REPORT
ON
THE MINERAL EXPLORATION
IN
VANUA LEVU
THE REPUBLIC OF FIJI

PHASE II

FEBRUARY 1997

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 second-phase of a three-phase project to be compiled in 1998. JICA and MMAJ sent a survey team to the Republic of Fiji headed by Mr. Osamu Miyaishi from 1 July to 18 November 1996.

The team exchanged views with the officials concerned with 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 second phase of the exploration project was prepared.

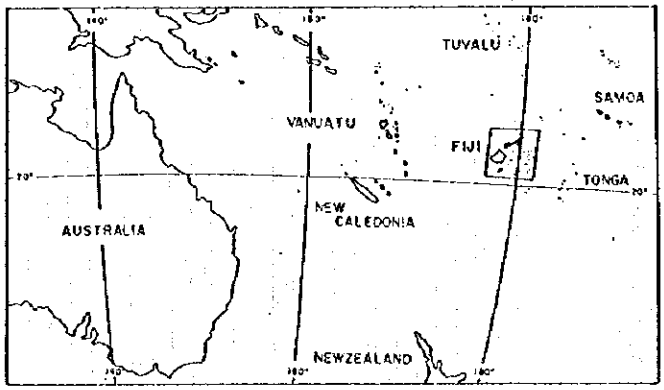
We hope that this report will serve the development of the Republic of Fiji and contribute to the promotion of friendly relations between our two countries.

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 1997

Kimio FUJITA
President,
Japan International Cooperation Agency

Shozaburo KIYOTAKI
President,
Metal Mining Agency of Japan



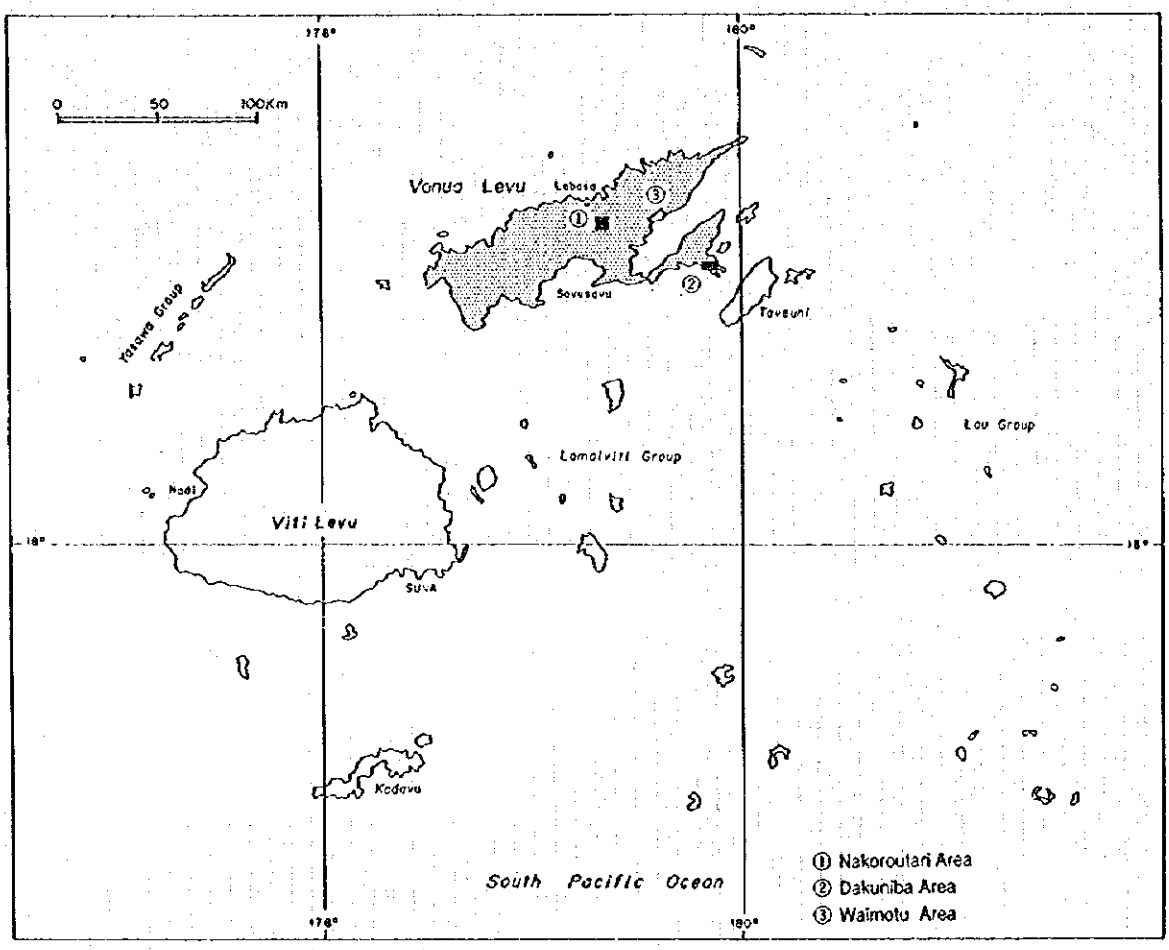


Fig. 1-1 Index Map of the Survey Area

SUMMARY

During the second year of the Vanua Levu mineral exploration project, drilling was carried out in the Nakoroutari and Dakuniba areas. A total of six holes was drilled, three holes in each area. Each hole was 300 m long, and thus the total of 1,800 m was drilled in the two areas. The geological conditions and mineralization clarified by the drilling are summarized below.

MJFV-1, MJFV-2, and MJFV-3 drilled in the Nakoroutari area all confirmed two zones of clay quartz veins. In holes MJFV-2 and -3, weak silicified zones were confirmed in deeper parts. The clay quartz veins confirmed by this drilling strike in the NNW direction and are concluded to continue 600 m in the strike direction. Although the veins encountered in MJFV-1 and -3 are thin, grades of about 5g/t Au were obtained by assay, and thus the surface gold showings were confirmed to continue into deeper zones. The Au content of the weakly silicified zones, however, is low. The IP anomalies obtained by CSAMT and IP surveys during the first year are inferred to reflect the deep-seated silicified zones confirmed by MJFV-1 and -3. Thus, it was clarified by the work during this year that the surface mineral showings continue downward to the deeper parts, and that the geophysical anomalous zones correspond to the silicified zones. Evidences regarding stronger mineralization in the vicinity, however, could not be obtained, and it is believed that the mineral showings confirmed by the first and second (present) year surveys represent the characteristics of the mineralization of this area.

MJFV-4, MJFV-5, and MJFV-6 drilled in the Dakuniba area all encountered quartz veins and clay veins containing quartz-silicified angular fragments. Each hole encountered veins and several mineralized zones at depth inferred from the investigation of surface outcrops and trenches.

Particularly the hole MJFV-5 confirmed the existence of a clay vein with a high average gold content of 11.3 g/t in a width of 2.2 m, and 0.60 m within this vein contained an average of 27.6 g/t Au, the highest assay result of this area. This vein contains angular fragments of quartz and silicified rocks. In this MJFV-5, existence of five zones containing higher than 1

g/t Au was confirmed within an interval of approximately 60 m below this high-gold vein. This indicates stronger mineralization in the subsurface zones compared to the surface showings.

The hole MJFV-4 confirmed mineralized zones at three depths, two of which are clay veins containing silicified fragments, and the other a silicified-argillized zone accompanied by quartz veins. The maximum gold content of these zones is 0.79 g/t Au (0.30 m width), and although it is weaker than the surface showings, continuation of gold mineralization into the deeper parts was confirmed.

In the hole MJFV-6, there are many quartz veins between 55 m and 129 m depth, and alteration accompanied by chlorite-mixed layer minerals occurs extensively near the bottom of the targeted trench. In the deeper parts, chlorite alteration occurs extensively which is accompanied by disseminated to irregular vein pyrite. The highest assay result is 0.2 g/t Au and lower than the surface showings.

It is inferred that the mineralization confirmed in MJFV-4, -5, and -6 strikes in the same direction as that of the surface showings, WNW-ESE. Therefore, the three holes drilled this year have proved that the mineralized zone of the Dakuniba is continuous at least for 700 m in the strike direction in subsurface parts. The vicinity of the clay vein with quartz and silicified angular fragments confirmed by MJFV-5 is concluded to be particularly promising. The distances between MJFV-4 and -5, and between MJFV-5 and -6 are approximately 150 m and 550 m respectively, and the continuity of the veins and the conditions of mineralization should be confirmed by supplementary drilling.

Thus, with the above, the following work is recommended for the third year of the project.

- ☐ Drilling be carried out with high priority in the Dakuniba area. The objective of the drilling should be the clarification of the extension of the mineralization confirmed by MJFV-5.
- ☐ Further work is not recommended for Nakoroutari area. The area can be evaluated by the work carried out during the first and the second (present) year.
- ☐ Geophysical prospecting be carried out in Waimotu area which was recommended on the basis of the results of the work of the first year. In this area, high gold grade, similar to the Dakuniba area has been obtained by the work of the first year.

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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 a three year period from 1995 to 1997.

The survey carried out during the present Fiscal 1996 is, thus, the second 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 area, 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 is 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.

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

1-2-1 Conclusions of the First Phase Survey

(1) Nakoroutari Area

a. This area comprises an areal extent of 36 km^2 and is located approximately 15 km south of Labasa. Geochemical, surface magnetic, and IP surveys have been conducted since 1988 in the Leli's Prospect. Also six holes with a total depth of 1,053 m have been drilled in this prospect. The holes were aimed at a quartz breccia zone associated with the NNW-SSE fault system and encountered ores with a core thickness of 0.6 m at 11.6 g/t Au.

b. The geology of this area is composed mainly of basalt-andesite lava and volcaniclastics of the Koroutari Andesites, and andesitic volcaniclastics of the Sueni Breccia. These units belong to Upper Miocene-Lower Pliocene Natewa Volcanics Group.

c. Four zones were selected from the study of existing geological and resources data and information. They are; Leli's Prospect, a zone to the south of the same Prospect, Navakuru, and Mugsy's Prospect. Mineralization and alteration were found to occur in all five zones. The Leli's Prospect was concluded to be the most promising. It is noted that the altered zone to the south of Leli's Prospect show evidence of gold mineralization.

d. The Leli's Prospect occurs within the quartz vein-breccia zone developed in the Koroutari Andesite lava-volcaniclastics which belong to the Natewa Volcanic Group. There are two quartz vein-breccia zones, the eastern and western zones, part of the NNW-SSE system. A silicified tuff breccia sample with a grade of 12.9 g/t Au has been collected in the vicinity of the Leli's Prospect, and although in a limited area, high-grade zones have been confirmed.

e. Geophysical survey by CSAMT array was carried out for 12 km and time domain IP for 7.5 km at the Leli's Prospect.

f. The CSAMT array method identified intrusive-shaped high resistivity zones in the central parts of Line B-C and Line D-F. One-dimensional resistivity structure analysis showed the existence of two buried high-resistivity bodies which extend in the N-S direction between Lines A-C and D-F. These two bodies as a whole extend in the NW-SE direction and are interpreted to be areas of silicification.

g. The apparent resistivity measured by the time domain IP method resulted in a distribution pattern harmonious with the results of the CSAMT array. The chargeability background is dominantly low. Chargeability anomalies exceeding 10 mV·s/V were detected at three localities, but they are independent anomalies and their reliability is very low. Weak anomalies of over 5 mV·s/V occurred continuously in the central-western part of all

traverse lines. These are inferred to be the anomalies detected by Geoterrex (1988). A two-dimensional model simulation was made and it is inferred from the results that these IP anomalies are caused by bodies 100 m below the surface. Also the simulation results indicate that these bodies have chargeability in the general range of 5-7 mV·s/V and most probably formed by pyrite mineralization. These bodies and the two high-resistivity bodies detected by the CSAMT array between Lines B and F are located in approximately the same locality. Thus it is believed that pyritization and silicification are closely related in this area.

h. Resistivity and chargeability of 30 rock samples (including core samples) were measured in the laboratory. The resistivity of silicified rocks was the highest at 2,884 ohm-m, followed by basalt > andesite > volcaniclastic rocks. The chargeability of volcaniclastic rocks was the highest at 11.7 mV·s/V, followed by silicified rocks > andesite > basalt. It was shown from this work that identification of rock types from physical characteristics was difficult.

(2) Dakuniba Area

a. This area is located approximately 65 km east of Savusavu with an areal extent of 36 km^2. A zone comprising WNW-ESE striking quartz veins occurs 1 km north of the Dakuniba Village in the upper reaches of the Nagagani Creek. The zone was previously explored and is called the Dakunba Prospect. In the past, two holes with a total length of 176 m have been drilled, soil and rock geochemical survey, CSAMT geophysical survey, and trenching were carried out.

b. The geology of this area consists of basaltic lava and volcaniclastics of the Dakuniba Basalt belonging to the Upper Miocene - Lower Pliocene Natewa Volcanic Group.

c. Mineralization occurs in the quartz veins developed in the basaltic lava and volcaniclastics. The major veins are developed over 2 km in length and strike WNW-ESE and dip steeply. Alteration associated with mineralization is observed in the northeastern part of the area and they are; quartz-clay veins extending from the upper reaches of the Wailevu Creek to the Nagagani Creek, argillized and pyrite dissemination from the Nubuni Creek westward, and mineralization observed in the quartz veins of a tributary of the Waikava Creek.

d. The continuity of individual quartz veins exposed in the upper reaches of the Nagagani Creek has not been confirmed, but the grade of the quartz veins is high with a maximum of 16 g/t Au and 21 samples containing more than 1 g/t Au were collected from 1 km long outcrop. Thus, this zone is concluded to be promising.

