(HQ-WL rods are used 68 pcs)

Table 1-3 Drilling Meterage of Diamond Bit Used

Size	Bit no.	Drill hole no.			Total
		MJFV-7	MJFV-8	MJFV-9	
PQ	1412	104.20			104.20
	1412		106.90		106.90
	1412			59.75	59.75
	subtotal				270.85
HQ	3467	77.85			77.85
	3467		71.80		71.80
	3467			116.45	116.45
	subtotal				266.10
NQ	1650	218.05			218.05
	1650		221.60		221.60
	1650			124.70	124.70
	subtotal				564.35
Total		400.10	400.30	300.90	1,101.30
(average drilled meter/bit)					367.10

Table 1-4 Consumables Used

Description	Specification	Units	Quantity			Total
			MJFV-9	MJFV-8	MJFV-7	
Light oil		l	1,860	1,600	1,800	5,260
Hydraulic oil		l	40	20	40	100
Engine oil		l	10	10	40	60
Gear Oil		l	10	10	20	40
Grease		kg	65	62	50	177
Polymer	PP/40	kg	68	199	25	292
Polymer	Liqui Pol	l	0	0	0	0
Polymer	Aus trol	kg	152	170	56	378
Polymer	(total)	kg	220	369	81	670
Cement		kg	300	300	250	850
Benthonite		kg	275	650	600	1,525
Diamond shoe bit	PW	pcs	1	(1)	(1)	1
Diamond shoe bit	HW	pcs	1	(1)	(1)	1
Diamond reamer	PQ	pcs	2	(1)	(2)	4
Diamond reamer	HQ	pcs	2	(2)	(2)	2
Diamond reamer	NQ	pcs	2	(2)	(2)	2
Core barrel	PQ	pcs	1	(1)	(1)	1
Core barrel	HQ	pcs	1	(1)	(1)	1
Core barrel	NQ	pcs	1	(1)	(1)	1
Inner Tube assembly	PQ	pcs	2	(2)	(2)	2
Inner Tube assembly	HQ	pcs	2	(2)	(2)	2
Inner Tube assembly	NQ	pcs	2	(2)	(2)	2
Locking coupling	PQ	pcs	1	(1)	(1)	1
Locking coupling	HQ	pcs	1	(1)	(1)	1
Locking coupling	NQ	pcs	1	(1)	(1)	1
Adapter coupling	PQ	pcs	1	(1)	(1)	1
Adapter coupling	HQ	pcs	1	(1)	(1)	1
Adapter coupling	NQ	pcs	1	(1)	(1)	1
Landing ring	PQ	pcs	1	(1)	(1)	1
Landing ring	HQ	pcs	1	(1)	(1)	1
Landing ring	NQ	pcs	1	(1)	(1)	1
Core lifter case	PQ	pcs	2	(2)	(2)	3
Core lifter case	HQ	pcs	2	(2)	(2)	2
Core lifter case	NQ	pcs	2	(2)	(2)	2
Core lifter	PQ	pcs	2	(1)+1	(2)	3
Core lifter	HQ	pcs	2	(2)	(2)	2
Core lifter	NQ	pcs	2	(2)	(2)	2
Stop ring	PQ	pcs	2	(2)	(2)	3
Stop ring	HQ	pcs	2	(1)	(2)	2
Stop ring	NQ	pcs	2	(2)	(2)	2
Thrust ball bearing	PQ	pcs	4	(4)	(4)	4
Thrust ball bearing	HQ	pcs	4	(4)	(4)	4
Thrust ball bearing	NQ	pcs	4	(4)	(4)	4
Inner tube stabilizer	PQ	pcs	1	(1)	(1)	1
Inner tube stabilizer	HQ	pcs	1	(1)	(1)	1
Inner tube stabilizer	NQ	pcs	1	(1)	(1)	1
Core box	PQ	pcs	23	40	37	100
Core box	HQ	pcs	26	16	17	59
Core box	NQ	pcs	22	40	40	102

Table 1-5 Working Time Analysis of the Drilling Operation

Hole No.	Bit size	Drilling: Drilling length (m)	Drilling: Core length (m)	Shift: Drilling (shift)	Shift: Total (shift)	Man working: Engineer (man)	Man working: Worker (man)	Working Time: Drilling (h)	Other work (h)	Recovering (h)	Reassemblage (h)	Dismantlement (h)	Road construction (h)	Total (h)
MJFV-9	PQ	59.75	58.75	5.0	18.0	43	113	34.0						
	HQ	46.35	44.70	4.0	4.0	18	35	25.5						
	NQ	194.80	194.30	12.0	18.0	38	75	92.5						
	total	300.90	297.75	21.0	40.0	99	223	152.0	48.0	151.5	31.0	12.0	56.0	450.5
MJFV-8	PQ	106.90	101.70	10.0	11.0	23	46	76.5						
	HQ	71.80	69.55	10.0	10.0	17	40	59.5						
	NQ	221.60	221.60	12.0	13.0	28	56	107.5						
	total	400.30	392.85	32.0	34.0	68	142	243.5	49.5	16.0	11.0	11.0	49.5	380.5
MJFV-7	PQ	104.20	97.60	10.0	12.0	37	72	78.5						
	HQ	77.85	77.85	4.0	4.0	8	12	37.0						
	NQ	218.05	217.80	14.0	18.0	38	85	120.0						
	total	400.10	393.25	28.0	34.0	83	169	235.5	85.0	3.0	12.0	12.0	8.0	355.5
Grand total		1,101.30	1,083.85	81.0	108.0	250	534	631.0	182.5	170.5	54.0	35.0	113.5	1,186.5

Note: Time for mobilization and demobilization is not included.

Table 1-6 Length and Head of Water for Drilling

Drill hole no.	Length of water supply pipe	Height from stream
MJFV-7	300 m	60 m
MJFV-8	400 m	60 m
MJFV-9	200 m	35 m

(7) Road construction

Road constructed last year was used with some repairs for most of the way and approximately 40 m, 80 m and 160 m of roads were newly constructed this year to Sites MJFV-7, -8, and -9 respectively. During the drilling operation, however, rainfall was quite heavy and parts of the road became inaccessible and thus approximately 600 m of substitute road had to be newly constructed. Bulldozer (Caterpillar D6) was used for road construction.

(8) Core identification and analysis

The acquired cores were carefully studied at the site, columns were prepared, and samples for laboratory examination were separated. The amount of laboratory work carried out is laid out in Table 1-7. Thin sections of rocks and polished sections of ores were prepared, and microscopic observation, X-ray diffraction analysis, and homogeneous temperature measurement of fluid inclusion were carried out in Japan. And chemical analyses were done by Analabs Pty. Ltd., in Australia.

Table 1-7 Amount of Laboratory Work

Analysis	Amount
Thin section microscopy	10
Polished thin section microscopy	10
Measurement of homogenization temperatures of fluid inclusions	5
X-ray diffraction analysis	32
Chemical analysis	55

(9) Demobilization

Demobilization was started on 5 September after the completion of the MJFV-7 hole, and the drilling equipment was pulled by bulldozer to the main highway near Dakuniba, the cores were transported to the MRD core-shed in Labasa. The camp was demobilized and moved to Labasa on

10 September.

1-3-4 Participants of the Third Phase Survey

[Fijian Members]

Vijendra PRASAD	Coordinator, MRD
Isireli NAGATA	Geologist, MRD
Moape NAVIA	Assistant, MRD

[Japanese Members]

Osamu MIYAISHI	Team Leader, Geologist, NED
Hiroshi ISHIKAWA	Drilling Engineer, NED

Note MRD : Mineral Resources Department

NED : Nikko Exploration and Development Co., Ltd.

Chapter 2 Geography of the Survey Area

2-1 Location and Access

The area is located 65 km east of Savusavu. It takes one hour and 40 minutes from Savusavu to Dakuniba village, which is south central part of the area on the coast of Koro Sea, via an unpaved government road.

2-2 Topography and Drainage

The area shows generally steep mountainous topographic feature except the coastal area. Dominant creeks such as the Dakuniba and Nakasaki Creeks are developed in the southern part of the area flowing to the Koro Sea, and the Waikava and Wailevu Creeks flows to the Buca Bay to north. The mountains are less than around 350 m in elevation. The mountain range is characterized by narrow ridges around which a narrow drainage system has developed with numerous waterfalls.

2-3 Climate and Vegetation

As Vanua Levu belongs to the tropical rain forest climatic zone, it has two seasons, dry (April-November) and wet (December-March). Also, it is located in the monsoon zone and there is a southeasterly trade wind throughout the year. Precipitation on the northern side of the island is relatively low, and high on the southern side. The monthly temperature and precipitation observed at Labasa and Nabouwalu is listed in Table 1-8.

Table 1-8 Temperature and Precipitation at Savusavu and Labasa

(Data in 1996)

Area	Item		Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Cot.	Nov.	Dec.	Annual
Savusavu	Temp. (℃)	high	30.5	30.3	-	30.6	28.5	27.6	28.1	27.0	28.0	28.0	29.5	30.5	29.0
		low	24.1	24.4	-	23.7	22.3	22.4	21.7	21.7	22.6	22.3	22.3	22.7	22.7
	Precipitation(mm)		352	147	193	135	272	327	84	26	76	378	159	265	2,415
Labasa	Temp. (℃)	high	31.2	32.2	31.8	32.1	29.7	29.2	29.9	29.5	30.1	30.2	31.5	32.3	30.8
		low	22.9	22.0	22.7	21.5	20.1	20.0	18.1	18.3	20.1	20.4	21.5	-	20.7
	Precipitation(mm)		532	-	453	93	209	264	76	11	123	119	92	290	2,262

The greater part of Vanua Levu is covered by dense forest, while some areas are covered with planted pine trees. There are many palms along the coast.

Chapter 3 General Geology

3-1 Outline of the Past Geological Surveys

An outline of the geology of Fiji was reviewed and summarized by Rodda (1989), Okuda (1989) and others. Geological maps of Vanua Levu at 1:50,000 have been published covering the whole island by the Geological Survey of Fiji (now the MRD).

A reconnaissance map at 1:250,000 has been compiled by Rickard (1966). The gold mineralization of the western Pacific region including Fiji has been summarized by Ishihara and Urabe (1989). The metallic mineral deposits of Fiji were reviewed by Colley (1976, 1980) and Colley and Flint (1995) of the MRD. Reports concerning most individual prospects are available at the library of the MRD.

3-2 General Geology around the Survey Area

(1) Geologic Setting

Tectonically, the Fijian islands are located at the eastern margin of the Indo-Australian Plate and form an island arc on an ocean ridge (Lau Ridge) at a point where it bends from the ENE-WSW to N-S direction. At the Tonga Trench on the eastern side of the Tonga Arc, which is located to the east of the Lau Ridge, the Pacific Plate is being subducted westward at the Vanuatu Trench on the western side of the Vanuatu Arc located to the west of the Fijian islands.

The Lau Basin is located between the Tonga Arc and the Lau Ridge, and the North Fiji Basin between Vanuatu and Viti Levu. Both these basins have spreading axis. The northern side of Vanua Levu is bounded by the left lateral Fiji Transform Fault and the southern side by the Hunter Fracture Zone, a left lateral transform fault. The northern part of the Fijian Islands is considered to be rotating counterclockwise due to the eastward movement of the Indo-Australian Plate south of the Hunter Fracture Zone and the spreading of the North Fiji Basin. This rotation is believed to have begun during Miocene and Early Pliocene time. Before the advent of the spreading of the North Fiji Basin, Eocene to Miocene chain of island arcs (Vanuatu Arc-Fiji Islands- Tonga-Lau Arc), continuous in the NW-SE to N-S direction, are believed to have existed due to the subduction of the Pacific Plate at the Tonga Trench and its northward extension.

The geology of the Fijian Islands consists totally of Cenozoic units. The oldest unit is Eocene (limestone and volcanic rocks) in age while the youngest is represented by the volcanic ejecta of historic times originating Taveuni Island. In Vanua Levu, the geologic units are characterized by Late Miocene to Late Pliocene strata and consists mainly of volcanic rocks (basalt, andesite, dacite) accompanied by sandstone, mudstone and marl. At the Udu Peninsula in the northeast, felsic volcanic rocks are dominant. Taveuni Island is underlain by post Pliocene basalts with volcanic activity continuing to recent times. The islands on the Koro Sea consist of Pliocene to Pleistocene basalt. The Lau Islands are underlain by Middle Miocene to Quaternary strata, which are mainly composed of volcanics (basalt, andesite, dacite and rhyolite) and accompanied by limestones. Kadavu Islands consist of Middle Pliocene to Pleistocene volcanic rocks. The Mamanuca and Yasawa Islands are underlain by volcanic rocks and intercalated pelagic limestone.

3-3 Geologic Setting of the Survey Area

Stratigraphically, Vanua Levu is underlain in most areas by Late Miocene to Pliocene strata that consist of basalt, andesite and dacite with intercalated sandstone, mudstone, and marl. The volcanic rocks are classified largely into the Natewa Volcanic Group, the Monkey Face Volcanic Group, the Udu Volcanic Group, the Nararo Volcanic Group and the Bua Volcanic Group.

Table 1-9 Simplified Volcanic Stratigraphy of Vanua Levu

Geologic Unit Name	Main Lithology	Thickness	Age
Bua Volcanic Group	Basalt	more than 900 m	(3.3-2.8 Ma)
Nararo Volcanic Group	Acidic andesite		
Udu Volcanic Group	Dacite Rhyolite	more than 300 m	(7.0-6.8 Ma)
Monkey Face Volcanic Group Natewa Volcanic Group	Andesite	more than 1,500 m	(7.5-3.5 Ma)

3-4 Brief History of Mining in the Survey Area

Various types of mineralization are known in Vanua Levu and there are many prospects and some mines. The major types of mineralization are kuroko, epithermal veins and dissemination. Bauxite ore deposits also occur on the western part of the islands.

(1) Kuroko type deposits

Kuroko type deposits occur on the Udu Peninsula in the northeastern part of Vanua Levu. They are called the Udu deposits (Nukudamu deposits) and discovered in 1957, followed by the drilling of 381 holes during 1957 to 1968. In 1968, thirty two thousand tons of ore at the average grade of 5.9% Cu and 6.7% Zn was mined before ceasing operations.

The Udu deposits occur in the intensely altered pumice bearing Udu Volcanic Breccia. The deposits are distributed within approximately 450 m × 200 m area. The main ore body has a pipelike shape covering 300 m × 120 m in plan and plunges 20°-30° to the ESE. The ore occurring in the center of the pipe is mainly composed of massive sulfide and has undergone argillization, silicification and pyrite dissemination. Disseminated ore is dominant in the surrounding area. The massive ore displays a zonation composed of black ore, yellow ore and sulfide ore in descending order. The main ore minerals are; pyrite, sphalerite, tennantite and barite, while chalcopyrite is scarce compared to the Japanese equivalents. The Mouta and Wainikoro Prospects are also well known.

(2) Epithermal gold deposits

The main epithermal type prospect is at Mount Kasi in the southwestern part of the island. The deposit was mined by the open cut method during 1932 to 1946 with an estimated production of around 60,000 ounces of gold. An estimated 265 thousands tons of ore grading 7g/t Au was treated. The mineralization encompasses an area of 10 km^2

Gold mineralization occurs in quartz barite veins along faults hosted by calc-alkaline andesite. The main ore deposit strikes NW-SE and dips steeply westward. The mined ore zone extends 300 m in length, 12 m in width, and 30 m vertically. The hanging wall of the fault that hosts the ore is brecciated, with the width of the mineralized zone becoming wider at shallower depths. The brecciated zone is 25 m in maximum width, gold-bearing and silicified. The deposits are classified as epithermal high-sulfidation type. Constituent minerals are native gold, pyrite, chalcopyrite, tetrahedrite and arsenopyrite. The average grade is in the order of 7 g/t Au and 0.6 g/t Ag. The upper part of the brecciated zone tends to show higher grades, which reach 92 g/t Au.

Epithermal type mineralization is thought to occur at the Nakoroutari, Dakuniba and Waimotu areas.

(3) Disseminated type mineralization

A wide alteration zone is located around the Koroinasolo village. The area is underlain by basaltic-andesitic volcanic rocks and marine sediments of the Miocene-Pliocene Koroma Formation. Silicification, opalization and brecciation develop. The areal extent of propylitic alteration is about 25 km^2. Geochemical anomalies of Au and As in soil are extracted. Disseminated ore deposits of porphyry type are expected.

Chapter 4 Interpretation of the Survey Results

4-1 Geologic Structure, Mineralization, and Mineralization Controls

The most promising mineralization confirmed by the six drill holes drilled during the second and third years is the argillized-silicified brecciated zone of MJFV-5 with a maximum grade of 27.6g/t (0.60 m thick). This zone is continuous for about 700 m from MJFV-4 to -6 and is inferred to dip steeply northward. Gold mineralization was also confirmed in the five other drill holes with obtained grades of 0.2-3g/t.

As described below, one of the centers of hydrothermal alteration is in the area around the upper reach of the Nagagani Creek and here gold mineralization occurred at a certain stage of relatively long alteration process. The western part of the area was uplifted relative to the eastern part and was eroded to a lower horizon and thus the center of mineralization is interpreted to have become shallower than in the eastern part. The gold mineralization is thus controlled by the distribution of this bed and the geologic structure and is believed to be lower in the east. Namely;

(1) The basaltic lava in this area has most probably flowed into shallow sea. There is evidence that at least a part of the vitreous to fine-grained basalt lava and hyaloclastite in the lower parts of the western drill holes flowed into water and it has been confirmed to be a lower horizon. Gentle folding is repeated in the area, but the general trend is inferred to be eastward dipping.

(2) The alteration is confined to the immediate vicinity of the ore veins in the western part such as in drill holes MJFV-4 and -7. At the side of the veins, mixed-layer mineral zones are formed and chlorite-sericite zones are formed near richer veins. Smectite zones occur away from the veins. On the other hand, chlorite occurs widely in the deeper parts of drill holes MJFV-9 and -6, indicating high-temperature phase. Strong pyrite dissemination is observed in this chlorite zone. Although the gold grade of the samples from this zone is low, alteration of this zone and the above gold mineralization is believed to have been related to hydrothermal activity of almost the same period. Chlorite is widely distributed on the surface as well in the east and is in contrast to the west where unaltered rocks to smectite occur on the surface. Thus it is reasonable to consider the eastern part as the center of alteration than to consider it as being shallow.

(3) The mineralization confirmed at MJFV-4 and -9 is believed to occur along shear fractures because it is continuous, associated with fault clay minerals, and the zone contains silicified and quartz breccia. In other words, the mineralization at the Dakuniba Prospect is concluded

to be controlled by WNW trending fault. This fault is not clear on the surface, but the topography from the drilling sites MJFV-4 to -7 to the Nagagani Creek is extremely steep and suggests the existence of a fault.

(4) Fluid inclusion data shows high temperatures of 220° to 240°C near the high-grade zone of MJFV-5, and somewhat lower temperatures of 180° to 210°C and 130° to 230°C at MJFV-4 and -6 respectively. Also the fluid inclusions in the quartz veins in the east such as those in MJFV-6 and -9 sometimes consists solely of liquid phase. This could indicate lower temperatures at shallow zones in the east.

(5) This hydrothermal system has the characteristics of low sulfidation type. Namely the gangue minerals are; quartz, potash feldspars, calcite, and clay minerals (mixed-layer minerals and sericite). Kaolin minerals and alunite are not found. Also there are few sulfide minerals, and they are; pyrite, chalcopyrite, sphalerite, and galena. The high Au samples from MJFV-5, however, contain somewhat larger amounts of sphalerite and galena. Occurrence of electrum is confirmed in MJFV-6.

4-2 Mineral Potential of the Area

The three holes drilled during the third year of this project all penetrated quartz and silicified breccia-argillized zone containing more than 1g/tAu. This zone continues to the high-grade quartz and silicified breccia-argillized zone of MJFV-5 and thus was confirmed that the gold mineralization occurred widely in this zone.

Considering the grade and width of the gold mineralization confirmed in MJFV-7, -8, and -9, the prospectivity is relatively low near MJFV-7 and -8, but is believed to be sufficiently high in the deeper parts near MJFV-9 and to the east of MJFV-6. Also since gold mineralization, although relatively weak, is observed on the surface in the WNW-ESE extension of the drilled area, there is a good possibility of gold mineralization in the deeper parts of these areas.

The drilling during the second and third year of this exploration project is concentrated within an area of 700 m in length, and is not sufficient to cover the whole Dakuniba Area. The potential for gold discovery is good particularly in the altered zones where gold anomalies were found by rock geochemical prospecting.

Chapter 5 Conclusions and Recommendations

5-1 Conclusions

Three drill holes were drilled in the Dakuniba Area during the third year of the Vanua Levu mineral exploration and arrived at the following conclusions.

All three holes drilled during the third year of this project, namely MJFV-7, -8, and -9, encountered argillized zone accompanied by silicified breccia. The existence of this zone in these drill holes had been inferred from the results of the investigation of surface outcrops and trenches, and drilling at MJFV-4, -5, and -6 carried out during the previous year.

(1) MJFV-7 penetrated argillized zone with quartz breccia and silicified breccia at 226.60-228.00 m depth (1.40 m thick), 249.90-253.70 m (3.80 m), and 259.10-260.20 m (1.10 m). The gold grades of these horizons were 0.41g/t Au, 0.47g/t Au, and 0.27g/t Au, respectively. Of the above gold-bearing horizons, the grades at 227.50-227.60 m depth (0.10 m thick) and 251.05-251.20 (0.15 m) were 2.3g/t Au and 3.1g/t Au respectively. They are both higher than 1g/t Au.

(2) MJFV-8 confirmed the existence of the mineralized zone at three horizons. The zone encountered at 116.80-130.30 m depth (13.50 m thick) was a clay vein including a silicified zone and the grade was 0.23g/t Au, 0.55g/t Au, 0.64g/t Au, 0.32g/t Au, 0.63g/t Au, and 1.9g/t Au at depths of 116.80-117.25 m (0.45 m thick), 118.10-118.60 m (0.50 m), 122.10-123.80 m (1.70 m), 124.30-124.70 m (0.40 m), 125.10-127.70 m (2.60 m), and 128.15-129.25 m (1.10 m), respectively. The altered zones at 141.45-141.70 m depth (0.25 m thick) and 142.60-143.00 m (0.40 m) contained 0.47g/t Au and 0.47g/t Au, respectively. The gold content of the silicified zone at 279.90-280.70 m depth (0.80 m thick) was less than 0.08g/t Au.

(3) In MJFV-9, there are many quartz-calcite veins at 87.20-93.35 m depth, and gold content of 1.01g/t Au, 0.46g/t Au, and 0.34g/t Au was confirmed at 87.20-87.30 m (0.10 m thick), 88.10-88.45 m (0.35 m), and 90.70-94.75 m (4.05 m), respectively. The interval of 93.75-94.05 m (0.30 m thick) showed particularly high gold content of 2.3 g/t Au, the highest value of MJFV-9.

(4) The major ore zones encountered by the three drill holes of MJFV-7, -8 and -9; namely the three zones at 226.60-260.20 m depth of MJFV-7, silicified argillized zone at 116.80-130.30 m depth of MJFV-8, and the quartz-calcite veinlet zone at 87.20-95.35 m depth of MJFV-9 were confirmed to be continuous to the quartz breccia-bearing silicified breccia clay zone encountered in MJFV-5 with a WNW-ESE strike. Thus, the continuity of the mineralized zone inferred from the results of the second year survey to exist for 700 m from MJFV-4 to -6 was confirmed in the

subsurface part of the area.

(5) Although the assay results of these cores are lower than that of MJFV-5, the grade distribution agrees with the general eastward dip. This mineralized zone extends further east and westward, but its surface showings are weak.

(6) The fluid inclusions of the quartz veins in the east part show lower temperature than those from the western part, although no conclusive data are available.

(7) The gold grade distribution and fluid inclusion data reported above alone is not sufficient for inferring the mineral prospectivity in the lower subsurface zone of the area. The gold grade distribution above, however, indicates that the ore resources delineated during the second and third years are small.

(8) The mineral potential of other mineralization areas in the Dakuniba Area is difficult to evaluate since only surface data are available. However, since widespread gold mineralization was confirmed in the Nagagani Creek Area, it is believed that other parts of the present area also have sufficient mineral potential for further exploration.

5-2 Recommendations

The work carried out during the third year of this project was successful in locating gold mineralization in the upper reaches of the Nagagani Creek. It is believed that, however, without additional data, it will not be efficient to immediately attempt to verify high-grade ore zone sufficiently large for development only in this area.

It has been shown by surface geochemical surveys that there are areas other than the upper Nagagani Creek where, although of low analytical values, gold anomalies cover large areal extent. It is most desirable to apply regional survey methods including geophysics to these other anomalous areas, delineate target areas for drilling, and then on the basis of this work, decide on the most prospective areas for detailed investigation.

