LEGEND

GEOLOGY

- GREAT DYKE
- YOUNGER GRANITES
- OLDER GNEISSES (GRANITIC GNEISSES) (TONALITIC GNEISSES)
- LIMPOPO MOBIL BELT (GRANULITIC GNEISSES)
- BASEMENT SCHIST COMPLEX

BOREHOLE

- ⊙, ⊕, ⊗ : BOREHOLE LOCATION
- 46 : BOREHOLE DEPTH (m)
- (6) : STATIC WATER LEVEL (m)
- [15] : DEPTH AT WATER FIRST ENCOUNTERED (m)

STATIC WATER LEVEL
BOREHOLE DEPTH
PERCENTAGE (%)
RANGE OF DEPTH (m) [15], SAMPLE NO
RANGE OF STATIC W.L (m) (11), SAMPLE NO.

SHURUGWI C.L.
CHILIMANZI C.L.
RUNDE C.L.
MAZVIHWA C.L.
MBERENGWA C.L.
MARANDA C.L.
CHIBI C.L.
MATIBI NO.1 C.L.

MVUMA
SHURUGWI
CHILIMANZI C.L.
SHURUGWI C.L.
MASVINGO PROV.
MASHAVA
MASVINGO
JENYA FAULT
RUNDE C.L.
MIDLANDS PROV.
ZVISHAVANE
MAZVIHWA C.L.
CHIBI C.L.
MBERENGWA C.L.
TOKWE R.
SUNDI R.
NUANETSI R.
MATIBI NO.1 C.L.
MARANDA C.L.
BUBYE R.

OJ RJ SP TP
OH RH SN TN
QH RH SN TN
QG RG SM TM

SCALE

THE REPUBLIC OF ZIMBABWE
THE MINISTRY OF WATER RESOURCES AND DEVELOPMENT
RURAL WATER SUPPLY PROGRAMME IN COMMUNAL LANDS

BOREHOLE DEPTH AND WATER LEVEL

JAPAN INTERNATIONAL COOPERATION AGENCY
JICA DAW NO. ZIM REF NO

図 3-2-7 深井戸深度および水位

LEGEND

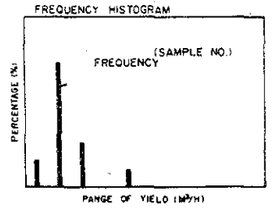
GEOLOGY

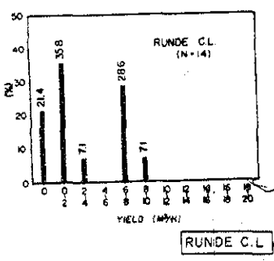
- GREAT DYKE
- YOUNGER GRANITES
- (GRANITIC GNEISSES) OLDER GNEISSES (TONALITIC GNEISSES)
- LIMPOPO MOBIL BELT (GRANULITIC GNEISSES)
- BASEMENT SCHIST COMPLEX

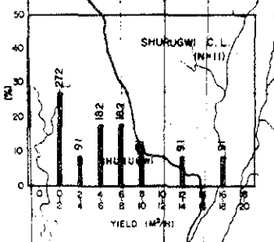
YIELD

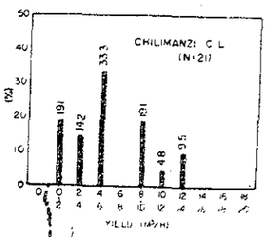
- BOREHOLE
- 5.4 YIELD (M^3/H) AT PUMPING TEST OF CONSTRUCTION
- (0.225) SPECIFIC CAPACITY ($M^3/H/M$)

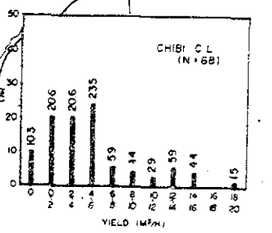
FREQUENCY HISTOGRAM

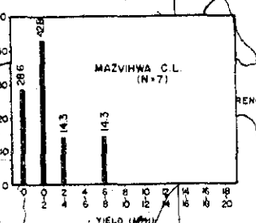


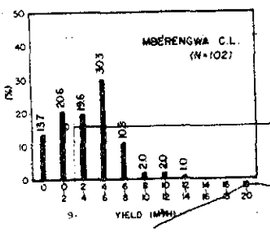


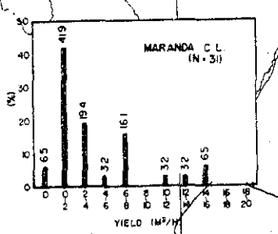


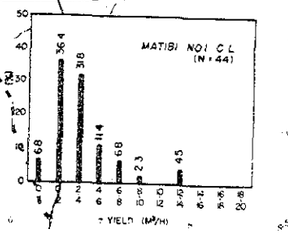












MASVINGO PROV.

MIDLANDS PROV.

GWERU
MVUMA
MASHAVA
MASVINGO
JENYA FAULT
TOKWE R.
LUNDI R.
NUANETSI R.
SABIE R.
ZVISHAVANE
SHURUGWI C.L
CHILIMANZI C.L
RUNDE C.L
MAZVIHWA C.L
MBERENGWA C.L
CHIBI C.L
MATIBI NO.I C.L
MARANDA C.L
QJ RJ QH RH
SP TP SN TN
QH RH QG RG
SN TN SM TM

SCALE

THE REPUBLIC OF ZIMBABWE
THE MINISTRY OF WATER RESOURCES AND DEVELOPMENT
RURAL WATER SUPPLY PROGRAMME IN COMMUNAL LANDS

BOREHOLE YIELD DATA

JAPAN INTERNATIONAL COOPERATION AGENCY

JICA DAW NO ZIM REF NO

図 3-2-8 深井戸揚水量

（２）電気探査

選定された地域においての地下水開発の可能性および開発対象地層の深度を調査するため、調査団によって電気探査を実施した。調査カ所数は当初8カ所の対象共有地で計50サイトを計画したが、調査期間の制約のため実施したのはこのうち47サイトである。各村落共有地毎のサイト数は人口の比率で割りつけた。

表3-2-2(1)～(2)に選定されたサイトの位置を、図3-2-9および表3-3-6に位置図を示す。

i)探査地点の選定

調査対象サイトの選定後探査地点を決定するためまず調査団により地形図、地質図および空中写真の解読が行われた。次にこれから得られた情報を基礎にして実際に現地を踏査し、最終的に探査地点を決定した。最終的な地点の決定に当たっては次のような事柄が考慮された。

* 風化帯の厚さ、断層、破砕帯および岩脈の存在
* 集水域の広さ
* 社会／経済的な有効性
* 地形的な観点からの電気探査実施の可能性

ii)探査方法

探査方法は垂直探査方法とし、電極配列はWennerの4極配列とした。探査深度は原則として120mとし深度1mから120mまでの間に37回の測定を行った。探査地点はできるだけ直線上に並ぶよう設定し1サイトにおいて3～4地点の探査を行った。電極の配列は図3-2-10に、また探査に使用した機器のリストは表3-2-7に示した。

iii)解析方法

実際の測定で得られたρa値(見掛け比抵抗値)を両対数方眼紙にプロットし、ρa-a曲線を作成した。この曲線を理論的な計算の基に作図されたSundberyの標準曲線および補助曲線を用いて地層の境界深度および地層の固有比抵抗値を解析した。測定したすべての地点のρa-a曲線および解析結果や探査結果から推定される地質断面図は図3-2-11に示すとおりである。

vi)解析結果

図3-2-11に示している地質断面図において、電気探査結果では岩相の区分が明確にならないため、ここでは推定される風化の度合によって地層を区分した。また、地表踏査および空中写真の判読結果から断層破砕帯或は岩脈の貫入が認められる場合には、これらの点についても考慮し、地質断面図を作成した。

風化の度合は、標準曲線および補助曲線を用いて解析された地層の固有比抵抗値から次のように区分した。

区分	記号	固有比抵抗値
－完全風化帯	（Ｃｗ）	ほぼ50Ω-m以下
－強風化帯	（Ｈｗ）	ほぼ50～500Ω-m
－中風化帯	（Ｍｗ）	ほぼ500～1,500Ω-m
－弱風化帯	（Ｓｗ）	ほぼ1,500～3,000Ω-m
－未風化帯	（Ｆ）	ほぼ3,000Ω-m以上

ここに示した比抵抗値は一つの目安であり、各々の地点における相対的な関係によって、断面図に示した区分は若干異っている。また、全体的にみると同じ風化帯に属する場合でも新期花コウ岩層では比抵抗値が高く、他の地層ではこれよりも低い傾向がみられる。

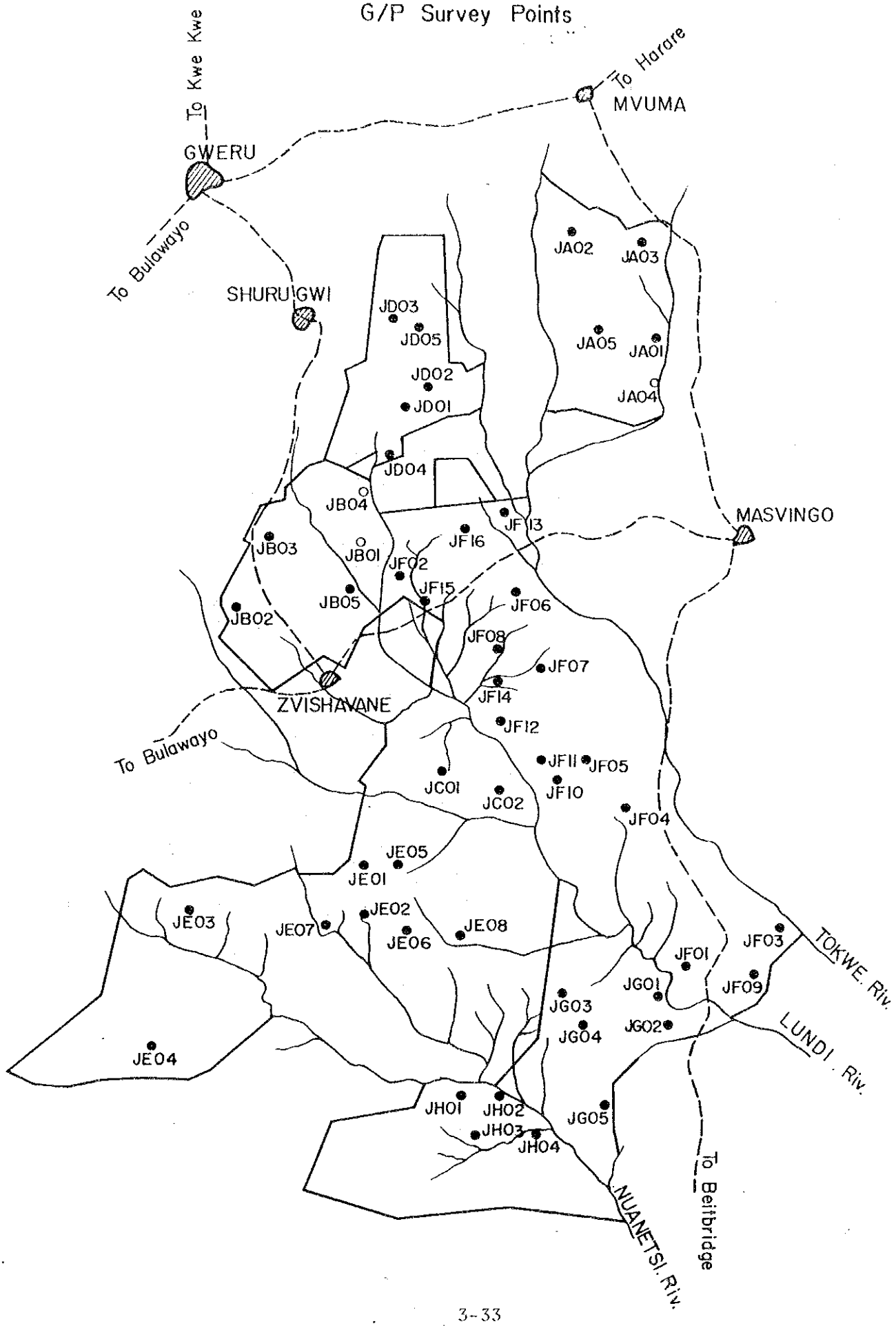
比抵抗値および各風化帯の垂直的な分布状況から判断して、地下水開発の可能性があるのは強風化帯および中風化帯までであり、未風化帯はもちろん弱風化帯においても地下水開発は困難と思われる。このような観点に立って各サイトにおける地下水開発の可能性の深度を判定したのが、表3-2-8である。最大深度とは、その深度以上掘削しても地下水を開発することは困難であろうと考えられる深度であり、最小深度とは最低その深度までは掘ってみる必要があるという深度である。