(3) Waimotu Area

a. The Bill's Hill Prospect is located approximately 45 km northeast of Savusavu, and the Waimotu Lode and Nuku Prospect are 0.5 km and 2.5 km east-northeast from there.

b. A total of 18 holes have been drilled in the three prospects of this area. A total of 551 m adits was dug and seven holes with a total of 609 m length were drilled into the Waimotu Lodes, seven and four holes were drilled in the Bill's Hill Prospect and Nuku Prospect, respectively.

c. The geology of this area consists mainly of weakly propyritized andesite and basaltic lava and volcaniclastics of the Koroutari Andesite and Korotini Breccias. These units belong to the Natewa Volcanic Group.

d. The Waimotu Lodes are comprised of; Main Lode, East Lode, and West Lode. A length of about 70 m was confirmed for the Main Lode in outcrop, but both mineralization of the East and West Lodes were confirmed only at one outcrop and the entrance of the adit. All three veins have a N-S strike and with a dip of 75° - 90° east for the Main and East Lodes. The widths of the veins are, 1.2 m maximum for the Main Lode and 0.8 m was confirmed at an outcrop for the East Lode. The maximum grade is 24.2 g/t Au for the Main and 42.5 g/t Au for the East Lodes. The gold content of 42.5 g/t was obtained in a sample collected from the East Lode (0.8 m wide), but a sample collected only 1 m south of this sample contained only 2.4 g/t Au, thus the fluctuation in the grade is strong. On the other hand, the average grade of four samples collected along the 70 m length of the Main Lode is 7.2 g/t Au and the gold content is constant. The grade of the West Lode is the lowest of the three at 0.92 g/t Au.

e. Silicified and argillized (kaolinized) zones are well developed in the Bill's Hill Prospect. Quartz and chalcedony stockwork is developed cutting through these zones, and its strike is N-S and the eastward dip is generally steep. Surface observation of the stockwork shows the occurrence of geothite as an opaque with very minor amount of chalcopyrite. The cores drilled in the past show strong dissemination of pyrite in the silicified zone. The maximum grade of individual veinlets of the stockwork is 0.21 g/t Au.

f. At Nuku, a silicified zone comprising chalcedony-quartz veins extends in a N-S direction for approximately 150 m and the average width of this zone is approximately 7 m.

The direction of dip was seemingly east, but it is difficult to determine the dip on the surface and from the results of the past drilling, it is inferred to be westward dipping. The highest grade of the stockwork is 4.3 g/t Au (sampled width 2.5 m) and the average of the total 150 m is 1.3 g/t Au (average sampled width 7 m). The past two holes encountered ores at approximately 50 m below the surface and the average grade over a 7 m width is 0.6 g/t Au.

g. The lower parts of the three prospects in this area have been drilled. All three have

significant mineral potential and the zone extending from the lower part of the Waimotu Lode to the subsurface part of eastern Bill's Hill is concluded to be an interesting target for further exploration.

1-2-2 Recommendations for the Second Year

(1) Nakoroutari Area

In the Nakoroutari Area, the Leli's Prospect is the most promising for further work including drilling. The target for drilling should be the lower part of the high-grade veins of the quartz-breccia zone. This zone is accompanied by gold mineralization and was confirmed by the first phase survey. This location is near stations 7 and 8 of the electric survey Line C. Also, confirmation of the CSAMT and IP high-resistivity zones is strongly recommended and this target will be the lower part of the vicinity of stations 6 and 7 of Lines B and E.

(2) Dakuniba Area

The first phase survey confirmed the existence of gold-bearing quartz veins at the Dakuniba Prospect. The lower parts of the quartz veins of the Dakuniba Prospect are practically unexplored, and it is recommended that drilling be carried out during the 2nd phase if this project. The high-grade zone in the upper reaches of the Nagagani Creek is considered to be a particularly promising target.

(3) Waimotu Area

In the past, geological survey and exploration were carried out covering limited parts of the Waimotu Lodes, Bill's Hill, and Nuku Prospects. This work, however, is not sufficient for assessment of the resources in the area. Of these three zones, the Waimotu Lode has the highest assay results from outcrop and is therefore most interesting. Therefore, it is recommended that we first confirm the downward continuity and the distribution of the veins by electric survey, namely CSAMT and IP, then follow it up by drilling.

1-3 Outline of the Second 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 km² in areal extent. It is located at latitude 16°07′S-17°01′S and longitude 178°29′E- 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 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 Objectives of the Survey

The objectives of the second phase survey are to locate new ore deposits by clarifying the geology and the mineralization of the areas considered to have relatively high mineral potential from the results of the first phase survey, and to transfer technology to the Fijian counterparts.

1-3-3 Survey Methods

(1) Amount of Work

The work carried out during the second 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
a Nakoroutari area	MJFV-1	S70° W	-45°	300.20m
	MJFV-2	S70° W	-45°	300.70m
	MJFV-3	S70° W	-45°	300.60m
Dakuniba area	MJFV-4	S30° W	-45°	300.50m
	MJFV-5	S30° W	-45°	300.30m
	MJFV-6	S30° W	-45°	300.70m
Total	6 holes			1,803.00m

(2) Drilling Methods

The drilling work was carried out under contract with Radial Drilling (Fiji) Proprietary Ltd.

A PQ bit was used for drilling through the surficial weathered zone, reamed by PW casing shoe, and the PW casing pipes were inserted. For the whole length, except the surficial zone, wire-line method was used with PQ, HQ and NQ bits. As the upper weathered rocks area prone to collapse, casing pipe was extended until rock became stable. Regarding loss of circulation which occurred during the operation, no special measures was taken and continued drilling to prevent the loss without significant disturbance.

Total core recovery was attempted. In cases where total recovery was not possible, at least 80% of the core was recovered.

(3) Machinery

A drilling rig of the Longyear L-44 was used. The specifications for the drilling rig, pump and other machinery are listed Table1-2, the conditions of the diamond bits in Table 1-3, and the used consumables in Table 1-4.

(4) Operations

Construction, moving, and withdrawal were done by one shift per day, while drilling was carried out by two twelve hours shifts. Each shift consisted of one drilling engineer and two drillers. The Japanese team and the Fijian counterparts supervised the operation and assisted for auxiliary work such as drilling road maintenance and sump digging and water pond construction.

(5) Transportation of machinery

The drilling equipment imported in the Radial warehouse in Suva and supplementary material stored in Suva were transported to MJFV-2 site by two trucks. The equipment was ferried from Natovi to Savusavu.

The rig and the compartment of pipes between drill sites were hauled by a Caterpillar D-6.

Table 1-2 Drilling Machine and Equipment

Drilling Machine Model L-44(1set)

Specifications:	
Capacity	1000m(BQ-WL)
Dimensions(L X W X 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 X W X H)	1,800mm X 750mm X 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	500m
Motor	Hydraulic motor DANFOSS MT400
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 X W X H)	1,700mm X 7,00mm X 1,200mm
Engine Model "Deutz Mag SA., FIL210D"	15HP

Derrick

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

Drilling Tools

Drilling rods	PQ-WL 1.5m	2
	HQ-WL 3.0m	71
	NQ-WL 3.0m	137
Casing pipes	Guide(168mm)	2
	PW 1.5m	12
	HW 3.0m	23
	NW 3.0m	(HQ-WL rods are used 71)

Table 1-3 Drilling Meterage of Diamond Bit Used

Size	Bit no.	Drill hole no.						Total
		MJFV-2	MJFV-1	MJFV-3	MJFV-6	MJFV-4	MJFV-5	
PQ	1347	52.40						52.40
	1348		51.65					51.65
	1349			48.65				48.65
	1350				55.45			55.45
	1351					55.05		55.05
	1352						54.80	54.80
	subtotal							318.00
HQ	332901	29.30						29.30
	2771	60.00						60.00
	2772	9.45	95.80					105.25
	2773			111.00				111.00
	2774				101.65			101.65
	2775					95.85		95.85
	2776						98.90	98.90
	subtotal							601.95
NQ	1648	148.75						148.75
	1649		151.25					151.25
	1650			139.65				139.65
	1651				133.50			133.50
	1652				9.00	148.60		157.60
	1653						145.30	145.30
	subtotal							876.05
Total (19pcs)		299.90	298.70	299.30	299.60	299.50	299.00	1796.00
						Drilling lenght/bit (1,796m / 19pcs)		94.53

Table 1-4 Consumables Used

Description	Specification	Units	Quantity						Total
			MJFV-2	MJFV-1	MJFV-3	MJFV-6	MJFV-4	MJFV-5	
Light oil		l	1,200	1,600	1,800	1,480	1,600	1,900	9,580
Hydraulic oil		l	40	60	0	80	60	100	340
Engine oil		l	40	50	20	100	60	60	330
Gear Oil		l	50	80	40	100	40	50	360
Grease		kg	22	10	22	21	30	24	129
Polymer	PP/40	kg	41	160	60	100	97	89	547
Polymer	Liqui Pol	l	50	50	50	75	100	50	375
Polymer	Aus trol	kg	24	24	12	4	0	0	64
Polymer	(total)	kg	115	234	122	179	197	139	986
Cement		kg	200	300	250	250	400	400	1,800
Benthonite		kg	100	250	175	525	200	650	1,900
Diamond shoe bit	PW	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Diamond shoe bit	HW	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Diamond reamer	PQ	pcs	2	1+(1)	(2)	(2)	1+(1)	(2)	4
Diamond reamer	HQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Diamond reamer	NQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Core barrel	PQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Core barrel	HQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Core barrel	NQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Inner Tube assembly	PQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Inner Tube assembly	HQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Inner Tube assembly	NQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Locking coupling	PQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Locking coupling	HQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Locking coupling	NQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Adapter coupling	PQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Adapter coupling	HQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Adapter coupling	NQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Landing ring	PQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Landing ring	HQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Landing ring	NQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Core lifter case	PQ	pcs	2	(2)	(2)	(2)	(1)+1	(2)	3
Core lifter case	HQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Core lifter case	NQ	pcs	2	(2)	(2)	(2)	(2)	(2)	2
Core lifter	PQ	pcs	2	(1)+1	(1)+1	(1)+1	(1)+1	(2)	6
Core lifter	HQ	pcs	2	2	2	(2)	(2)	(2)	6
Core lifter	NQ	pcs	2	(2)	(2)	2	(1)+1	(2)	5
Stop ring	PQ	pcs	2	(2)	(2)	(2)	(1)+1	(2)	3
Stop ring	HQ	pcs	2	(1)+1	(1)+1	(2)	2	(2)	6
Stop ring	NQ	pcs	2	(2)	(2)	(1)+1	(2)	(2)	3
Thrust ball bearing	PQ	pcs	4	(4)	(4)	(4)	(4)	(4)	4
Thrust ball bearing	HQ	pcs	4	(4)	(4)	(4)	(4)	(4)	4
Thrust ball bearing	NQ	pcs	4	(4)	(4)	(4)	(4)	(4)	4
Inner tube stabilizer	PQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Inner tube stabilizer	HQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Inner tube stabilizer	NQ	pcs	1	(1)	(1)	(1)	(1)	(1)	1
Core box	PQ	pcs	21	20	19	21	21	21	123
Core box	HQ	pcs	22	21	25	22	21	23	134
Core box	NQ	pcs	42	27	27	27	27	26	176

Table 1-5 Working Time Analysis of the Drilling Operation

Hole No.	Bit size	Drilling length (m)	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-2	168mm	0.8	0.8	0.5	3.5	8	9	1.0						
	PQ	52.4	50.5	4.5	4.5	8	12	19.0						
	HQ	98.8	97.0	8.0	10.0	17	23	50.0						
	NQ	148.6	148.6	7.0	10.0	25	40	53.0						
	total	300.5	296.8	20.0	28.0	58	84	123.0	81.0	46.0	12.0	7.0	22.0	291.0
MJFV-1	168mm	1.5	1.0	0.5	2.5	6	12	1.0						
	PQ	51.7	49.6	5.5	6.5	12	25	40.0						
	HQ	95.8	94.5	9.0	9.0	18	32	60.0						
	NQ	151.3	151.1	7.0	9.0	18	33	58.0						
	total	300.2	296.1	22.0	27.0	54	102	159.0	64.0	33.0	11.0	10.0	110.0	387.0
MJFV-3	168mm	1.3	1.3	1.0	3.0	5	12	1.0						
	PQ	48.7	47.5	3.0	4.0	7	14	33.0						
	HQ	111.0	109.9	8.0	9.0	12	25	60.0						
	NQ	139.7	139.7	9.0	14.0	27	52	54.5						
	total	300.6	298.3	21.0	30.0	51	103	148.5	65.0	37.5	20.0	16.0	8.0	295.0
MJFV-6	168mm	1.3	1.3	1.0	4.0	11	21	2.0						
	PQ	55.5	52.5	5.0	5.0	9	20	36.5						
	HQ	101.7	101.7	7.0	10.0	16	22	37.5						
	NQ	142.5	142.2	11.0	22.0	34	45	81.0						
	total	300.9	297.7	24.0	41.0	70	108	157.0	98.0	11.0	48.0	8.0	202.0	524.0
MJFV-4	168mm	2.5	0.5	1.0	3.0	6	6	2.0						
	PQ	53.6	53.2	6.0	6.0	12	9	39.0						
	HQ	95.9	95.7	6.0	7.0	13	17	52.5						
	NQ	148.6	148.6	11.0	13.0	29	36	88.5						
	total	300.5	298.0	24.0	29.0	60	68	182.0	153.0	6.0	7.0	27.0	18.0	393.0
MJFV-5	168mm	1.3	1.3	1.0	2.0	9	14	0.5						
	PQ	54.8	53.4	6.0	6.0	13	21	35.5						
	HQ	98.9	98.8	6.0	6.0	12	21	50.0						
	NQ	145.3	145.3	12.0	25.0	57	97	70.0						
	total	300.3	298.8	25.0	39.0	91	153	156.0	98.5	124.0	22.5	24.0	0.0	425.0
Grand total		1,803.0	1,785.6	136.0	194.0	384	618	925.5	559.5	257.5	120.5	92.0	360.0	2,315.0

(6) Drilling Water

Water from nearby creeks was pumped up for drilling use. The pipe lengths for the drilling water and the pumped- up heights are as listed below..

Table 1-6 Length and Head of Water for Drilling

Drill hole no.	Length of water supply pipe	Height from head of stream
MJFV-1	200m	50m
MJFV-2	300m	20m
MJFV-3	50m	10m
MJFV-4	200m	55m
MJFV-5	350m	50m
MJFV-6	100m	20m

(7) Road Construction

Roads for transporting drilling equipment were constructed or upgraded by caterpillar D-6 for a total of 500m and 3,700 m lengths in the Nakoroutari area and the Dakuniba area, respectively.

(8) Withdrawal

Drilling was completed on 5 November and withdrawal was planned to begin on the same day. The continuous rain from the middle of October, however, rendered transportation of the rig and supplementary equipment impossible because of the softened drilling road in the Dakuniba area. Eventually, the bulldozer succeeded to tow the rig and other equipment to the entrance of the drilling road on 8 November.

All the drill cores are stored in the MRD core shed near Labasa.

(9) Drill Core Study

The recovered drill cores were studied in detail and 1:200 scale geologic columns were prepared.

Representative rocks were sectioned and studied microscopically, the mineralized parts were chemically analyzed and polished thin sections were studied. Constituent minerals were identified using X-ray diffraction analysis. Resistivity and chargeability were measured for the cores of the Nakoroutari area.