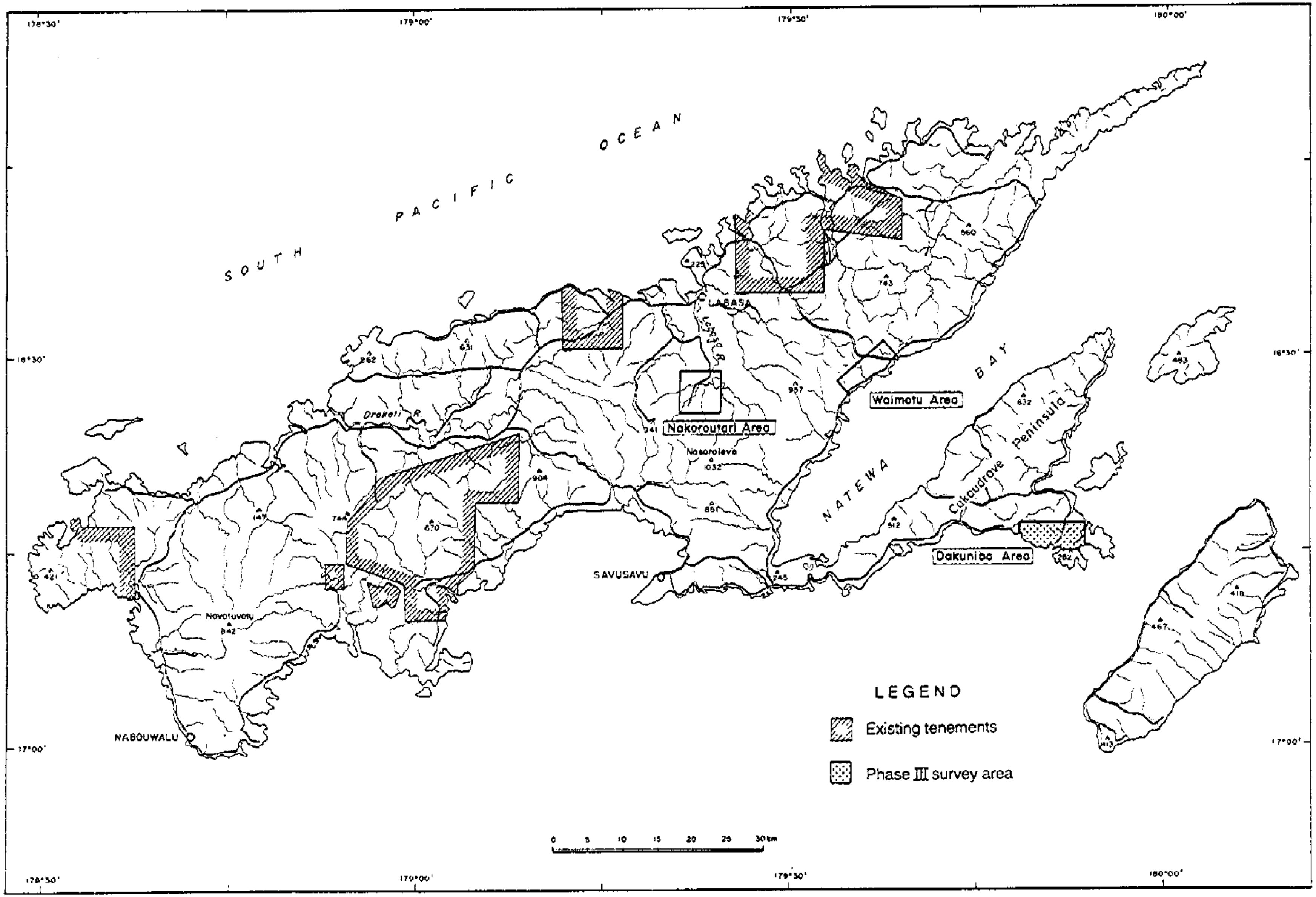


Fig. 1-2 Location Map of the Survey Area

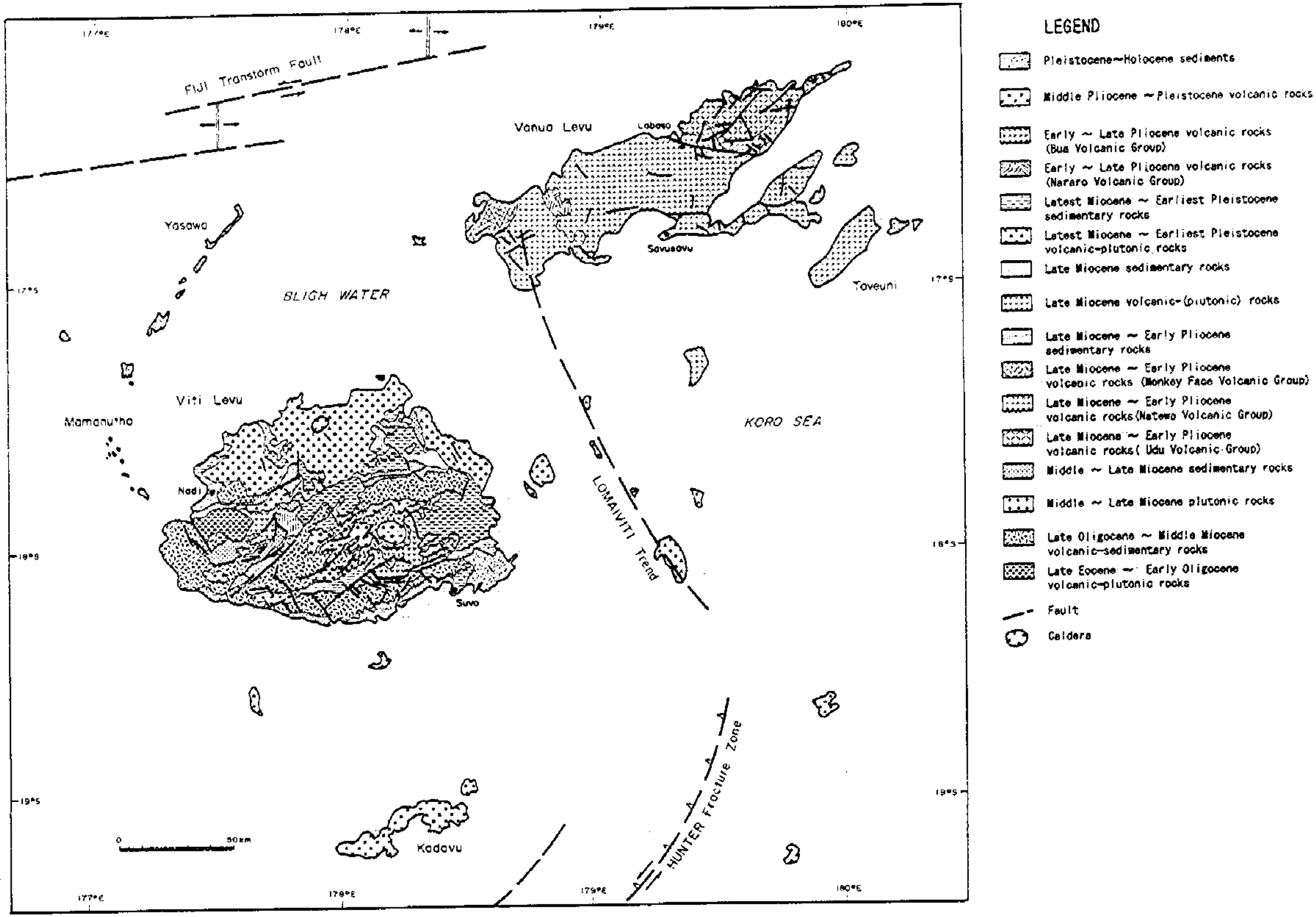


Fig. 1-3 Simplified Geologic Map around the Survey Area

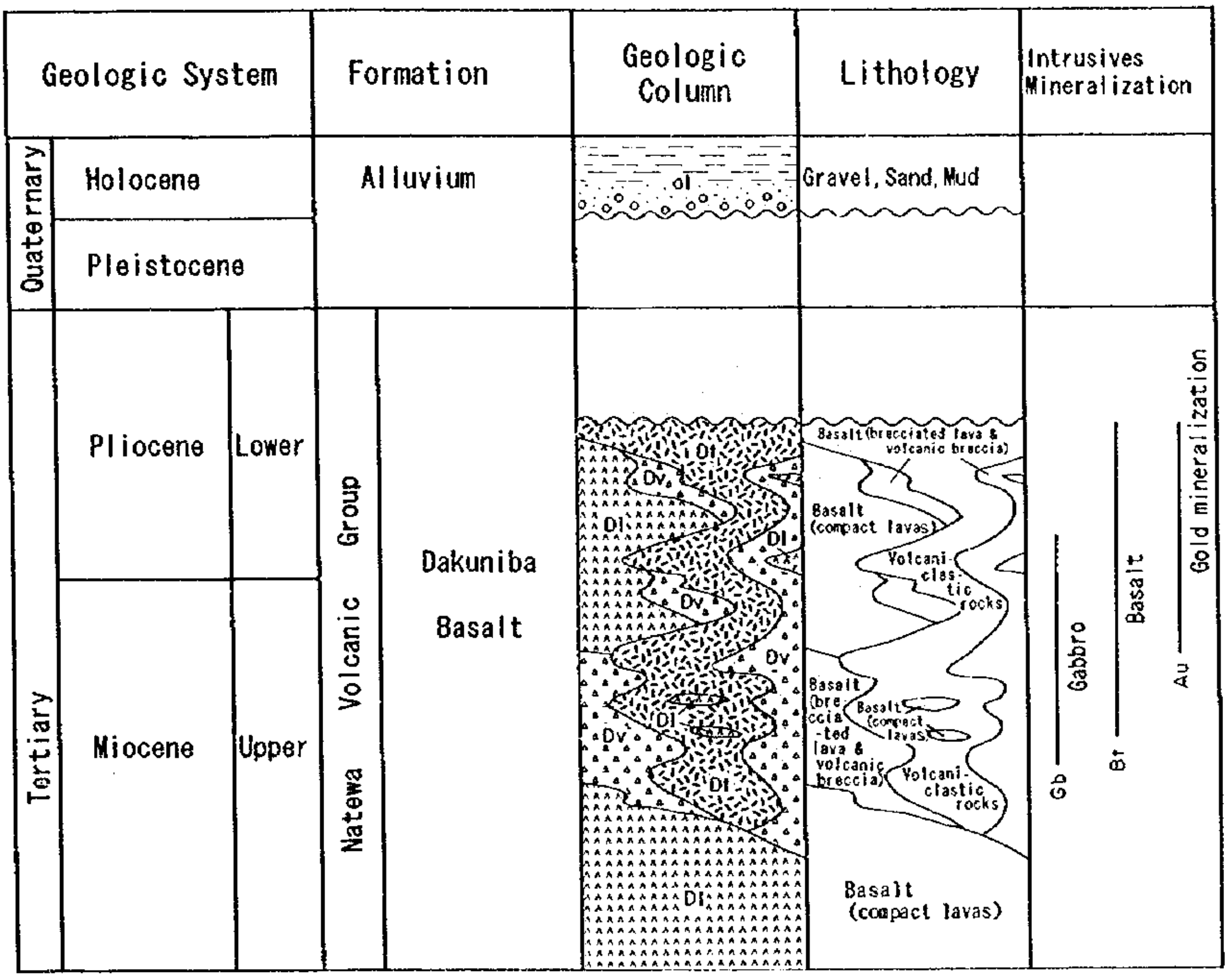


Fig. 1-4 Schematic Stratigraphic Column of the Dakuniba Area

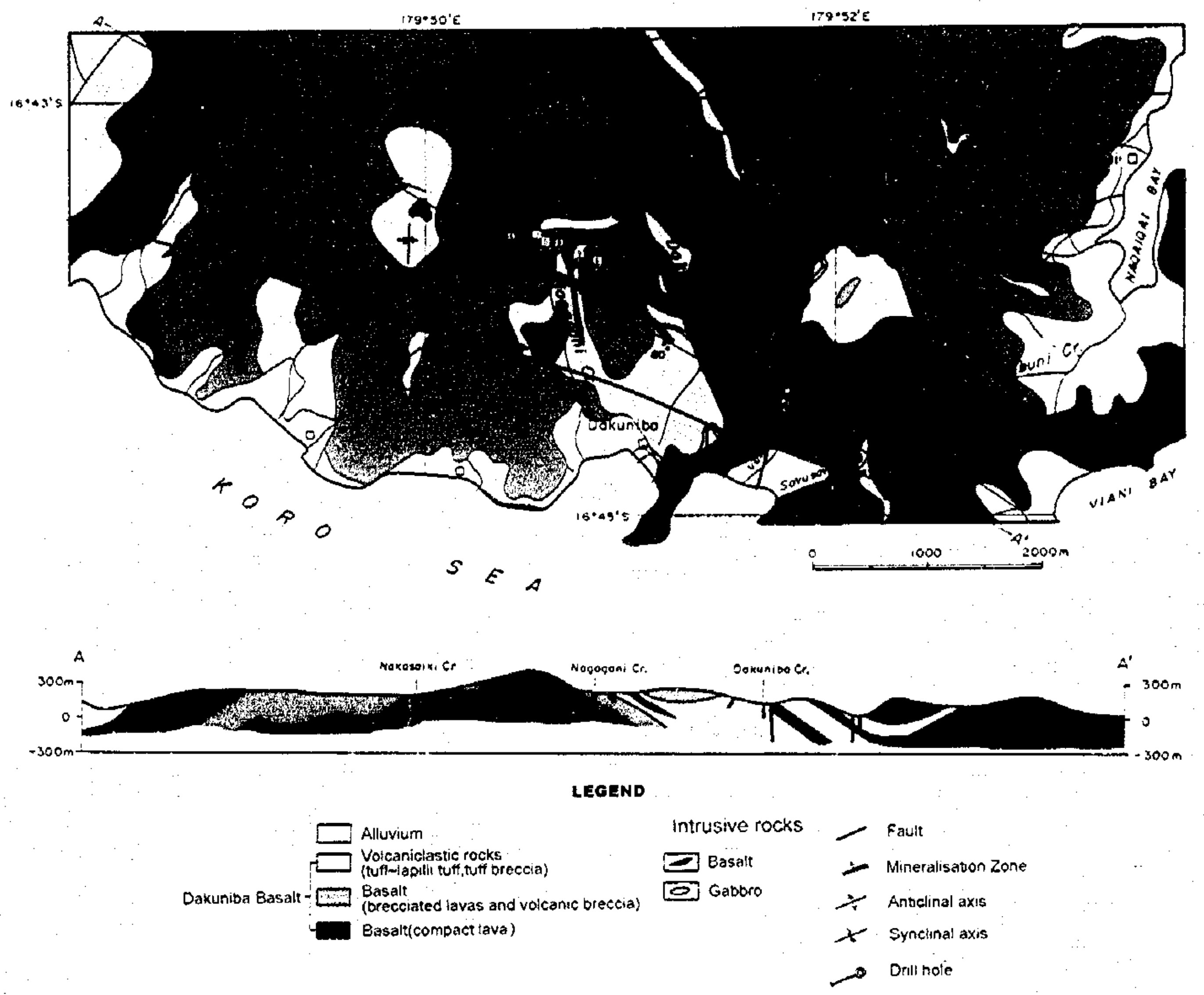


Fig. 1-5 Geologic Map of the Dakuniba Area

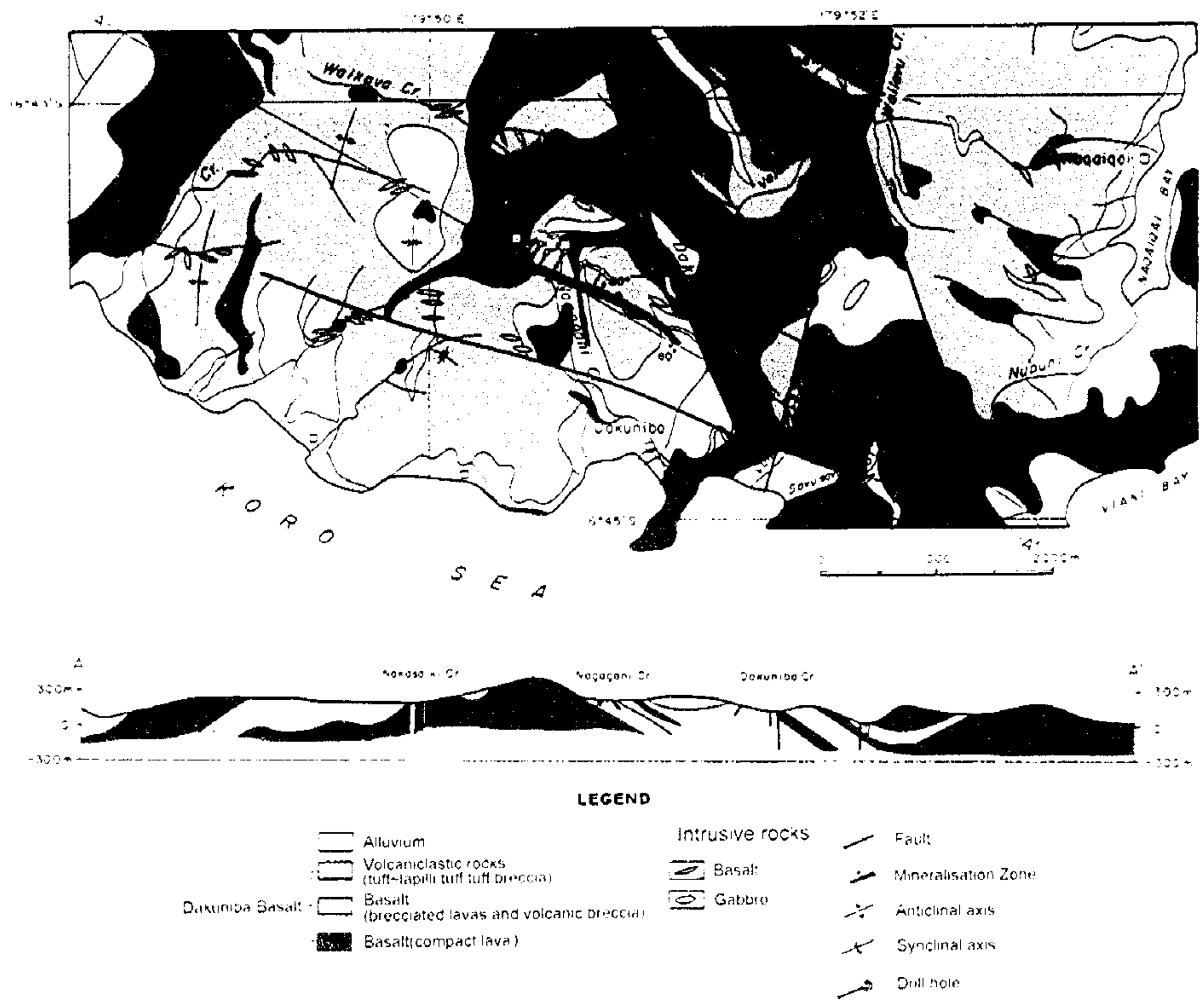
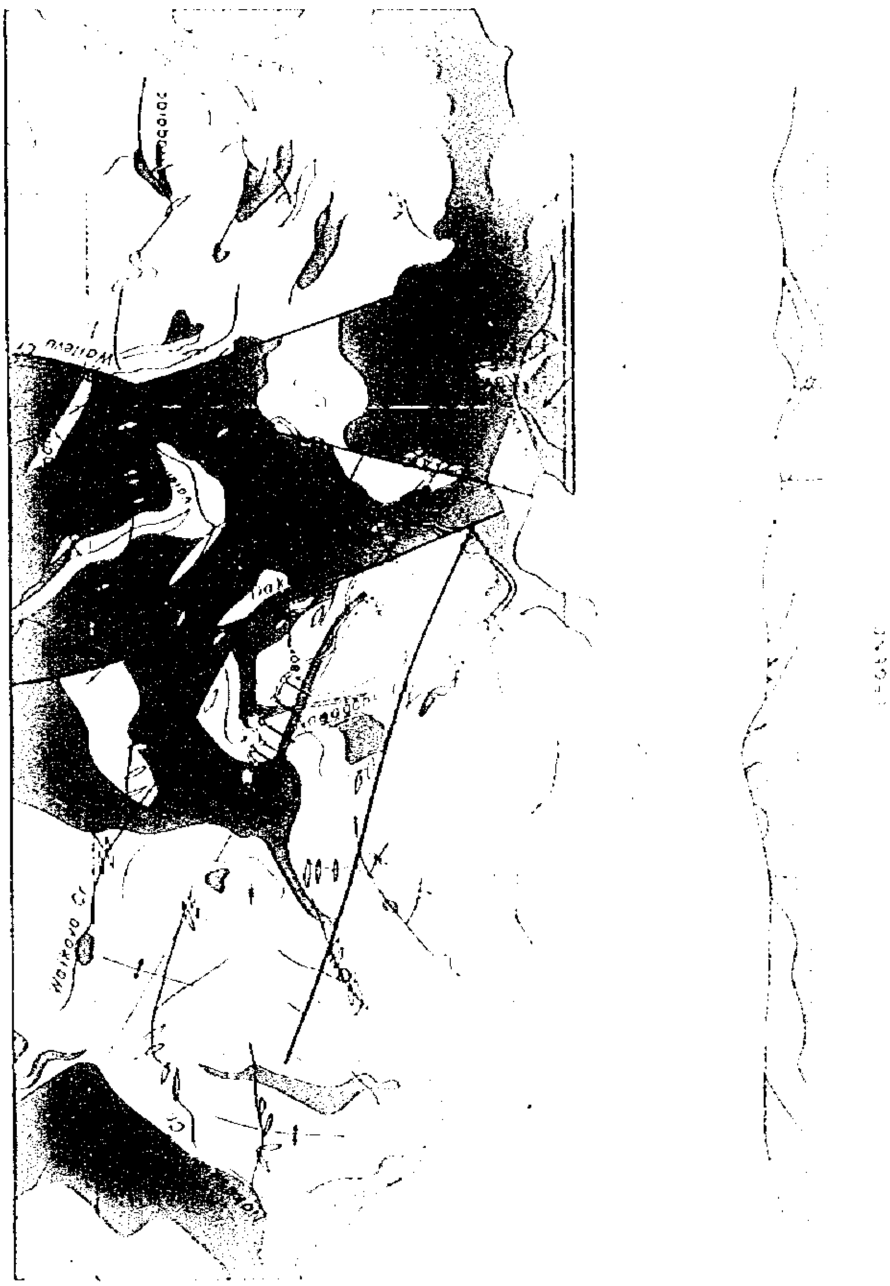