地域的にも地質的にも大きなバラツキがあり、判定が難かしいが、平均すると最大深度は61m、最小深度は約44mとなった。なお、最大深度が40mを越ないサイトでの地下水開発はかなり困難であると推定される。ρa-a曲線、調査断面図および地質平面図は図3-2-11に示すとおりである。

図　3-2-9　　電気探査地点位置図

Fig　LOCATION MAP

G/P Survey Points



LEGEND

- ● JF08 GEOPHYSICAL PROSPECTING POINT
- PT-3 PUMPING TEST
- J1 SAMPLING NAMBER FOR LABORATORY
- ▲ 4 FIELD WATER TEST

LIST OF SURVEY POINTS

	NAME OF C.L	ITE	NAME OF SITE	GRID REF	NO. OF G/P
MIDLANDS PROVINCE	CHILIMANZI	JA01	GOVERE SCH.	TP580192	3
		JA02	CHIZHOU B.C.	TP382364	3
		JA03	MUWANI B.C.	TP540385	5
		JA04	SHASHE SCH	TP561055	0
		JA05	VUDZI B.C.	TP435216	2
	RUNDE	JB01	SHIKU SCH.	SN976778	0
		JB02	HLUPO	RH033671	3
		JB03	NEAR CHINAMH SCH.	RH090770	3
		JB04	HANAWA SCH	SN964883	0
		JB05	MABA SA B.C.	SN960690	3
	MAZVIHWA	JC01	MTAMBI B.C.	TN160345	3
	SHURUGWI	JC02	MUROWA SCH.	TN273287	3
		JD01	MAKOTORE SCH.	TP048043	4
		JD02	MAZIVISA B.C.	TP105086	4
		JD03	HANKE B.C.	TP036254	4
		JD04	BANGA SCH.	TN063945	3
		JD05	TUMBA SCH.	TP066193	2
	MBRENGWA	JE01	MWEMBE B.C.	TN009150	2
		JE02	RENGWE B.C.	TN010068	3
		JE03	CHIGEZI SEC SCH.	GH330093	3
		JE04	BVUMBURA SCH.	QG856818	3
		JE05	MBRASHAMA SCH.	TN083175	3
		JE06	MAZIDZI SCH.	TN035025	3
		JE07	RUSINGE SCH.	SN937032	3
		JE08	BUKUTA B.C.	TN211003	3
MASVINGO PROVINCE	CHIBI	JF01	MUTOTI SCH.	TM643962	3
		JF02	CHIGWIKWE B.C.	TN045725	3
		JF03	GORORO B.C.	TN818025	3
		JF04	MAKAMURE SCH.	TN497262	3
		JF05	CHISHAWA B.C.	TN440393	3
		JF06	MAKOVERE SCH.	TN306650	3
		JF07	TARU B.C.	TN320540	3
		JF08	BELLA SCH.	TN249578	2
		JF09	SHINDI B.C.	TN766919	3
		JF10	DAVIRA SCH.	TN356319	3
		JF11	DAVIRA B.C.	TN319359	3
		JF12	MASUMIRE STORE	TN256425	3
		JF13	BEFURE SCH.	TN222840	3
		JF14	CHISENGA SCH.	TN264508	3
		JF15	MADZIVIDONDO B.C.	TN136856	3
		JF16	MUROTOSI SCH.	TN186841	4
	MATIBI NO.I	JG01	MATANDE SCH.	TM596893	3
		JG02	MASOSWE SCH.	TM590931	3
		JG03	NEW PAMBE SCH.	TM400894	3
		JG04	MAKWIRE SCH.	TM436837	3
		JG05	MUSHAWA B.C.	TM486675	3
	MARANDA	JH01	MAZATSE B.C.	TM201696	3
		JH02	MUNYAMAN SCH.	TM252709	3
		JH03	LAGER	TM213633	3
		JH04	CHEHOMA SCH.	TM318625	3

NO OF G/P ; NAMBER(S) OF GEOPHYSICAL PROSPECTING

MIDLANDS PROV.

MASVINGO PROV.

MVUMA

GWERU

SHURUGWI

CHILIMANZI C.L

SHURUGWI C.L

RUNDE C.L

MAZVIHWA C.L

MBERENGWA C.L

MARANDA C.L

CHIBI C.L

MATIBI NO.I C.L

MASHAVA

MASVINGO

ZVISHAVANE

QJ RJ
QH RH

SP TP
SN TN

QH RH
QG RG

SN TN
SM TM

TOKWE R.

LUNDI R.

MUNETSI R.

SURVE R.

SCALE

THE REPUBLIC OF ZIMBABWE
THE MINISTRY OF WATER RESOURCES AND DEVELOPMENT
RURAL WATER SUPPLY PROGRAMME IN COMMUNAL LANDS
SURVEY LOCATION MAP BY J.I.C.A
JAPAN INTERNATIONAL COOPERATION AGENCY
JICA DAW NO. | ZIM REF NO.

図 3-2-9 調査位置図 (JICA)

表 3-2-6　　地質調査地点一覧表 (1)

(Midlands Province)

C.L.	No.	Site No.	Site Name	Grid Ref.
Chilimanzi	1	JA-01	GOVERE Sch.	TP560-192
	2	JA-02	CHIZHOU B.C.	TP382-364
	3	JA-03	MUWANI B.C.	TP540-385
	4	JA-04	SHASHE Sch.	TP561-055
	5	JA-05	VUDZI B.C.	TP435-216
Runde	6	JB-01	MARIRA B.C.	SN976-778
	7	JB-02	near RUSVINGE Sch.	RH033-671
	8	JB-03	near CHINAMI Sch.	RH090-770
	9	JB-04	MABASA B.C.	SN960-695
Mazvihwa	10	JC-01	near D.C. OFFICE	TN160-345
	11	JC-02	MUROWA Sch.	TN273-287
Shurugwi	12	JD-01	MAKOTORE Sch.	TP045-065
	13	JD-02	MAZIVISA B.C.	TP105-086
	14	JD-03	HANKE B.C.	TP036-234
	15	JD-04	BANGA Sch.	TN053-945
	16	JD-05	MATUMBA Sch.	TP092-193
Mberengwa	17	JE-01	MWEMBE B.C.	TN009-158
	18	JE-02	RENGWE B.C.	TN010-068
	19	JE-03	CHINGEZI Sch.	QH933-083
	20	JE-04	MVUMBURA Sch.	QG856-818
	21	JE-05	MBIRASHAVA Sch.	TN083-175
	22	JE-06	MUDZIDZI Sch.	TN105-025
	23	JE-07	RUSINGE Sch.	SN937-032
	24	JE-08	BUKUTA B.C.	TN211-023
Total	24 Sites			

表 3-2-6　　地質調査地点一覧表 (2)

(Masvingo Province)

C.L.	No.	Site No.	Site Name	Grid Ref.
Chibi	25	JF-01	MUTOTI Sch.	TM643-962
	26	JF-02	CHIGWIKWE B.C.	TN045-725
	27	JF-03	GORORO B.C.	TN818-025
	28	JF-04	MAKAMURE Sch.	TN497-262
	29	JF-05	CHISHAWE B.C.	TN440-390
	30	JF-06	MAKOVERE Sch.	TN306-660
	31	JF-07	TARU B.C.	TN320-540
	32	JF-08	BELLA Sch.	TN249-578
	33	JF-09	SHINDI B.C.	TN766-919
	34	JF-10	DAVIRA Sch.	TN356-319
	35	JF-11	DAVIRA B.C.	TN319-359
	36	JF-12	MASUNIRE STORE	TN256-425
	37	JF-13	BEFURE Sch.	TN222-840
	38	JF-14	CHISENGA Sch.	TN264-508
	39	JF-15	MADZIVADONDO B.C.	TN136-656
	40	JF-16	MUKOTOSI Sch.	TN166-841
Matibi No.1	41	JG-01	MATANDE Sch.	TM596-883
	42	JG-02	MASOGWE Sch.	TM590-831
	43	JG-03	PEMBA Sch.	TM400-894
	44	JG-04	MAKWIRE Sch.	TM436-837
	45	JG-05	MUSHAVA B.C.	TM488-675
Maranda	46	JH-01	MAZATESE B.C.	TM201-698
	47	JH-02	MUNYAMANI Sch.	TM252-709
	48	JH-03	LAAGER	TM213-638
	49	JH-04	CHEHOMA B.C.	TM318-625
Total	25 Sites			

図 3-2-10　Wennerの4極法による電極配置図

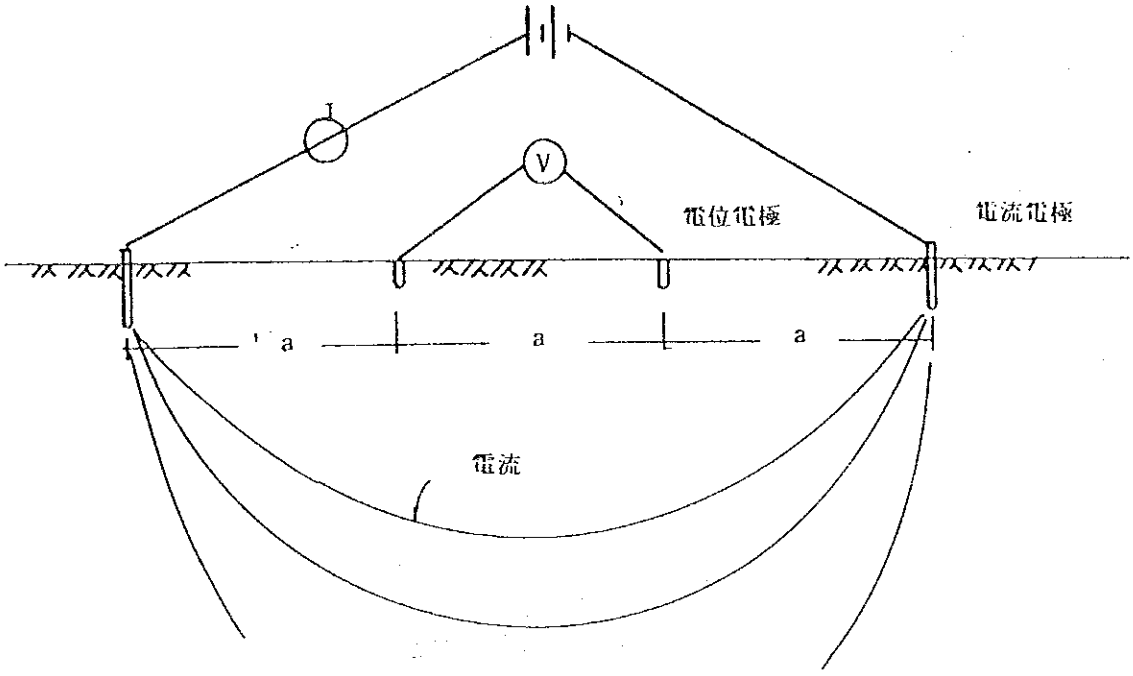


表3－2－7　電気探査の使用資機材表

名称	型式および仕様	数量
測定器	応用　ES-G2	2セット
レベル	ニコン　E-G	2セット
簡易コンパス	三笠　S-25	2セット
間縄	100m	8本
電線	200m	6本
電極棒	φ19mm、600mm	12本
乾電池	45V　BM-1	30個
バッテリー	12V	2個
ハンマー	2　lbs	10本
予備部品		2セット