Table 1-7 Amount of Laboratory Work

Analysis	Amount
Observation of thin section	30
Observation of polished thin section	20
Measurement of homogenization temperatures of fluid inclusions	12
X-ray diffraction analysis	72
Chemical analysis	83
Measurement of resistivity and chargeability	35

1-3-4 Participants of the Second Phase Survey

[Fijian Members]

Vijendra PRASAD	Coordinator, MRD
Isireli NAGATA	Geologist, MRD
Moape NAVIA	Assistant, MRD
Jonati RAILALA	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.

1-3-5 Duration of the Second Phase Survey

The survey of the second phase was carried out during the period from 2 July, 1996 to 18 November, 1996. Duration of the field survey and the organization of the survey team were as follows:

Duration of drilling

20 July, 1996 ~ 8 November, 1996

Duration of laboratory work, report preparation

19 November, 1996 ~ 28 February, 1997

Chapter 2 Geography of the Survey Area

2-1 Location and Access

The island of Vanua Levu is approximately 180 km east-west, 35 km north-south and approximately 5,500 km² in areal extent. It is located at latitude 16°07′S-17°01′S and longitude 178°29′E- 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 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.

2-2 Topography and Drainage

The island shows generally gentle undulation in the northern part and steep mountainous topographic feature. Dominant rivers such as the Dreketi and Labasa Rivers have developed in the northern part of the island and carry silt to the sea, resulting in the development of lowlands with mangrove plants in some areas. The mountains are around 600m to 900m in elevation, with the highest peak Mountain Nasorolevu, reaching 1,032m. The top of the mountain range is gentle in

topography, characterized by flat peaks around which a narrow drainage system has developed with numerous waterfalls. The cone shaped volcanoes vary in size such as large Bua Volcano, and in contrast, the smaller one east of Viani Bay.

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 below.

Table 1-8 Temperature and Precipitation at Labasa

(Data in 1995)

Area	Item		Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Cot.	Nov.	Dec.	Annual
Labasa	Temp. (℃)	high	31.3	31.7	31.7	31.2	30.2	29.9	30.2	29.3	30.1	31.4	32.1	32.3	31
		low	22.2	22.5	22.7	21.9	19.1	19.3	20.2	21.2	19.9	19.9	21.7	21.8	21
	Precipitation(mm)		486	392	762	249	66	56	67	19	39	99	120	100	2,346

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 Richard (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 was 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) Plate tectonics

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 ENE-WSW to N-S a 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 are considered to be rotating anticlockwise 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 - 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 rock (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 of 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, 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 determination
Bua Volcanic Group	Basalt	more than 900 m	(3.3-2.8 Ma)
Udu Volcanic Group	Dacite Rhyolite	more than 300 m	(7.0-6.8 Ma)
Nararo Volcanic Group	Acidic andesite		
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, disseminated. 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 381 holes during 1957 to 1968. In 1968, Thirty two thousand tons of ore at a 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 an approximately 450m × 200 m area. The main ore body has a pipe-like shape in plan view covering 300 m × 120 m in plan and plunges 20--30° to the ESE. The ore occurring 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 mainly: 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 tonnes 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, 12m in width, and 30 m vertically. The hanging wall of the fault which 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 has developed. 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 Integrated Examination of the Survey Results

4-1 Geologic Structure, Mineralization, and Mineralization Controls

(1) Nakoroutari Area

Gold mineralization was confirmed in quartz angular fragments and argillized zones of this area by the three holes drilled during the second year of this project. The mineralization is developed in the basalt ~ andesite lava and pyroclastic rocks of the Koroutari Andesite of the Upper Miocene to Lower Pliocene Natewa Volcanic Group.

Gold mineralization occurred in two quartz-argillized zones and one silicified zone approximately parallel in the NNW-SSE direction, and these three zones are considered to dip eastward (Fig. 1-10). Namely, the quartz-argillized zone on the eastern side crosses MJFV-1 at 60.80 ~ 75.80 m depth, MJFV-2 near 118.20 m depth, and MJFV-3 near 67.40 m. The zone on the western side crosses the mineralized zone in MJFV-1 near 120.40 m depth, and MJFV-3 near 152.10 m depth, and it probably crosses MJFV-2 through the quartz angular fragments zone near 195 m depth, but mineralization is weaker than in the other two holes. Aside from the above two zones, a silicified zone is inferred to pass through the vicinity of 250 m depth of MJFV-2 and near 250 m depth of MJFV-3 with NNE-SSW strike. This silicified zone contains quartz veinlets and the alteration is weak, and is correlated to the high resistivity zone inferred from the results of CSAMT survey. The CSAMT survey results suggest the possibility of two N-S trending blind silicified zones at the Korobua Fault and its vicinity, namely the division of the high resistivity zone into two parts. The validity of this inference should be verified by dense drilling.

The mineralization accompanied by quartz angular fragments-silicified zones is epithermal, and the lack or the paucity of sulfide minerals in the quartz veins and alteration zones is the characteristics of the mineralization of this area. The homogenization temperatures of the quartz samples range from 200 to 260° C, and the occurrence of chalcedonic quartz with crustified structure and other features indicate the shallow location of genesis. Regarding minor element content, however, although samples with high As and Hg content are harmonious with shallow genesis, As, Sb, and Hg contents are not necessarily high. Also, Au and Ag contents for MJFV-1 and MJFV-2 are 5.76 g/t Au, 90 g/t Ag (5 cm wide) and 5.06 g/t Au, <0.4 g/t Ag (10 cm wide) respectively, and it is seen that the Au/Ag ratio differs significantly among the high gold samples. The composition of the sample from

MJFV-2 is 0.89 g/t Au, 1.5 g/t Ag (15 cm wide). Also electrum occurred in MJFV-3 and its Ag grade is low compared to Au content. The dominant gangue minerals are quartz and smectite with minor contents of potassium feldspar or carbonate minerals. It is noted that in the drill holes in this area, kaolin minerals and alunite are not observed and enargite and luzonite are also absent. These facts indicate that this belong to the low-sulfidation type gold mineralization (White and Hedenquist, 1990).

The regional alteration of this area is generally weak. Chlorite-sericite and mixed-layer minerals were formed by hydrothermal alteration associated with mineralization, and these alteration zones are inferred to extend in the NW-SE direction with steep dip. The basis of this reasoning is explained below. Identification of the alteration minerals enabled the separation of the alteration zones of all the drill holes in this area into upper smectite zone and lower chlorite-sericite zone. And in MJFV-1, mixed-layer clay occurs in between the smectite and sericite zones and also below the sericite zone. Although the detailed distribution of each alteration zone is not clear, chlorite-sericite zone extends in the NW-SE direction at steep dip cutting through the smectite and mixed-layer clay zone which are parallel to the ground surface, and the chlorite-sericite zone appears to be narrow on the surface. From this zoning of the alteration, it is considered that MJFV-1 and -3 penetrated the main part of the mineralization and alteration zones. Chlorite-sericite are believed to be the product of hydrothermal alteration associated with mineralization because mixed-layer clay occur again in the lower part of MJFV-1 and MJFV-3, and regional propylitization (chloritization) do not occur in this area.

It is clear from above that Au mineralization is associated with quartz-clay veins, mineralization-alteration is controlled by NNW-SSE structure. On the other hand, there is no clear evidence of the Au mineralization being controlled by lithology or stratigraphy. In other words, MJFV-1 has penetrated the uppermost stratigraphic horizon and MJFV-3 the lowermost horizon, and they both show similar Au content. Also samples from both MJFV-1 and MJFV-3 contain chalcopyrite, sphalerite, and galena together with pyrite.

The mineralization of this area is concluded to be of low-sulfidation type controlled by the fracture system in basalt-andesite lava-volcaniclastic rocks. Mineralization of this type is a product of a extensive regional circulation of hydrothermal fluid, and the location of the heat source is not necessarily confined within the area. It may be e necessary to consider a wider fluid circulation such as the that of the Labasa Caldera system. In fact many hot springs occur in this caldera. During the first year survey, however, stronger mineralization has not

been found outside of this Leli's Prospect.

(2) Dakuniba area

Three holes were drilled targeting the lower parts of the outcrops. The highest grade of 27.6 g/t Au (0.60 m wide) together with five 1 g/t Au zones were confirmed in MJFV-5. Although only grade of less than 1 g/t Au was obtained in MJFV-4 and MJFV-6, existence of several quartz and clay veins were confirmed in these holes and the possibility of the occurrence of high Au zones in the extension of these fracture systems is high. Also it is noted that outcrops with narrow quartz and silicified veins on the surface have higher grade in the subsurface zones. Wide pyrite dissemination· argillization zone occurs near the Karikarimasi Creek, and MJFV-6 caught the extension of this zone. Samples from this alteration zone have low Au content, but the relation of this hydrothermal activity which caused this alteration and Au mineralization could not be clarified by the drilling carried out during this year.

The gold mineralization confirmed by the drilling carried out during this year is controlled by the fracture system in basalt lava and basaltic volcaniclastic rocks, and it has the characteristics of the low-sulfidation type gold mineralization.

The geologic structure near the Dakuniba Prospect is relatively simple and the basalt lava and volcaniclastic rocks have NW~EW strike and gentle SE~S dip. The host of the ore veins is mostly basaltic lava. The ore veins appear to occur along faults in MJFV-4 and MJFV-5, and the veins are considered to be controlled by the WNW fault system. These faults are not clear on the surface. However, the topography between the MJFV-4 and MJFV-5 sites and the Nagagani Creek is extremely steep and suggests the existence of blind faults. Further it is believed that two WNW faults occur parallel to the extension of the Dakuniba Prospect 800 m north and south from the Prospect. Although only weak Au mineralization is recognized near the inferred fault zones, it is possible that these faults played roles in the circulation of hydrothermal fluid. MJFV-4 and MJFV-5 are located at the junction of the NW-SE trending ore veins and the WNW trending ore veins of the prospect and there is a high possibility of bonanza formation in this locality.

Alteration associated with mineralization is limited to the immediate margin of the ore veins in MJFV-4 and MJFV-5. Mixed-layer mineral is mainly formed here and the most prospective veins have chlorite-sericite zone. Smectite zone occurs away from the vein. One the other hand, MJFV-6 has widely occurring chlorite in the deeper parts which is the major

difference with the other two holes. Strong pyrite dissemination is observed in this alteration zone.

Fluid inclusion data show higher temperature of 220° ~ 240°C near the high Au part in MJFV-5, while the temperature is lower at 180° ~ 210°C and 130° ~ 230°C in MJFV-4 and MJFV-5 respectively. This may be an indication that the center of the Au mineralization was near MJFV-5.

The sulfide minerals present are sphalerite and galena aside from pyrite. Particularly, sphalerite and galena occur in fair amount in the samples from the high Au zone of the MJFV-5. Electrum is found in MJFV-6.

The gangue minerals are quartz, potash feldspar, calcite, and clay minerals (mixed-layer mineral, sericite and others). Kaolin and alunite are not observed.

4-2 Mineral Potential

(1) Nakoroutari area

The quartz vein-angular fragment zones of the Leli's Prospect extend in the N-S ~ NNW-SSE direction, and the eastern zone showed 5 g/t Au in MJFV-1 and MJFV-3 and the alteration accompanying mineralization is expected to continue for about 600 m N-S. A silicified zone was confirmed in the high resistivity zone, but signs of high Au potential was not obtained. The results of the first and the second year works indicate that the high Au zone confirmed by drilling has the highest gold value in the Nakoroutari area.

(2) Dakuniba area

Three holes (MJFV-4, -5, -6) were drilled in the Dakuniba area. One of them (MJFV-5) encountered clay vein containing quartz ~ silicified angular fragments showing a grade of 27.6 g/t Au (0.60 m wide). MJFV-4 and MJFV-6 also confirmed the existence of quartz ~ silicified angular fragments-clay zone, although of low Au grade. This indicates the wide existence of Au concentrated hydrothermal fluid in this area. The homogenization temperature of the fluid inclusions is slightly higher for the high Au value samples from MJFV-5 than the other two drill holes and is thus considered that there is a possibility of Au precipitation in the deeper parts of the two holes. There appears to be sufficient room for the occurrence of ore deposits on both sides of MJFV-5, and thus the mineral potential near

MJFV-5 is expected to be high.

Chapter 5 Conclusions and Recommendations

5-1 Conclusions

The following results were obtained by drilling in Nakoroutari and Dakuniba areas during the second year of the of the Vanua Levu mineral exploration project.

(1) Nakoroutari area

Drilling in this area (MJFV-1, -2, -3) confirmed the existence of Au showings consisting of quartz veins - calcite veins and clay veins and the grades are; 5.76 g/t Au in MJFV-1 (120.40 m deep, 0.05 m wide), 5.06 g/t Au in MJFV-3 (152.10 m deep, 0.10 m wide). Although thin, these are ore level grades. From the location of the ore in the drill holes and the ore showings on the surface, the mineralization is considered to be a series of veins filling the fissures system of this area. With this assumption, the ores in both drill holes would be 600 m apart in the strike direction (NNW-SSE). However, the MJFV-2 hole in between the two has only a low grade, 0.032 g/t Au, 0.10 m wide, quartz clay zone. In spite of this, it is significant that a gold showing with 600 m strike length was discovered. Also parallel low-grade veins are inferred to occur exceeding 400 m in strike length with a maximum grade of 0.89 g/t Au (MJFV-2, 118.40 m deep, 0.25 m wide). In the deeper parts of MJFV-2 and MJFV-3, quartz veinlets occur and the rocks are silicified, but promising gold showings were not found. It is felt that the characteristics of the gold mineralization of this area were clarified by the work carried out during the first and second years of this project.

(2) Dakuniba area

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 to 123.35 m depth contained 27.6 g/t Au with a width of 0.60 m. If this zone is continuous to the outcrop (trench T34) and the strike of the vein is N75°W, the dip of the vein would be about 50°. It highly possible that this vein is continuous to that encountered in MJFV-4 at 190.40 m depth (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 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 part (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 this year. 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 is promising and it is necessary to clarify the extension of the veins laterally and vertically toward MJFV6.

5-2 Recommendations for the Third Year

The following results were obtained by drilling in Nakoroutari and Dakuniba areas during the second year of the of the Vanua Levu mineral exploration project.

(1) Nakoroutari area

The geology, alteration, and the characteristics of the gold mineralization of this area were clarified by the work carried out during the first and second years of this project. Drilling in this area (MJFV-1, -2, -3) confirmed the ores in three drill holes would extend 600 m in the strike direction (NNW-SSE). Judging from the widths and gold grades of the veins that drill holes encountered, however, it is not felt that promising gold deposits are emplaced in this area. No further work in this area is recommended.