Fig. 1-5 Geologic Map of the Dakuniba Area



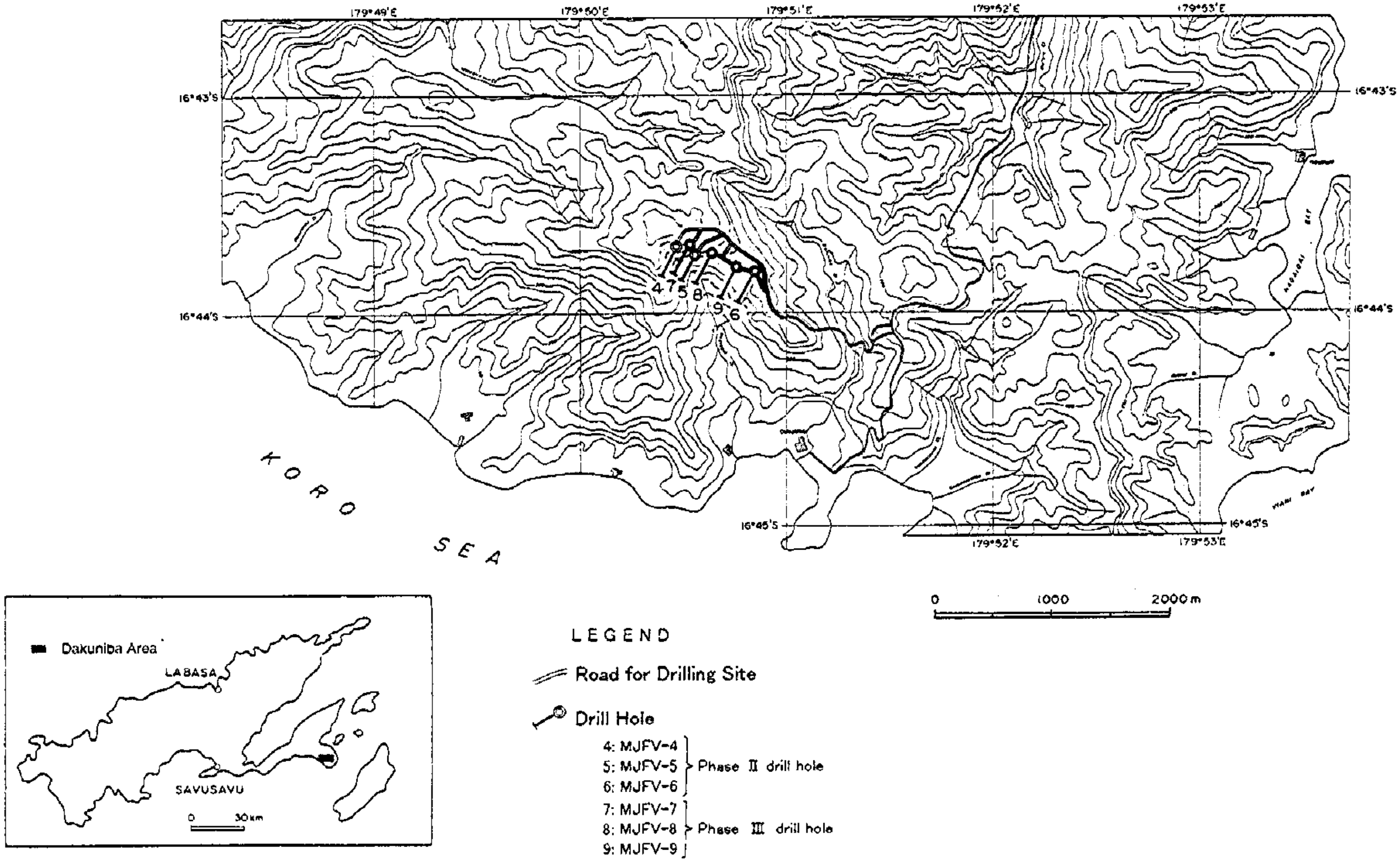


Fig. 1-6 Location Map of Drill Holes

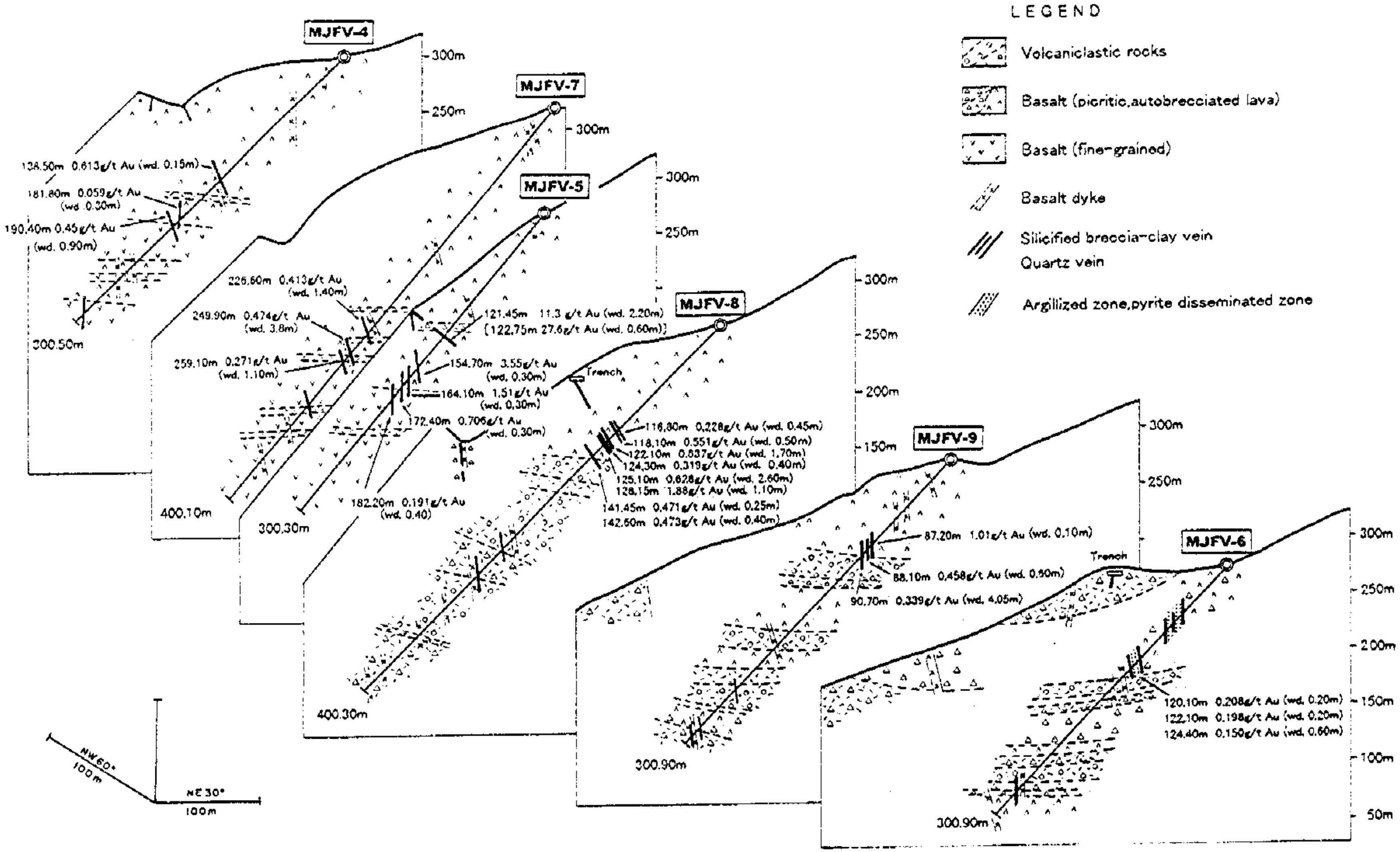
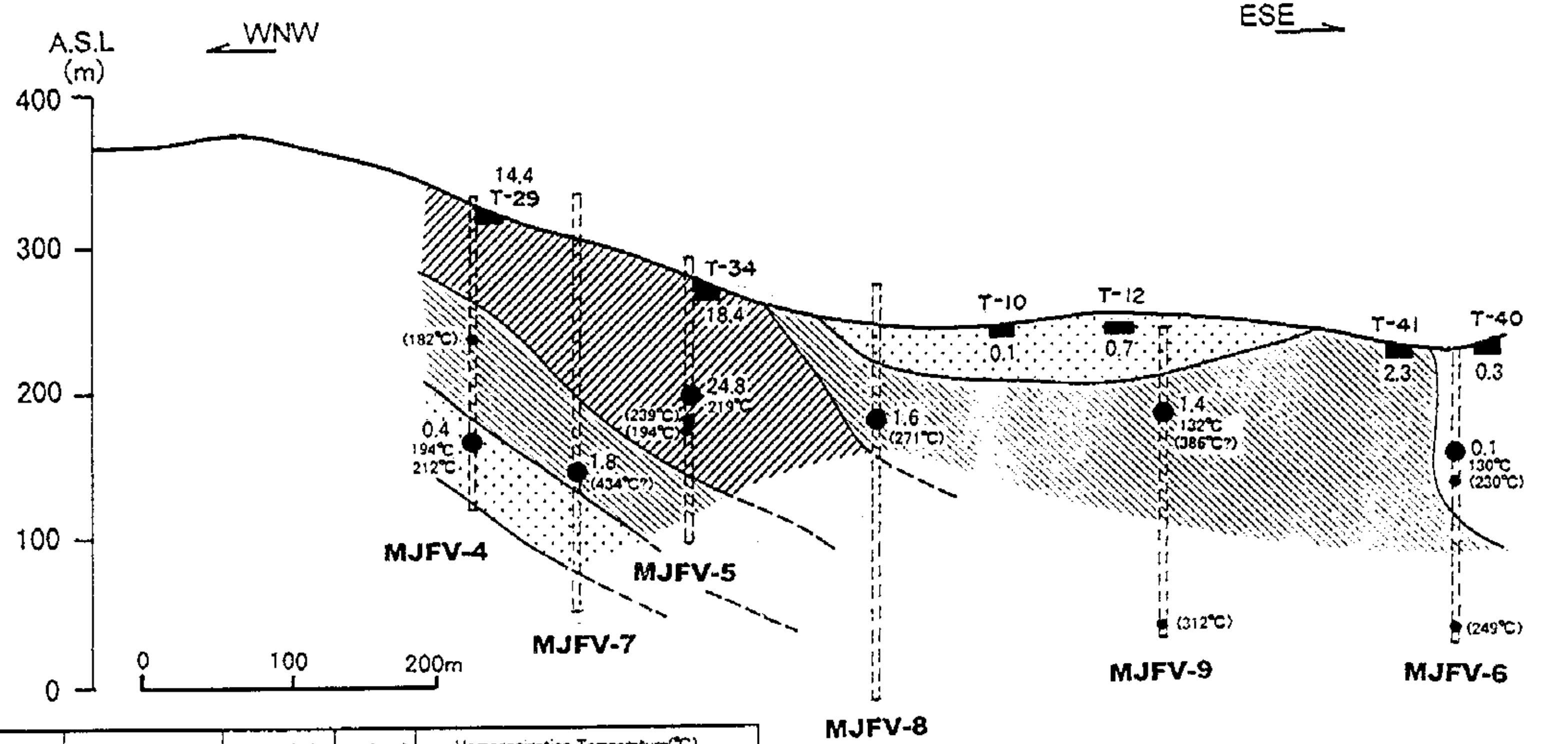


Fig. 1-7 Schematic Block Diagram of the Drill Holes



Hole No.	Depth(m)	width(m)	Au(g/t)	Homogenization Temperature(℃)	
				from main zone	from adjacent zones
MJFV-4	180.95 - 182.60	1.65	0.08	194 212	182
MJFV-5	121.45 - 123.65	2.20	11.27	219	194 239
MJFV-6	120.10 - 125.00	4.90	0.03	130	230 249
MJFV-7	249.90 - 253.70	3.80	0.47	-	434?
MJFV-8	125.10 - 127.70	2.60	0.63	-	271
MJFV-9	90.70 - 94.75	4.05	0.34	132	312 386?

194℃ Homogenization temperature from the main zone

(271℃) Homogenization temperature from the adjacent zone

434℃? Unreliable data (shown only for reference)

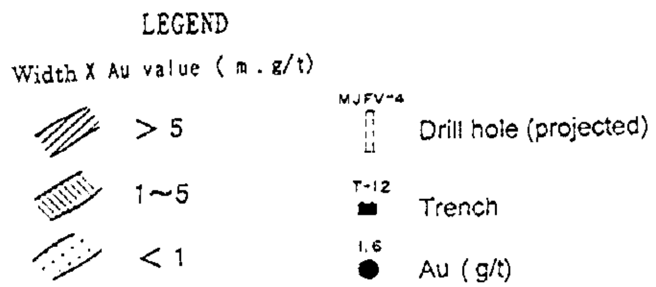


Fig. 1-8 Integrated Profiles of the Assay Values and Homogenization Temperatures

PART II DETAILED DISCUSSION

PART II DETAILED DISCUSSIONS

Chapter1 Dakuniba Area

1-1 Drilling Sites, Direction, and Inclination

The sites, elevation, direction, inclination, and length of drilling carried out in the Dakuniba Area during the third year of this project are laid out below.

Table 2-8 Location, Orientation and Length of Drill Holes in the Dakuniba Area

Drill No.	Coordinates		Elevation (m)	Direction	Inclination	Drilled Length(m)
	Latitude	Longitude				
MJFV-7	16°43' 37"S	179°50' 33"E	320	S30°W	-45°	400.10
MJFV-8	16°43' 47"S	179°50' 39"E	260	S30°W	-45°	400.30
MJFV-9	16°43' 49"S	179°50' 45"E	220	S30°W	-45°	300.90

1-2 Drilling

(1) MJFV-7

Core drilling by wire line method and drilling mud was used for drill hole MJFV-7. PQ bit was used to 104.20 m depth. The first 14.50 m was reamed and PW casing was inserted, and 104 m long HW casing was inserted. HQ bit was used to 182.05 m and 182 m NW casing was inserted. Subsequently NQ bit was used to 400.10 m.

Rod broke near 80 m, but this accident did not affect the operations significantly. The drilling mud used consisted mostly of bentonite with minor amount of polymers.

The drilling operations are summarized in Table 2-2, and the progress is shown in Table 2-3 and Figure 2-1.

Table 2-2 Summary of the Drilling Operation on MJFV-7

Drilling Length

Drilling Length	Meterage(m)
Length planned	400.00
Length drilled	400.10

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	Aug. 17~Aug.19	3.0	1.5	1.5	12	22
Drilling	Aug. 20~Sept. 4	15.5	14.0	1.5	61	120
Dismantling	Sept. 4~Sept. 6	2.5	1.5	1.0	10	27
Total		21.0	17.0	4.0	83	169

Working Hours

Operation	(hours)	(percentage)
Drilling	235.5	66.2%
Other work	85	23.9%
Recovering	3	0.8%
Subtotal	323.5	91.0%
Reassemblage	12	3.4%
Dismantlment	12	3.4%
Water supply	8	2.3%
Grand total	355.5	100.0%
(Road construction)	202	-

Casing Pipe Inserted

Size	Meterage (m)
PW	14.5
HW	104.0
NW	182.0

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
PQ	104.20	97.60
HQ	77.85	77.85
NQ	218.05	217.80
Total	400.10	393.25

Core Recovery of 100m Hole

Depth of hole	Core recovery
0.00m~100.00m	93.4%
100.00m~200.00m	100.0%
100.00m~200.00m	99.8%
300.00m~400.10m	100.0%
total	98.3%

Efficiency of Drilling

Total length/drilling period	19.1m/day
Total length/shift	11.8m/shift

Table 2-3 Records of the Drilling Operation on MJFV-7

Date	Drilling length (m)		Daily total (m)		Cumulative length (m)		Shift (shift)		Man working (man)	
	Shift 1	Shift 2	Drilling length	Core length	Drilling length	Core length	Drilling	Total	Enginner	Worker
Aug 17	0.00		0.00	0.00	0.00	0.00	0	1	2	0
Aug 18	0.00		0.00	0.00	0.00	0.00	0	1	5	11
Aug 19	0.00		0.00	0.00	0.00	0.00	0	1	5	11
Aug 20	3.25		3.25	0.20	3.25	0.20	1	1	4	11
Aug 21	16.35	20.10	36.45	32.90	39.70	33.10	2	2	4	11
Aug 22	10.50	10.55	21.05	21.05	60.75	54.15	2	2	4	11
Aug 23	9.00	10.35	19.35	19.35	80.10	73.50	2	2	4	9
Aug 24		4.60	4.60	4.60	84.70	78.10	1	1	3	2
Aug 25	13.50	9.00	22.50	22.50	107.20	100.60	2	2	4	7
Aug 26	18.90	24.60	43.50	43.50	150.70	144.10	2	2	4	8
Aug 27	30.00	8.30	38.30	38.30	189.00	182.40	2	2	4	8
Aug 28	30.50	14.55	45.05	44.90	234.05	227.30	2	2	4	8
Aug 29	15.45	10.90	26.35	26.25	260.40	253.55	2	2	4	8
Aug 30	18.55	9.05	27.60	27.60	288.00	281.15	2	2	4	8
Aug 31		0.00	0.00	0.00	288.00	281.15	0	1	2	0
Sep 1	18.00	21.50	39.50	39.50	327.50	320.65	2	2	4	7
Sep 2	17.30	17.70	35.00	35.00	362.50	355.65	2	2	4	9
Sep 3	12.25	21.40	33.65	33.65	396.15	389.30	2	2	4	9
Sep 4	3.95	0.00	3.95	3.95	400.10	393.25	1	2	4	9
Sep 5	0.00		0.00	0.00	400.10	393.25	0	1	5	11
Sep 6	0.00		0.00	0.00			0	1	5	11
Total	217.50	182.60	400.10	393.25	400.10	393.25	27	34	83	169

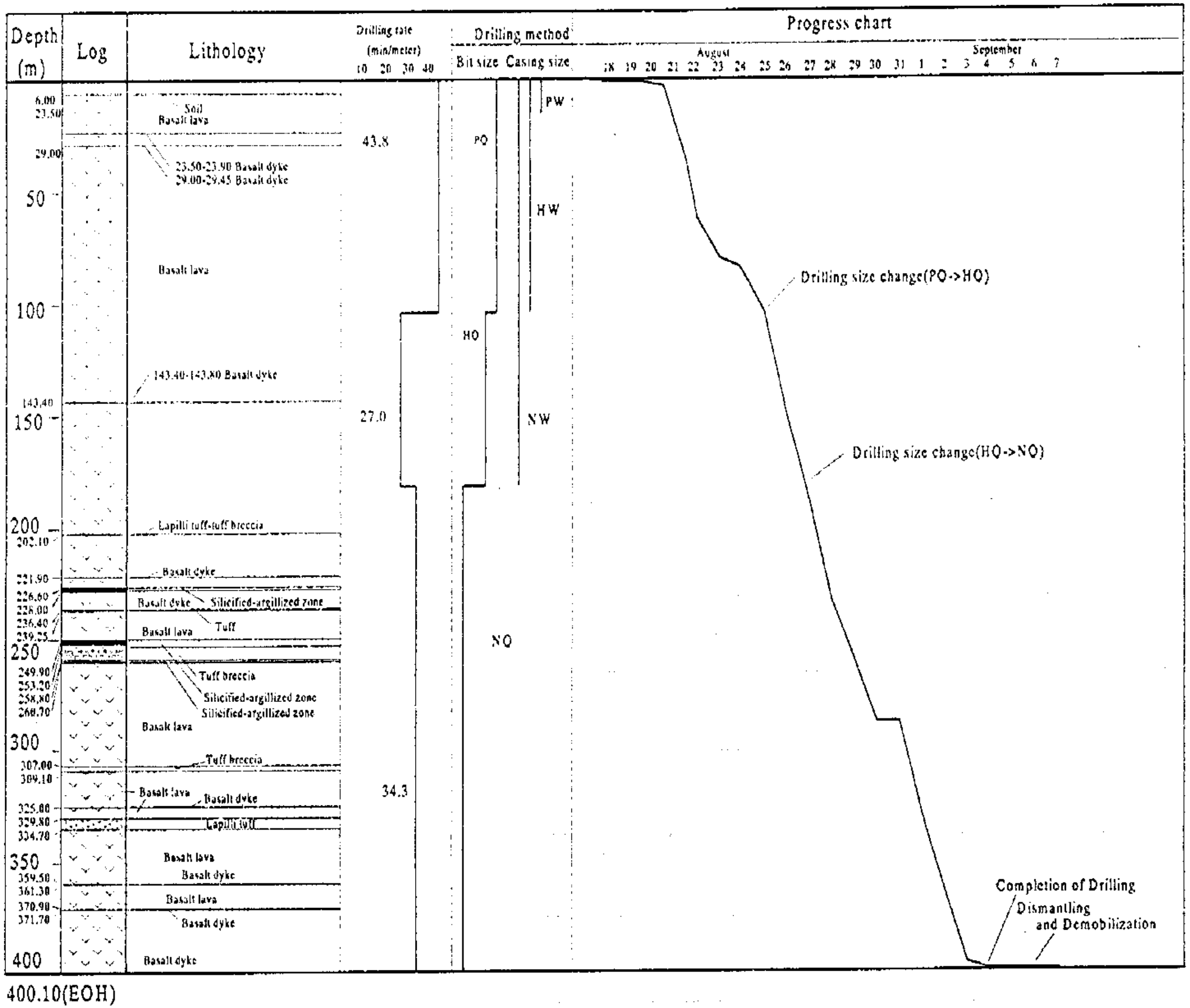


Fig. 2-1 Drilling Progress of MJFV-7

(2) MJFV-8

Core drilling by wire line method and drilling mud was used for drill hole MJFV-8. PQ bit was used to 106.90 m depth and 12 m PW casing was inserted, and 108 m long HW casing was inserted. HQ bit was used to 178.70 m and 180 m NW casing was inserted. Subsequently NQ bit was used to 400.30 m.

The drive shaft coupling of the wire line broke during this operation, but this accident did not affect the progress significantly.

The drilling operations are summarized in Table 2-4, and the progress is shown in Table 2-5 and Figure 2-2.

Table 2-4 Summary of the Drilling Operation on MJFV-8

Drilling Length

Drilling Length	Meterage(m)
Length planned	400.00
Length drilled	400.30

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	Jul. 30	0.5	0.5	0.0	3	7
Drilling	Jul. 30～Aug. 16	17.0	17.0	1.0	62	130
Dismantling	Aug. 16	0.5	0.5	0.0	3	5
Total		18.0	17.0	1.0	68	142

Working Hours

Operation	(hours)	(percentage)
Drilling	243.0	72.5%
Other work	49.5	14.8%
Recovering	20.5	6.1%
Subtotal	313.0	93.4%
Reassemblage	11.0	3.3%
Dismantlment	11.0	3.3%
Grand total	335.0	100.0%
(Road construction)	49.5	-

Casing Pipe Inserted

Size	Meterage (m)
PW	12.00
HW	108.00
NW	180.00

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
PQ	106.90	101.70
HQ	71.80	69.55
NQ	221.60	221.60
Total	400.30	392.85

Core Recovery of 100m Hole

Depth of Core Recovery	Core recovery
0.00m～100.00m	94.8%
100.00m～200.00m	97.8%
200.00m～300.00m	100.0%
300.00m～400.30m	100.0%
total	98.1%

Efficiency of Drilling

Total length/drilling period	22.2m/day
Total length/shift	11.8m/shift

Table 2-5 Records of the Drilling Operation on MJFV-8

Date	Drilling length (m)		Daily total (m)		Cumulative length (m)		Shift (shift)		Man working (man)	
	Shift 1	Shift 2	Drilling length	Core length	Drilling length	Core length	Drilling	Total	Enginner	Worker
Jul 30	0.00	5.40	5.40	3.00	5.40	3.00	1	2	4	9
Jul 31	11.00	11.50	22.50	19.70	27.90	22.70	2	2	4	8
Aug 1	16.50	10.50	27.00	27.00	54.90	49.70	2	2	4	9
Aug 2	9.00	10.50	19.50	19.50	74.40	69.20	2	2	4	8
Aug 3		7.75	7.75	7.75	82.15	76.95	1	1	3	3
Aug 4	11.75	13.00	24.75	24.75	106.90	101.70	2	2	4	9
Aug 5	5.00	14.80	19.80	18.00	126.70	119.70	2	2	4	9
Aug 6	9.90	11.00	20.90	20.45	147.60	140.15	2	2	4	9
Aug 7	2.20	10.10	12.30	12.30	159.90	152.45	2	2	4	9
Aug 8	11.60	6.00	17.60	17.60	177.50	170.05	2	2	3	9
Aug 9	1.20	2.95	4.15	4.15	181.65	174.20	2	2	3	7
Aug 10		14.05	14.05	14.05	195.70	188.25	1	1	3	2
Aug 11	18.00	21.00	39.00	39.00	234.70	227.25	2	2	4	7
Aug 12	21.00	18.00	39.00	39.00	273.70	266.25	2	2	4	7
Aug 13	15.00	17.00	32.00	32.00	305.70	298.25	2	2	4	9
Aug 14	30.30	21.35	51.65	51.65	357.35	349.90	2	2	4	9
Aug 15	27.25	15.00	42.25	42.25	399.60	392.15	2	2	4	11
Aug 16	0.70	0.00	0.70	0.70	400.30	392.85	1	2	4	8
Total	190.40	209.90	400.30	392.85			32	34	68	142

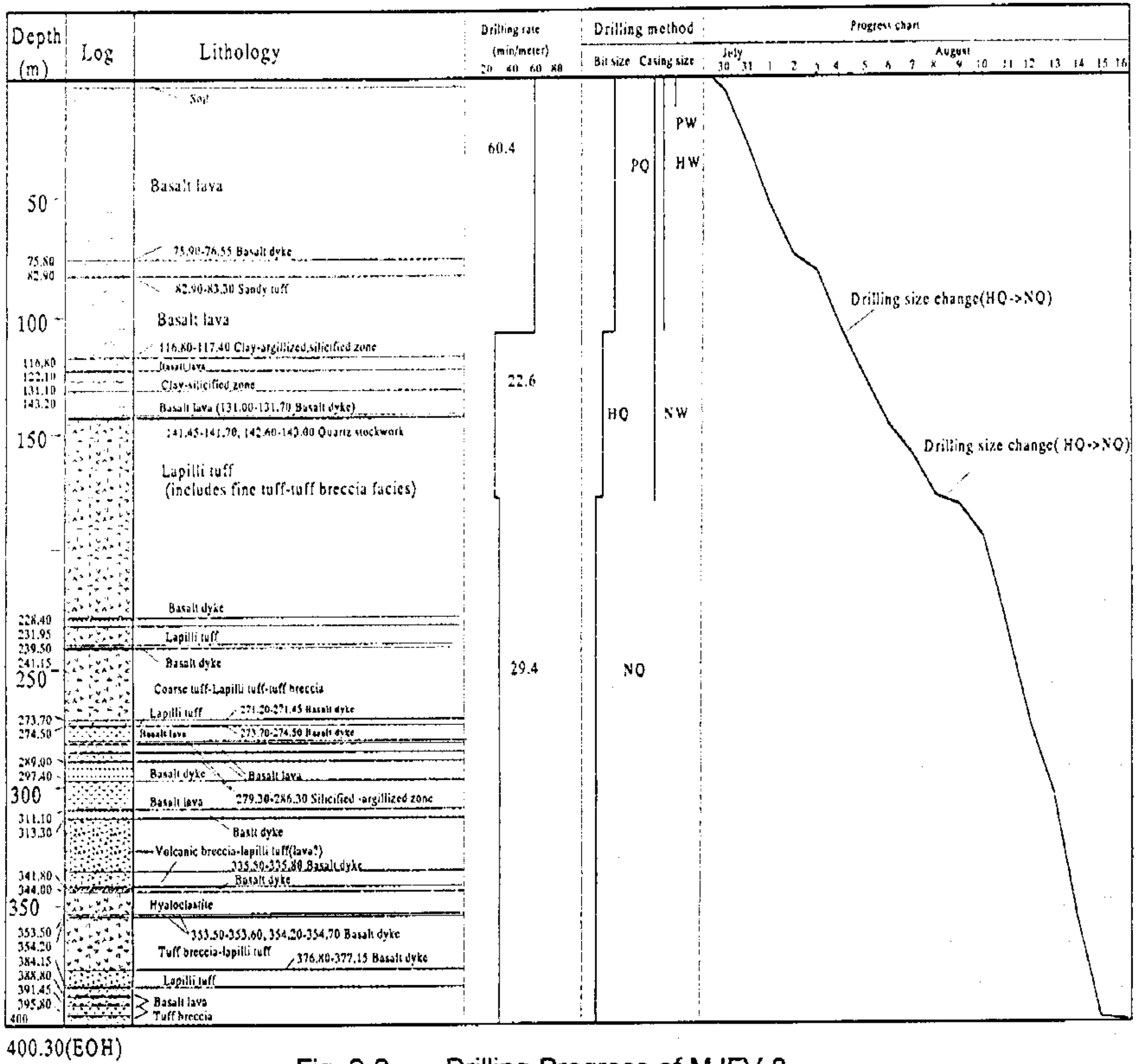


Fig. 2-2 Drilling Progress of MJFV-8

(3) MJFV-9

Dry blocking was carried out for 1.5 m, and wire line core drilling with drilling mud was used subsequently for drill hole MJFV-9. PQ bit was used to 59.75 m depth, the first 7.50 m was reamed and PW casing inserted, and 60 m long HW casing was inserted. HQ bit was used to 176.20 m and 177 m NW casing was inserted. Subsequently NQ bit was used to 300.90 m.