表 3－2－8　電気探査によつて想定される井戸堀削深度

Site	D in Max. (m)	D in Min. (m)	Site	D in Max. (m)	D in Min. (m)
JA 01	95	50	JF 01	80	50
02	55	50	02	60	55
03	90	65	03	65	50
04	Not Performed		04	50	35
05	40	22	05	75	55
JB 01	Not Performed		06	40	30
02	50	46	07	80	70
03	60	34	08	40	27
04	Not Performed		09	45	30
05	40	28	10	75	60
JC 01	45	36	11	30	25
02	80	50	12	30	25
JD 01	44	25	13	40	30
02	90	70	14	80	75
03	80	40	15	60	40
04	65	50	16	85	40
05	70	55	JG 01	80	65
JE 01	25	14	02	80	40
02	40	30	03	80	70
03	40	27	04	55	45
04	40	20	05	100	75
05	40	20	JH 01	100	70
06	50	40	02	60	45
07	56	40	03	60	40
08	60	48	04	60	40

Note : Average Depth in Maximum = 61 m
Average Depth in Minimum = 44 m

Explanation

Topography:

Composed of rounded hill, and dwalas of granites at places.

Vegetation:

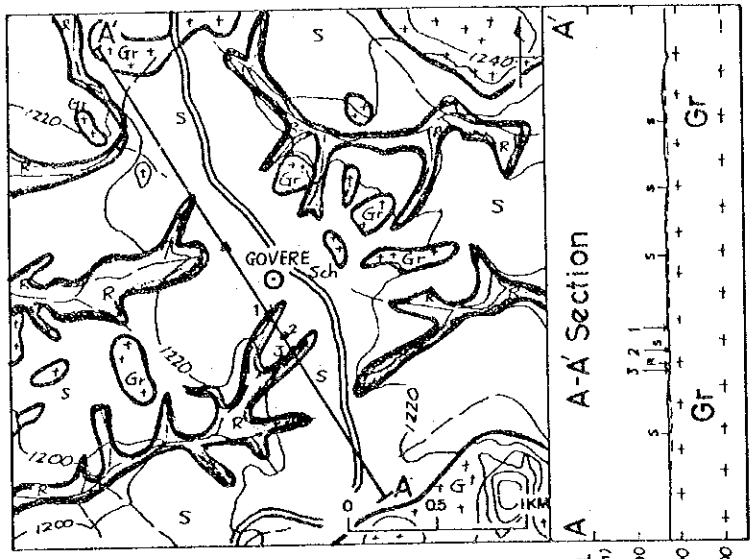
Cultivation and rock area 60%, sparse bush area 40%.

Geology:

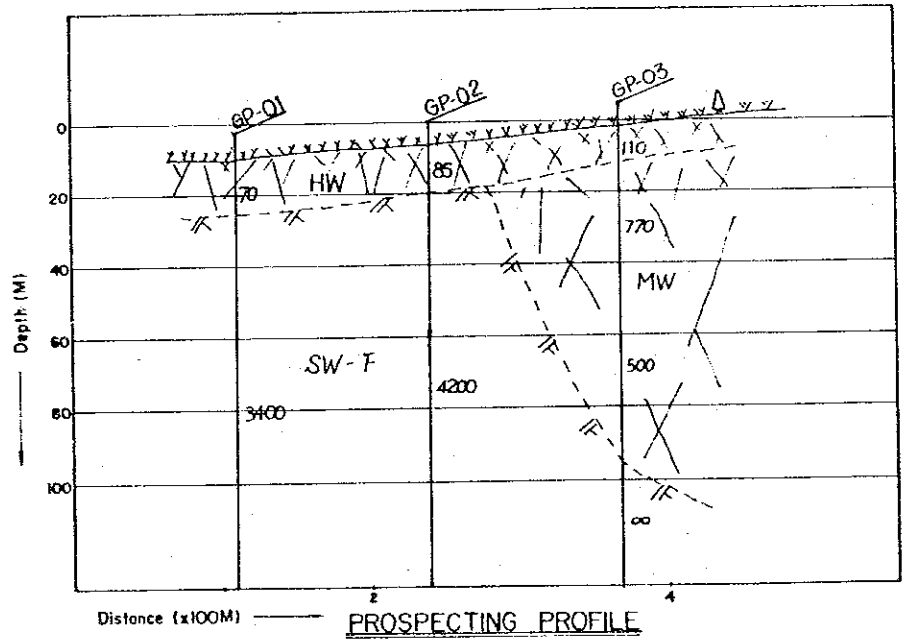
Consist of massive, medium grained Granite, which is mostly overlain by thin silty sand.

Points of geophysical survey:

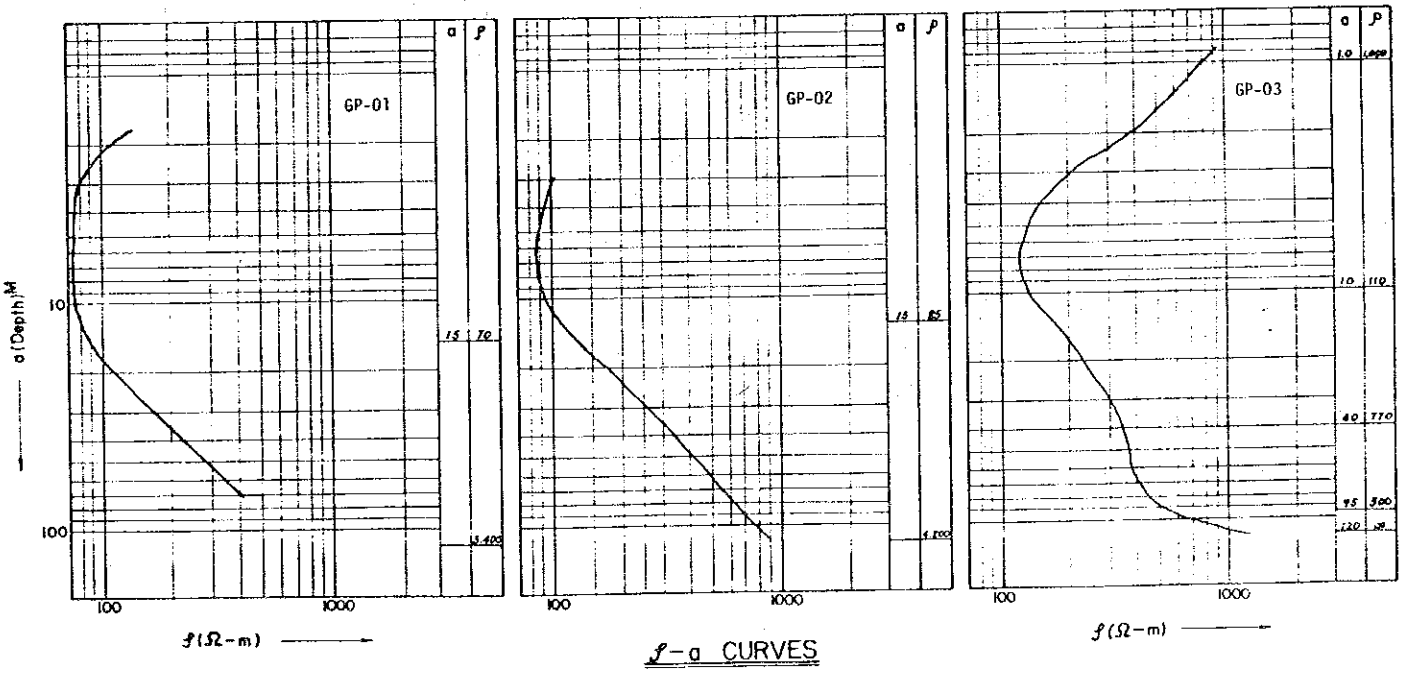
Arranged in a depression which has moist soil and is well wooded.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ-σ CURVES

Explanation

Topography:

This area is hilly, and dwalas, bornhardts and castle koppies occur at places.

Vegetation:

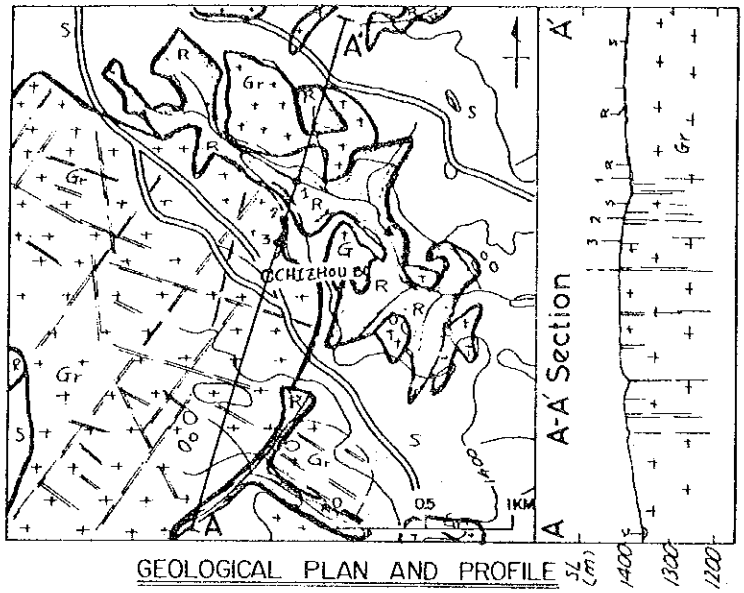
Cultivation area 20%, dense bush area 80%. Granitic rocks are mostly exposed at the bush area.

Geology:

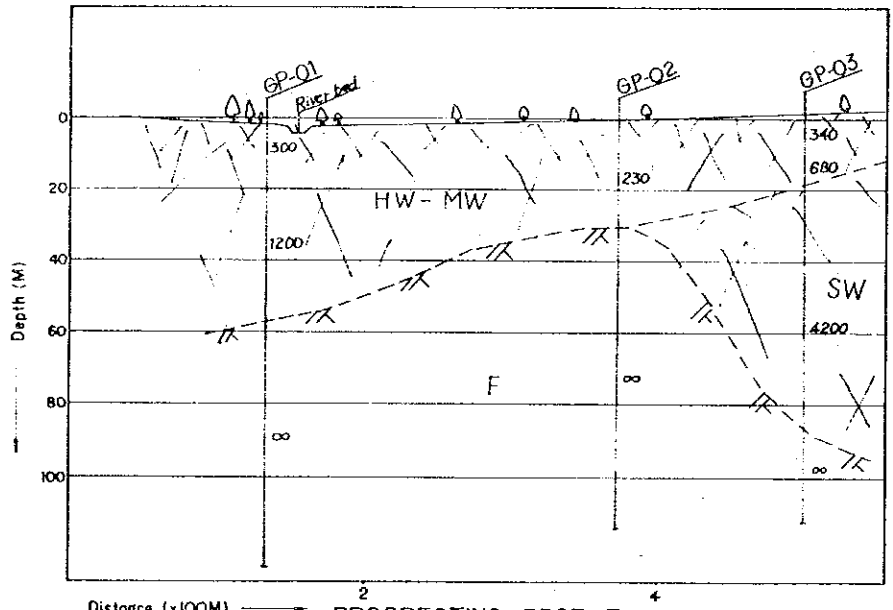
Consist of massive, granodioritic, partly porphyritic Granite, which has faults in north-east trend and joints in a north-west strike and vertical dip.