(2) Dakuniba area

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

(3) Waimotu Area

Pursuant to the first phase survey results, further work in the Waimotu area is recommended. The area is located approximately 45 km northeast of Savusavu, and the Waimotu Lode and Bill' Hill Prospect are most interesting within the area.

a. Geological survey and exploration carried out in the Waimotu Lodes and Bill's Hill Prospects are not sufficient for assessment of the resources in the area.

A total of 551 m adits was dug and seven holes with a total of 609 m length were drilled into the Waimotu Lodes, seven and four holes were drilled in the Bill's Hill Prospect, respectively. Of these, half of the drilling lengths targeting the Waimotu Lodes may not be enough to penetrate the ore zone of the Main Lode.

b. The zone extending from the lower part of the Waimotu Lodes to the subsurface part of eastern Bill's Hill has never been drilled in the past presumably due to no outcrop. The following high grades of Waimotu Lodes and occurrence of mineralization on the Bill's Hill indicate mineralization may extend in between.

The widths of the Waimotu Lodes were confirmed at outcrops: 1.2 m maximum for the Main Lode and 0.8 m for the East Lode. The maximum grade is 24.2 g/t Au for the Main and 42.5 g/t Au for the East Lodes. The gold content of 42.5 g/t was obtained in a sample collected from the East Lode (0.8 m wide). The grade of the West Lode is the lowest of the three at 0.92 g/t Au.

In conclusion, geological survey and exploration carried out covering limited parts of the Waimotu Lodes and Bill's Hill Prospects are not sufficient for assessment of the resources in the area. Therefore, it is recommended that we first confirm the downward continuity of the known veins and the distribution of new veins parallel to the known three veins, by electric survey, namely CSAMT and IP, then follow it up by drilling.