During the operation, fuel pump of the main engine and water pump broke down and the repair took eight days.

The drilling operations are summarized in Table 2-6, and the progress is shown in Table 2-7 and Figure 2-3.

Table 2-6 Summary of the Drilling Operation on MJFV-9

Drilling Length

Drilling Length	Meterage(m)
Length planned	300.00
Length drilled	300.90

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	Jul. 1～Jul. 4	4.0	2.0	2.0	15	36
Drilling	Jul.5～Jul.29	24.5	17.5	7.0	73	150
Dismantling	Jul.29	0.5	0.5	0.0	1	5
Total		29.0	20.0	9.0	89	191

Note: Engineers and workers from July 13 through 17 are not counted because of the breakdown of the equipment.

Working Hours

Operation	(hours)	(percentage)
Drilling	152	37.5%
Other work	48	11.8%
Recovering	151.5	37.4%
Subtotal	351.5	86.7%
Reassemblage	31	7.6%
Dismantlment	12	3.0%
Water supply	11	2.7%
Grand total	405.5	100.0%
(Road construction)	56.0	-

Casing Pipe Inserted

Size	Meterage (m)
PW	7.50
HW	60.00
NW	177.00

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
PQ	59.75	58.75
HQ	116.45	114.80
NQ	124.70	124.30
Total	300.90	297.85

Core Recovery of 100m Hole

Depth of Core Recovery	Core recovery
0.00m～100.00m	97.4%
100.00m～200.00m	100.0%
200.00m～300.20m	99.6%
total	99.0%

Efficiency of Drilling

Total length/drilling period	10.3m/day
Total length/shift	7.5m/shift

Drilling period: 29 days
shift: 40shifts

Table 2-7 Records of the Drilling Operation on MJFV-9

Date	Drilling length (m)		Daily total (m)		Cumulative length (m)		Shift (shift)		Man working (man)	
	Shift 1	Shift 2	Drilling length	Core length	Drilling length	Core length	Drilling	Total	Enginner	Worker
Jul 1	0.00		0.00	0.00	0.00	0.00	0	1	2	7
Jul 2	0.00		0.00	0.00	0.00	0.00	0	1	6	9
Jul 3	0.00		0.00	0.00	0.00	0.00	0	1	3	11
Jul 4	0.00		0.00	0.00	0.00	0.00	0	1	4	9
Jul 5	3.00		3.00	2.00	3.00	2.00	1	1	4	11
Jul 6		9.50	9.50	9.50	12.50	11.50	1	1	3	3
Jul 7	5.85	17.75	23.60	23.60	36.10	35.10	2	2	4	11
Jul 8	19.05	4.60	23.65	23.65	59.75	58.75	2	2	4	9
Jul 9	0.00	0.00	0.00	0.00	59.75	58.75	0	2	4	9
Jul 10	0.00	0.00	0.00	0.00	59.75	58.75	0	2	4	9
Jul 11	0.00	0.00	0.00	0.00	59.75	58.75	0	2	4	9
Jul 12	0.00	0.00	0.00	0.00	59.75	58.75	0	2	4	9
Jul 13			0.00	0.00	59.75	58.75				
Jul 14			0.00	0.00	59.75	58.75				
Jul 15			0.00	0.00	59.75	58.75				
Jul 16			0.00	0.00	59.75	58.75				
Jul 17			0.00	0.00	59.75	58.75				
Jul 18	3.15	21.00	24.15	24.15	83.90	82.90	2	2	4	5
Jul 19	9.10	13.10	22.20	20.55	106.10	103.45	2	2	4	7
Jul 20		12.00	12.00	12.00	118.10	115.45	1	1	2	3
Jul 21	21.00	24.00	45.00	45.00	163.10	160.45	2	2	4	9
Jul 22	13.10	15.60	28.70	28.70	191.80	189.15	2	2	4	9
Jul 23	30.30	15.50	45.80	45.80	237.60	234.95	2	2	4	9
Jul 24	0.00	0.00	0.00	0.00	237.60	234.95	0	2	4	9
Jul 25	0.00	3.10	3.10	3.10	240.70	238.05	1	2	4	9
Jul 26	7.90	0.00	7.90	7.90	248.60	245.95	1	2	4	9
Jul 27		0.00	0.00	0.00	248.60	245.95	0	1	1	2
Jul 28	22.20	12.10	34.30	33.90	282.90	279.85	2	2	4	7
Jul 29	18.00	0.00	18.00	18.00	300.90	297.85	1	2	4	7
Total	152.65	148.25	300.90	297.85			22	40	89	191

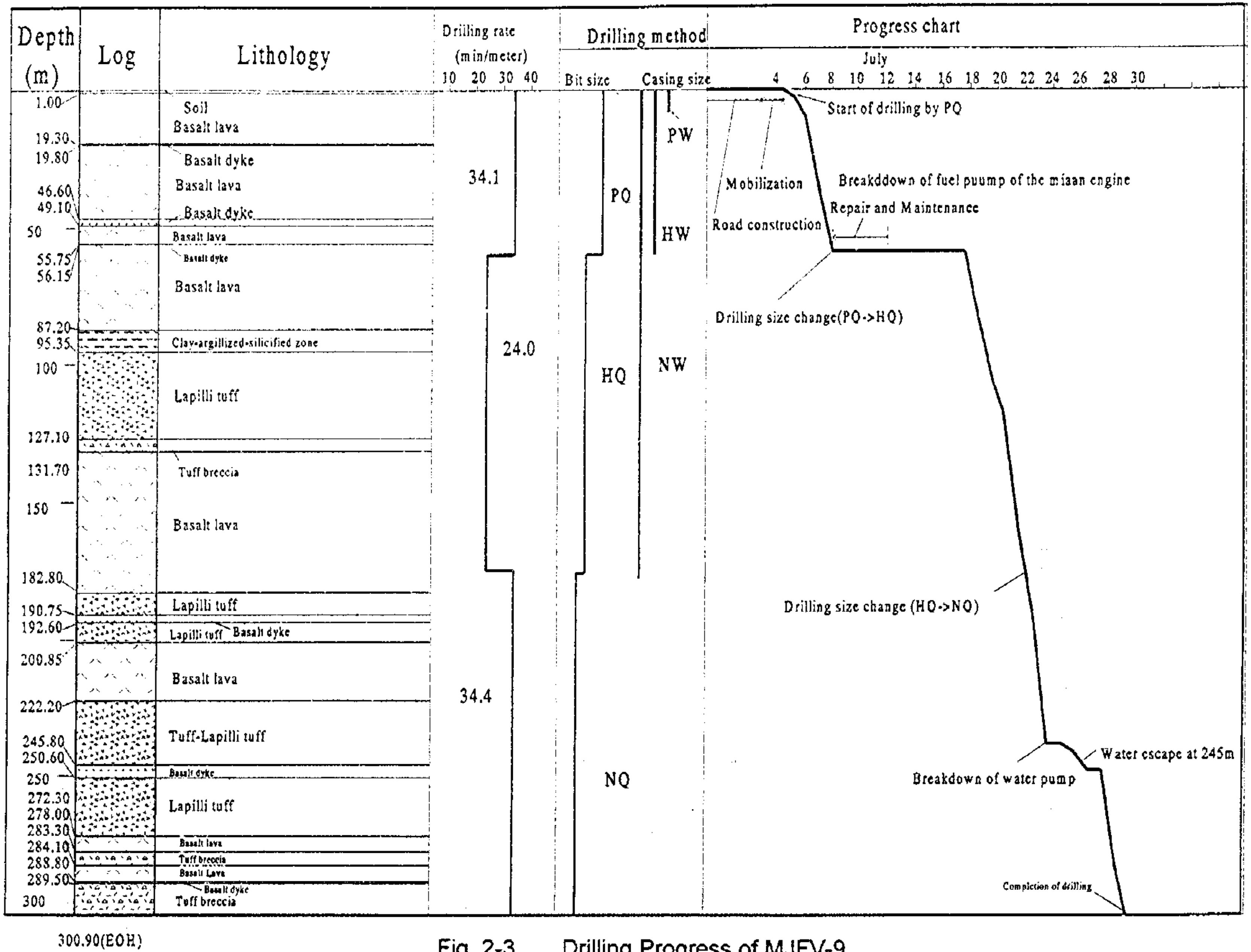


Fig. 2-3 Drilling Progress of MJFV-9

1-3 Geology, Alteration and Geology

(1) MJFV-7

MJFV-7 was drilled in order to clarify the west-northwestward extension of the gold mineralization (2.20 m wide, 11.3g/t) confirmed in MJFV-5. As a result three argillized-silicified zones were confirmed at 226.60-260.20 m depth.

The geology of MJFV-7 consists mainly of basalt lava with intercalation of thin lapilli tuff and tuff breccia. Also 20-90 m wide basalt dikes intrude into the lava (Fig. 2-4).

① Geology

- 0-6.00 m: Surface soil.
- 6.00-202.10 m: Picritic basalt lava. Basalt dikes intrude into the lava at depths of 23.50-23.90 m, 29.00-29.45 m, 45.00-45.20 m, 55.60-56.00 m, and 143.40-143.80 m. The basalt lava mainly has dark green, hard, and compact lithology. Some parts, however, are red and somewhat soft and porous, with spherulitic structure filled by silica minerals, zeolite, and green minerals (chlorite). The basalt dikes are green with fine-grained texture. A thin tuff layer is intercalated at 78.50-78.55 m depth. The tuff is sandy, green, and mosaic texture.
- 202.10-207.20 m: Tuff breccia and lapilli tuff. This rock consists of green to red lapilli-volcanic fragments and dark green sandy matrix. The lithology is partly hyaloclastite. The boundary with the overlying basalt is transitional.
- 207.20-211.00 m: Autobrecciated basalt lava. This rock is brown to reddish purple, and calcite fills irregular druses. Pyroxene phenocrysts are coarse-grained and have the same lithology as the overlying picritic lava.
- 211.00-236.40 m: This rock is weakly autobrecciated and has similar lithology to the upper (6.00-202.10 m) basalt lava. The interval at 226.60-228.00 m depth is a silicified and argillized mineralized zone (details to be mentioned in the following section).
- 236.40-239.25 m: Coarse-grained tuff. It is brown and sandy to coarse-grained. Bedding is observed and the angle with the drill hole is approximately 40°.
- 239.25-249.90 m: The rock is picritic basalt lava and is dark green with compact lithology. It is intruded by basalt dikes at depths of 248.00-248.05 m and 248.40-249.20 m, and their angle with the drill hole is approximately 80°.
- 249.90-253.70 m: Argillized and silicified zone (details to be mentioned in the following section).
- 253.70-258.80 m: Tuff-tuff breccia. The rock is tuff to 256.20 m depth and is pale green. It is

tuff breccia further down and is green. Tuff breccia consists of green and red blocks and green and sandy matrix. The matrix constitutes over 60 percent of the rock.

- 258.80-260.70 m: Argillized and silicified zone (details to be mentioned in the following section).
- 260.70-307.00 m: Basalt lava. This rock is glassy to fine-grained compared to the lava shallower than 258.80 m depth. It is dark gray to dark green, hard, and compact rock. It is, however, generally weakly autobrecciated. It contains small amount of medium-grained pyroxene phenocrysts.
- 307.00-309.10 m: Lapilli tuff.
- 309.10-329.80 m: Basalt lava. The lithology is similar to that of 260.70-300.70 m depth. This, however, is paler color and is pale green to grayish green. It is intruded by a basalt dike at 325.00-325.60 m depth and it intersects the drill hole at 35°.
- 329.80-354.70 m: Lapilli tuff.
- 354.70-400.10 m: Basalt lava. The lithology of this basalt is similar to that at depth of 260.70-300.70 m. It is intruded by basalt dikes at 359.50-359.70 m, 359.90-360.10 m, 360.40-361.30 m, and 370.90-371.70 m.

② Mineralization and alteration

In this hole, chlorite and mixed-layer minerals occur near faults and ore veins, and smectite generally occurs at some distance from the faults and veins. Quartz veins and argillized zones that are considered to be associated with mineralization are found at the following depths(Fig. 2-5).

- 226.60-228.00 m: Silicified-argillized zone. This zone is subdivided into very strong silicified and brecciated rock at 226.60-226.90 m depth (0.30 m thick), weakly argillized basaltic gangue at 226.90-227.50 m (0.60 m), dark gray clay strongly disseminated with pyrite at 227.50-227.60 (0.10 m), silicified angular gravel at 227.60-227.90 m (0.30 m), dark gray clay strongly disseminated with pyrite at 227.90-228.00 m (0.10 m).

Depth (m)	Width(m)	Au(g/t)	Description
226.60-226.90	0.30	0.160	Silicified breccia zone
226.90-227.50	0.60	0.041	Weakly silicified –argillized zone
227.50-227.60	0.10	2.32	Clay zone with pyrite dissemination
227.60-227.90	0.30	0.591	Silicified breccia zone
227.90-228.00	0.10	0.962	Clay zone with pyrite dissemination

• 249.90-253.70 m: Silicified-argillized zone. This zone is subdivided into argillized basalt at 249.90-251.05 m depth (1.15 m thick), silicified angular gravel at 251.05-251.20 m (0.15 m), gray clay strongly disseminated with pyrite at 251.20-251.50 m (0.30 m), argillized basalt with quartz veinlets at 251.50-251.60 m (0.10 m), weakly argillized basalt at 251.60-252.20 m (0.60 m), argillized somewhat hard angular basalt gravel and soft clay matrix at 252.20-252.30 m (0.10 m), weakly argillized basalt at 252.30-253.20 m (0.09 m) and quartz veinlets bearing gray clay strongly disseminated with pyrite at 253.20-253.70 m (0.50 m).

Depth (m)	Width(m)	Au(g/t)	Description
249.90-251.05	1.15	0.162	Argillized zone
251.05-251.20	0.15	3.13	Silicified breccia zone
251.20-251.50	0.30	0.610	Clay
251.50-251.60	0.10	0.842	Clay zone with quartz veinlets
251.60-252.20	0.60	0.122	Weakly argillized zone
252.20-252.30	0.10	0.532	Clay-breccia zone
252.30-253.20	0.90	0.496	Weakly argillized zone
253.20-253.70	0.50	0.612	Clay zone with quartz veinlets

• 259.10-260.20 m: Silicified-argillized zone. The interval at 259.10-259.65 m depth (0.55 m thick) is an argillized zone. The interval at 259.65-259.75 m (0.10 m) consists of silicified angular gravel, and that at 259.75-60.20 m (0.45 m) is an argillized zone.

Depth (m)	Width(m)	Au(g/t)	Description
259.10-259.65	0.55	0.228	Argillized zone
259.65-259.75	0.10	0.401	Silicified zone
259.75-260.20	0.45	0.221	Argillized zone

Other than the above three zones, silicified zones and quartz veins were encountered at the following depth.

• 303.90-304.20 m: Swarms of 1 mm to 1 cm thick drusy quartz veins, on the whole green. Gold content is below the limit of detection (0.008g/t).

• 338.40-338.60 m: Weakly silicified basalt accompanied by quartz veinlets. Gold content is below limit of detection (0.008g/t).

(2) MJFV-8

MJFV-8 was drilled to clarify the downward continuation of the gold mineralization intercepted at MJFV-5 from which a sample returned 11.3g/t Au over the 2.20 m interval. As a result of drilling, three mineralization zones were intersected: at depth of 116.80-30.30 m consisting of a clay-silicified zone, and at depths of 141.45-141.70 m and 142.60-143.00 m consisting of quartz pyrite stockwork, and at 279.90-280.70 m depth of weakly argillized zone with pyrite dissemination. The vein at 125.10-127.70 m depth consists of clay and silicified fragments with pyrite dissemination, including an interval of 0.20 m at 3.13g/tAu.

The geology of the drill hole consists mainly of basalt lava and volcaniclastics of same type. Basalt dykes of 15 cm-8 m widths intrude the rocks (Fig. 2-6).

① Geology

- 0-2.40 m : Soil.
- 2.40-143.20 m : Picritic basalt lava. It shows dark green to purplish green or reddish color. It consists of 1-5 m thick flow units, within which the color changes from reddish to dark green. Generally, it contains amygdules and irregular cavities that are filled with quartz, calcite, zeolite and green minerals. It has an intercalation of brown-colored sandy tuff at 82.90-83.30 m depth. It is intruded by basalt dykes at 75.90-76.55 m, 93.75-98.00 m and 131.00-131.70 m depths.
- 143.20-274.50 m : It consists mainly of tuff breccia and lapilli tuff with intercalation of fine to coarse tuff. The bedding planes inferred from the alternation of tuff and tuff breccia crosses at 50° to 70°. The tuff breccia consists of dark green to green angular basalt blocks showing mosaic texture within less amount of matrix. The basalt blocks are composed of medium grained phenocrysts and glassy groundmass. Basalt dykes are confirmed at depths of 228.40-231.95 m, 239.50-241.15 m, 243.50-243.70 m, 271.30-271.45 m and 273.70-274.50 m.
- 274.50-289.00 m : Basalt lava. It shows similar facies to the picritic basalt at the depth of 2.40-143.20 m.
- 289.00-297.40 m : Basalt dyke. It shows blacky to dark green and is hard and compact. The phenocrysts consist mainly of medium-grained pyroxene.
- 297.40-313.30 m : Basalt lava. It shows similar facies to that at 274.50-289.00 m depth.
- 313.30-341.80 m : Volcanic breccia to lapilli tuff. It is massive and lacks beddings. It consists of blackish angular blocks and blackish to dark green matrix that shows mosaic texture. It

contains pyroxene fragments of 1-3 mm diameter. It shows hyaloclastic texture. It is intruded by basalt dike at depth of 335.50-335.80 m

- 341.80-344.00 m : Tuff to tuff breccia. It contains finer facies than in 313.30-341.80 m depth. Grading is observed with an angle of 45°-80° from the drilling direction. Tuff breccia shows blackish to gray color, and consists of angular blocks of 15 cm diameter at maximum and sandy matrix. The volume ratio of blocks and matrix increases to the lower part. It contains rather fine-grained pyroxene phenocrysts, and is sandy. It may be of hyaloclastic origin.
- 384.15-388.80 m : Basalt lava. It shows the facies similar to that of 341.80-344.00 m depth.
- 3888.80-391.45 m : Tuff breccia. It shows the facies similar to that of 344.00-384.15 m depth.
- 391.45-395.80 m : Basalt lava. It shows the facies similar to that of 341.80-344.00 m depth. Basalt dykes are confirmed at depths of 391.65-391.90 m, 393.90-394.40 m and 394.70-394.90 m.
- 391.45-400.30 m : Tuff breccia. It contains more matrix compared to that of 388.80-391.65 m depth. Basalt dykes intrude at the depth of 400.20-400.29 m.

② Mineralization and alteration

Generally, alteration is weak and smectite is the most predominant clay mineral to the end of the drill hole. Mixed-layer mineral and sericite occur along the veins at the depth of 116.80-130.30 m(Fig.2-7). Major mineralization and alteration zones are as follows.

- 116.80-117.25 m : Clay zone. It is partly silicified and disseminated with pyrite
- 117.25-118.10 m : Weakly silicified basalt.
- 118.10-118.60 m : Clay zone with pyrite dissemination.
- 118.60-122.10 m : Weakly argillized basalt. Two quartz veinlets of 5 mm and 2 cm widths occur.
- 122.10-123.80 m : Argillized basalt and clay. Three quartz veinlets occur.
- 123.80-124.30 m : Weakly argillized basalt.
- 124.30-124.70 m : Clay zone. A quartz vein of 5 mm width occurs along the drilling direction.
- 124.70-125.10 m : Weakly argillized basalt.
- 125.10-127.70 m : Soft grayish green-whitish clay with pyrite dissemination. The interval at 125.40-125.60 m depth is strongly silicified. A quartz vein of 5 mm width occurs at an angle of 80° at 127.40 m depth.
- 127.70-128.15 m : Weakly argillized basalt. It is pale green-grayish.

- 128.15-129.25 m : Silicified and argillized zone. The angle of the boundary with the upper argillized zone is 60°.
- 129.25-129.45 m : Weakly argillized basalt.
- 129.45-130.30 m : Clay. A quartz vein of 1 cm width occurs.

Depth (m)	Width(m)	Au(g/t)	Description
116.80-117.25	0.45	0.228	Clay and partly silicified
118.10-118.60	0.50	0.551	Argillized(Pyrite disseminated)
122.10-122.50	0.40	0.918	Argillized(quartz veinlets)
122.50-123.50	1.00	0.654	Clay(Soft, quartz vein)
123.50-123.80	0.30	0.203	Argillized basalt(gangue rock)
124.30-124.70	0.40	0.319	Argillized(quartz veinlets)
125.10-125.40	0.30	0.478	Argillized
125.40-125.60	0.20	3.13	Silicified
125.60-126.60	1.00	0.416	Clay
126.60-127.70	1.10	0.406	Clay
128.15-129.25	1.10	1.88	Silicified and argillized

- 141.45-141.70 m : Quartz-pyrite stockwork in pale yellow altered rock. This zone intersects the drill hole at an angle of 30°.
- 142.60-143.00 m : Quartz-pyrite stockwork in pale yellow altered rock. This zone intersects the drill hole at an angle of 30°-45°.

Depth (m)	Width (m)	Au (g/t)	Description
141.45-141.70	0.30	0.471	Quartz-pyrite stockwork
142.60-143.00	0.30	0.473	Quartz-pyrite stockwork

- 241.20-241.24 m : A drusy quartz vein of 4 cm width. It assays less than the detection limit of gold (0.008g/t).
- 279.90-280.70 m: A weakly to moderately silicified zone with pyrite dissemination. It assays less than the detection limit of gold.

(3) MJFV-9

MJFV-9 was drilled to clarify the downward continuation of the gold mineralization at the trenches such as Trench 12. As a result of drilling, a wide zone from 87 to 95 m interval with frequent quartz veining was encountered. It appears that this zone continues to the surface showings. Quartz veins and argillized zones with pyrite dissemination were encountered at depths (Figs. 2-8, -9).

① Geology

- 0-1.00 m : Soil.
- 1.00-95.35 m : Picritic basalt lava. It is dark green and pyroxene and olivine phenocrysts are prominent. It shows amygdaloidal texture. The structure of the lava varies from compact-massive to auto-brecciated ones. Basalt dykes occur at the depths of 19.30-19.80 m, 46.60-49.10 m and 55.75-56.15 m
- 95.35-127.10 m : Lapilli tuff of mosaic texture. At an interval of 124.25-127.10 m, it comprises of alternations of fine tuffs and tuff breccias and partly shows mudflow deposits. It is green to pale and massive. It contains basalt blocks of less than 10 cm diameter and pyroxene crystals.
- 127.10-131.70 m : Tuff breccia. It appears to be a marginal facies of basalt lava. The boundary between this unit and the upper basalt lava is vague.
- 131.70-182.80 m : Basalt lava. It shows grayish green and is fine-grained and compact rock.
- 182.70-200.85 m : Lapilli tuff. The upper part is massive and shows mosaic texture. The lower part shows vague laminae. A basalt dyke intrudes at 190.75-192.60 m depth.
- 200.85-222.20 m : Basalt lava. It shows dark green and contains amygdules of about 1 cm diameter filled with green minerals (smectite?)
- 222.20-272.30 m : Tuff and tuff breccia. The interval at 222.20-236.60 m comprises of alternations of fine tuffs and tuff breccias. The bedding planes crosses at angles of 40° with the drill hole. A dyke intrudes at the depth of 245.60-250.60 m.
- 272.30-278.00 m : Basalt lava. It is massive and compact.
- 278.00-283.00 m : Tuff breccia. The facies is similar to the tuff breccia at about 270 m depth.
- 283.00-290.00 m : Basalt lava. This rock ranges from massive to weakly brecciated texture. A basalt dyke intrudes into the depth of 288.80-289.50 m.
- 290.00-300.90 m : Lapilli tuff and tuff breccia. It comprises mosaic of green, red and black lithic fragments
- 283.20-300.90 m : Basalt lava. Basalt dykes intrude at the depths of 293.60-294.80 m and 300.70-300.90 m.

② Mineralization and alteration

The alteration pattern shows a clear zoning of clay minerals from smectite near the surface and mixed-layered mineral and chlorite at depth. Chlorite, however, occurs widely at depth different from the MJFV-7 and MJFV-8.

・87.20-87.30 m : A quartz veinlet of 1 cm width occurs in the argillized zone.

・87.30-88.10 m : Weakly argillized basalt and soft clay occurs along fractures.

・88.10-89.70 m : Argillized zone. Silicified breccia occurs at the depth of 88.45-88.50 m. Soft clay occurs within weakly altered and brecciated basalt.

・89.70-89.90 m : Basalt.

・89.90-90.25 m : Weakly silicified zone.

・90.25-90.70 m : Basalt.

・90.70-93.05 m : Argillized zone. It includes the following intervals: silicified breccia zone at 91.35-91.55 m, quartz vein of 5 mm width (at the angle 15°) at 91.70-91.95 m, quartz fragments containing zone at 93.00-93.05 m, quartz breccia zone at 93.70-93.75 m, quartz stockwork at 93.75-94.05 m, quartz vein accompanying angular basalt fragments at 94.05-94.10 m, quartz-calcite stockwork at 94.10-94.75 m and unaltered basalt at 94.75 to 95.15 m.