Points of geophysical survey:

Arranged in a depression which has moist soils and is well wooded.



GEOLOGICAL PLAN AND PROFILE



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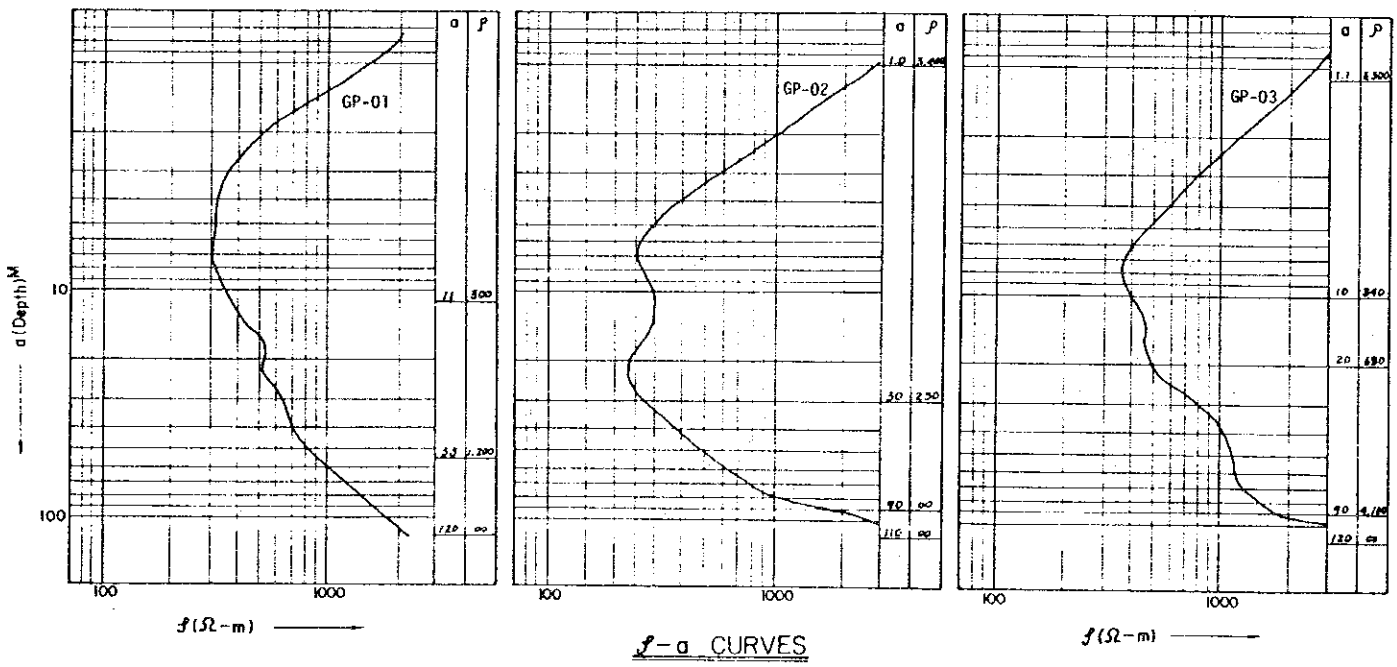


ρ - a CURVES

Explanation

Topography:

Near plane, and it slopes gently eastward.

Vegetation:

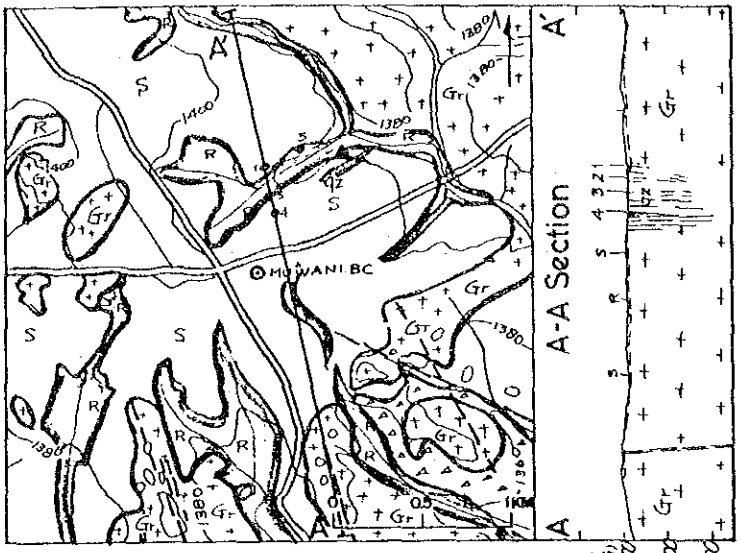
Cultivation and rock areas 40%, sparse bush area 60%.

Geology:

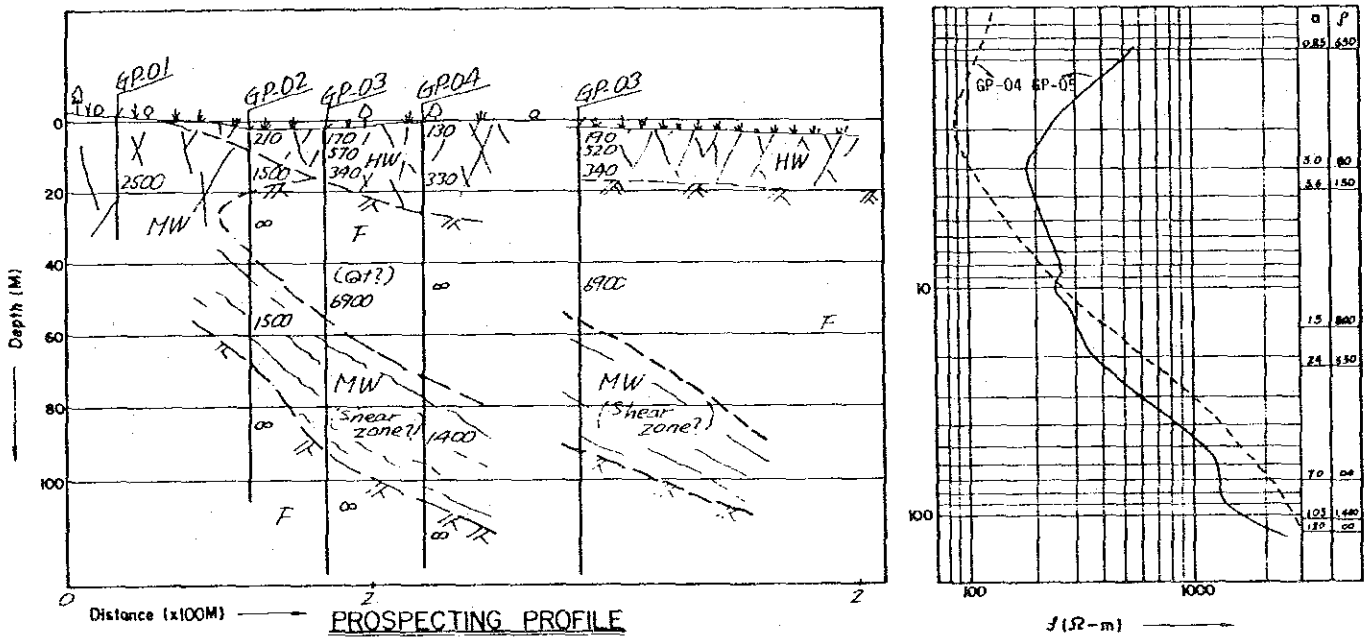
Massive, granodioritic, partly porphyritic Granite. Soil consists of white sand and Gravel with quartz.

Points of geophysical survey:

The line of the survey points is arranged in the crossing direction to the trend of the Quartz vein and the joints of rock. The rock is weathering at about 3 meters depth near the survey points.



GEOLOGICAL PLAN AND PROFILE



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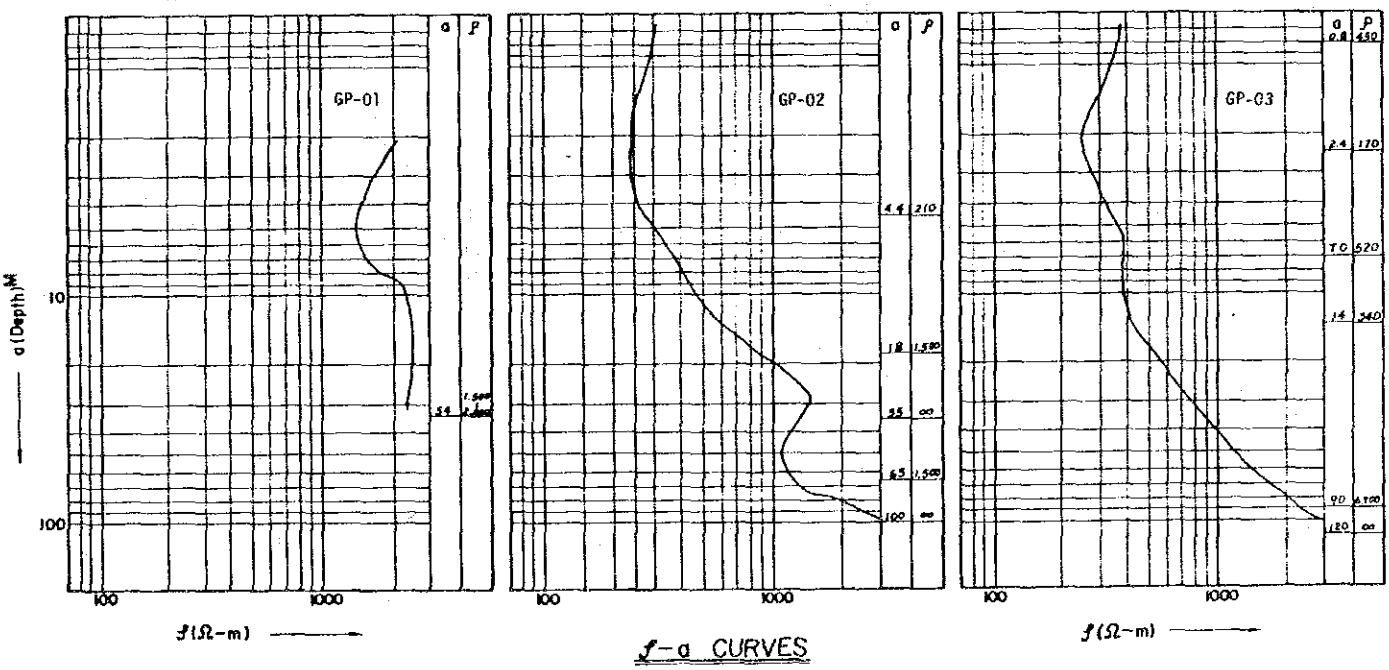


ρ-a CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : SHASHE Sch. (JA04)

Explanation

Topography:

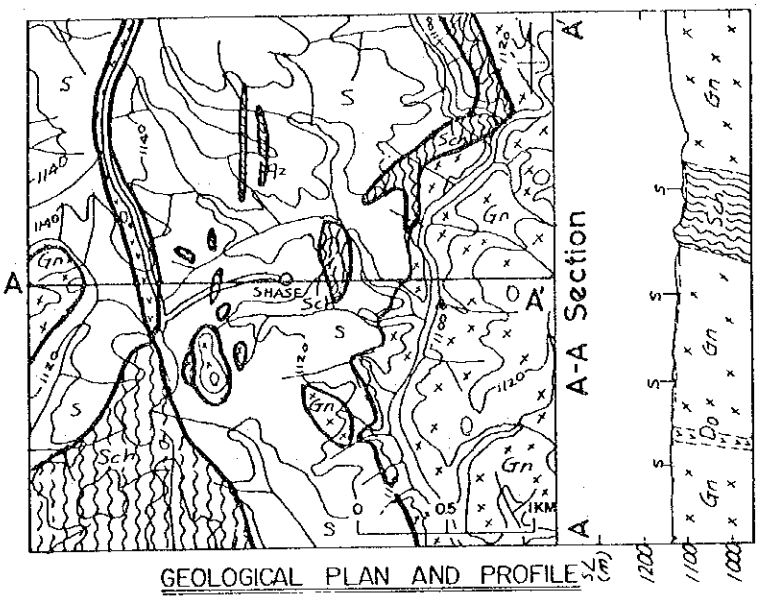
This area is hilly, and slopes gently to the SHASHE River.