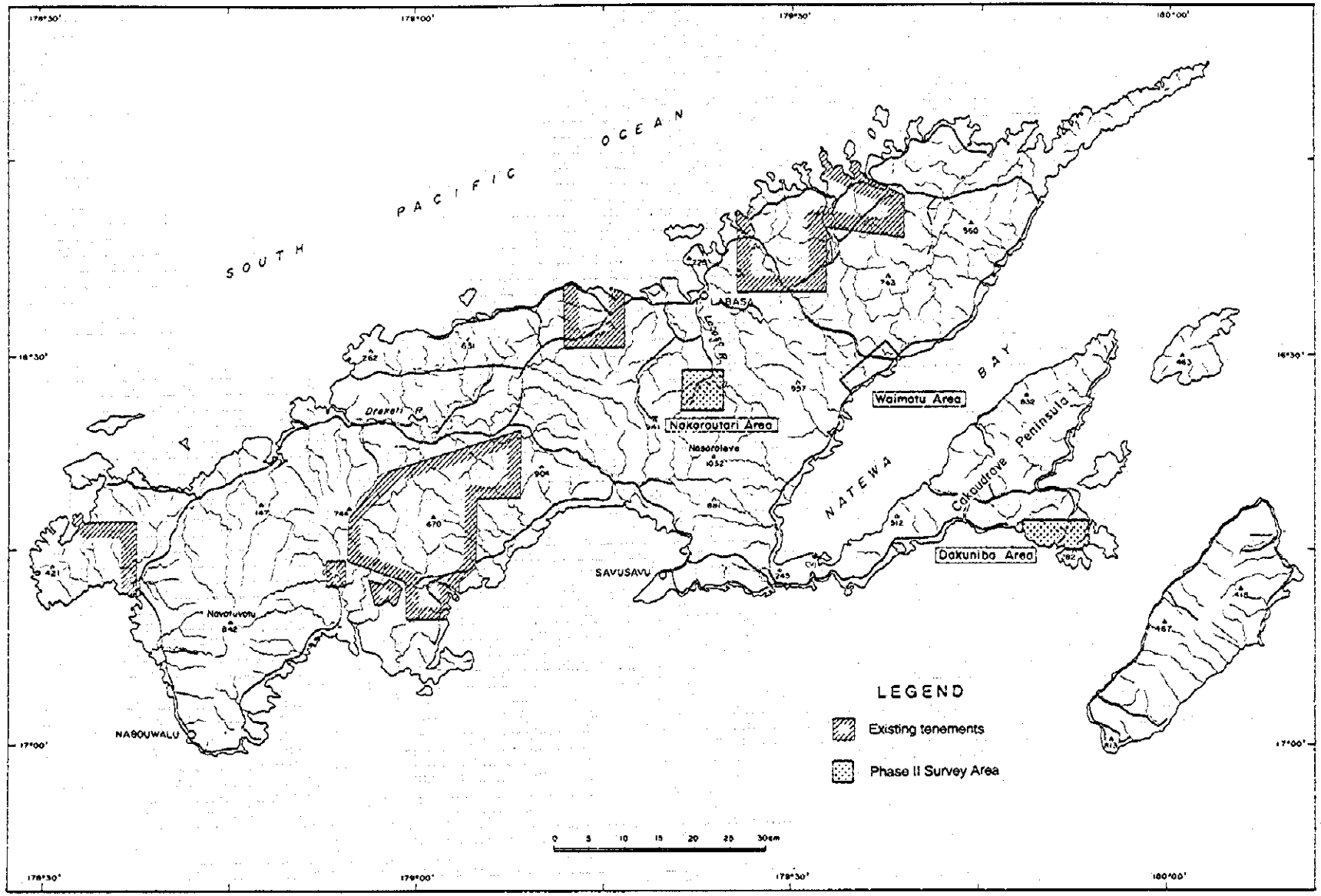


Fig. 1-2 Location Map of the Survey Area

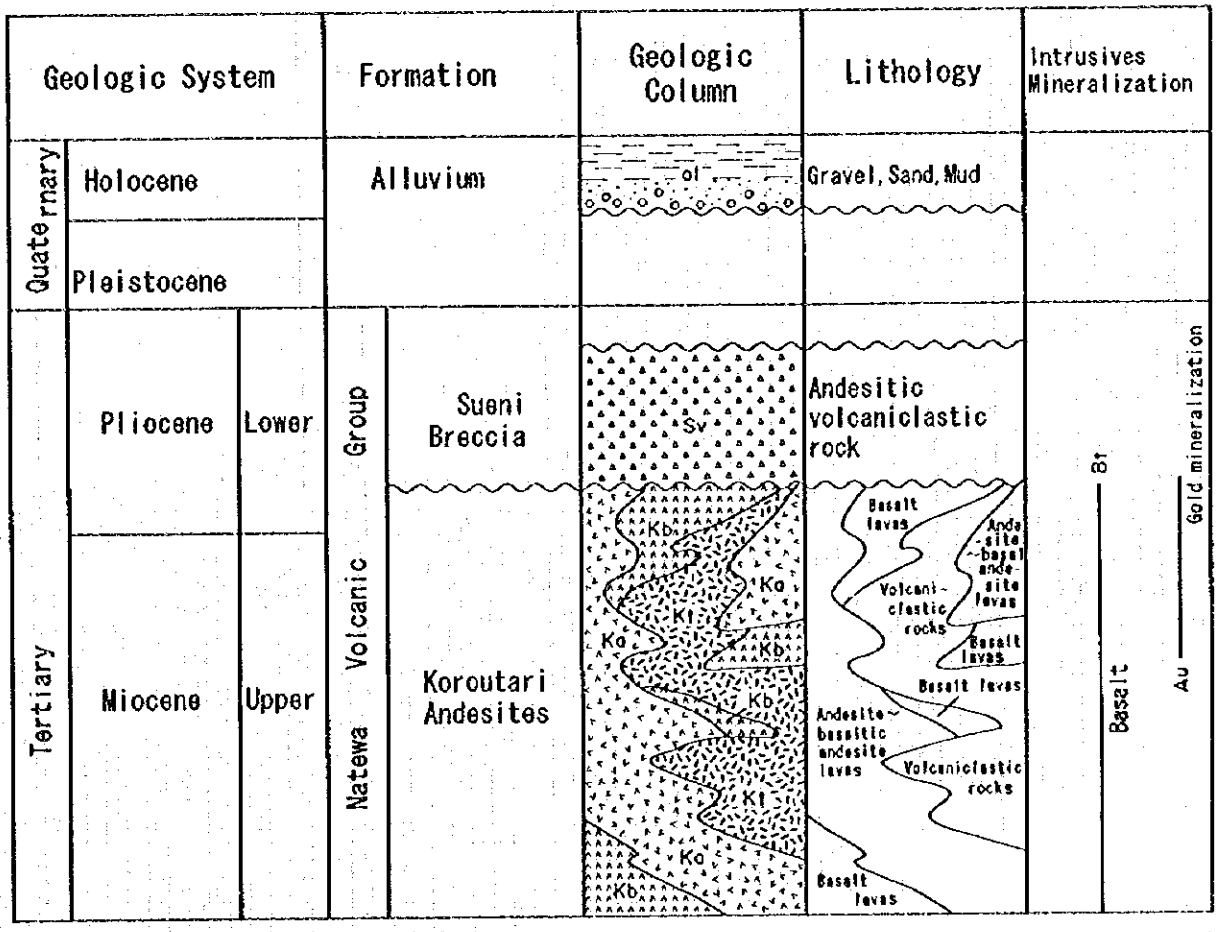


Fig. 1-3 Schematic Stratigraphic Column of the Nakoroutari Area

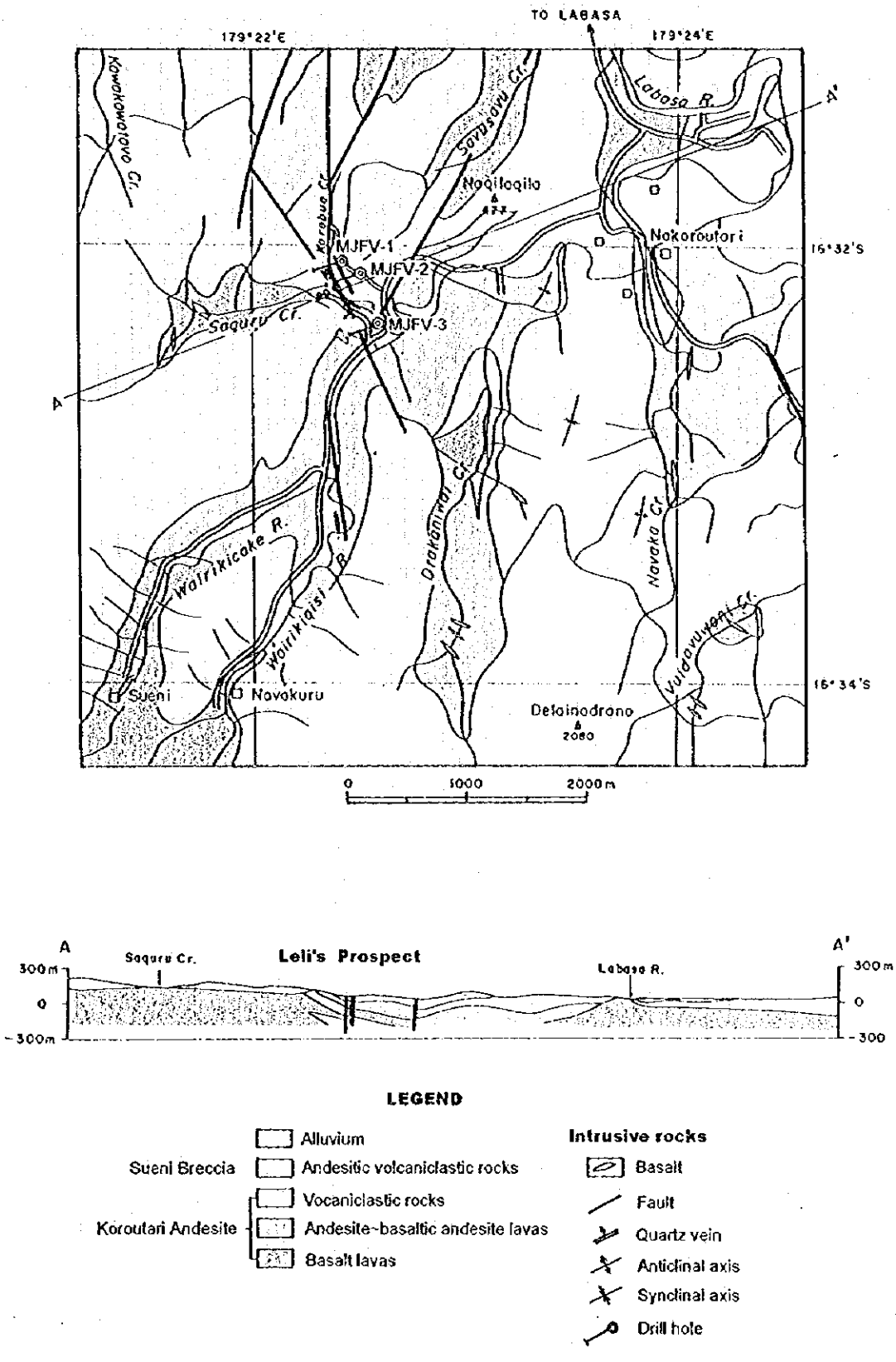


Fig. 1-4 Geologic Map of the Nakoroutari Area

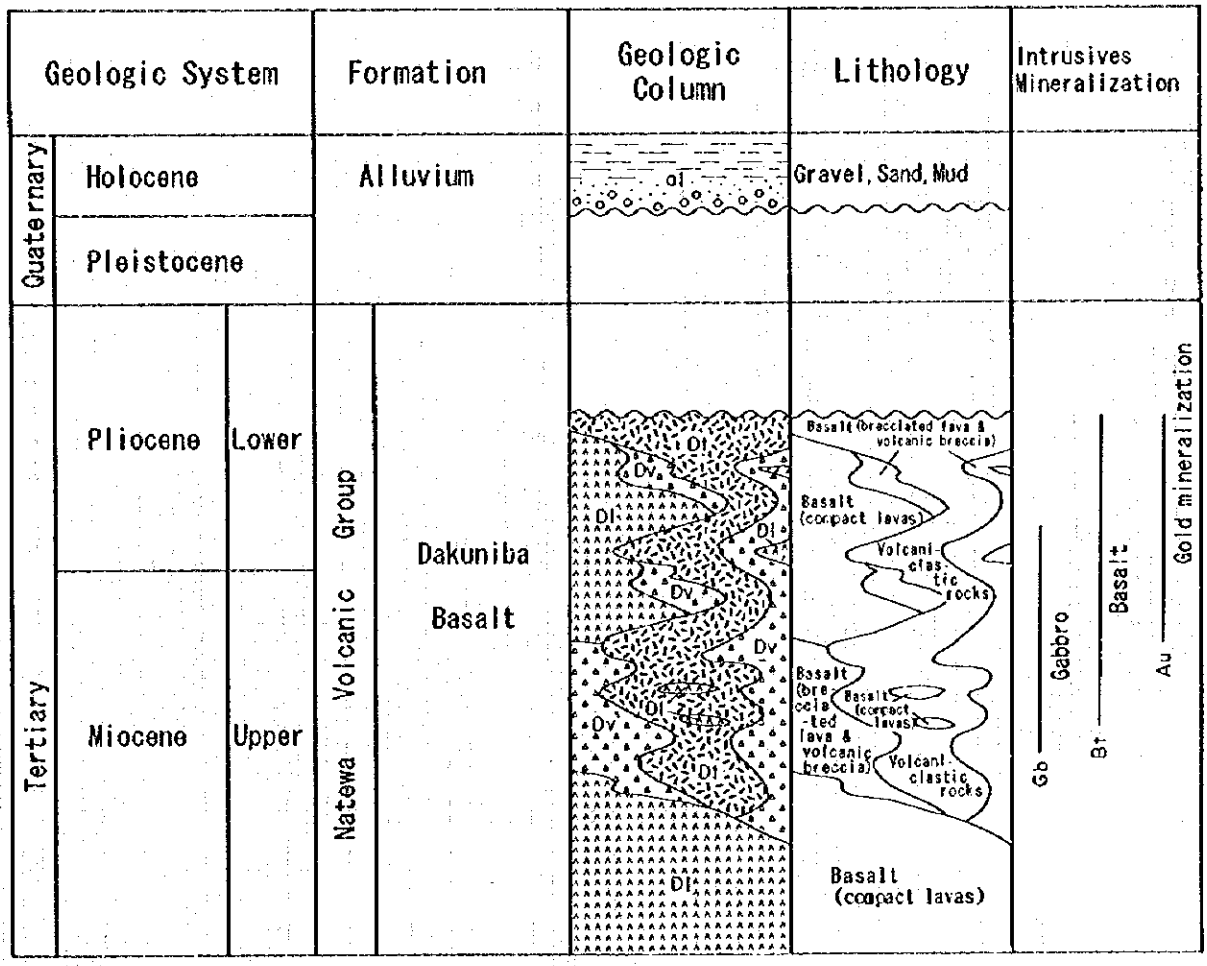


Fig. 1-5 Schematic Stratigraphic Column of the Dakuniba Area

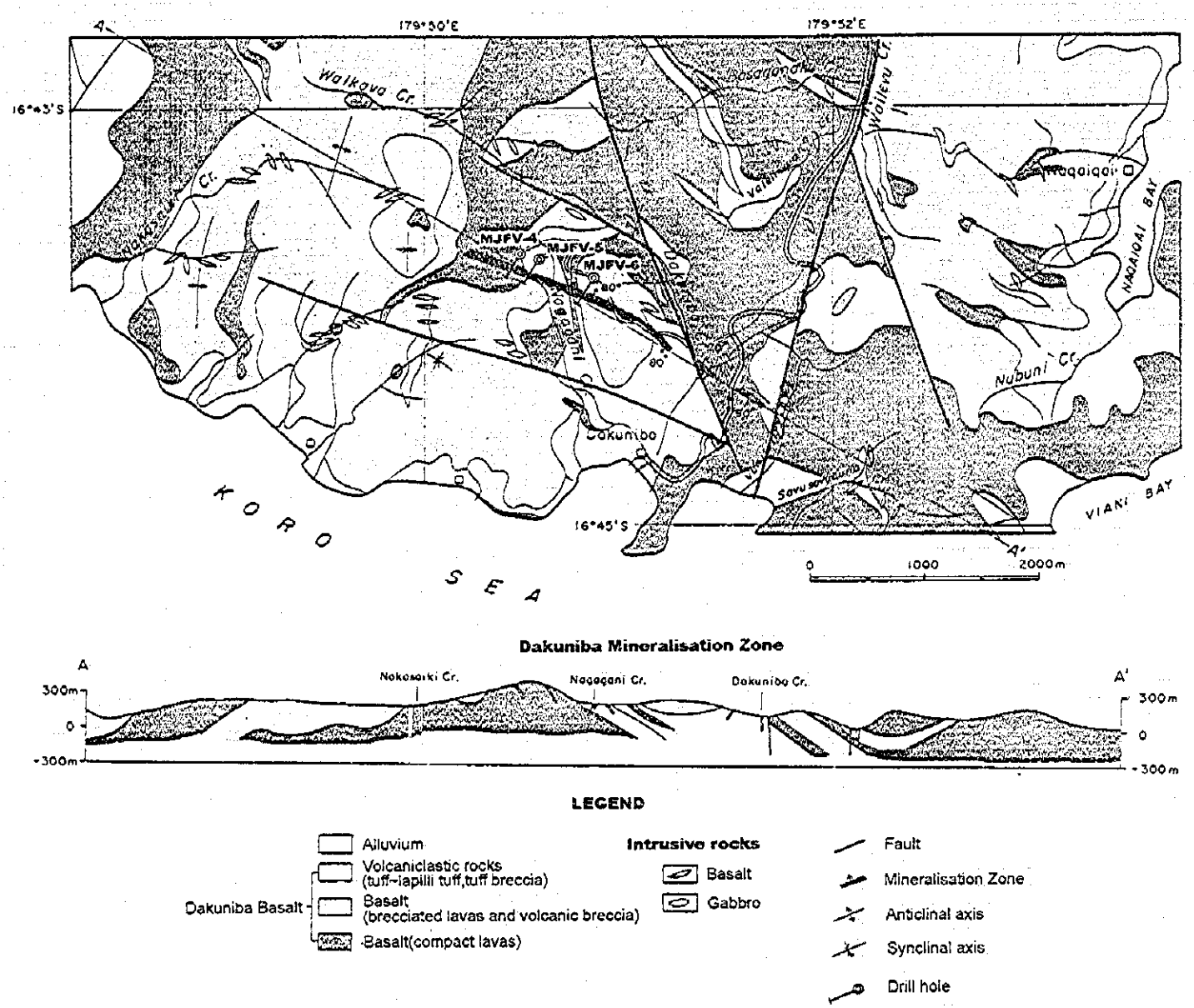


Fig. 1-6 Geologic Map of the Dakuniba Area

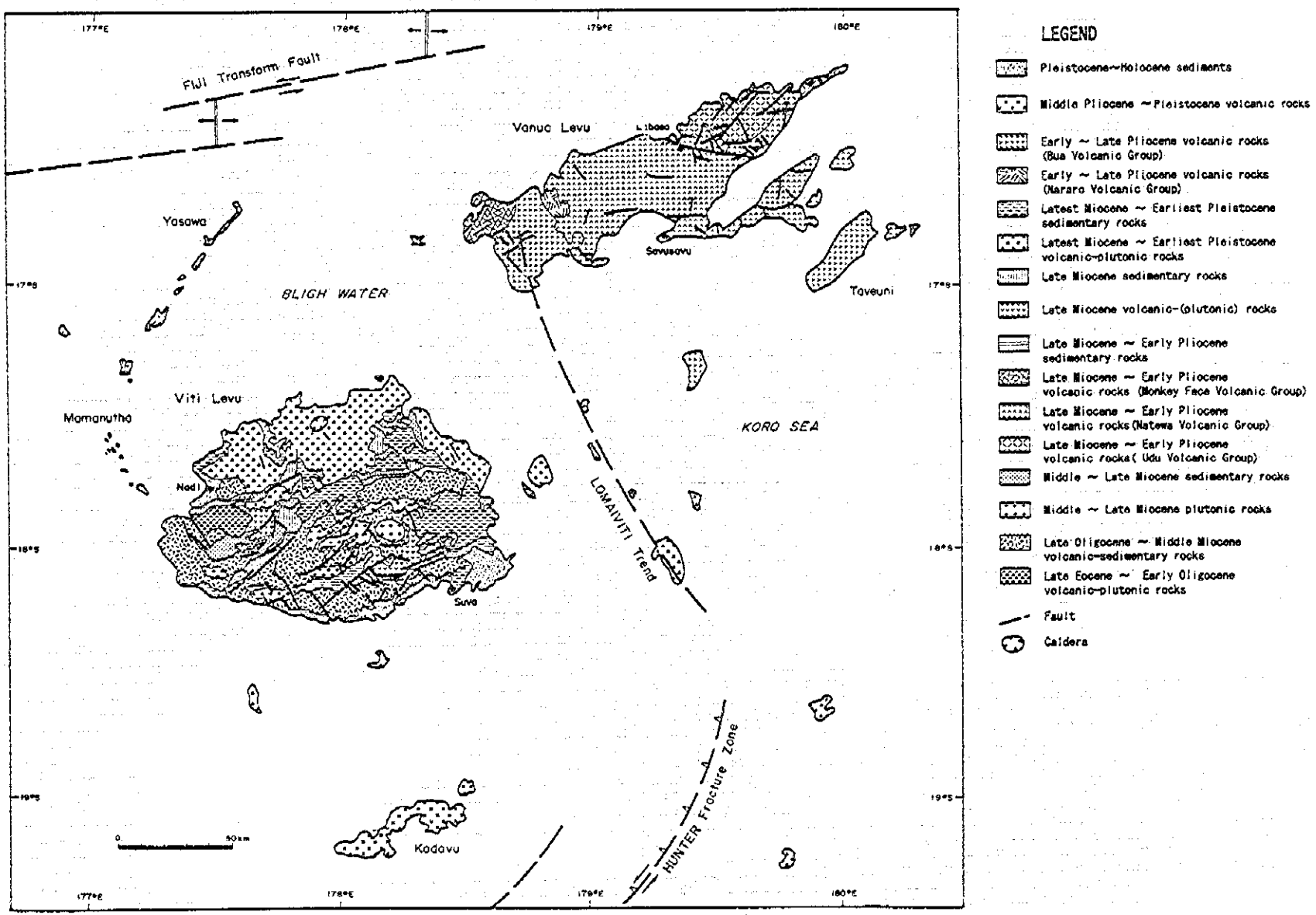
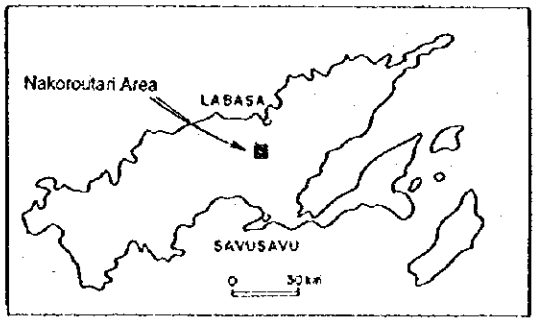