・95.15-95.35 m: Silicified zone. A 5 mm wide quartz veinlet occurs at 95.15-95.25 m

Depth (m)	Width (m)	Au (g/t)	Description
87.20-87.30	0.10	1.01	Quartz vein・Strongly silicified
88.10-88.45	0.35	0.562	Argillized
88.45-88.50	0.05	0.516	Brecciated zone with silicified fragments
88.50-88.70	0.20	0.262	Argillized zone
90.70-91.35	0.65	0.436	Argillized zone
91.35-91.55	0.20	0.291	Breccia zone with silicified fragments
91.55-91.70	0.15	0.020	Argillized zone
91.70-91.95	0.25	0.051	Quartz veinlets
91.95-93.00	1.05	0.101	Argillized zone
93.00-93.05	0.05	0.372	Breccia zone with silicified fragments
93.05-93.70	0.65	0.211	Argillized zone
93.70-93.75	0.05	0.792	Breccia zone with quartz fragments
93.75-94.05	0.30	2.33	Quartz stockwork
94.05-94.10	0.05	0.171	Breccia-quartz vein
94.10-94.75	0.65	0.008	Calcite-quartz veinlets
95.15-95.25	0.10	0.401	Silicified zone with a quartz veinlet

Quartz veinlets occur at the depth of 240-290 m. The veinlets assay mostly lower than detection limit in gold. A quartz vein at the depth of 289.90-290.10 m assays low in gold.

Depth (m)	Width (m)	Au (g/t)	Description
243.65-243.70	0.05	<0.008	Clay-Quartz veinlets
245.35-245.50	0.15	<0.008	Drusy quartz veinlets
246.70-246.85	0.15	<0.008	Quartz veinlets
248.60-249.00	0.40	<0.008	Clay
284.10-284.50	0.40	<0.008	Silicified-argillized zone
289.90-290.10	0.20	0.101	Clay with drusy quartz

1-4 Drilling Results and Considerations

1-4-1 Major alteration associated with mineralization confirmed by drilling

The target for the drilling carried out this year-1997-was the confirmation of the extent of the gold mineralization of drill hole MJFV-5, and this was accomplished at the three holes MJFV-7, -8, and -9 (Figs. 2-10 to 2-12).

(1) MJFV-7

The major mineralization confirmed in this hole occurs in the argillized-silicified zones at depths of; 226.60 m (1.40 m thick), 249.90 m (3.80 m thick), and 259.10 m (1.10 m thick). The angle of these zones and the drill hole are; 60°, 60°-80°, and 60° respectively. It is believed from the characteristics of the silicification and argillization that the mineralization at 226.60 m (1.40 m thick) is continuous to those at 138.50 m depth of MJFV-4 and 121.45 m of MJFV-5. The attitude in this case would be approximately NW 70° strike and 75°N dip. It is also inferred that the two zones at 249.90 m (3.80 m thick) and 259.90 m depths (1.10 m thick) are correlated to those at 181.80 m and 190.90 m depths of MJFV-4, and that near 152.40-172.60 m depth of MJFV-5. The attitude of the zones in this case is approximately NW 75° strike and 75° dip.

There are only two samples from sections with grade exceeding 1gt/t Au in MJFV-7 and thus the grade of mineralization in this hole is lower than that of MJFV-5 samples.

(2) MJFV-8

The major mineralization confirmed in this hole occurs in the argillized-silicified zone at 116.80-130.30 m depth and this is inferred to be continuous to those encountered at MJFV-4 to MJFV-7. Only two samples from this hole have gold content exceeding 1g/t and the grade is lower than that of MJFV-5, but comparable thickness of gold showing was confirmed. Particularly the 2.6 m interval between 125.10 m and 127.70 m has average grade of 0.63g/t Au and 1.10 m from 128.15 m depth contains 1.88g/t Au. Although this is not high for general underground gold mining, this is considered to be sufficiently high grade at this stage of exploration to warrant further investigation of this mineralization.

Previous trench (T-35) on the surface shows low gold grade of 0.047g/t (0.20 m wide) and clear silicification or argillization were not observed. The mineralization in the argillized-silicified zone at 116.80 to 130.30 m depth with N70°W strike and N75° dip is possibly continuous to the vicinity of this trench. There is also the possibility that this ore vein continues to the argillized-silicified zone at 87.20 to 95.35 m depth of MJFV-9.

(3) MJFV-9

In this hole, many quartz veinlets were encountered in relatively shallow parts. This zone is inferred to be continuous to the argillized-silicified zone at 116.80-130.30 m depth of MJFV-8 and to the quartz veinlet zone at 120.10-128.60 m depth of MJFV-6. This is harmonious with the attitude of this zone mentioned above, namely N70°W strike and 75°N dip. The mineral showing of a trench (T-41) and the quartz veinlet zone of MJFV-6 occur along an approximately 80°N line, and correspond to the mineralization direction of WNW-ESE inferred from surface geological survey. Thus it is deemed appropriate. Although clear mineral showings were not observed at the trench (T-12) on the MJFV-9 section, it is believed to correspond to the locality of the exposure.

1-4-2 Results of Laboratory Work

(1) Microscopic studies

Ten thin sections and ten polished thin sections are studied microscopically. The results are shown in Tables A-1 and A-2 in Appendix.

(2) X-ray diffraction analyses

Fifty-five samples were subjected to X-ray diffraction analysis(Fig.A-3). Identified clay minerals are mainly smectite, mixed-layer mineral and chlorite with small amount of metahalloysite. Generally chlorite and smectite occur within and adjacent to mineralized veins. Schematic zoning in Figures. 2-11, 13 and 15 was drawn on the assumption that the vein structures control the clay mineral occurrence resulting from the hydrothermal fluid circulation. The definition of alteration zones is after Naito and et al. (1993). Smectite-quartz zone occurs deeper than mixed-layered mineral zone in the Hole MJFV-7. On the other hand, in the Hole MJFV-9 mixed layered mineral occurs from the surface to 100m depth, smectite from 100 m to 200 m, and chlorite from 200m to the bottom. The zonation is correlated to that of MJFV-4, -5 and –6. It is newly revealed that smectite and metahalloysite occur paragenetically.

(3) Fluid inclusion study

Homogenization temperature was measured for 5 out of 6 samples that were prepared for measurement (Fig.A-5). Four samples are quartz, while DD742 and DD914 are calcite-quartz. All the samples except DD818 from MJFV-8 contain only a few fluid inclusions measurable for the homogenization temperature. Samples DD740, DD818 and DD922 are considered to contain primary inclusions, although no sample shows clear evidence of zonal growth.

Homogenization temperature of two inclusions from sample DD740 are 407°C and 460°C. The high temperatures may have resulted from boiling of the fluid at formation time of inclusions, although only two inclusions were measurable.

The inclusions from sample DD742 contain only liquid phase. Consequently no temperature data were obtained. It is, however, considered that the inclusions were formed at around 100°C.

The sample DD818 contains inclusions of primary and secondary origin. The homogenization temperatures of primary inclusions range widely between 185°C and 373°C, and generally higher than 300°C. The homogenization temperatures of secondary inclusions are between 192°C and 265°C, lower than the primary ones.

The sample DD914 obtained from 0.5-2cm wide calcite-quartz vein contains secondary inclusions. The inclusions show necking-down texture.

Temperatures of only two inclusions from the sample DD916 were measurable, showing 365°C and 406°C. It is difficult to determine whether they are of primary or secondary origin.

The sample DD922 was taken from a 1 cm wide quartz vein. It contains mono-phase inclusions consisting of only gas-phase in addition to two-phase ones, although it shows lower temperature than DD740. The homogenization temperatures of primary inclusions vary between 268°C and 351°C.

The extraordinarily high temperature data of DD740 and DD916 are excluded from the consideration of mineralization.

1-4-3 Fissure System and Mineralization

Fissure system and alteration both believed to be related to mineralization were encountered in all three holes drilled this year. The most promising zone is the quartz and silicified angular fragments-clay zone, although the maximum grade is 2-3g/t Au in the three holes MJFV-7, -8, and -9, the zone is 700 m long extending from MJFV-4 to -6. During the work in 1995 and 1996, it was only noted that the attitude of this zone is similar to that of the mineral showing zone on the surface, but during this year the continuity of the zone was confirmed at least for 700 m. This gold mineralization has the following characteristics.

(1) The characteristics of mineralization

The mineralization confirmed by the work of the second and the third (present) year is controlled by the fissure system in the host basalt lava and basaltic volcaniclastic rocks, and has the characteristics of low sulfidation hydrothermal system.

Alteration associated with mineralization is limited to immediate vicinity of the ore veins in the western part (MJFV-4, -7, -5). The parts adjacent to the veins consist mainly of mixed-layer minerals and the strongest mineralized veins have chlorite-sericite zone. Smectite zone occurs at a distance from the veins. In the eastern part (MJFV-6 and -9), on the other hand, chlorite zone is formed in the deeper parts and strong pyrite dissemination is observed in this altered zone.

The fluid inclusion data of MJFV-5 show high temperature zone of 220-240℃ near the high Au zone, while those of MJFV-4 and -6 show somewhat lower figure of 180-210℃ and 130-230℃ (Fig. 2-13). This indicates that the center of gold mineralizing fluid was near MJFV-5.

The identified sulfide minerals are; aside from pyrite, chalcopyrite, sphalerite, and galena. Particularly in MJFV-5, sphalerite and galena are somewhat richer in high gold zone. Also electrum is found in MJFV-6. Argentite is found in one sample. Au/Ag ratio is over 10 and the content of As, Sb, and Hg is small.

The gangue minerals are; quartz, potash feldspar (adularia), calcite, and clay minerals (mixed layer minerals and sericite). Kaolin minerals and alunite have not been identified.

(2) Geologic structure and mineralization

It is shown by the surface geological survey carried out during this project that the geologic structure of the area in the vicinity of the Dakuniba Prospect is, on the whole, relatively simple. Basalt lava and basaltic volcaniclastic rocks strike in the NW direction and gently dip in the SW direction.

The host rock of the mineralization is mainly basaltic rock. The lithology of the basalt is relatively simple; it consists mainly of non-clastic lava associated with coarse-grained volcaniclastic rocks. These rocks are not bedded and thus their structure is not clear. There are, however, small amount of fine-grained volcaniclastic rocks intercalated in the lava and coarse-grained volcaniclastic material. Many of these beddings and the drill hole cross at about 45°, and from the attitude on the surface, it is inferred that the bed is close to horizontal.

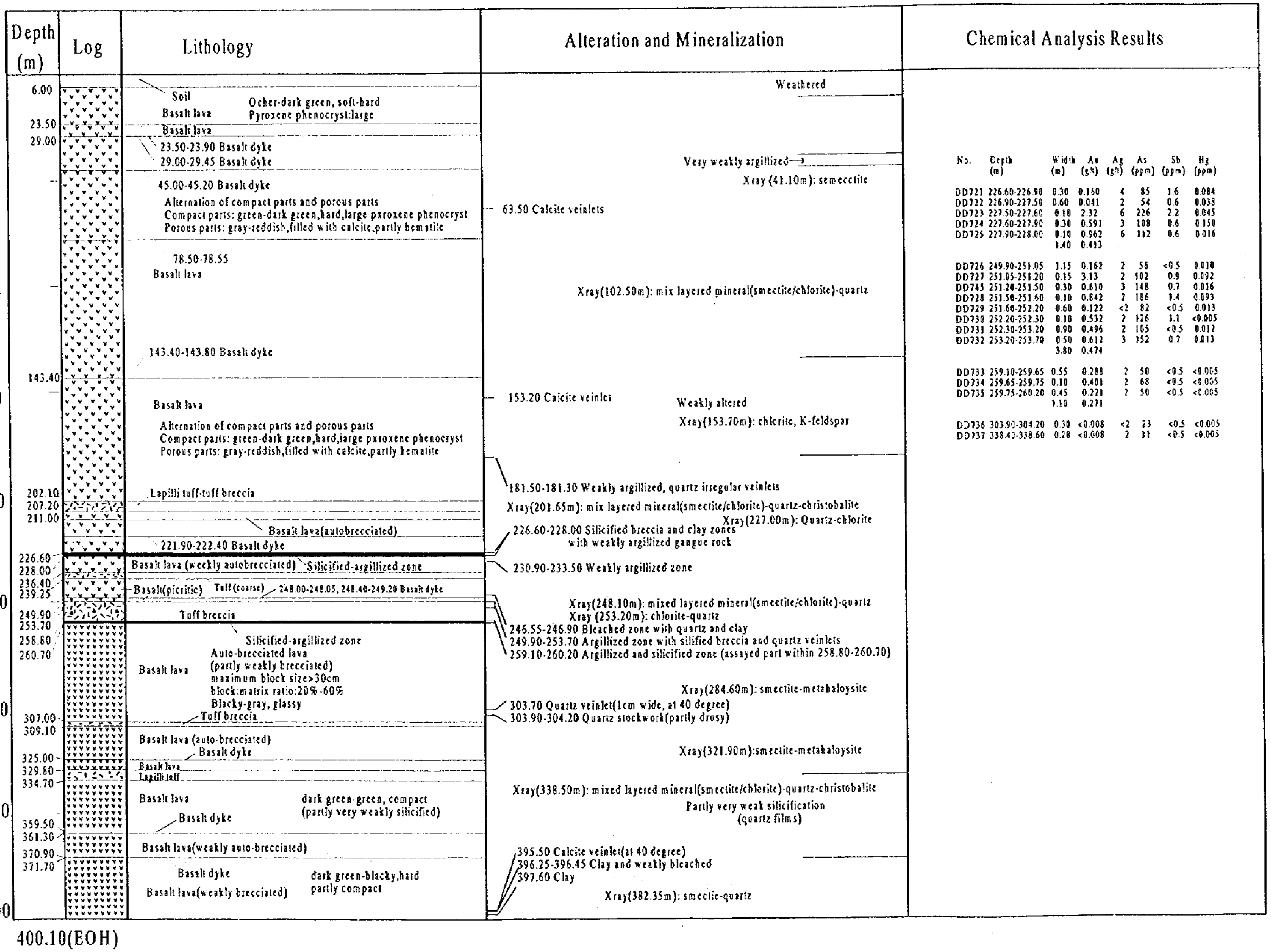
From the above, the geology between MJFV-4 and MJFV-9, namely the west-northwestern and the east-southeastern parts, is correlated as follows. Thick picritic basalt lava is distributed at elevation higher than 150 m, several meters thick red coarse-grained lava and dark green hard compact lava either on the surface or in shallow subsurface zones. The bottom of the lava slightly rises in the west and is around 200 m above sea level. Alternates and these pairs of lava form the flow units. Also these do not contain pillow lava and thus it is believed that the lava flows were formed either on the surface or in shallow subsurface zones. The bottom of this lava rises slightly to the west and is around 200 m above sea level. At zones shallower than 150-200 m elevation, glassy basalt lava and hyaloclastite is predominant in the west (MJFV-7 and -4), while picritic coarse-grained volcaniclastic rocks occur in the central (MJFV-8) to the eastern (MJFV-9 and -6) parts. It is seen that the glassy basal lava drops eastward. Thus it is inferred that the western part rose relative to the eastern part after the deposition of the hyaloclastite.

The fact that the geology shows evidences of shallower mineralization in the east is interpreted as follows. The major mineralization occurred before the differential vertical movement between the east and western parts and that the differential movement continued after the mineralization. The faults which caused the differential movement and the faults related to the mineralization are not evident on the surface. However, the topography from the MJFV-4, -7, -5 drilling sites to the Nagagani Creek is very steep suggesting the existence of a fault. Also it is inferred that there are two WNW-trending faults extending parallel to the elongation of the Dakuniba Prospect. Only weak gold mineralization is found at the inferred location of the faults, but the possibility of these faults' role in the circulation of hydrothermal fluids is considered warrants further careful consideration.

(3) Mineral potential in the vicinity of MJFV-5

The continuity of the gold mineralization from MJFV-4 to MJFV-6 has become clear by the drilling carried out during the present third year of this project. Gold grade exceeding 10g/t Au could not be obtained from drill holes other than MJFV-5. Therefore, the bonanza is concluded to be either fragmented or of small scale, however, if the fluid inclusion data is interpreted as; highest temperature at MJFV-5 and low at MJFV-4 and -6, then it is anticipated that the mineralizing fluids were of higher temperature in the deeper zones of MJFV-4 and MJFV-5. This would mean that there is a fairly good possibility that Au precipitation could have occurred at the deeper parts in the vicinity of MJFV-4 and MJFV-5. There is high possibility that discontinuous bonanza bodies occur in the mineralized zone that trends in the WNW-ESE direction. In MJFV-9, it is observed that there are not only the veins continuous to the surface trench but that there are many quartz veinlets within the pyrite disseminated silicified and argillized zone in the shallow (around 87-96 m depth) parts. It is of interest to note that these are all of low Au to barren grade.

As reported above, all six holes drilled during the present and previous year confirmed the existence of gold mineralization. Of the above, MJFV-5 show promising mineralization, but other holes showed mineralization lower than 10g/t Au and did not show promising results. In the Nagagani Prospect, however, gold mineralization was observed to occur widely, and it is concluded that mineral potential of the vicinity of Nagagani and other parts of the present study area have sufficient potential to warrant further detailed study.



No.	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	As (ppm)	Sb (ppm)	Hg (ppm)
DD721	226.60-226.90	0.30	0.160	4	85	1.6	0.084
DD722	226.90-227.50	0.60	0.041	2	54	0.6	0.038
DD723	227.50-227.60	0.10	2.32	6	226	2.2	0.045
DD724	227.60-227.90	0.30	0.591	3	108	0.6	0.150
DD725	227.90-228.00	0.10	0.962	6	112	0.6	0.016
		1.40	0.413				
DD726	249.90-251.05	1.15	0.162	2	56	<0.5	0.010
DD727	251.05-251.20	0.15	3.13	2	102	0.9	0.092
DD745	251.20-251.50	0.30	0.610	3	148	0.7	0.016
DD728	251.50-251.60	0.10	0.842	2	186	1.4	0.093
DD729	251.60-252.20	0.60	0.122	<2	82	<0.5	0.013
DD730	252.20-252.30	0.10	0.532	2	126	1.1	<0.005
DD731	252.30-253.20	0.90	0.496	2	105	<0.5	0.012
DD732	253.20-253.70	0.50	0.612	3	152	0.7	0.013
		3.80	0.474				
DD733	259.10-259.65	0.55	0.288	2	50	<0.5	<0.005
DD734	259.65-259.75	0.10	0.401	2	68	<0.5	<0.005
DD735	259.75-260.20	0.45	0.221	2	50	<0.5	<0.005
		1.10	0.271				
DD736	303.90-304.20	0.30	<0.008	<2	23	<0.5	<0.005
DD737	338.40-338.60	0.20	<0.008	2	11	<0.5	<0.005

Fig. 2-4 Geologic Log of MJFV-7

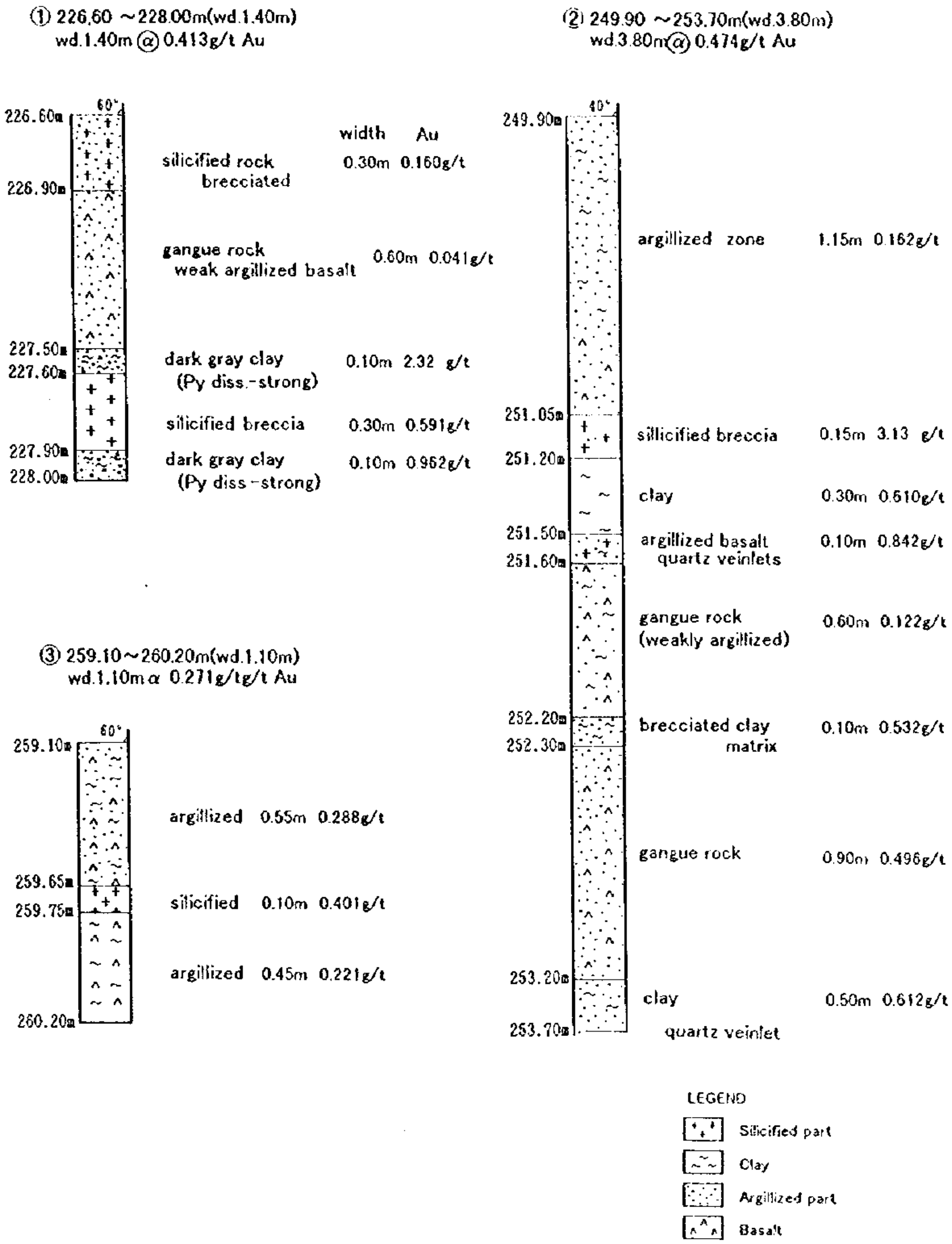
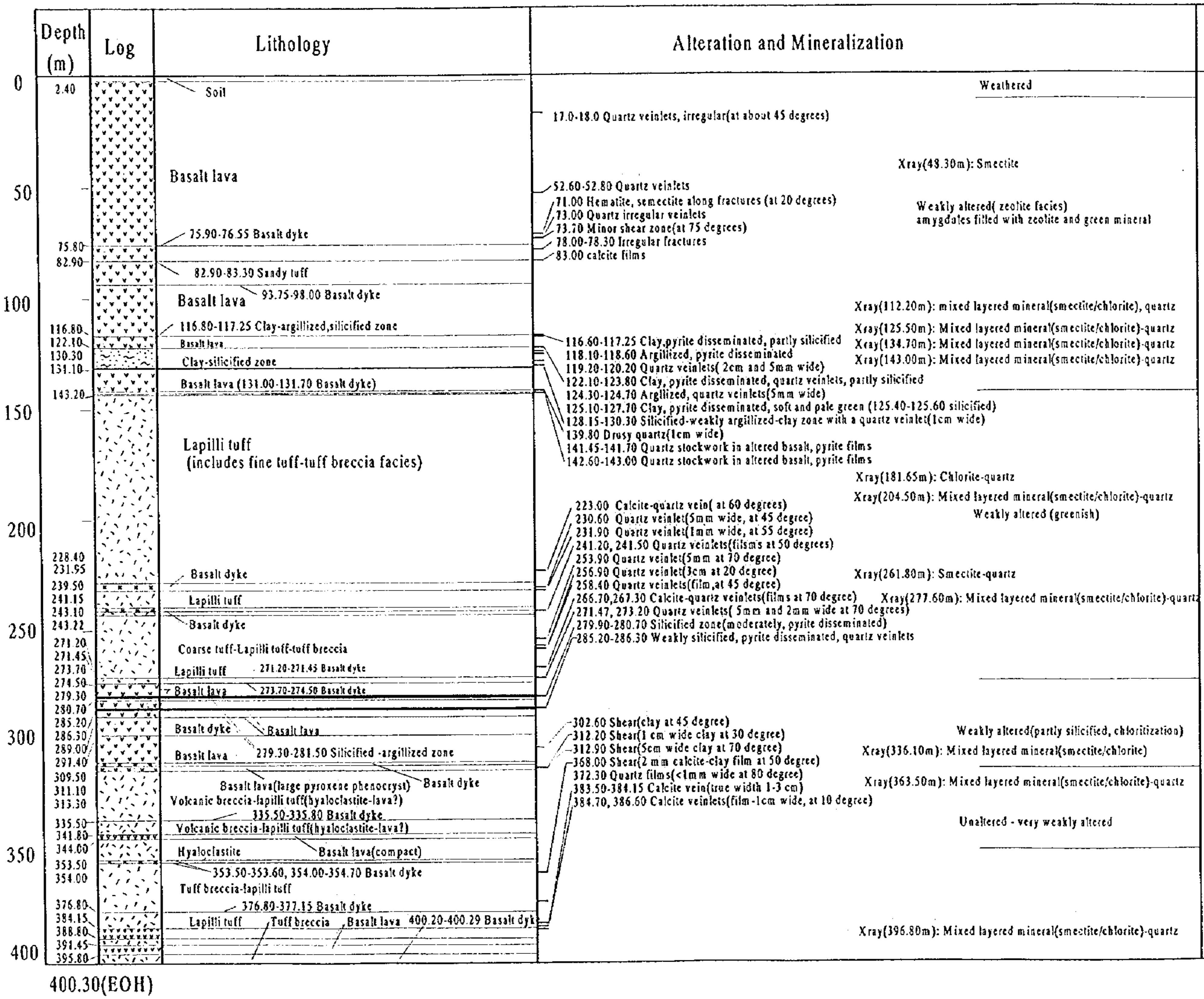