Vegetation:

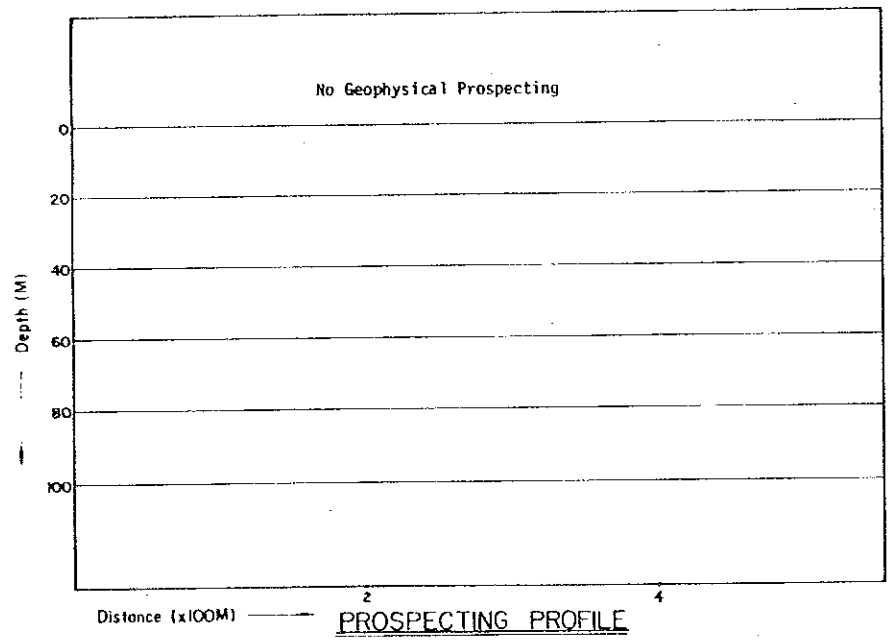
Cultivation area 60%, dense bush area 40%.

Geology:

Consists of Schist, banded Gneiss, Dolerite dyke, Quartz vein. The Quartz vein, the Dolerite dyke and faults trend north-south and dip westward.



GEOLOGICAL PLAN AND PROFILE



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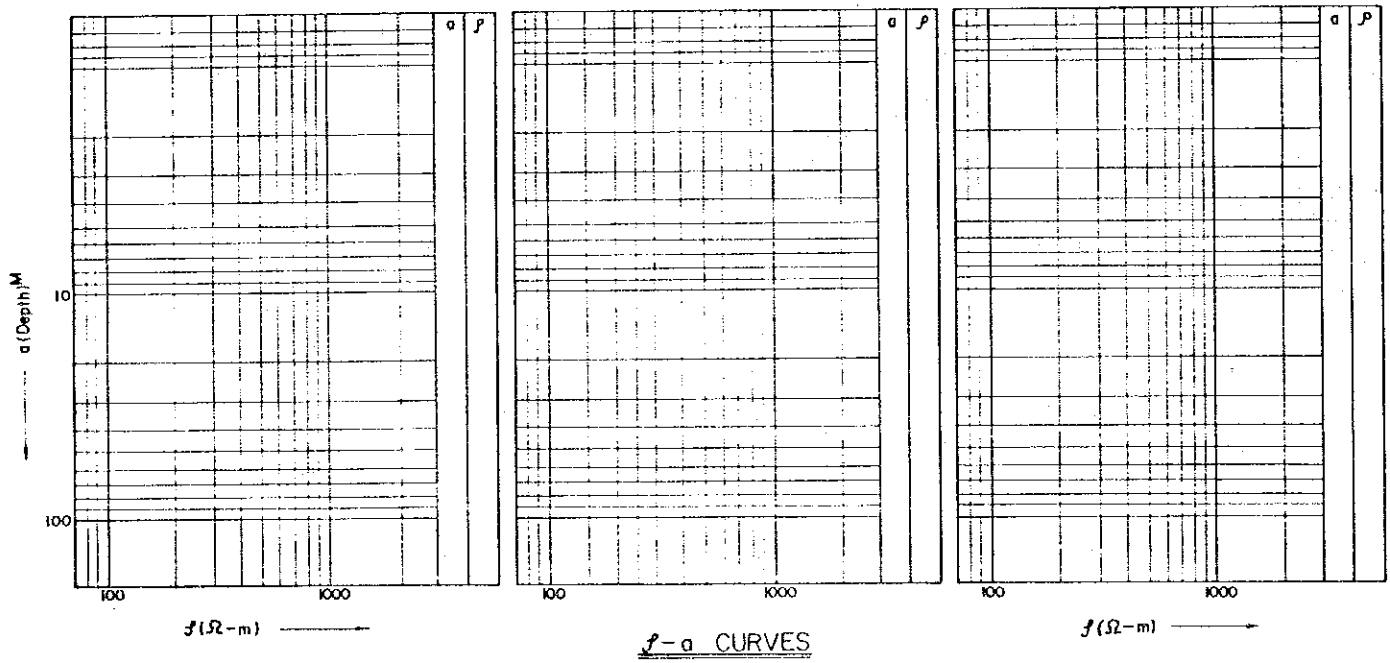
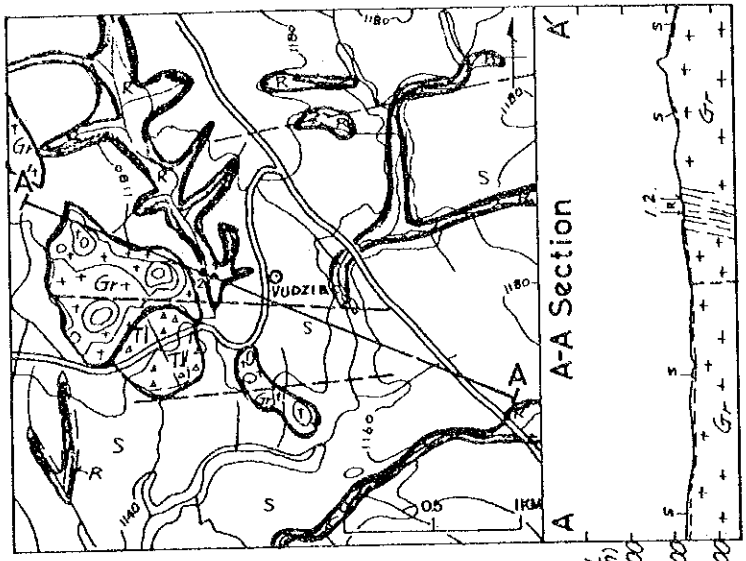


ρ - a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Hilly. Dwalas and bornhardts occur at places.

Vegetation:

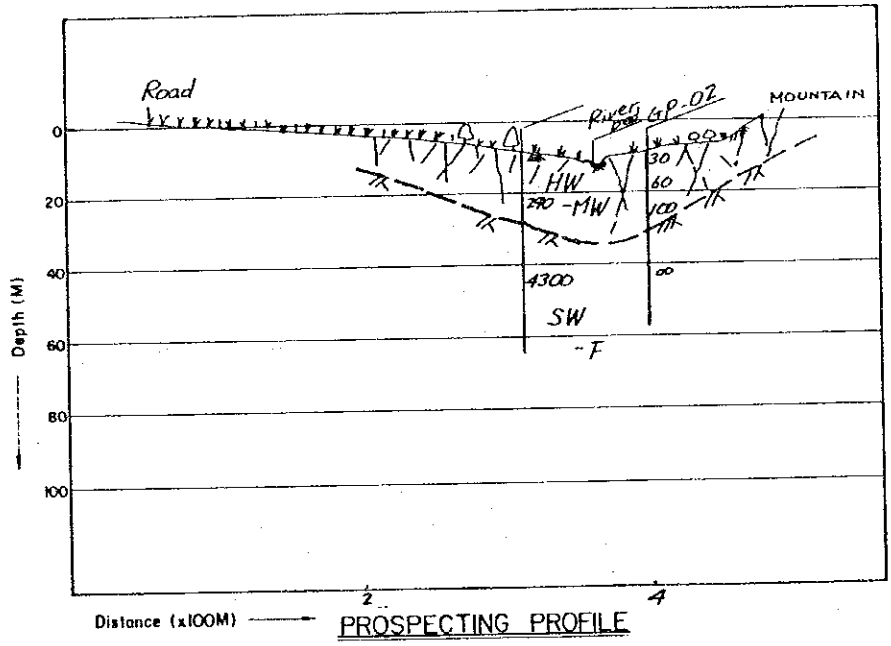
Cultivation and rock area 40%, sparse bush area 60%.

Geology:

Consist of massive, medium grained Granite. Soil consists of light greyish, medium grained sand. The rock has opened joints at interval of 1 to 2 meters and is well weathered at about 2 meters depth.

Points of geophysical survey:

Granite of geophysical survey points has Quartz veins, joints and faults in east-west trend.