Fig. 1-7 Simplified Geologic Map around the Survey Area



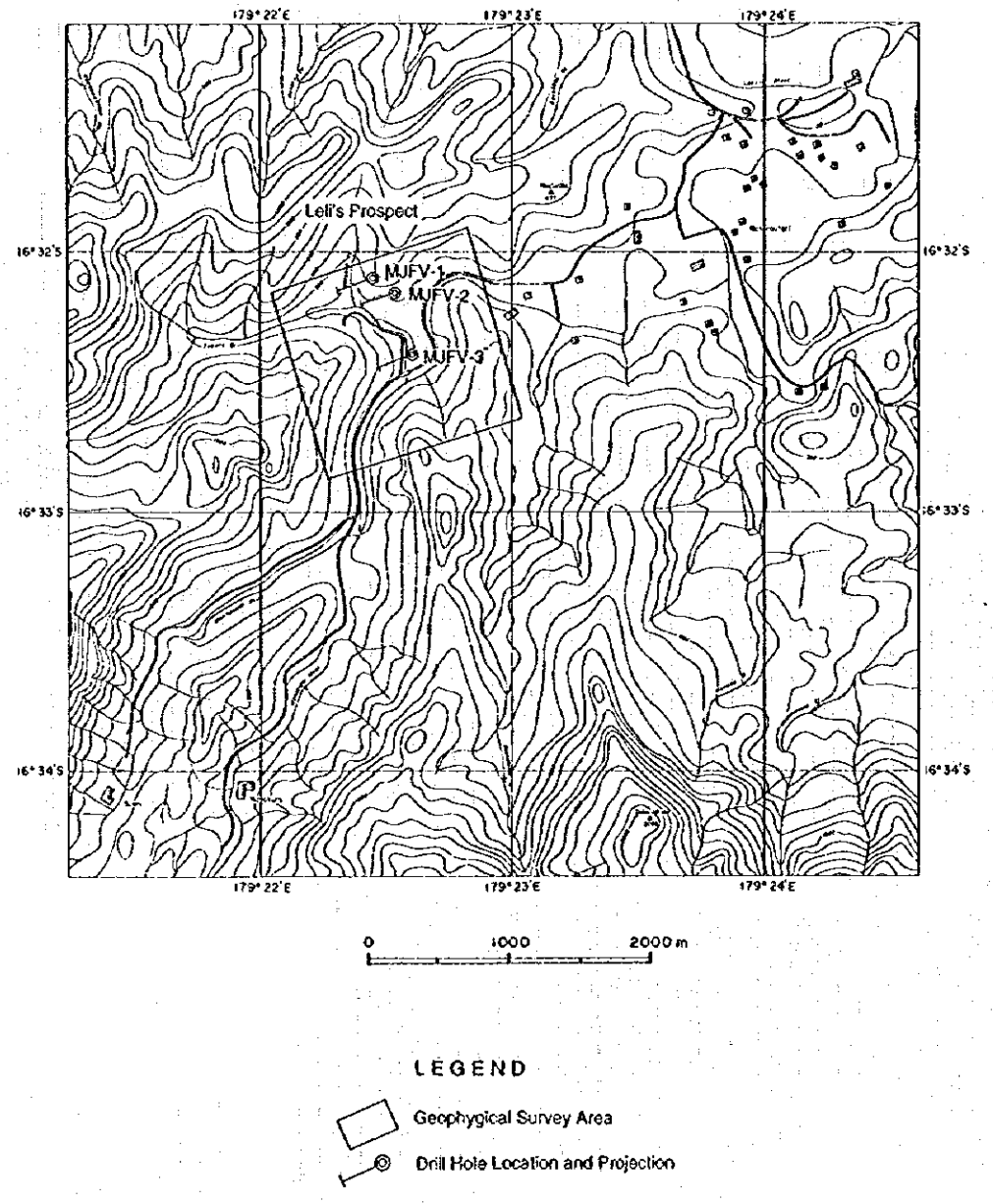


Fig. 1-8 Location Map of Drill Holes in the Nakoroutari Area

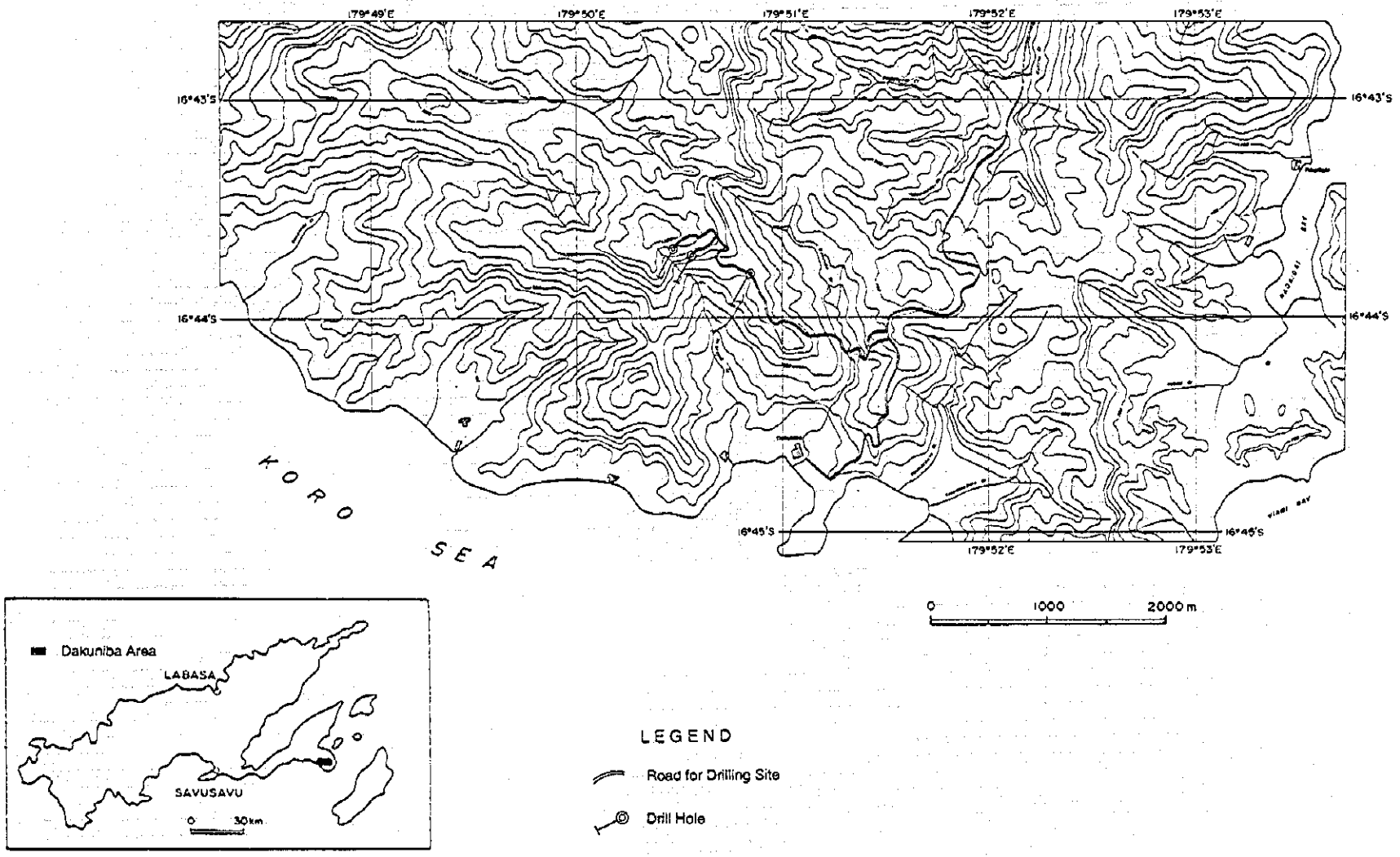


Fig. 1-9 Location Map of Drill Holes in the Dakuniba Area

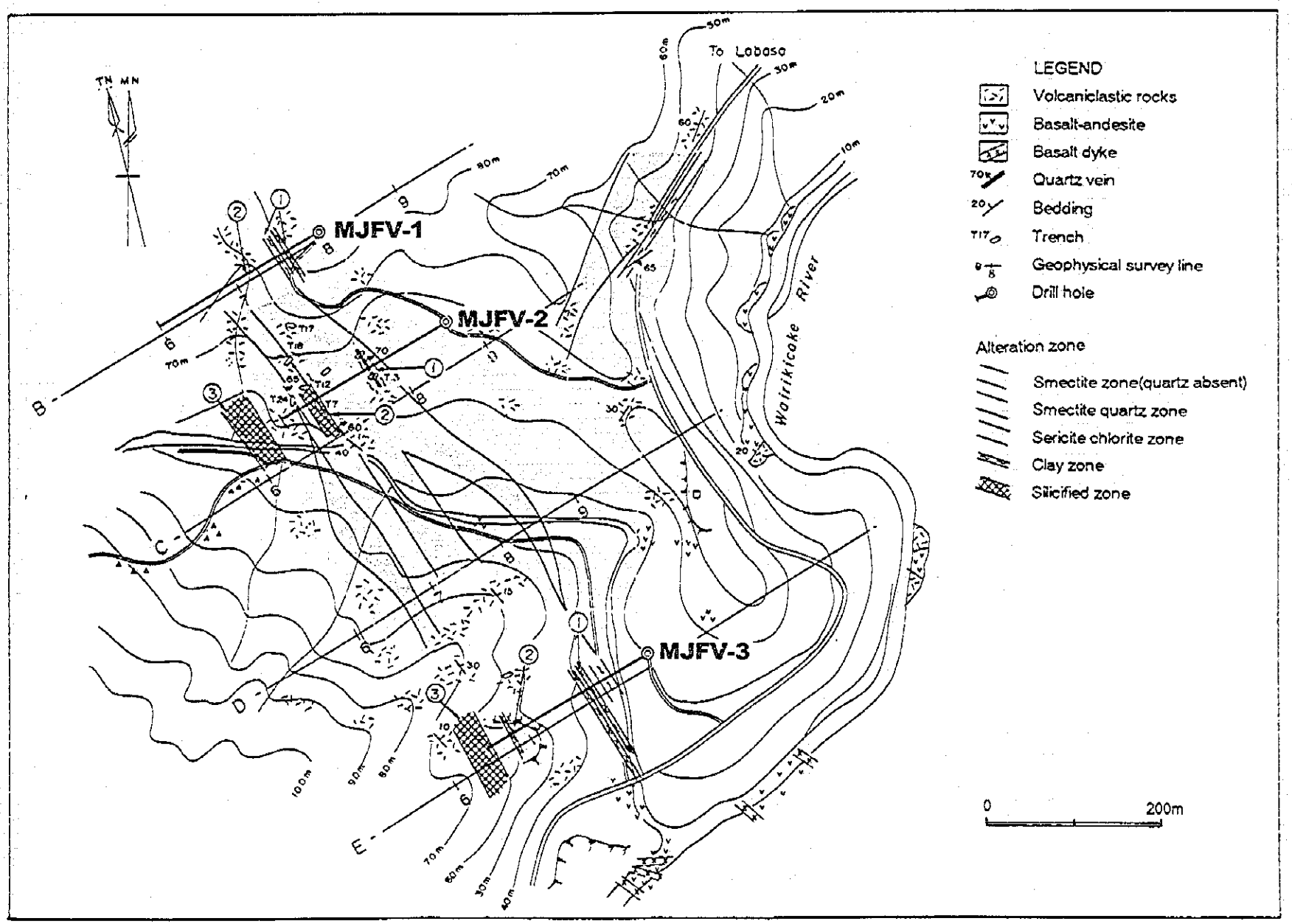


Fig. 1-10 Integrated Interpretation Map of the Nakoroutari Area

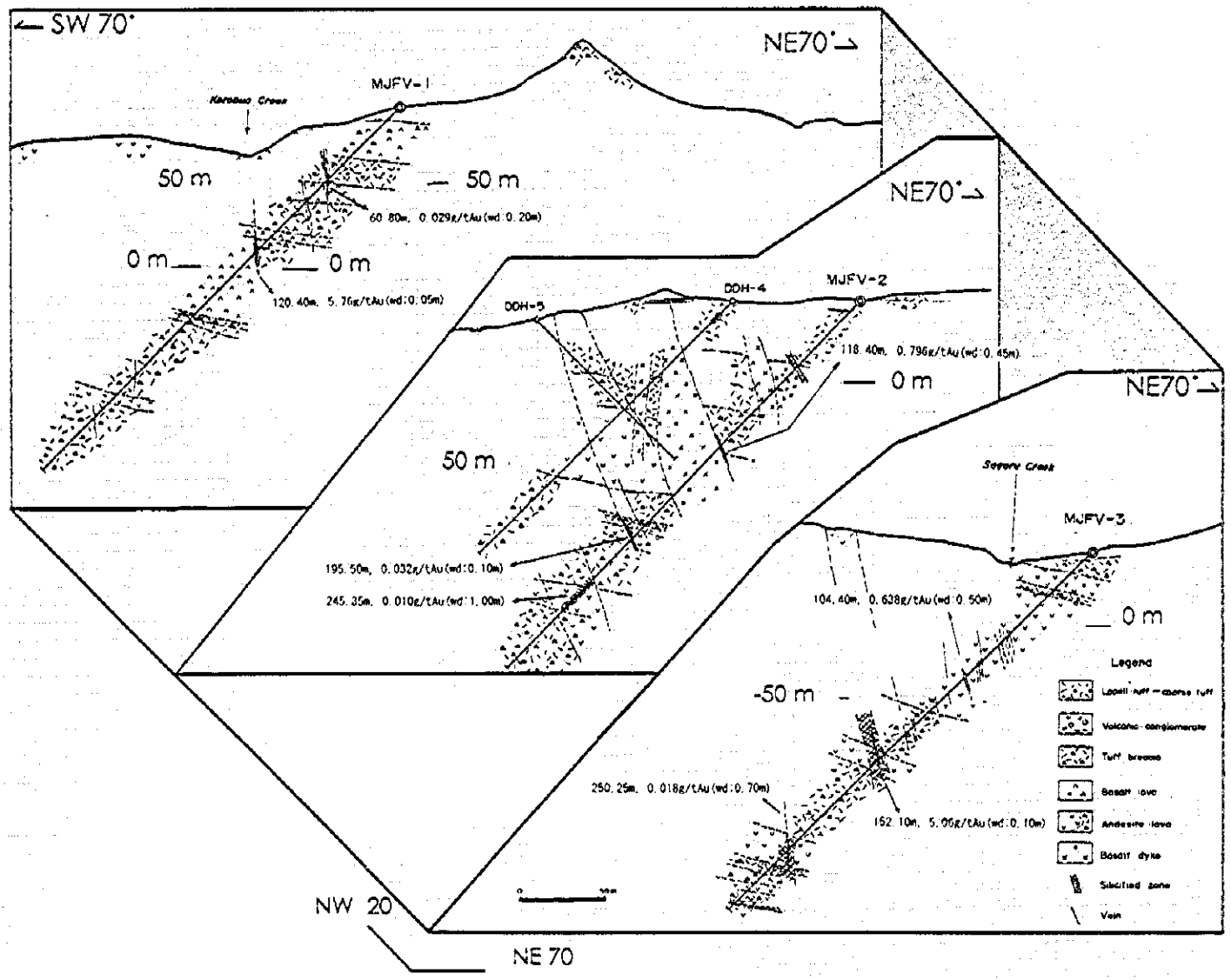


Fig. 1-11 Integrated Interpretation Profiles of the Nakoroutari Area

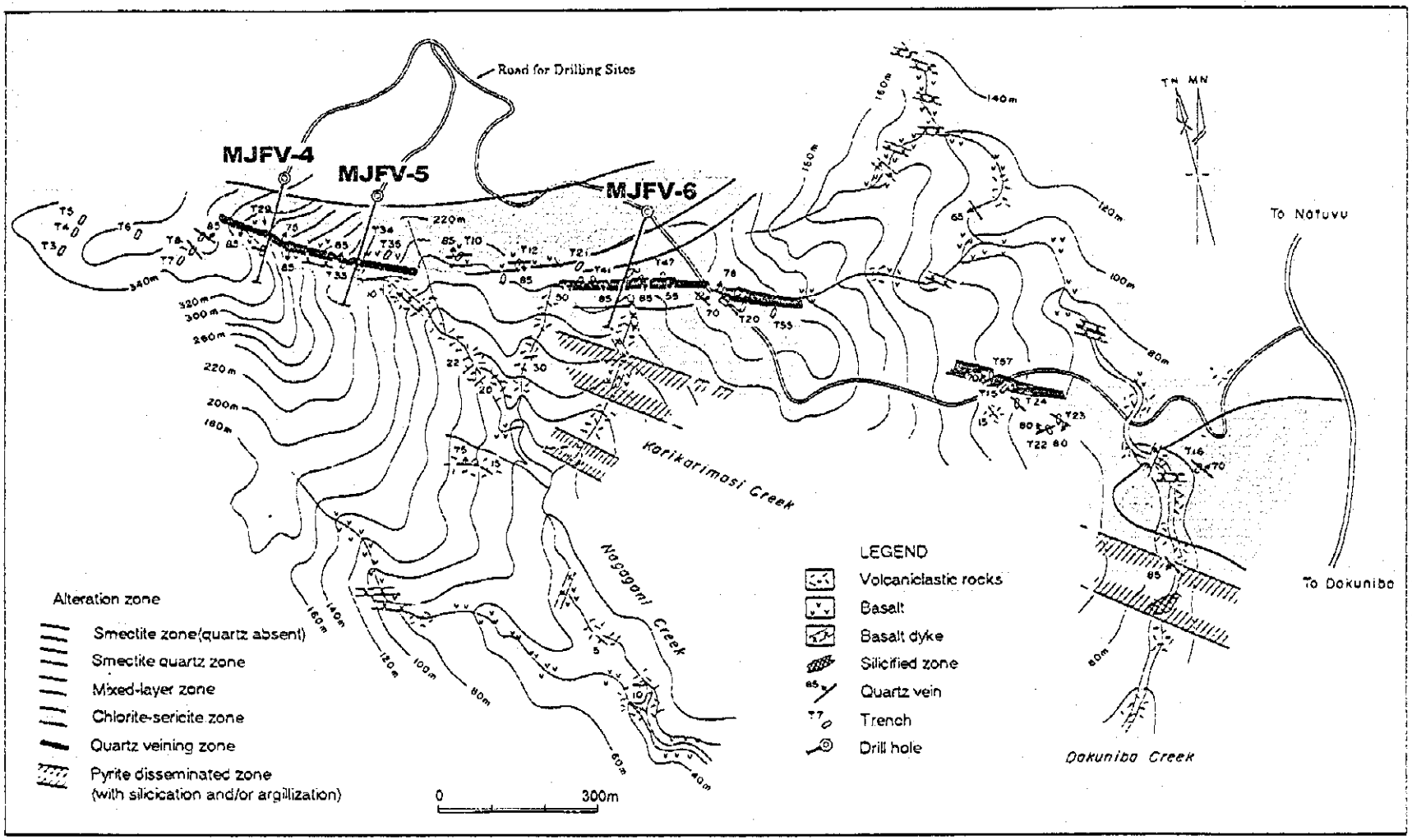


Fig. 1-12 Integrated Interpretation Map of the Dakuniba Area

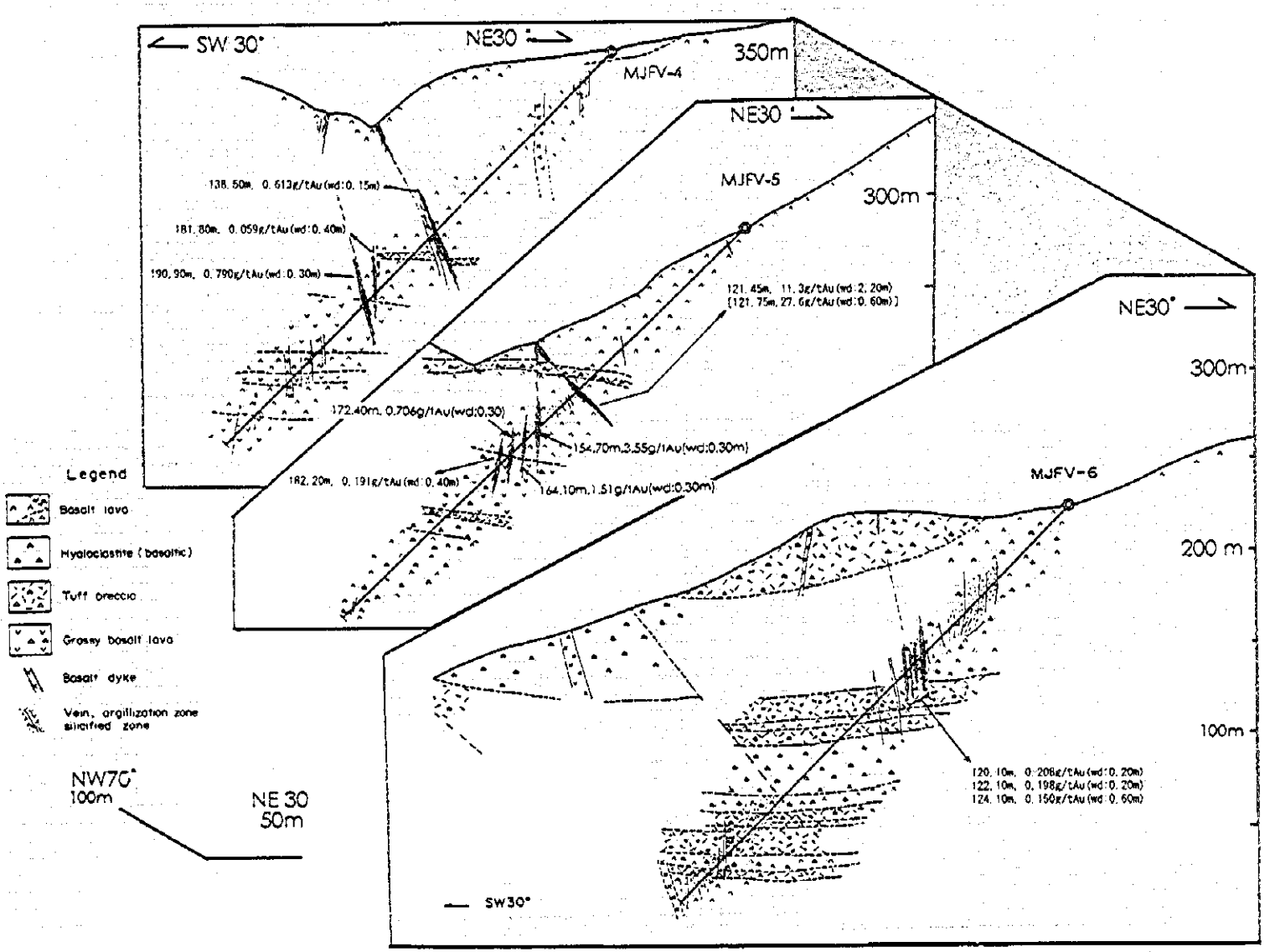


Fig. 1-13 Integrated Interpretation ProfilesMap of the Dakunibo Area

PART II DETAILED DISCUSSION

PART II DETAILED DISCUSSION

Chapter 1 Nakoroutari Area

1-1 Outline

The locations, directions and lengths of the drill holes are listed below.

Table 2-1 Location, Orientation and Length of Drill Holes in the Dakuniba Area

Drill No.	Coordinates		Elevation (m)	Azimuth	Inclination	Drilled Length(m)
	Latitude	Longitude				
MJFV-1	16° 32' 06"S	179° 22' 27"E	100	S70° W	-45°	300.20
MJFV-2	16° 32' 11"S	179° 22' 29"E	50	S70° W	-45°	300.50
MJFV-3	16° 32' 25"S	179° 22' 36"E	40	S70° W	-45°	300.30

1-2 Drilling

(1) MJFV-1

The MJFV-1 was drilled to the depth of 1.50 m by non-water drilling method using a pipe with cemented carbide tips of 168 mm diameter. Further drilling was done by PQ, HQ and NQ wireline method. A PQ bit was used to the depth of 53.15 m, while PW casing pipes were inserted to the depth of 7.5 m after reaming by PW casing diamond shoe. HW casing pipes were used for the length of 53 m. Drilling by the HQ bits was done to the depth of 151.95 m and NW casing pipes were inserted for the length of 147 m. Then, a NQ bit was used to the depth of 300.20 m, the end of hole.

Whole mud water escaped from the hole while drilling at 255m depth, but drilling was continued without significant trouble and delay of progress. Three types of polymer were added to drilling water to prevent circulation loss and vibration, although small amount of bentonite was also added.

The drilling operation is summarized on Table 2-2, and record of progress of the operation is shown in Table 2-13 and Fig. 2-1.

Table 2-2 Summary of the Drilling Operation on MJFV-1

Drilling Length

Drilling Length	Meterage(m)
Length planned	300.00
Length drilled	300.20

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	Aug. 5~Aug. 5	1.0	1.0	0.0	4	8
Drilling	Aug. 6~Aug.17	12.0	11.5	0.5	46	89