Fig. 2-5 Detailed Sketch of the Mineralization Zone Intersected by the MJFV-7



Chemical Analysis Results

No.	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	As (ppm)	Sb (ppm)	Hg (ppm)
DD822	116.80-117.25	0.45	0.228	4	86	1.0	0.093
DD828	118.10-118.60	0.50	0.551	2	86	0.6	0.028
DD829	122.10-122.50	0.40	0.918	2	50	<0.5	0.009
DD830	122.50-123.50	1.00	0.654	2	96	0.8	0.150
DD831	123.50-123.80	0.30	0.203	2	86	<0.5	0.009
		1.70	0.637				
DD832	124.30-124.70	0.40	0.319	4	61	1.2	0.023
DD837	125.10-125.40	0.30	0.478	2	60	1.0	0.008
DD823	125.40-125.60	0.20	3.13	3	80	1.1	0.013
DD833	125.60-126.60	1.00	0.416	2	50	<0.5	0.008
DD824	126.60-127.70	1.10	0.406	2	146	<0.5	<0.005
		2.60	0.628				
DD834	128.15-129.25	1.10	1.88	2	69	<0.5	<0.005
DD825	141.45-141.70	0.25	0.471	6	350	1.6	<0.005
DD826	142.60-143.00	0.40	0.473	6	265	1.6	<0.005
DD827	241.20-241.24	0.04	<0.008	<2	5	<0.5	<0.005
DD835	279.90-280.70	0.80	<0.008	<2	13	<0.5	<0.005

Fig. 2-6 Geologic Log of MJFV-8

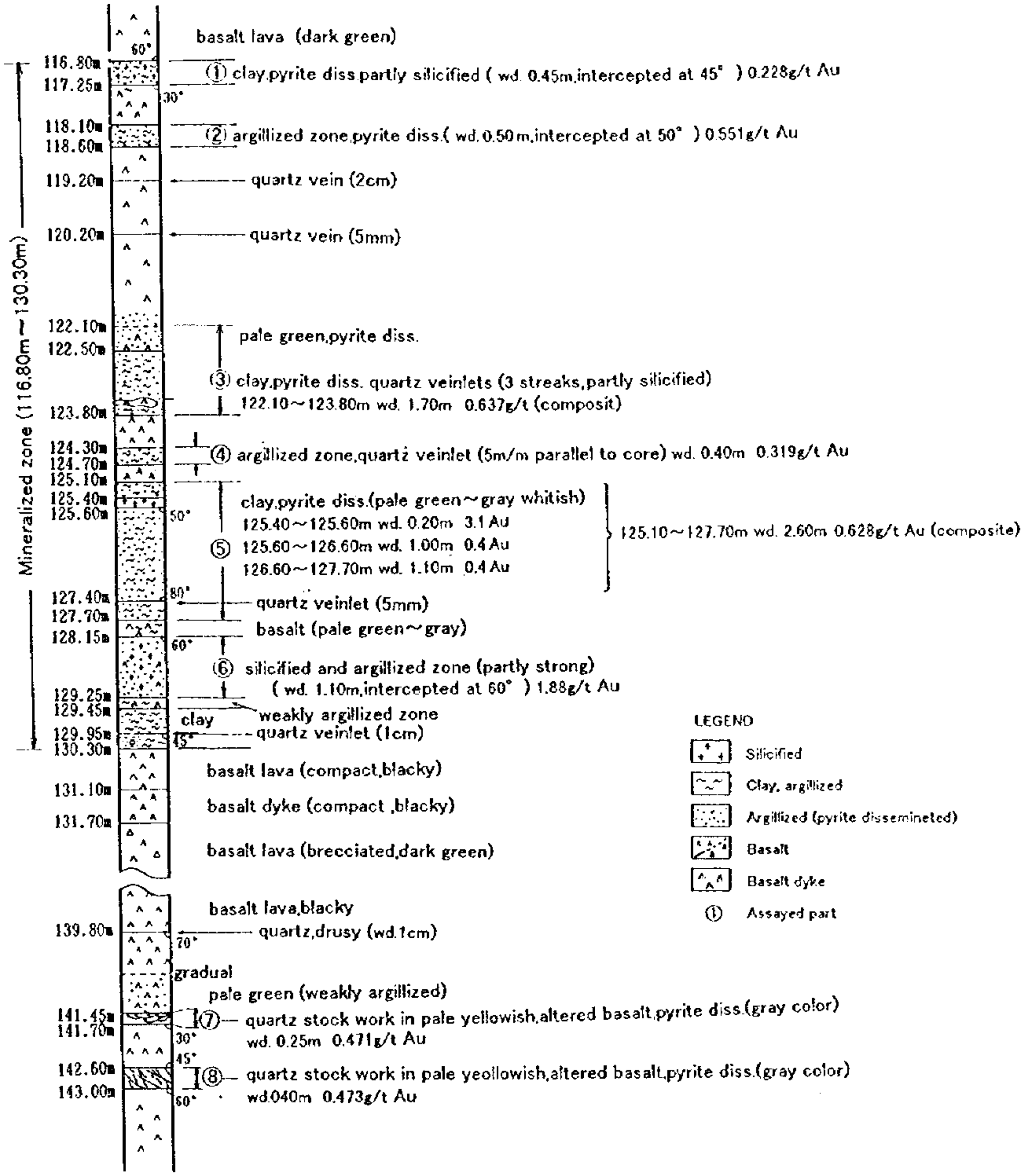
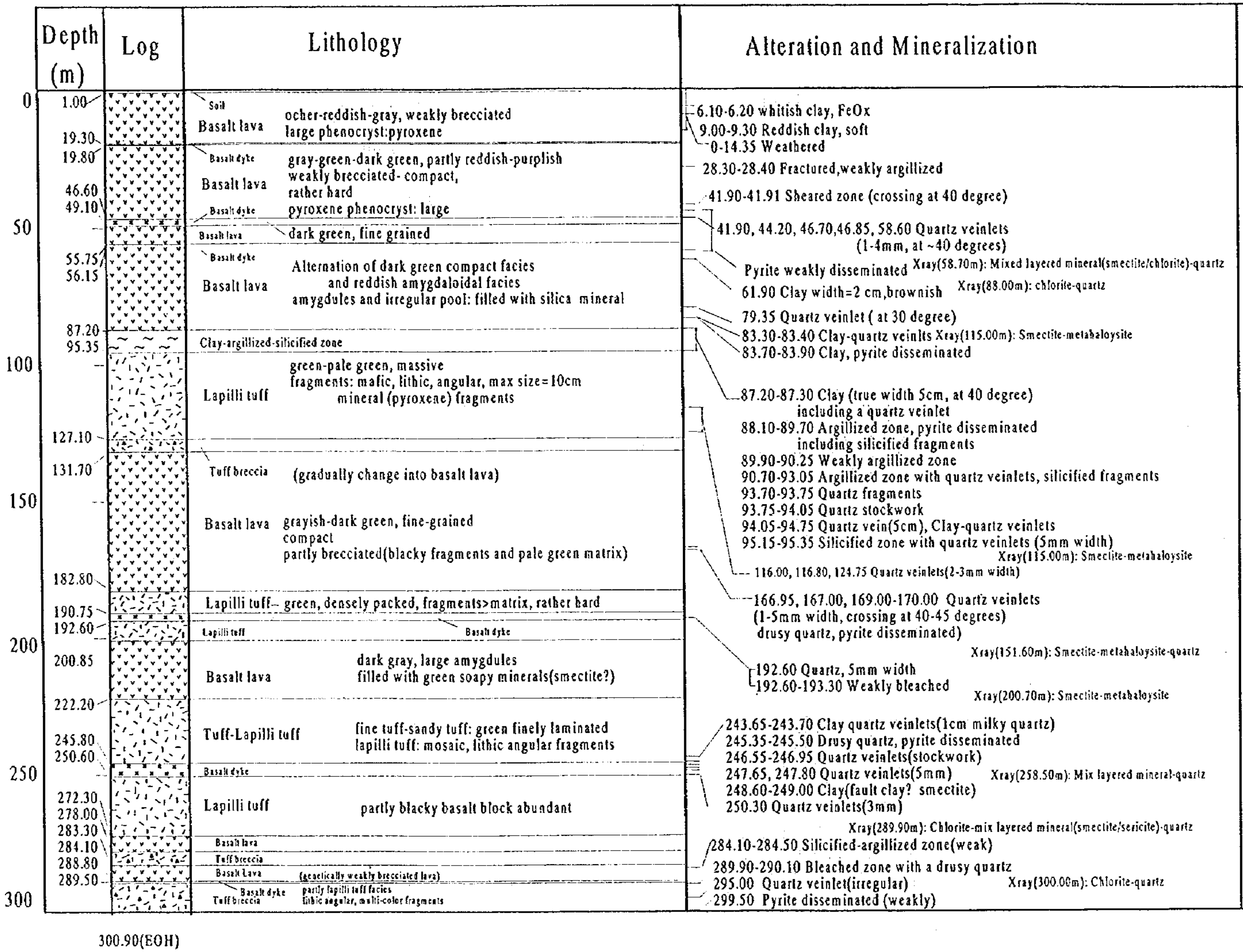


Fig. 2-7 Detailed Sketch of the Mineralization Zone Intersected by the MJFV-8



Chemical Analysis Results

No.	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	As (ppm)	Sb (ppm)	Hg (ppm)
DD901	87.20-87.30	0.10	1.01	2	60	<0.5	0.040
DD902	88.10-88.45	0.35	0.562	3	102	0.7	0.015
DD903	88.45-88.50	0.05	0.516	4	110	0.7	0.010
DD904	88.50-88.70	0.20	0.262	2	106	0.6	0.013
		0.60	0.458				
DD905	90.70-91.35	0.65	0.436	3	128	0.8	0.027
DD906	91.35-91.55	0.20	0.291	4	130	1.0	0.012
DD907	91.55-91.70	0.15	0.020	2	50	<0.5	0.009
DD908	91.70-91.95	0.25	0.051	2	100	<0.5	0.014
DD909	91.95-93.00	1.05	0.101	2	63	<0.5	0.016
DD910	93.00-93.05	0.05	0.372	2	63	<0.5	0.016
DD911	93.05-93.70	0.65	0.211	2	92	0.6	0.021
DD912	93.70-93.75	0.05	0.792	3	112	0.9	0.032
DD913	93.75-94.05	0.30	2.33	3	34	0.9	<0.005
DD914	94.05-94.10	0.05	0.171	2	23	<0.5	<0.005
DD915	94.10-94.75	0.65	0.008	<2	15	<0.5	<0.005
		4.05	0.339				
DD916	95.15-95.25	0.10	0.401	<2	50	<0.5	0.006
DD917	243.65-243.70	0.05	<0.008	<2	1	<0.5	<0.005
DD918	245.35-245.50	0.15	<0.008	2	5	<0.5	<0.005
DD919	246.70-246.85	0.15	<0.008	<2	3	<0.5	<0.005
DD920	248.60-249.00	0.40	<0.008	<2	19	<0.5	0.009
DD921	284.10-284.50	0.40	<0.008	2	50	<0.5	<0.005
DD922	289.90-290.10	0.20	0.101	6	70	<0.5	<0.005