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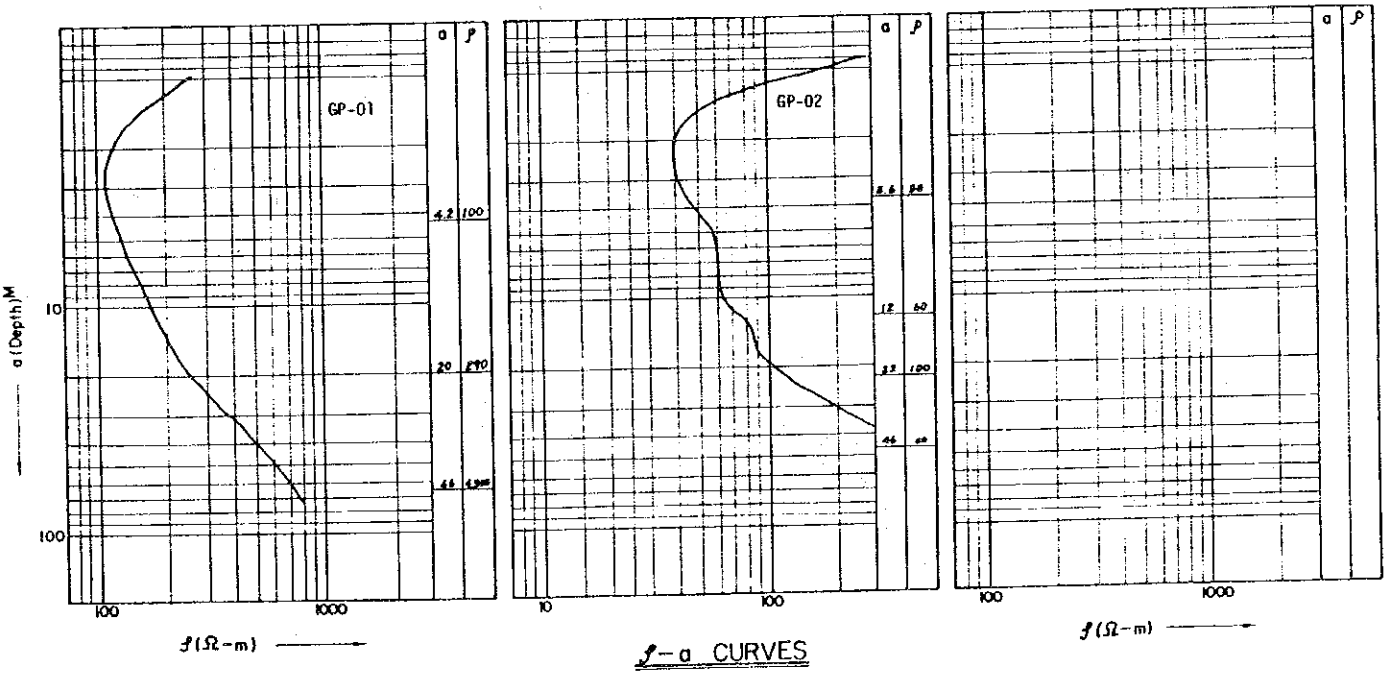
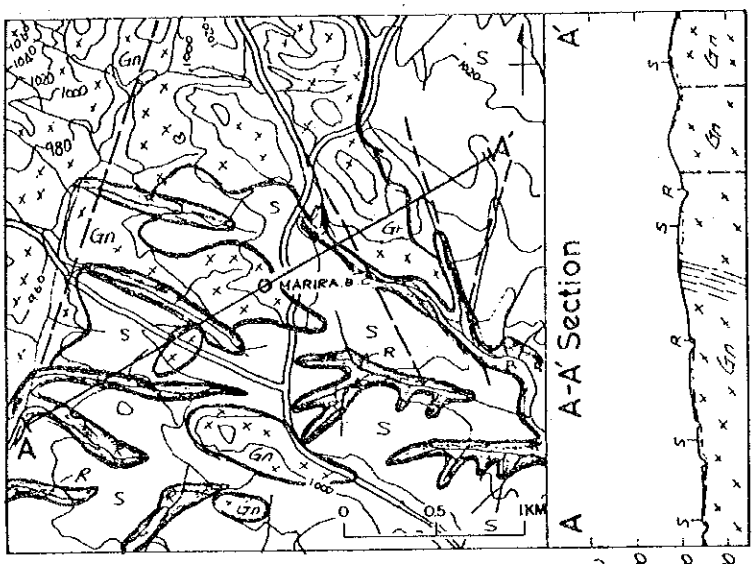


ρ-a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

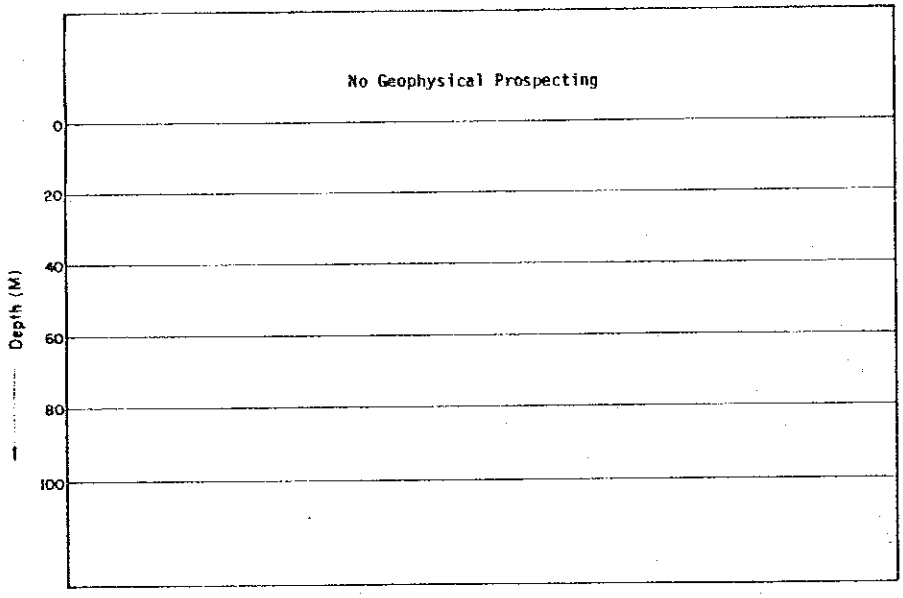
On the north side hilly, and hills composed of dwalas, bornhardts and castle koppies. On the South side it slopes gently.

Vegetation:

Cultivation and rock area 40%, sparse bush area 60%.

Geology:

Consists of banded Gneiss, which has faults in north-west trend and vertical dip.



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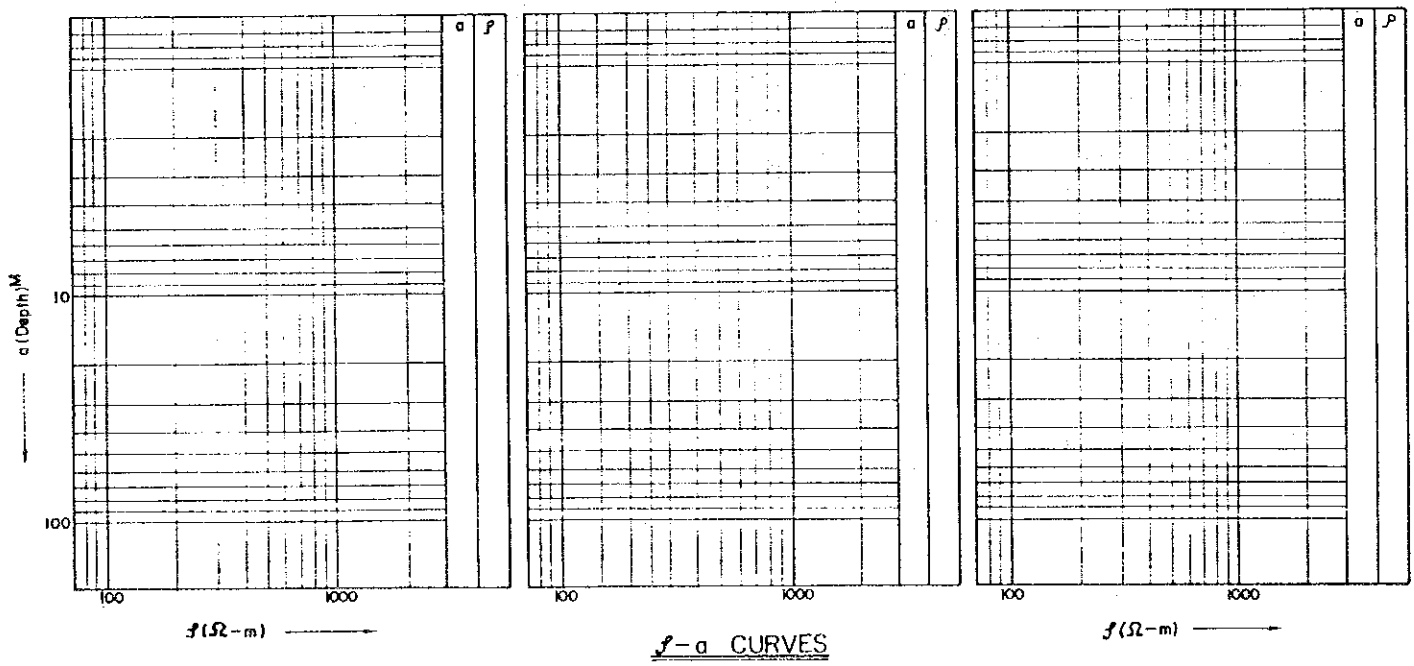
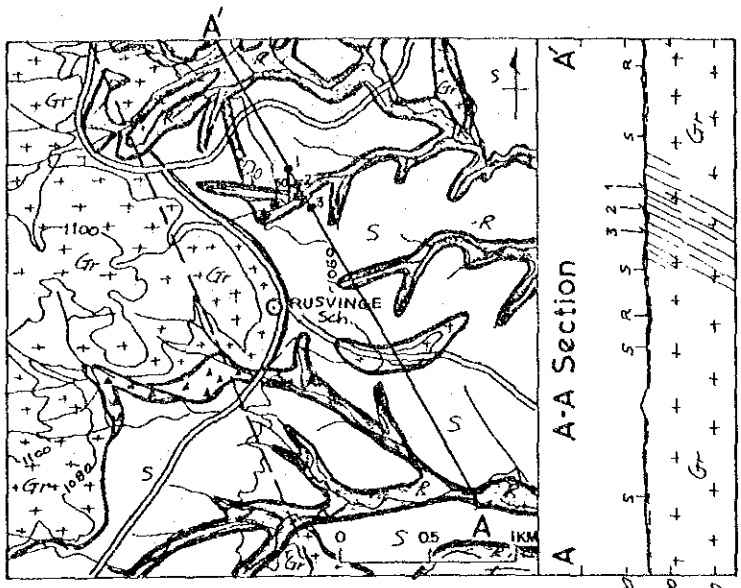


ρ-a CURVES



GEOLOGICAL PLAN AND PROFILE

Explanation

Topography:

On the east side it is plane which slopes gently eastward. On the west side it is hill which is composed of dwalas and bornhardts.

Vegetation:

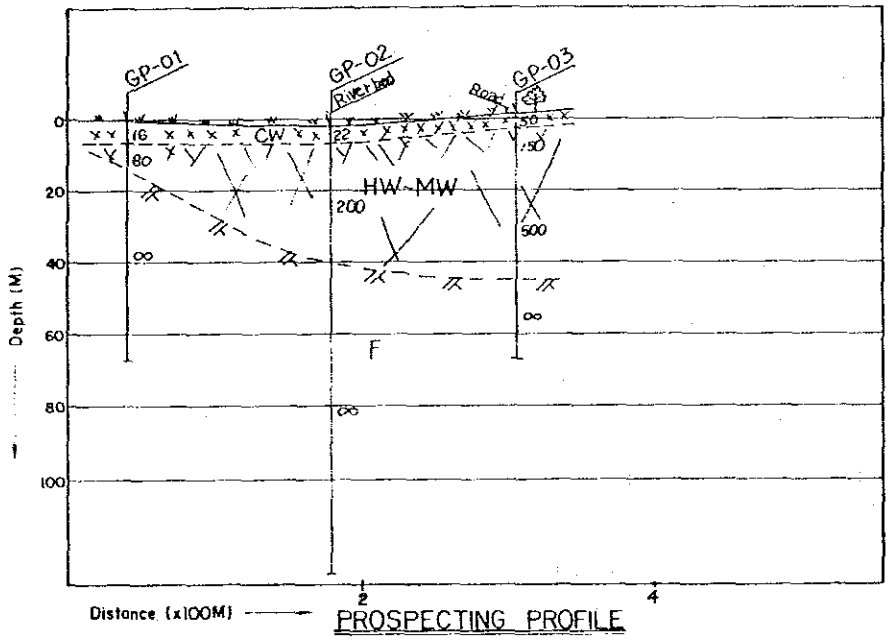
Cultivation area 55%, sparse bush area 45%.

Geology:

Consists of massive Granite. A large fault extends NNW. The rock is weathering about 3 meters depth.

Points of geophysical survey:

The rock of the site has joints and small quartz veins which trend NS to N15°W and dip vertical to 50°E. The line of the survey points arranged in the crossing direction to the trend of these.