Dismantling	Aug.18~Aug.19	1.5	0.5	1.0	4	5
Total		14.5	13.0	1.5	54	102

Working Hours

Operation	(hours)	(percentage)
Drilling	159	57.4%
Other work	64	23.1%
Recovering	33	11.9%
Subtotal	256	92.4%
Reassemblage	11	4.0%
Dismantlment	10	3.6%
Water supply	0	0.0%
Grand total	277	100.0%
(Road construction)	110	-

Casing Pipe Inserted

Size	Meterage (m)
168mm	1.50
PW	7.50
HW	53.00
NW	147.00

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
168mm	1.50	1.00
PQ	51.65	49.55
HQ	95.80	94.50
NQ	151.25	151.05
Total	300.20	296.10

Core Recovery of 100m Hole

Depth of Core Recovery	Core recovery
0.00m~100.00m	96.0%
100.00m~200.00m	99.9%
200.00m~300.20m	100.0%
total	98.6%

Efficiency of Drilling

Total length/drilling period	20.7m/day
Total length/shift	11.1m/shift

Table 2-3 Records of the Drilling Operation on MJFV-1

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 5	0.00	0.00	0.00	0.00	0.00	0.00	0	2	4	8
Aug 6	7.60	5.80	13.40	10.80	13.40	10.80	2	2	4	8
Aug 7	10.00	1.60	11.60	11.60	25.00	22.40	2	2	4	8
Aug 8	0.00	13.00	13.00	13.00	38.00	35.40	1	2	4	9
Aug 9	12.80	7.00	19.80	19.50	57.80	54.90	2	2	4	8
Aug 10	13.90	13.10	27.00	26.70	84.80	81.60	2	2	4	8
Aug 11	0.00	15.00	15.00	14.20	99.80	95.80	1	1	2	0
Aug 12	14.80	12.20	27.00	26.90	126.80	122.70	2	2	4	8
Aug 13	6.00	14.50	20.50	20.50	147.30	143.20	2	2	4	8
Aug 14	3.30	16.00	19.30	19.30	166.60	162.50	2	2	4	8
Aug 15	30.65	33.35	64.00	64.00	230.60	226.50	2	2	4	8
Aug 16	33.00	18.00	51.00	51.00	281.60	277.50	2	2	4	8
Aug 17	9.00	9.60	18.60	18.60	300.20	296.10	2	2	4	8
Aug 18	0.00	0.00	0.00	0.00	300.20	296.10	0	1	2	0
Aug 19	0.00		0.00	0.00	300.20	296.10	0	1	2	5
Total	141.05	159.15	300.20	296.10			22	27	54	102

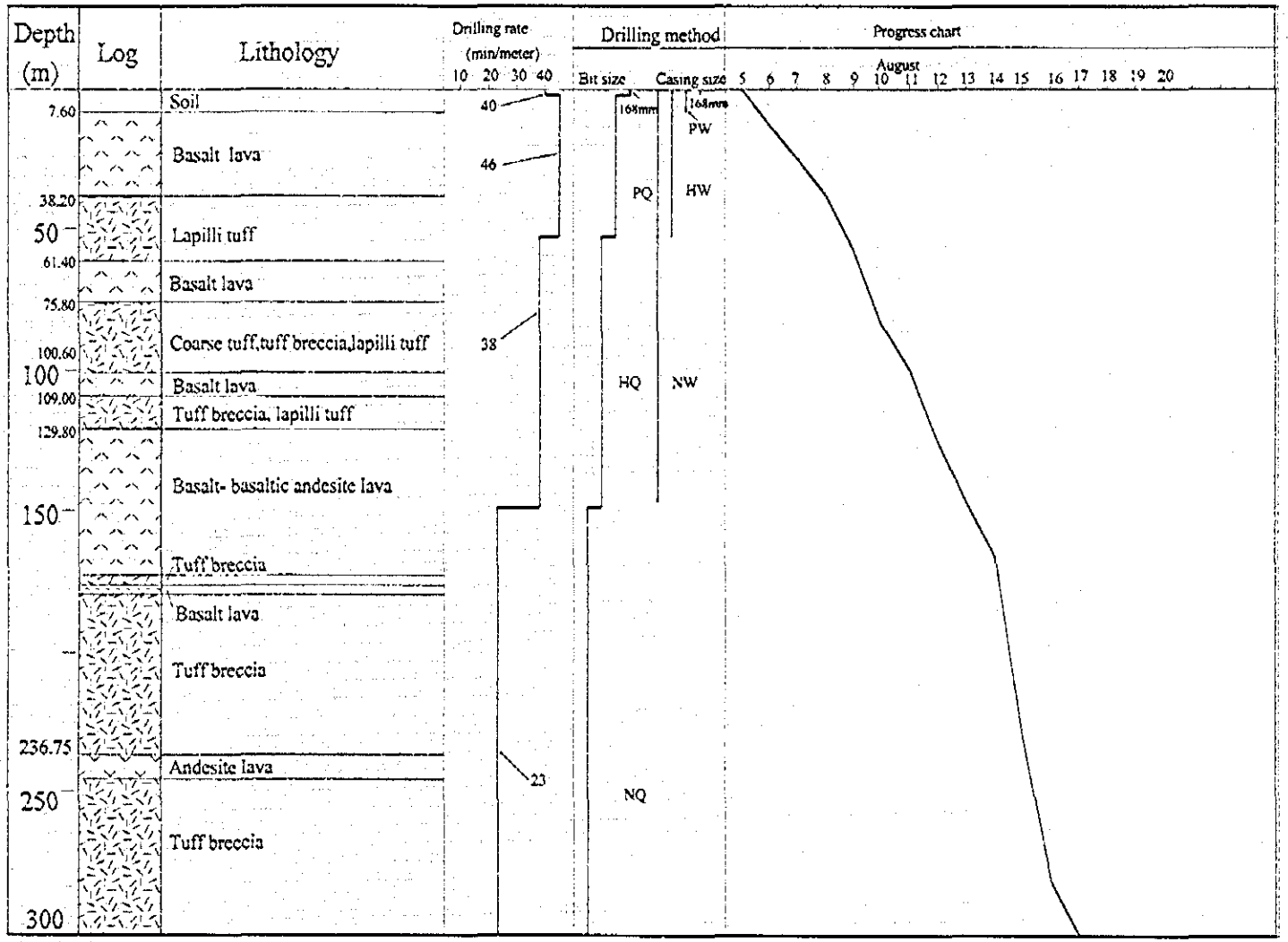


Fig. 2-1 Drilling Progress of MJFV-1

(2) MJFV-2

The MJFV-2 was drilled to the depth of 0.80 m by non-water method using a pipe with cemented carbide tips of 168 mm diameter. Further drilling was done by PQ, HQ and NQ wireline method. A PQ bit was used to the depth of 53.20 m, while PW casing pipes were inserted to the depth of 4.5 m after reaming by PW casing diamond shoe. HW casing pipes were inserted for the length of 54 m. Drilling by HQ bits was done to the depth of 151.95 m and NW casing pipes were inserted for the length of 151 m. A NQ bit were used to the depth of 300.50 m, the end of hole.

Coupling parts between the engine and the main gear box of the rig were broken while drilling at the depth of 152 m, resulting in the delay of progress for two day .