Fig. 2-8 Geologic Log of MJFV-9

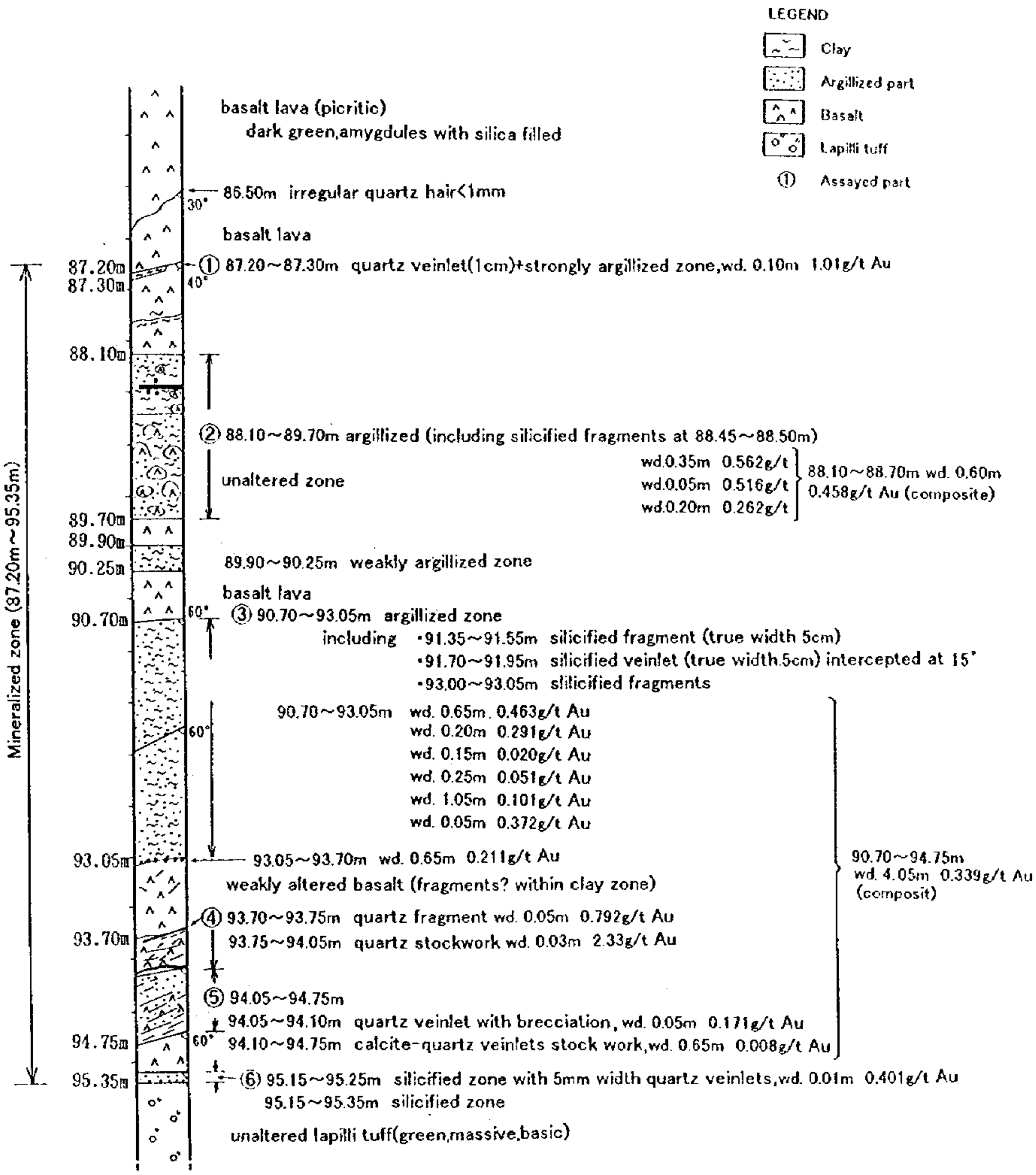


Fig. 2-9 Detailed Sketch of the Mineralization Zone Intersected by the MJFV-9

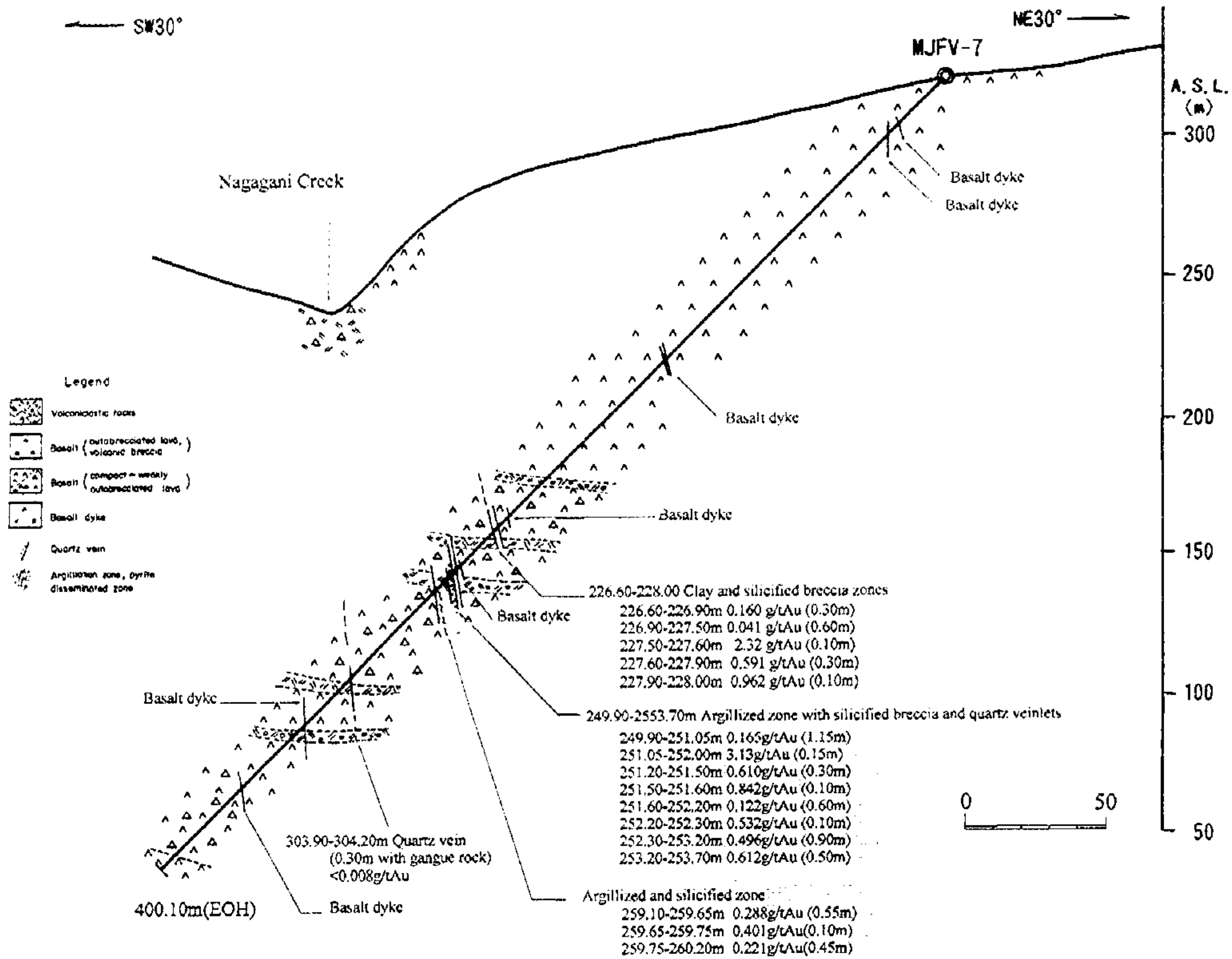


Fig. 2-10 Geologic Profile of MJFV-7

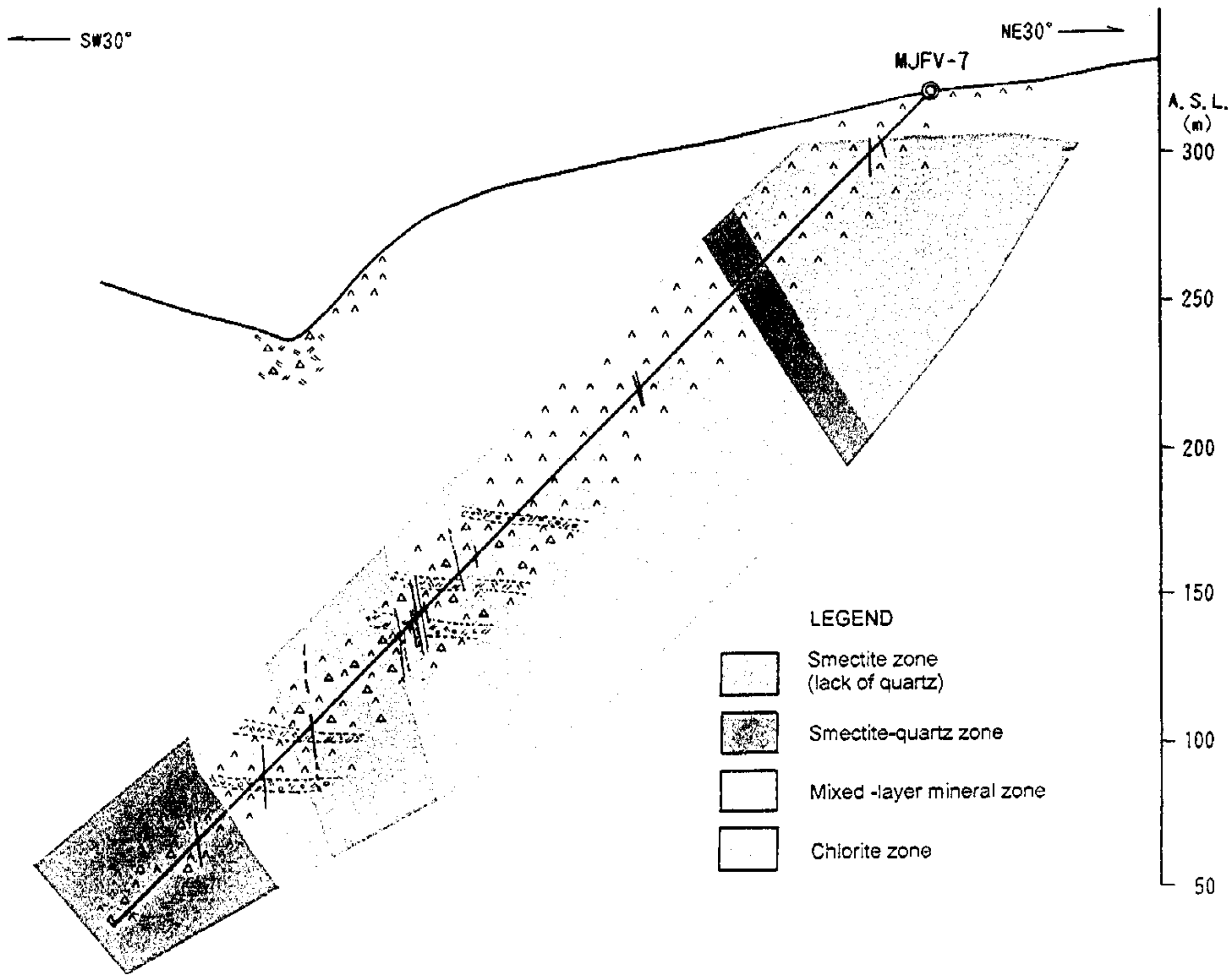


Fig. 2-11 Schematic Alteration Zoning of MJFV-7

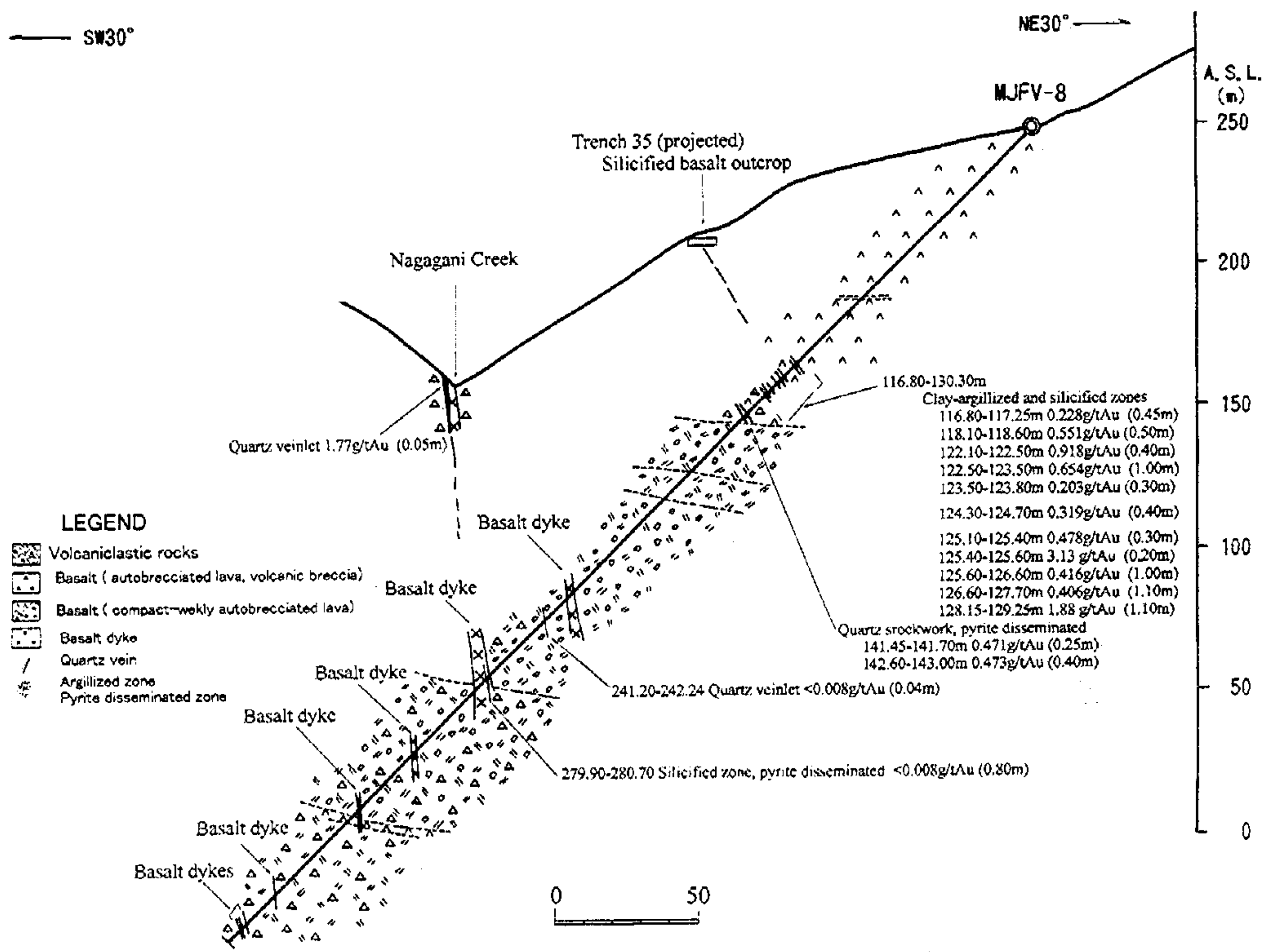


Fig. 2-12 Geologic Profile of MJFV-8

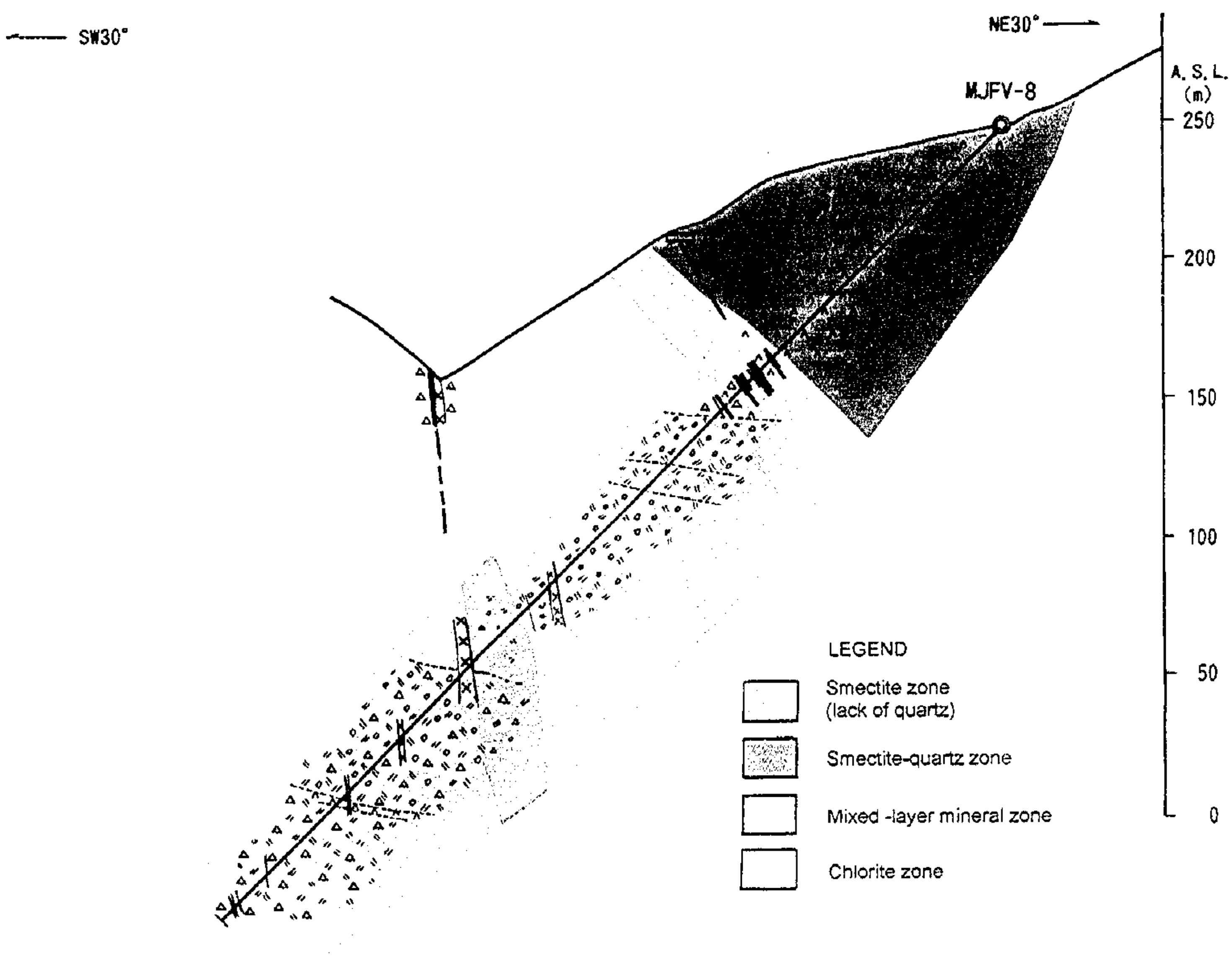


Fig. 2-13 Schematic Alteration Zoning of MJFV-8

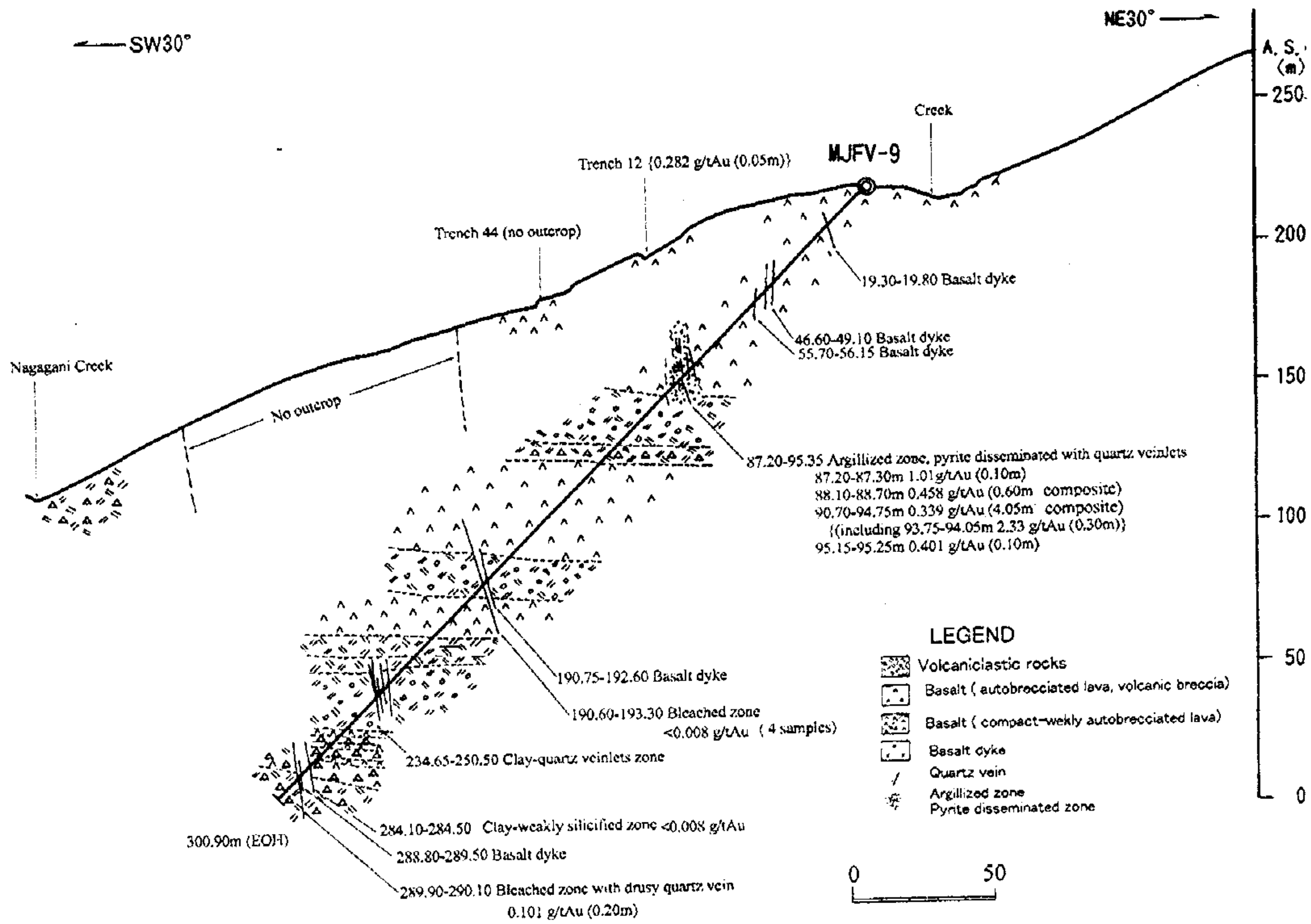


Fig. 2-14 Geologic Profile of MJFV-9

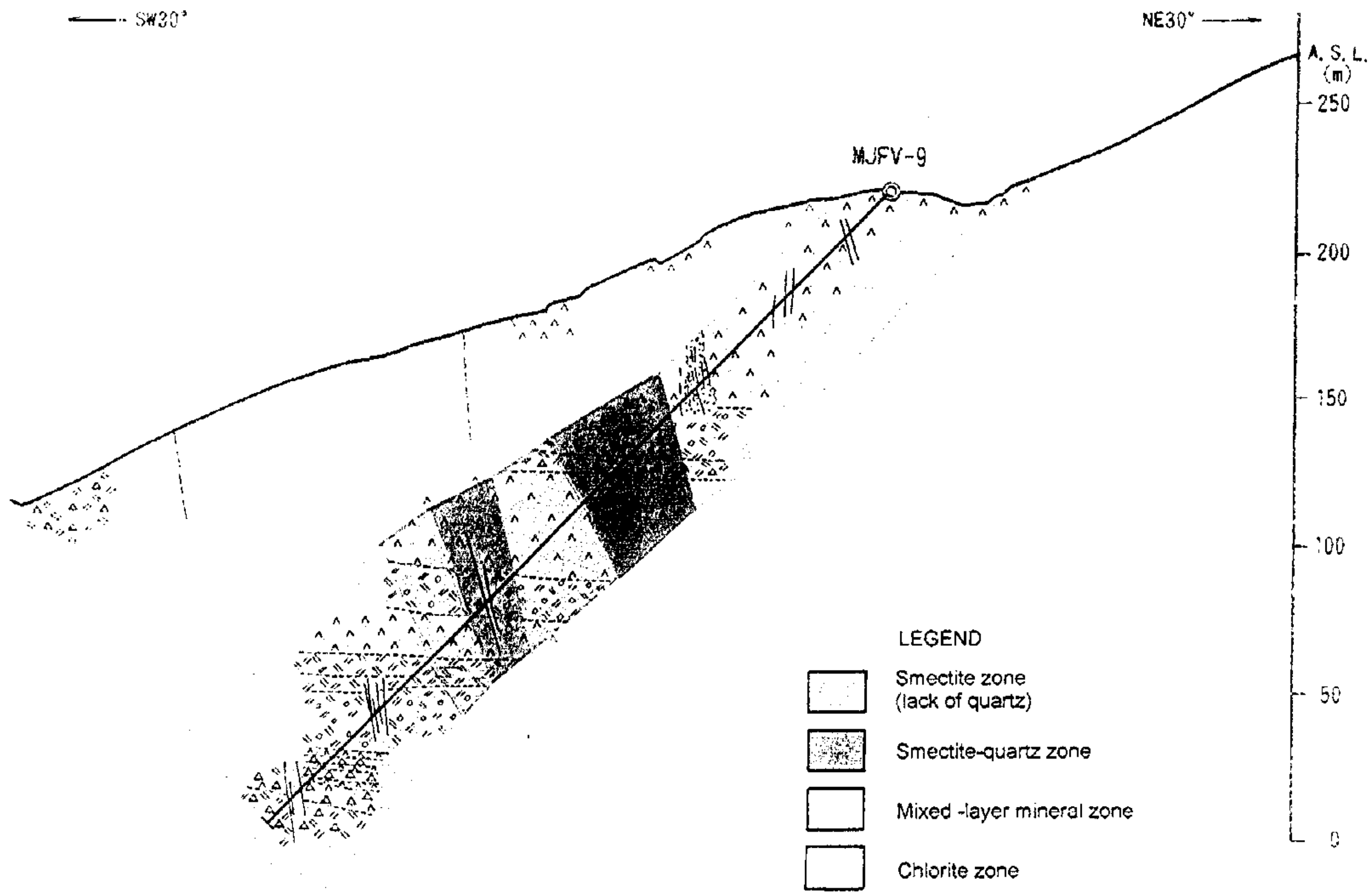


Fig. 2-15 Schematic Alteration Zoning of MJFV-9

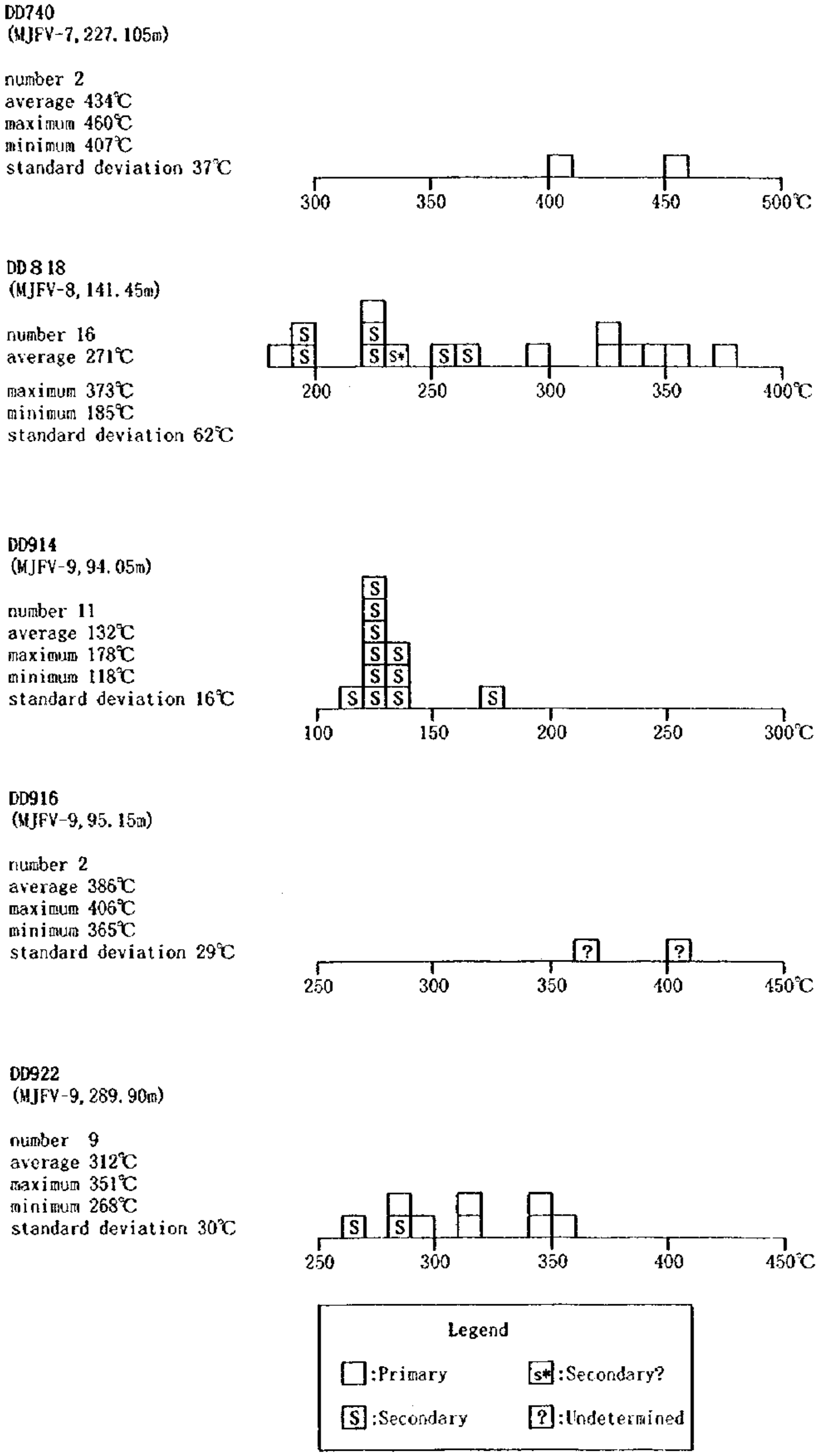


Fig. 2-16 Histograms of Homogenization Temperatures of Fluid Inclusions from the Dakuniba Area

PART Ⅲ CONCLUSIONS AND RECOMMENDATIONS

PART III CONCLUSIONS AND RECOMMENDATIONS

Chapter 1 Conclusions

Three drill holes were drilled in the Dakuniba Area during the third year of the Vanua Levu mineral exploration and arrived at the following conclusions.

All three holes drilled during the third year of this project, namely MJFV-7, -8, and -9, encountered argillized zone accompanied by silicified breccia. The existence of this zone in these drill holes was inferred from the results of the investigation of surface outcrops and trenches, and drilling at MJFV-4, -5, and -6 carried out during the previous year.

(1) MJFV-7 penetrated argillized zone with quartz breccia and silicified breccia at 226.60-228.00 m depth (1.40 m thick), 249.90-253.70 m (3.80 m), and 259.10-260.20 m (1.10 m). The gold grades of these horizons were 0.41g/t Au, 0.47g/t Au, and 0.27g/t Au, respectively. Of the above gold-bearing horizons, the grades at 227.50-227.60 m depth (0.10 m thick) and 251.05-251.20 (0.15 m) were 2.3g/t Au and 3.1g/t Au respectively. They are both higher than 1g/t Au.

(2) MJFV-8 confirmed the existence of the mineralized zone at three horizons. The zone encountered at 116.80-130.30 m depth (13.50 m thick) was a clay vein including a silicified zone and the grade was 0.23g/t Au, 0.55g/t Au, 0.64g/t Au, 0.32g/t Au, 0.63g/t Au, and 1.9g/t Au at depths of 116.80-117.25 m (0.45 m thick), 118.10-118.60 m (0.50 m), 122.10-123.80 m (1.70 m), 124.30-124.70 m (0.40 m), 125.10-127.70 m (2.60 m), and 128.15-129.25 m (1.10 m), respectively. The altered zones at 141.45-141.70 m depth (0.25 m thick) and 142.60-143.00 m (0.40 m) contained 0.47g/t Au and 0.47g/t Au, respectively. The gold content of the silicified zone at 279.90-280.70 m depth (0.80 m thick) was less than 0.08g/t Au.

(3) In MJFV-9, there are many quartz-calcite veins at 87.20-93.35 m depth, and gold content of 1.01g/t Au, 0.46g/t Au, and 0.34g/t Au was confirmed at 87.20-87.30 m (0.10 m thick), 88.10-88.45 m (0.35 m), and 90.70-94.75 m (4.05 m), respectively. The interval of 93.15-93.45 m (0.30 m thick) showed particularly high gold content of 2.3 g/t Au, the highest value of MJFV-9.

(4) The major ore zones encountered by the three drill holes of MJFV-7, -8 and -9; namely the three zones at 226.60-260.20 m depth of MJFV-7, silicified argillized zone at 116.80-130.30 m depth of MJFV-8, and the quartz-calcite veinlet zone at 87.20-95.35 m depth of MJFV-9 were confirmed to be continuous to the quartz breccia-bearing silicified breccia clay zone encountered in MJFV-5 with a WNW-ESE strike. Thus, the continuity of the mineralized zone inferred from the results of the second year survey to exist for 700 m from MJFV-4 to -6 was confirmed in the

subsurface part of the area.

(5) Although the assay results of these cores are lower than that of MJFV-5, the grade distribution agrees with the general eastward dip. This mineralized zone extends further east and westward, but its surface showings are weak.

(6) The fluid inclusions of the quartz veins in the east part show lower temperature than those from the western part, although no conclusive data are available.

(7) The gold grade distribution and fluid inclusion data reported above alone is not sufficient for inferring the mineral prospectivity in the lower subsurface zone of the area. The gold grade distribution above, however, indicates that the ore resources delineated during the second and third years are small.

(8) The mineral potential of other mineralization areas in the Dakuniba Area is difficult to evaluate since only surface data are available. However, since widespread gold mineralization was confirmed in the Nagagani Creek Area, it is believed that other parts of the present area also have sufficient mineral potential for further exploration.

Chapter 2 Recommendations

The work carried out during the third year of this project was successful in locating gold mineralization in the upper reaches of the Nagagani Creek. It is believed that, however, without additional data, it will not be efficient to immediately attempt to verify high-grade ore zone sufficiently large for development only in this area.

It has been shown by surface geochemical surveys that there are areas other than the upper Nagagani Creek where, although of low analytical values, gold anomalies cover large areal extent. It is most desirable to apply regional survey methods including geophysics to these other anomalous areas, delineate target areas for drilling, and then on the basis of this work, decide on the most prospective areas for detailed investigation.

REFERENCES

REFERENCES

Cox, M. E. (1980): Preliminary Geothermal Investigations in the Lambasa Area, Vanua Levu, Geothermal Report No.2 MRD.

Colley, H. and Greenbaum, D (1980): The Mineral Deposits and Metallogenesis of the Fiji Platform. Economic Geology vol.75, 807-829.

Colley, B. (1976): Mineral Deposits of Fiji (Metallic Deposits), Memoir No.1

Colley, H. and Flint, D. J. (1995): Metallic Mineral Deposits. Memoir 4, 198pp,MRD.

Hathway, B. (1993): The Nadi Basin: Neogene strike-slip faulting and sedimentation in a fragmented arc, western Viti Levu, Fiji. Journal of the Geological Society, London, vol. 150, 563-581.

Hedenquist, J. W. (1987): Volcanic-related hydrothermal systems in the Circum-Pacific Basin and their potential for mineralization. Mining Geology, vol.37, 347-364(in Japanese).

Ishihara, S. and Urabe, T. (1989): The mineralization of Fiji: Immature island arc. Chishitu News, vol.415, 18-31(in Japanese).

Izawa, E., Urashima, Y., Ibaraki, K., Suzuki, R., Yokoyama, T., Koga, A. and Taguchi, S. (1990): The Hishikari gold deposit: high grade epithermal veins in Quaternary volcanics of southern Kyushu, Japan. Journal of Geochemical Exploration, vol.36, 1-36.

Mallick, D. I. J. and Habgood, F. (1987): Interpretation of SLAR Imagery of the main islands of Fiji. British Geological Survey. 9 pp.

Mineral Resources Department (1994): Exploration and Mineral Digest,vol.10 No.4

Mineral Resources Department(1995): Exploration and Mineral Digest,vol.11 No.2

Mineral Resources Department(1996): Exploration and Mineral Digest, vol.12 No.1

Naito,K., Matsuhisa,Y., Izawa, E. and Takaoka, H.(1993): Oxygen isotopic zonation of hydrothermally altered rocks in the Hishikari gold deposit, southern Kyushu, Japan: Implications for mineral prospecting. Resource Geology special issue, no.14, 71-84.

Okuda, Y(1989): Geology of Fiji. Chishitu News, vol.415, 6-17 (in Japanese).

Reddy, D. P., and Flint, D. J. (1995): Vanua Levu: Summary status of geological knowledge and future work proposals. Mineral Resource Department, Note BP 50/11.

Rodda, P. (1989): Geology of Fiji. MRD

Shepherd, T. J., Rankin, A. H. and Alderton, D. H. M. (1985): Practical guide to fluid inclusion studies. Blackie, London.

White, N. C. and Hedenquist, J. W. (1990): Epithermal environments and styles of mineralization. Journal of Geochemical Exploration, vol.36, 57-71.