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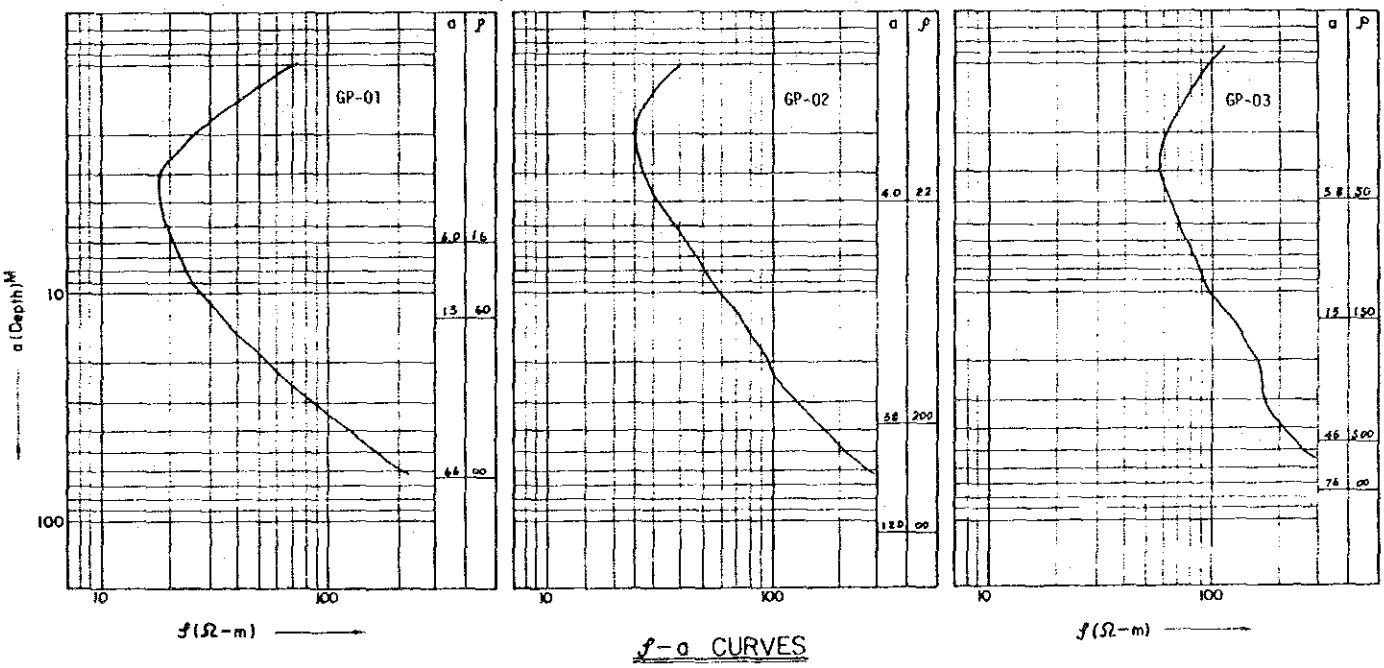


ρ-a CURVES

Explanation

Topography:

On the east side it is composed of rounded hill on which dwalas and castle koppies occur at places. On the west side it is plane which slopes gently eastward.

Vegetation:

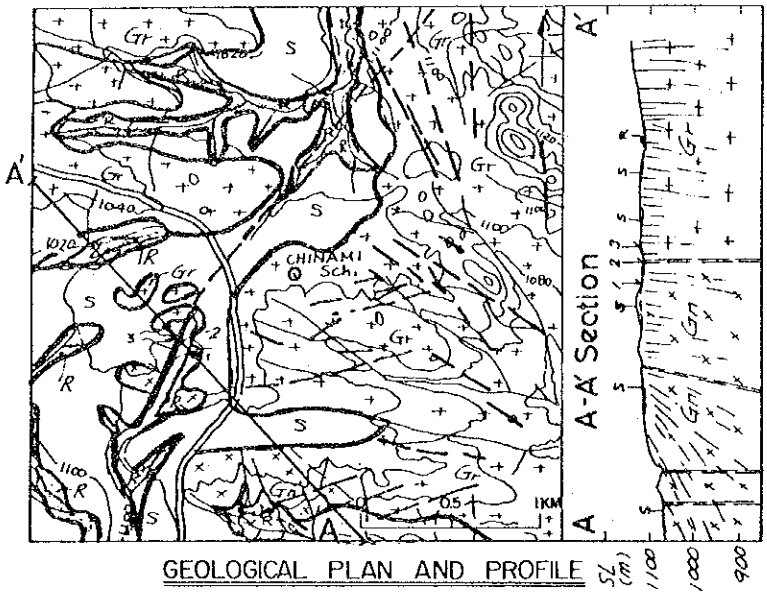
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

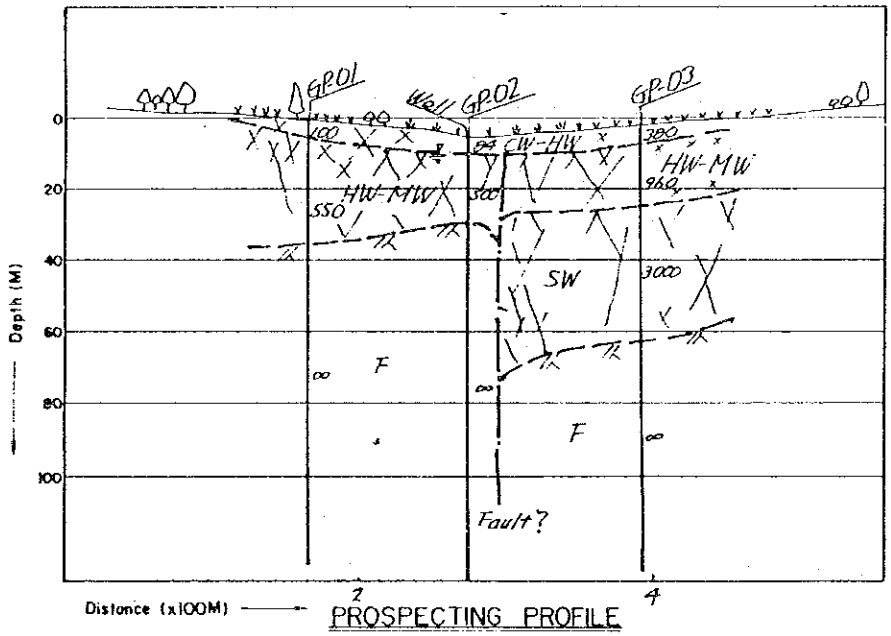
Consists of banded Gneiss with fine quartz vein and massive Granite. Airphoto trend line strikes NW and EW. Joints of rock strike EW-N30°W and dip due south. Soil consists of light brown, fine grained sand with quartz.

Points of geophysical survey:

Arranged in crossing direction to a fault and Quartz vein, and in a depression which has moist soil.



GEOLOGICAL PLAN AND PROFILE



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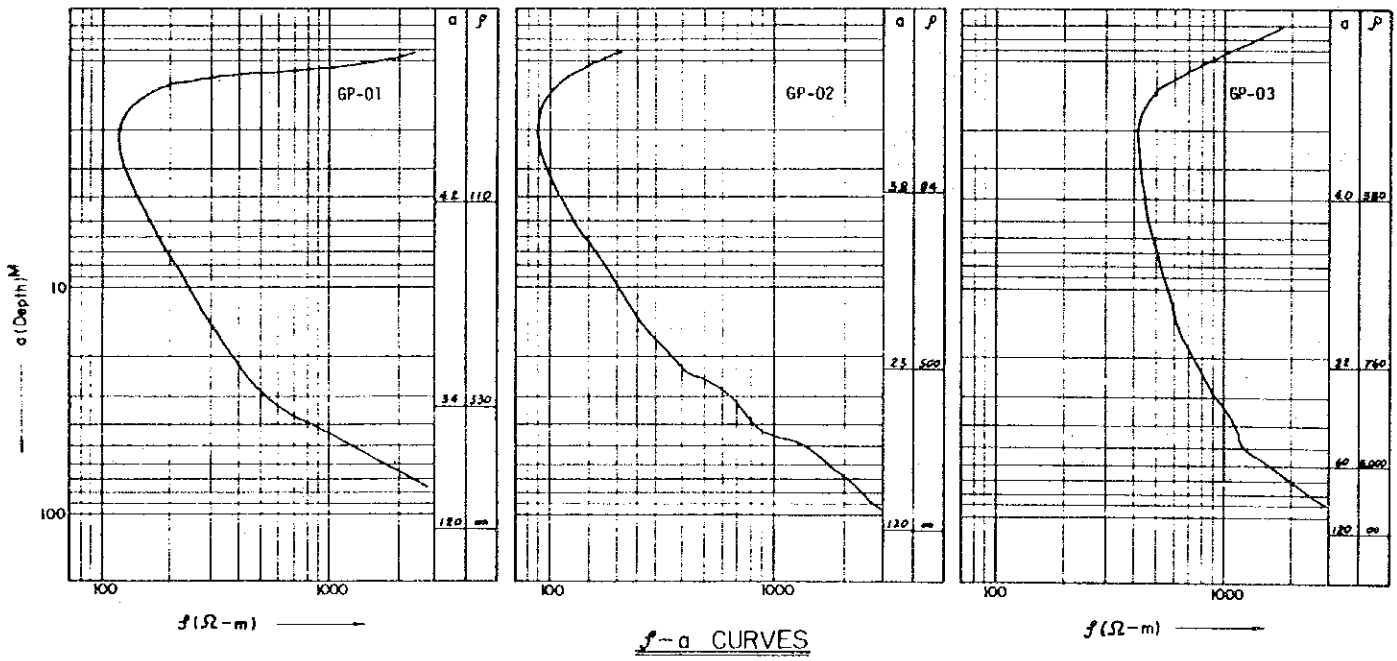
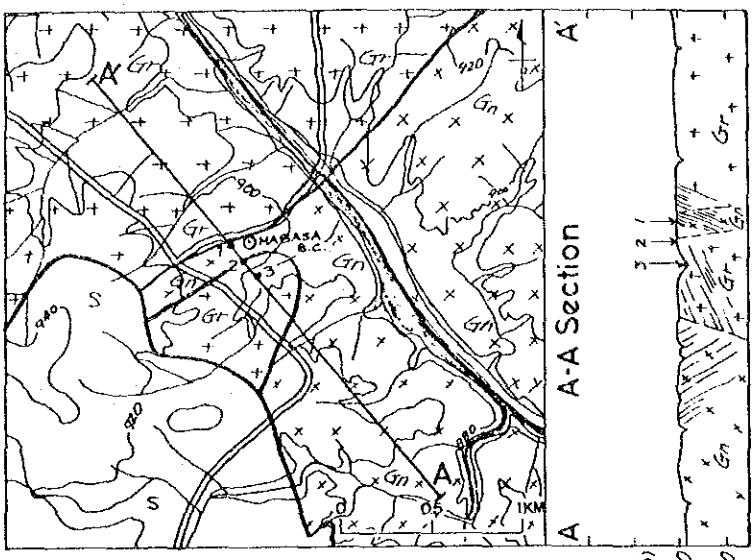


Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

The RUNDE River across from NW to SE direction. This area is hilly and slopes comparatively steeply towards the RUNDE River.