The drilling operation is summarized on Table 2-4, and record of progress of the operation is shown in Table 2-5 and Fig. 2-2

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

Drilling Length

Drilling Length	Meterage(m)
Length planned	300.00
Length drilled	300.50

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	July 20~July 21	2.0	1.5	0.5	6	6
Drilling	July 22~Aug. 3	12.5	12.0	0.5	48	75
Dismantling	Aug. 3~Aug. 4	1.5	0.5	1.0	4	3
Total		16.0	14.0	2.0	58	84

Working Hours

Operation	(hours)	(percentage)
Drilling	123	45.7%
Other work	81	30.1%
Recovering	46	17.1%
Subtotal	250	92.9%
Reassemblage	12	4.5%
Dismantlment	7	2.6%
Water supply	0	0.0%
Grand total	269	100.0%
(Road construction)	22	-

Casing Pipe Inserted

Size	Meterage (m)
168mm	0.80
PW	4.50
HW	54.00
NW	151.00

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
168mm	0.80	0.80
PQ	52.40	50.50
HQ	98.75	96.95
NQ	148.55	148.55
Total	300.50	296.80

Core Recovery of 100m Hole

Depth of Core Recovery	Core recovery
0.00m~100.00m	96.4%
100.00m~200.00m	99.9%
200.00m~300.20m	100.0%
total	98.8%

Efficiency of Drilling

Total length/drilling period	23.1m/day
Total length/shift	10.4m/shift

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

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 20	0.00	0.00	0.00	0.00	0.00	0.00	0	2	4	6
Jul 21	0.00	0.00	0.00	0.00	0.00	0.00	0	1	2	0
Jul 22	5.35	15.30	20.65	18.75	20.65	18.75	2	2	4	6
Jul 23	3.05	17.25	20.30	20.30	40.95	39.05	2	2	4	6
Jul 24	12.25	11.55	23.80	23.80	64.75	62.85	2	2	4	6
Jul 25	15.50	10.45	25.95	24.25	90.70	87.10	2	2	4	6
Jul 26	20.80	12.20	33.00	32.90	123.70	120.00	2	2	4	6
Jul 27	12.00	15.00	27.00	27.00	150.70	147.00	2	2	4	6
Jul 28	0.00	1.25	1.25	1.25	151.95	148.25	1	1	3	2
Jul 29	0.00	0.00	0.00	0.00	151.95	148.25	0	2	3	7
Jul 30	0.00	0.00	0.00	0.00	151.95	148.25	0	2	4	7
Jul 31	13.75	26.35	40.10	40.10	192.05	188.35	2	2	4	7
Aug 1	27.10	30.20	57.30	57.30	249.35	245.65	2	2	4	7
Aug 2	21.35	27.00	48.35	48.35	297.70	294.00	2	2	4	6
Aug 3	2.80	0.00	2.80	2.80	300.50	296.80	1	2	4	6
Aug 4	0.00	0.00	0.00	0.00	300.50	296.80	0	1	2	0
Total	133.95	166.55	300.50	296.80			20	29	58	84

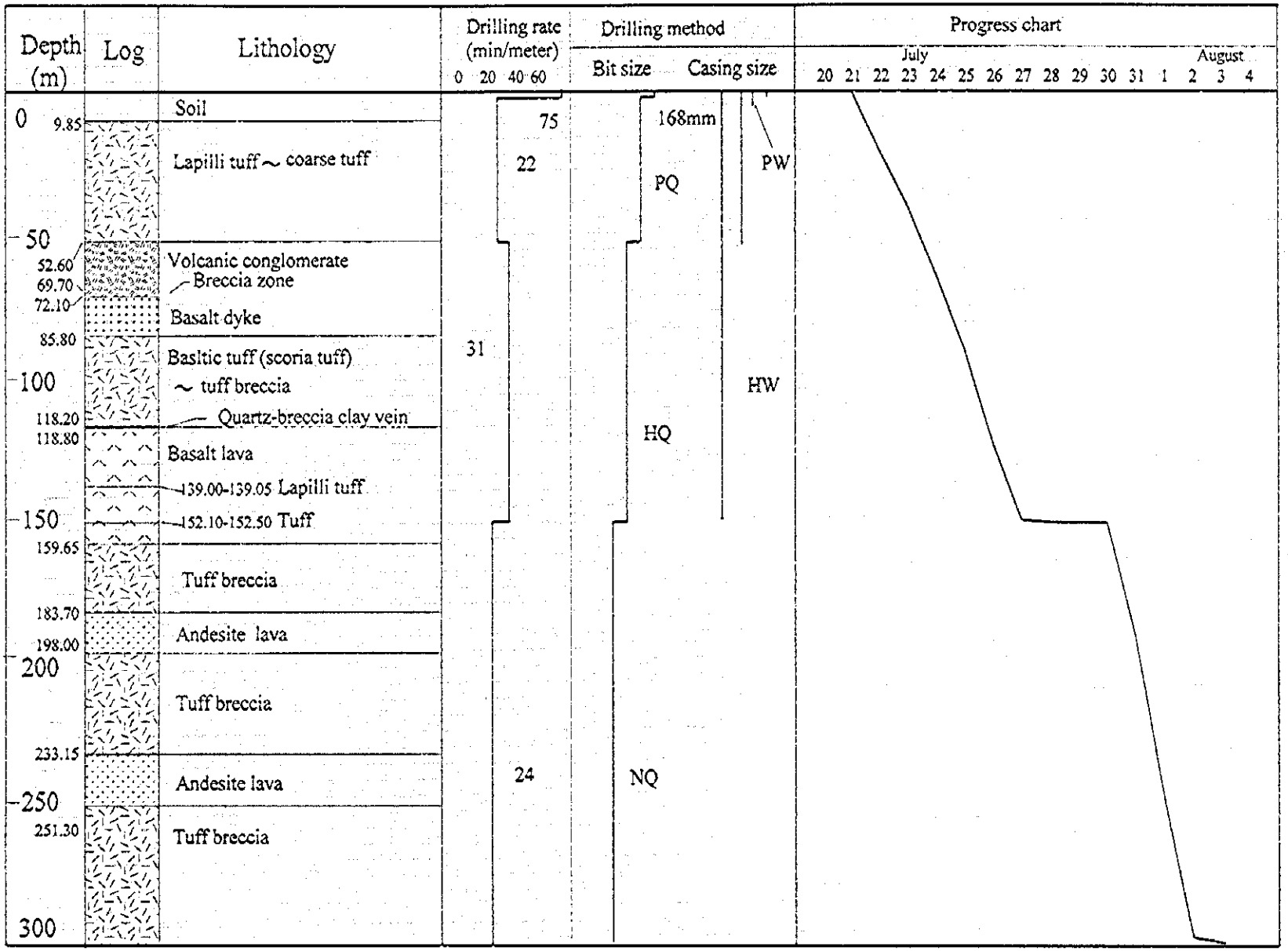


Fig. 2-2 Drilling Progress of MJFV-2

(3) MJFV-3

The MJFV-3 was drilled to the depth of 1.30 m by non-water drilling method using a pipe with cemented carbide tips of 168 mm diameter. Further drilling was done by PQ, HQ and NQ wireline method. A PQ bit was used to the depth of 49.95 m, while PW casing pipes were inserted to the depth of 10.50 m after reaming by PW casing diamond shoe. HW casing pipes were used for the length of 51 m. Drilling by the HQ bits were done to the depth of 160.90 m and NW casing pipes were inserted for the length of 152 m. Then, a NQ bit was used to the depth of 300.50 m, the end of hole.

A rod was broken while drilling at the depth of 46 m was being carried out without significant delay of progress. Three types of polymer were added to the drilling water to prevent circulation loss, vibration, although small amount of bentonite was also added.

The drilling operation is summarized on Table 2-6, and record of progress of the operation is shown in Table 2-7 and Fig. 2-3.

Table 2-6 Summary of the Drilling Operation on MJFV-3

Drilling Length

Drilling Length	Meterage(m)
Length planned	300.00
Length drilled	300.60

Survey Period

Operation	Survey Period				Total man day	
	Period	Day	Work day	Off day	Engineer	Worker
Preparation	Aug. 19~Aug. 20	1.5	1.5	0.0	5	12
Drilling	Aug. 20~Aug. 31	12.0	11.5	0.5	34	70
Dismantling	Sept. 1~Sept. 4	3.5	3.0	0.5	12	21
Total		17.0	16.0	1.0	51	103

Working Hours

Operation	(hours)	(percentage)
Drilling	148.5	51.7%
Other work	65.0	22.6%
Recovering	37.5	13.1%
Subtotal	251.0	87.5%
Reassemblage	20.0	7.0%
Dismantlment	16.0	5.6%
Water supply	0.0	0.0%
Grand total	287.0	100.0%
(Road construction)	8.0	-

Casing Pipe Inserted

Size	Meterage (m)
168mm	1.30
PW	10.50
HW	51.00
NW	162.00

Drilling Length by Each Bit Size

Bit size	Drilled length (m)	Core length (m)
168mm	1.30	1.30
PQ	48.65	47.45
HQ	110.95	109.85
NQ	139.70	139.70
Total	300.60	298.30

Core Recovery of 100m Hole

Depth of Core Recovery	Core recovery
0.00m~100.00m	97.7%
100.00m~200.00m	100.0%
200.00m~300.20m	100.0%
total	99.2%

Efficiency of Drilling

Total length/drilling period	17.7m/day
Total length/shift	10.0m/shift

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

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 19		0.00	0.00	0.00	0.00	0.00	0	1	1	5
Aug 20	1.30	0.00	1.30	1.30	1.30	1.30	1	2	4	7
Aug 21	8.65	13.85	22.50	21.30	23.80	22.60	2	2	4	7
Aug 22	20.00	12.55	32.55	32.55	56.35	55.15	1	2	3	7
Aug 23	4.45	12.80	17.25	16.15	73.60	71.30	2	2	3	6
Aug 24	14.20	11.80	26.00	26.00	99.60	97.30	2	2	3	6
Aug 25		6.20	6.20	6.20	105.80	103.50	1	2	1	2
Aug 26	18.00	17.75	35.75	35.75	141.55	139.25	2	2	3	7
Aug 27	18.25	11.80	30.05	30.05	171.60	169.30	2	2	3	7
Aug 28	6.00	0.00	6.00	3.00	177.60	172.30	2	2	4	7
Aug 29	12.00	33.00	45.00	48.00	222.60	220.30	2	2	4	7
Aug 30	30.00	24.00	54.00	54.00	276.60	274.30	2	2	3	7
Aug 31	18.00	6.00	24.00	24.00	300.60	298.30	2	2	3	7
Sep 1		0.00	0.00	0.00	300.60	296.10	0	1	1	0
Sep 2	0.00	0.00	0.00	0.00	300.60	296.10	0	2	3	7
Sep 3	0.00		0.00	0.00	300.60	296.10	0	1	4	7
Sep 4	0.00				300.60	296.10	0	1	4	7
Total	150.85	149.75	300.60	298.30	300.60	296.10	21	30	51	103

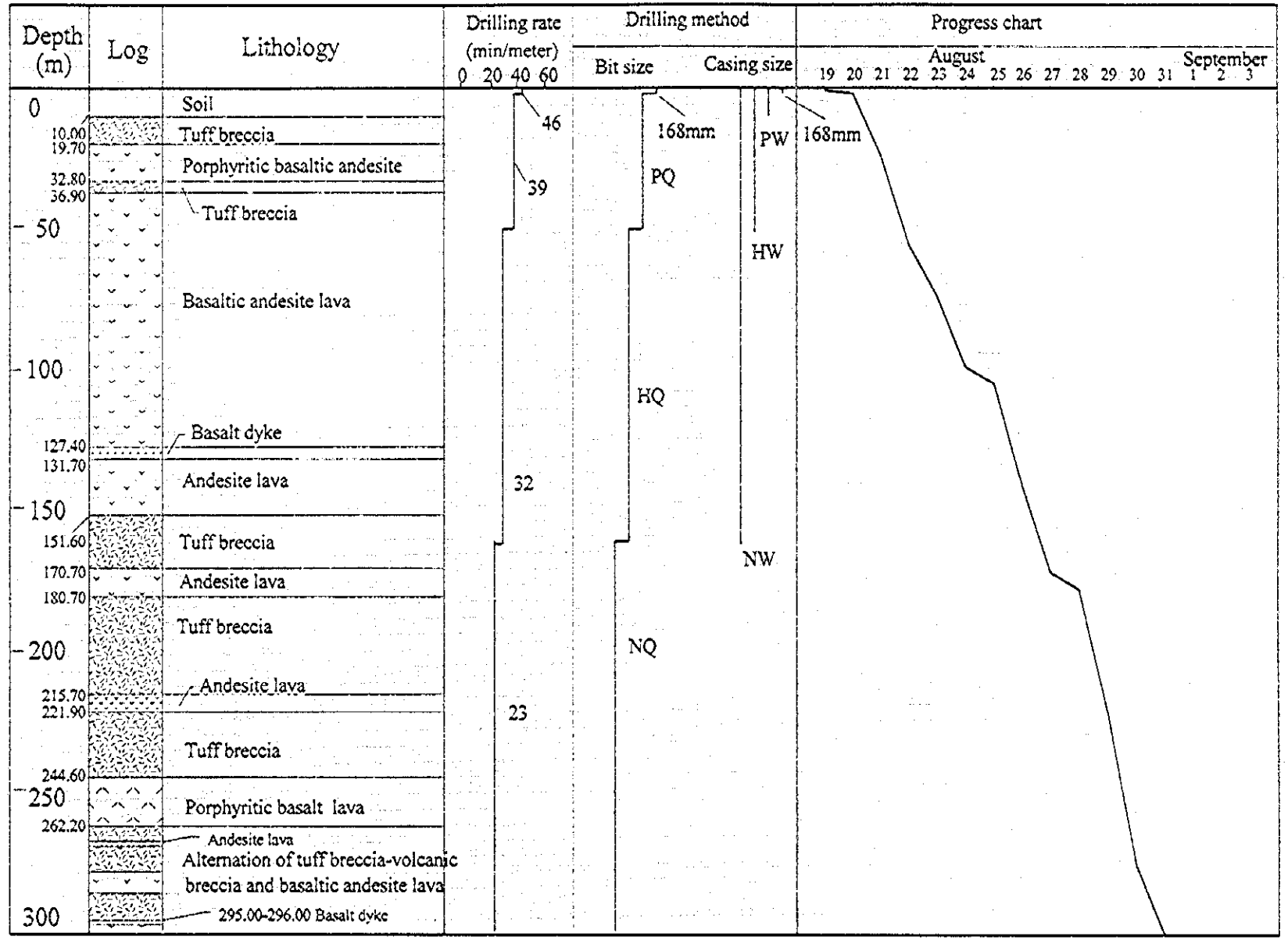


Fig. 2-3 Drilling Progress of MJFV-3