APPENDIX

Table A-1 Results of Microscopic Observation of Thin Sections

Sample No.	Depth (m)	Rock type	Texture	Phenocryst or fragment					Groundmass or matrix									Alteration
				ol	cpx	opx	pl	op	ol	cpx	opx	hb	pl	kf	qz	gl	op	
DD713	394.00	basalt	porphyritic	(◎)	◎			・		○	△		○			(◎)	・	ol totally→clay minerals, druse→carb. carb. and qz vein
DD714	361.20	basalt	porphyritic	(◎)	(○)		(○)	△	(△)	△			◎			(◎)	△	ol→clay+carb, gl totally→clay, pl→carb, carb. and qz vein
DD715	336.90	basalt	porphyritic	(○)	(○)			・	(△)	△			◎			(◎)	△	qt+carb vein, ol→clay + carb. pl & cpx→carb + qz
DD716	321.90	volc.breccia	clastic	(○)	◎			△		○			△			(◎)	△	ol totally→clay, gl totally→clay
DD717	293.60	basalt	porphyritic	(◎)	○			・	(△)	△			◎			(◎)	△	ol totally→clay minerals
DD814	210.50	lapilli tuff	clastic	(○)	◎		△	△	(△)	○			○			(◎)	△	ol→clay, gl totally→clay, druse→carb.
DD815	292.90	basalt	glomeroporphyritic	(○)	◎		○	・	(△)	○			◎			(○)	△	ol totally clay minerals
DD816	276.90	basalt	porphyritic	(◎)	△		○	△		(○)			○			(◎)	・	qz+carb vein, ol→clay+carb. pl & cpx→carb+qz
DD929	178.10	basalt	porphyritic	(○)	○			△	(△)	○			○			(◎)	・	ol totally→clay minerals
DD931	250.00	basalt	porphyritic	(◎)	○				(○)	(○)			△			(◎)	・	ol totally→clay minerals

abbrev. ol=olivine, cpx=clinopyroxene, opx=orthopyroxene, pl=plagioclase, op=opaque minerals, qz=quartz, hb=hornblende, kf=K-feldspar
gl=glass or microcrystalline aggregate, carb.=carbonate, serp=serpentine
◎: abundant, ○: common, △: small, ・: rare, ( ): totally decomposed

Table A-2 Results of Microscopic Observation of Polished Thin Sections

Sample No.	Depth (m)	Texture under microscope	Ore minerals						Gangue minerals								
			Py	Cha	Sph	Asp	Gal	others	Si	kf	pl	goe	chl	apa	carb	ser	others
DD740	227.10	silicified volcanic breccia	○		△		·	Au(·)	◎	◎			△			△	
DD742	251.20	silicified volcanic breccia	○		△		△		◎	△					○		
DD743	259.75	silicified volcanic breccia	○	△	·		·		◎	◎			△		◎		
DD817	125.40	silicified volcanic breccia	○	·	·				◎	◎			△		○	△	
DD818	141.45	silicified volcanic breccia	○	△	·	·			◎	◎					△	△	
DD819	125.50	silicified volcanic breccia	○	△					◎	○	◎		○		○		
DD822	116.80	carbonate rock	○	·											◎		
DD903	88.45	silicified tuff breccia	○	△	·			Cr(·)	◎	○	○		△		◎		
DD912	93.75	silicified volcanic breccia	○		·				◎	○			○		◎		
DD922	288.89	basalt with quartz vein	△		·		△		◎	◎	△				○	△	

Py=pyrite, Cha=chalcopyrite, Sph=sphalerite, Aca=acanthite, Gal=galena, Au=electrum, Hm=hematite. Mt=magnetiite

Si=quartz or SiO_2 polymorphs, kf=K-feldspar, pl=plagioclase, goe=goethite, clay=clay minerals, apa=apatite, cb=carbonate, chl=chlorite

◎=abundant, ○=common, △=small, ·=rare

Table A-3 Results of X-ray Diffraction Analysis of Drill Core Samples

Sample No.	Drill hole	Depth(m)	Silicate: Silica: Quartz	Silicate: Silica: Christobalite	Silicate: Silica: Tridymite	Silicate: Feldspar: K-feldspar	Silicate: Feldspar: Plagioclase	Silicate: Clay mineral: Smectite	Silicate: Clay mineral: Mixed layered(C/M)	Silicate: Clay mineral: Chlorite	Silicate: Clay mineral: Mixed layered(S/M)	Silicate: Clay mineral: meta Haloysite	Silicate: Clay mineral: Sepiolite	Silicate: Zeolite: Analcime	Silicate: Others: Pyroxene	Carbonate: Calcite	Carbonate: Siderite	Carbonate: Ankerite	Others: Pyrite	Others: glass
DD701	MJFV-7	41.10					◎	·							○					
DD702	MJFV-7	102.50	△				○		◎						·	○				
DD703	MJFV-7	153.70				·	◎			△					△	○			△	
DD704	MJFV-7	203.00	○	·			○		◎							△			·	
DD705	MJFV-7	227.00	○				△			△						◎			·	
DD706	MJFV-7	201.65	△	·			○		◎							△				
DD707	MJFV-7	248.10	○				○		○							◎				
DD708	MJFV-7	253.20	△				△			△						·		◎	△	
DD709	MJFV-7	284.60					◎	◎				△			○					
DD710	MJFV-7	321.90					△	◎				△	△	△						
DD711	MJFV-7	338.50	·	△			△		◎											
DD712	MJFV-7	382.35	△				○	◎				△			△	△				
DD801	MJFV-8	48.30						◎												○
DD802	MJFV-8	125.50	◎				△		△							△			·	
DD803	MJFV-8	112.20	◎				△		△							·		○		
DD804	MJFV-8	134.70	○				△		◎						○	○			·	
DD805	MJFV-8	181.65	·				△			△					◎					
DD806	MJFV-8	143.00	◎				○			·									△	
DD807	MJFV-8	204.50	△				△		◎					○		○			△	
DD808	MJFV-8	261.80	△				△	◎						○		○			·	
DD809	MJFV-8	277.60	△	·			○		◎						△					
DD810	MJFV-8	336.10					◎		○							△			△	
DD811	MJFV-8	363.50	△				◎		○						△				·	
DD812	MJFV-8	396.80	△				◎		◎							·				
DD924	MJFV-9	58.70	◎				△		△						△	○			·	
DD926	MJFV-9	88.00	◎				△			△								○	△	
DD927	MJFV-9	115.00			△		◎	△				△			△	△				
DD928	MJFV-9	151.60	△				△	◎				△							·	
DD930	MJFV-9	200.70			·		◎	○				○			△	◎				
DD932	MJFV-9	258.50	△				△		◎						◎					
DD933	MJFV-9	289.90	○				○			◎	◎				△		·			
DD934	MJFV-9	300.00	◎			·	△	·		△						◎				

◎ abundant ○ common △ small · rare C/M:chlorite/smectite

S/M:sericite/smectite

Table A-4a Results of Chemical Analysis of Drill Core Samples(1)

MJFV-7

Sample No.	Depth(m)	Width(m)	Au(g/t)	Ag(g/t)	As(ppm)	Sb(ppm)	Hg(ppm)
DD7 21	226.60 - 226.90	0.30	0.160	4	85	1.6	0.084
DD7 22	226.90 - 227.50	0.60	0.041	2	54	0.6	0.038
DD7 23	227.50 - 227.60	0.10	2.32	6	226	2.2	0.045
DD7 24	227.60 - 227.90	0.30	0.591	3	108	0.6	0.150
DD7 25	227.90 - 228.00	0.10	0.962	6	112	0.6	0.016
		1.40	0.413				
DD7 26	249.90 - 251.05	1.15	0.162	2	56	<0.5	0.010
DD7 27	251.05 - 251.20	0.15	3.13	2	102	0.9	0.092
DD7 45	251.20 - 251.50	0.30	0.610	3	148	0.7	0.016
DD7 28	251.50 - 251.60	0.10	0.842	2	186	1.4	0.093
DD7 29	251.60 - 252.20	0.60	0.122	<2	82	<0.5	0.013
DD7 30	252.20 - 252.30	0.10	0.532	2	126	1.1	<0.005
DD7 31	252.30 - 253.20	0.90	0.496	2	105	<0.5	0.012
DD7 32	253.20 - 253.70	0.50	0.612	3	152	0.7	0.013
		3.80	0.474				
DD7 33	259.10 - 259.65	0.55	0.288	2	50	<0.5	<0.005
DD7 34	259.65 - 259.75	0.10	0.401	2	68	<0.5	<0.005
DD7 35	259.75 - 260.20	0.45	0.221	2	50	<0.5	<0.005
		1.10	0.271				
DD7 36	303.90 - 304.20	0.30	<0.008	<2	23	<0.5	<0.005
DD7 37	338.40 - 338.60	0.20	<0.008	2	11	<0.5	<0.005

MJFV-8

Sample No.	Depth(m)	Width(m)	Au(g/t)	Ag(g/t)	As(ppm)	Sb(ppm)	Hg(ppm)
DD8 22	116.80 - 117.25	0.45	0.228	4	86	1.0	0.093
DD8 37	125.10 - 125.40	0.30	0.478	2	60	1.0	0.008
DD8 23	125.40 - 125.60	0.20	3.13	3	80	1.1	0.013
DD8 33	125.60 - 126.60	1.00	0.416	2	50	<0.5	0.008
DD8 24	126.60 - 127.70	1.10	0.406	2	146	<0.5	<0.005
		2.60	0.628				
DD8 34	128.15 - 129.25	1.10	1.88	2	69	<0.5	<0.005
DD8 25	141.45 - 141.70	0.25	0.471	6	350	1.6	<0.005
DD8 26	142.60 - 143.00	0.40	0.473	6	265	1.6	<0.005
DD8 27	241.20 - 241.24	0.04	<0.008	<2	5	<0.5	<0.005
DD8 28	118.10 - 118.60	0.50	0.551	2	86	0.6	0.028
DD8 29	122.10 - 122.50	0.40	0.918	2	50	<0.5	0.009
DD8 30	122.50 - 123.50	1.00	0.654	2	96	0.8	0.150
DD8 31	123.50 - 123.80	0.30	0.203	2	86	<0.5	0.009
		1.70	0.637				
DD8 32	124.30 - 124.70	0.40	0.319	4	61	1.2	0.023
DD8 35	279.90 - 280.70	0.80	<0.008	<2	13	<0.5	<0.005

Table A-4b Results of Chemical Analysis of Drill Core Samples(2)

MJFV-9

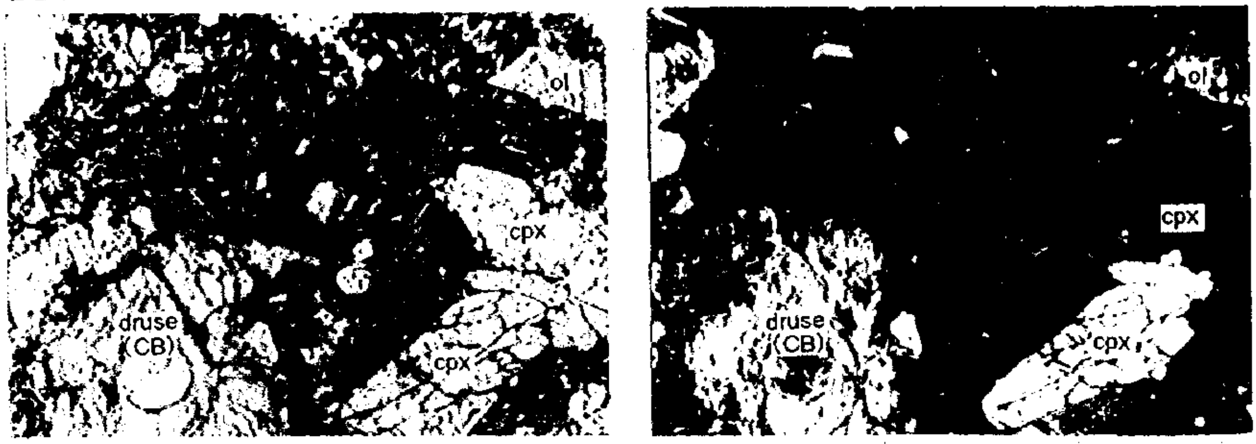
Sample No.	Depth(m)		Width(m)	Au(g/t)	Ag(g/t)	As(ppm)	Sb(ppm)	Hg(ppm)
DD9 01	87.20	87.30	0.10	1.01	2	60	<0.5	0.04
DD9 02	88.10	88.45	0.35	0.562	3	102	0.7	0.015
DD9 03	88.45	88.50	0.05	0.516	4	110	0.7	0.010
DD9 04	88.50	88.70	0.20	0.262	2	106	0.6	0.013
			0.60	0.458				
DD9 05	90.70	91.35	0.65	0.436	3	128	0.8	0.027
DD9 06	91.35	91.55	0.20	0.291	4	130	1.0	0.012
DD9 07	91.55	91.70	0.15	0.020	2	50	<0.5	0.009
DD9 08	91.70	91.95	0.25	0.051	2	100	<0.5	0.014
DD9 09	91.95	93.00	1.05	0.101	2	63	<0.5	0.016
DD9 10	93.00	93.05	0.05	0.372	2	63	<0.5	0.016
DD9 11	93.05	93.70	0.65	0.211	2	92	0.6	0.021
DD9 12	93.70	93.75	0.05	0.792	3	112	0.9	0.032
DD9 13	93.75	94.05	0.30	2.33	3	34	0.9	<0.005
DD9 14	94.05	94.10	0.05	0.171	2	23	<0.5	<0.005
DD9 15	94.10	94.75	0.65	0.008	<2	15	<0.5	<0.005
			4.05	0.339				
DD9 16	95.15	95.25	0.10	0.401	<2	50	<0.5	0.006
DD9 17	243.65	243.70	0.05	<0.008	<2	1	<0.5	<0.005
DD9 18	245.35	245.50	0.15	<0.008	2	5	<0.5	<0.005
DD9 19	246.70	246.85	0.15	<0.008	<2	3	<0.5	<0.005
DD9 20	248.60	249.00	0.40	<0.008	<2	19	<0.5	0.009
DD9 21	284.10	284.50	0.40	<0.008	2	50	<0.5	<0.005
DD9 22	289.90	290.10	0.20	0.101	6	70	<0.5	0.006

Table A-5 Homogenization temperatures of Fluid Inclusions

Sample No.	DD740	DD742	DD818	DD914	DD916	DD922
Hole No.	MJFV-7	MJFV-7	MJFV-8	MJFV-8	MJFV-9	MJFV-9
Depth(m)	227.10	251.20	141.45	94.05	95.15	289.90
Temperature(℃)	460	-	345	178	365	317
	407		256	125	406	347
			196	126		268
			192	118		294
			227	125		314
			265	128		351
			223	127		284
			185	131		342
			373	131		288
			232	131		
			317	127		
			336			
			317			
			351			
			293			
			227			
number	2	0	16	11	2	9
average	434		271	132	386	312
max	460		373	178	406	351
min	407		185	118	365	268
standard deviation	37		62	16	29	30
mode			227			

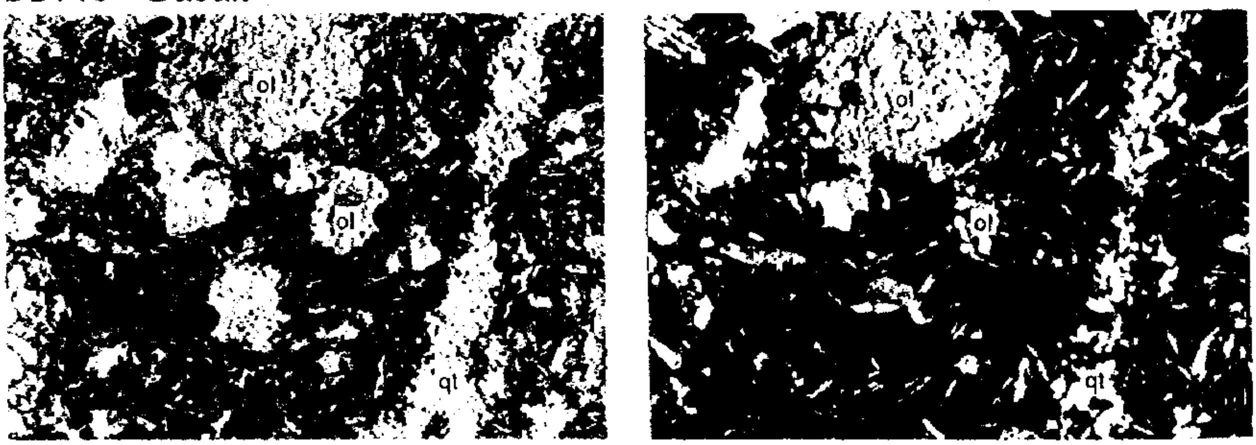
PHOTOGRAPHS

DD713　Basalt



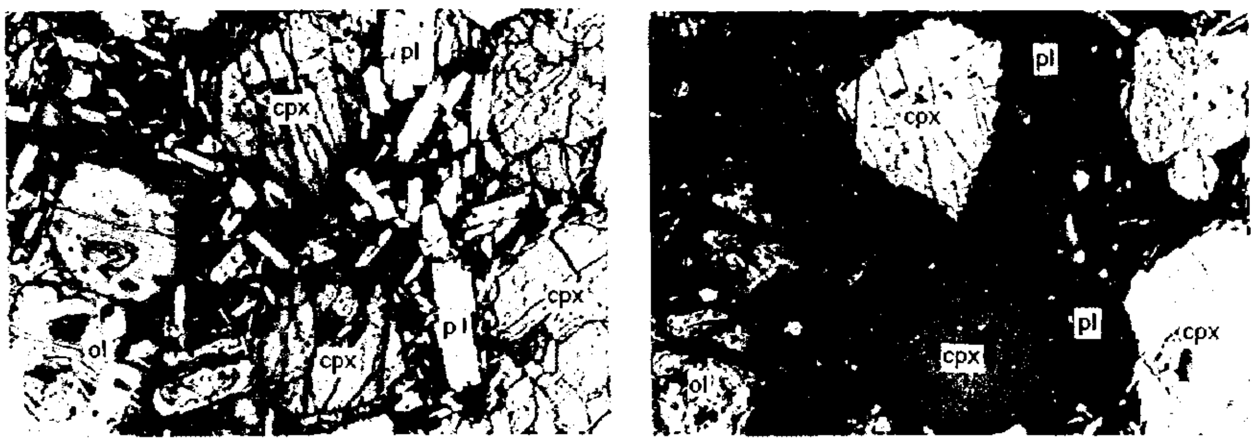
open nicols　　　　crossed nicols　0　0.5mm

DD715　Basalt



open nicols　　　　crossed nicolos　0　0.5mm

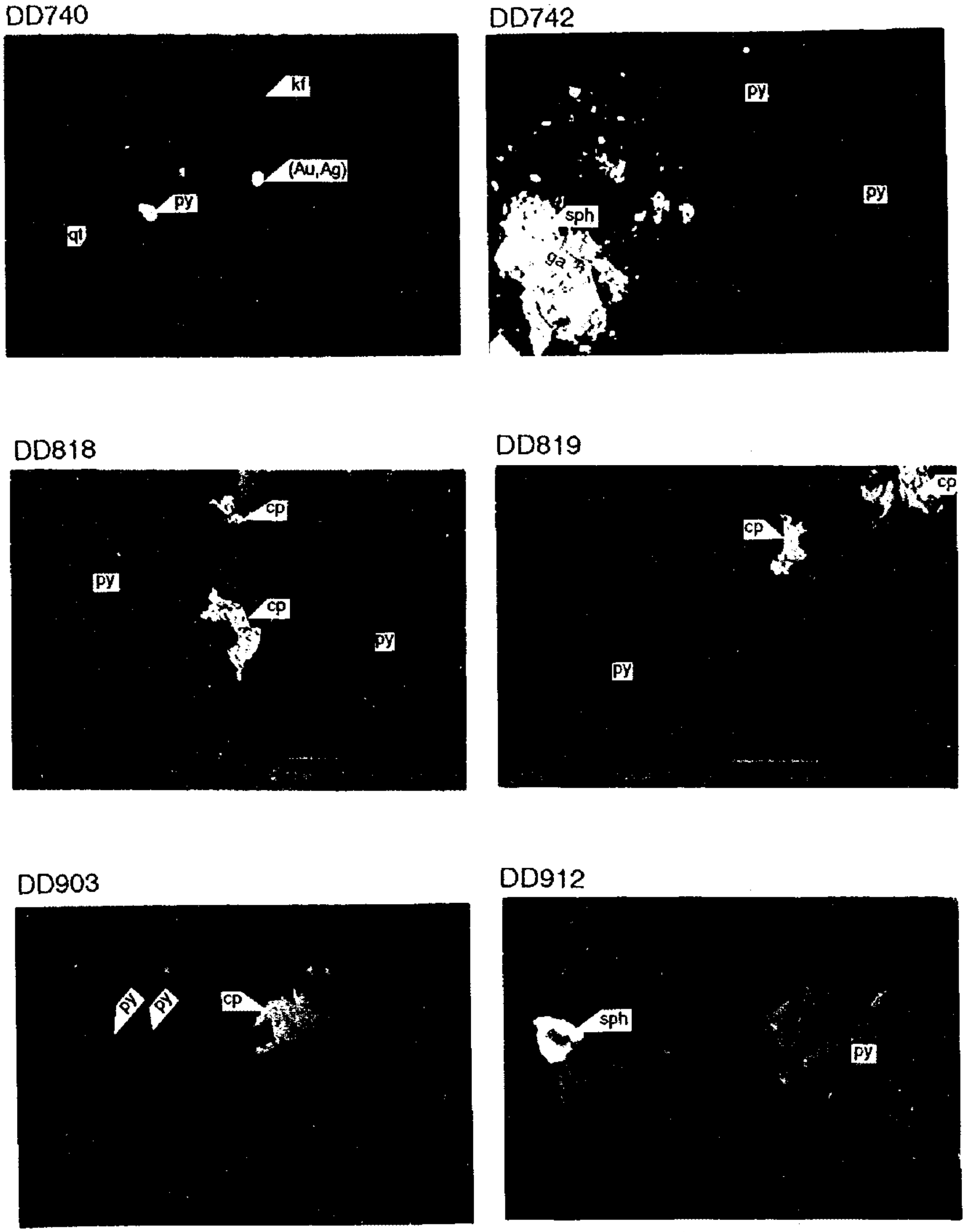
DD815　Basalt



open nicols　　　　crossed nicols　0　0.5mm

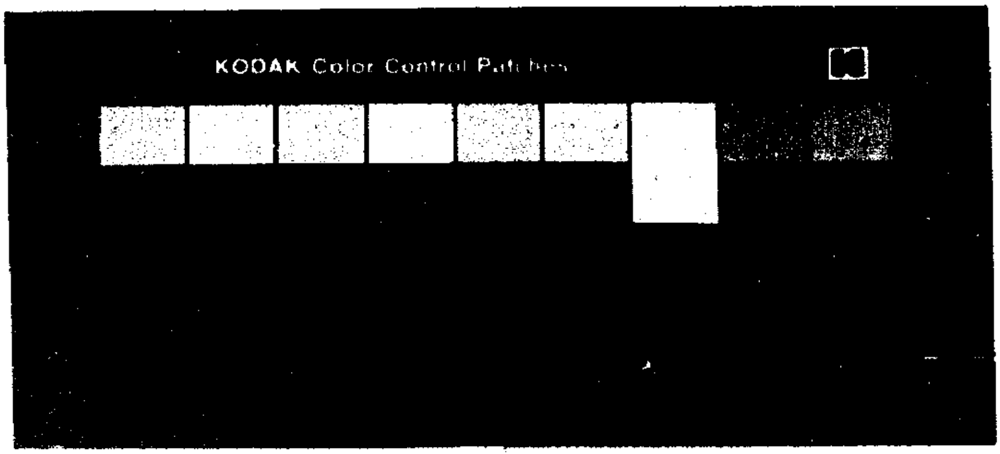
cpx: clinopyroxene　ol: olivine　pl: plagioclase　qt: quartz　CB: carbonate

Photo. 1　Microscopic Photographs of Thin Sections



(Au,Ag): electrum   cp: chalcopyrite   py: pyrite   sph: sphalerite   ga: galena
qt: quartz   kf: k-feldspar

Photo. 2   Microscopic Photographs of Polished Thin Sections



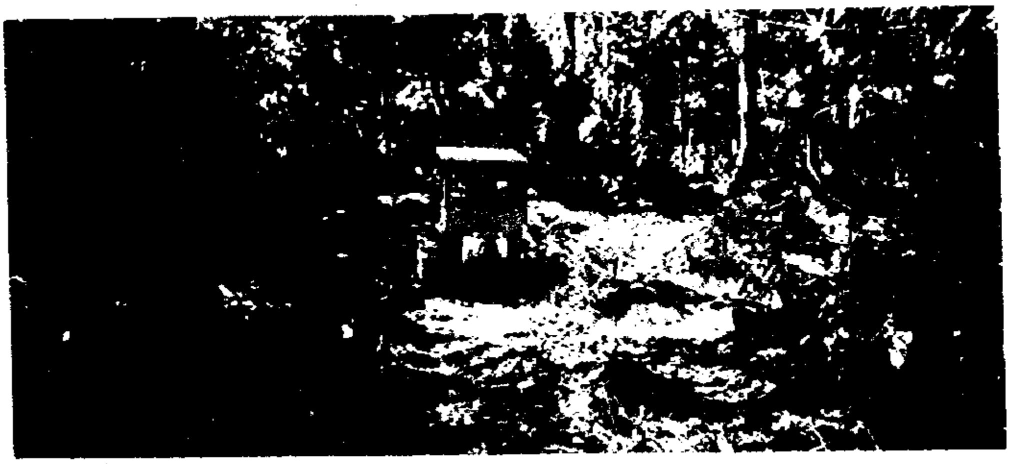
MJFV-7 227.50m－228.00m

MJFV-8 125.10m－127.00m

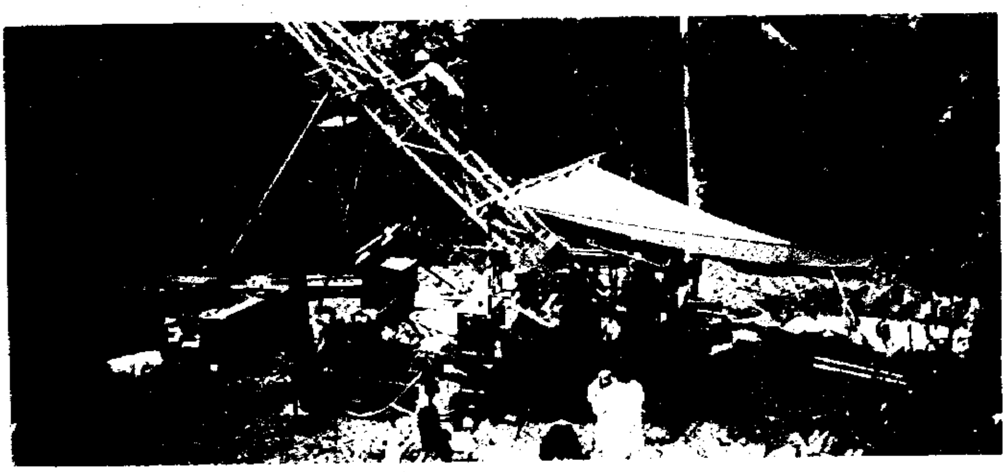
MJFV-9 93.70m－94.10m

Photo. 3 Photographs of Drill Cores

Perspective View of the Dakuniba Area



Road Construction by Caterpillar D-6



MJFV-9 Drilling Site

Photo. 4 Photographs of Drilling Operation in the Dakuniba Area