Vegetation:

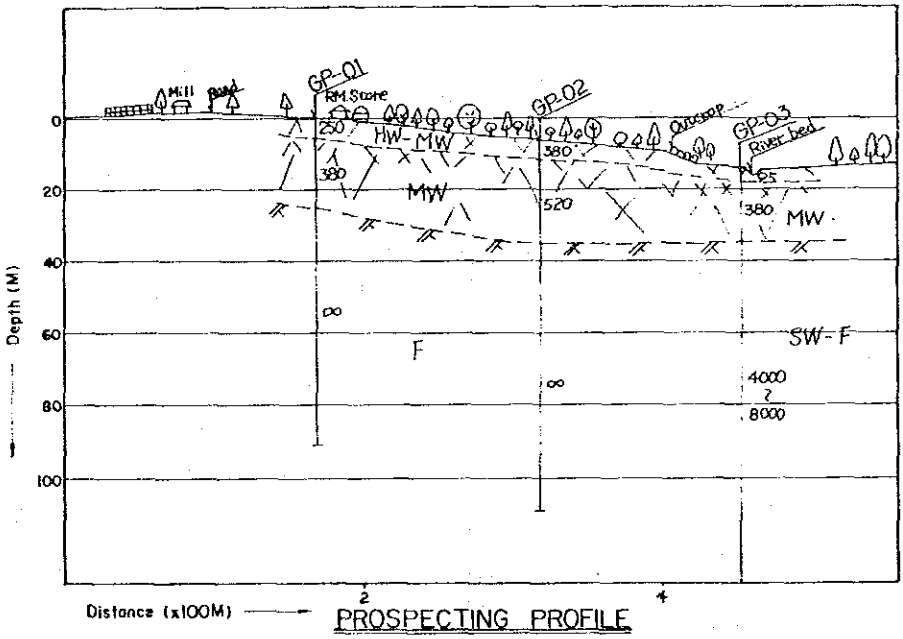
Cultivation area 20%, sparse bush area 80%.

Geology:

Consists of banded Gneiss and massive, pink partly porphyritic Granite. These rocks have many joints which trend NS. Soil consists of reddish brown, medium grained sand.

Points of geophysical survey:

Arranged in a depression in a wide watershed which has many joints.



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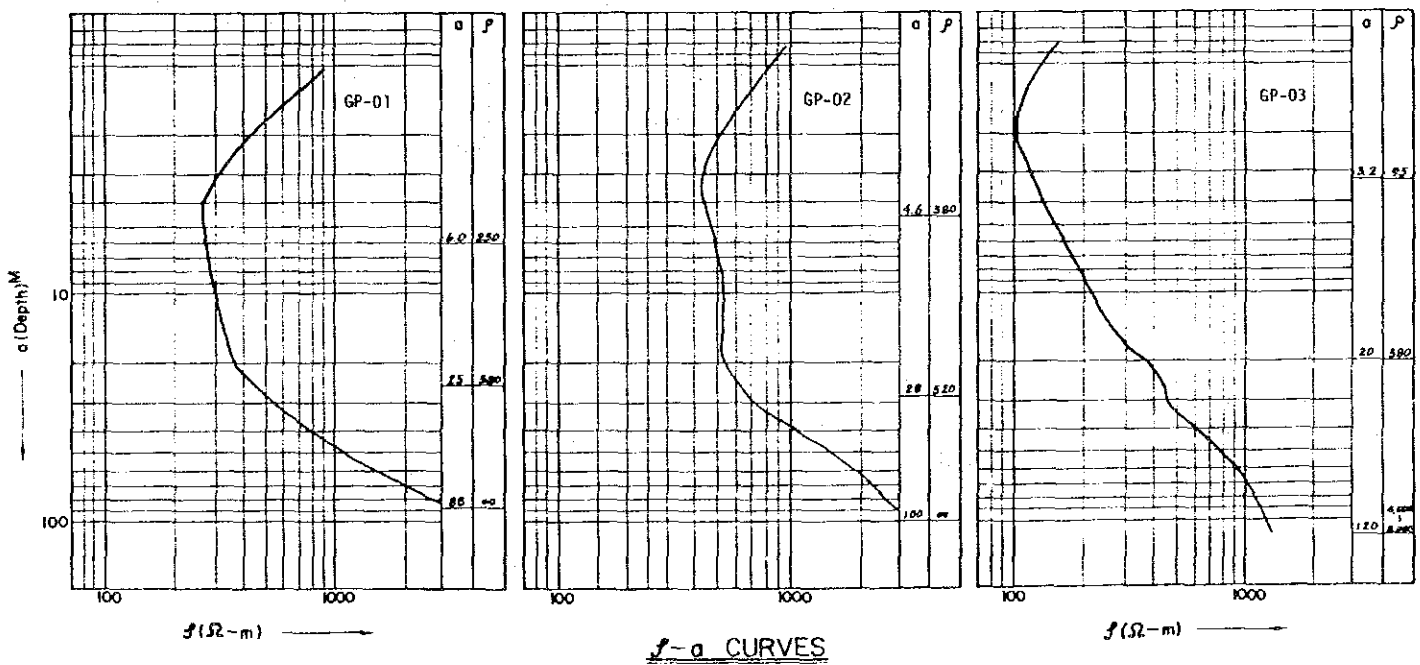


ρ-σ CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : COUNCIL OFFICE (JC01)

Explanation

Topography:

On the east side it is hilly. These hills are composed of castle koppies. On the west side it is plane and the exposures of rocks are confined to small area.

Vegetation:

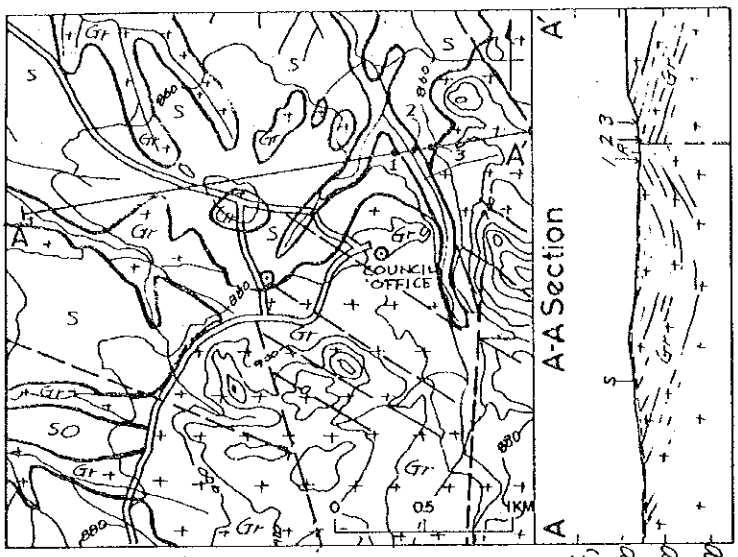
Cultivation area 30%, sparse bush area 70%.

Geology:

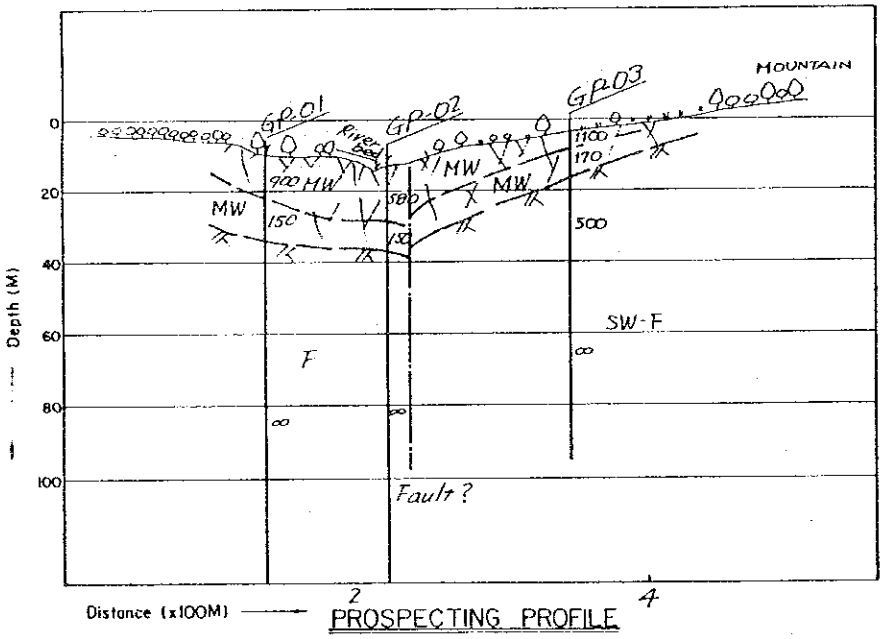
Consists of potash Granite which has many joints. These joints, airphoto trend line and faults strike NW. Soil consists of grey, fine to medium grained sand and weathered rock of about 2 meters depth.

Points of geophysical survey:

Arranged in the crossing direction to the shear zone of Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



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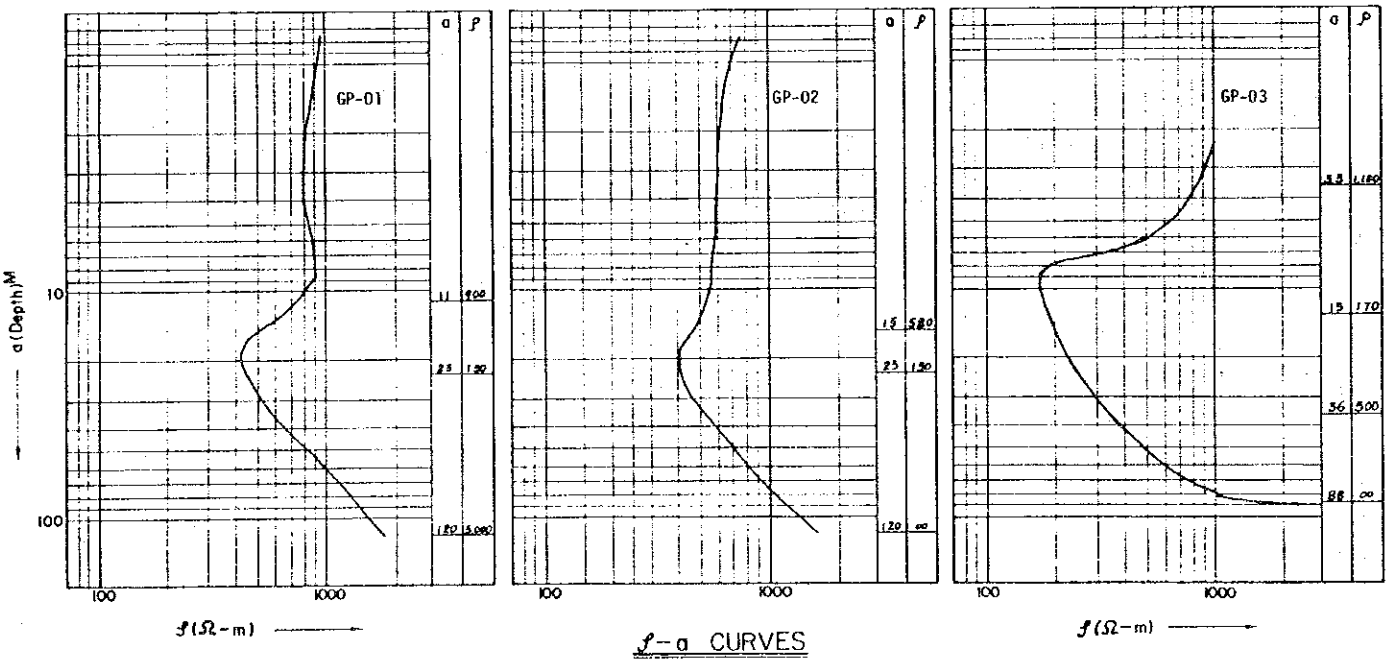


ρ-a CURVES

Explanation

Topography:

From Mt. MUROVE, north-west corner of the area, to south-east slopes hilly on the north side, and gently on the south side.

Vegetation:

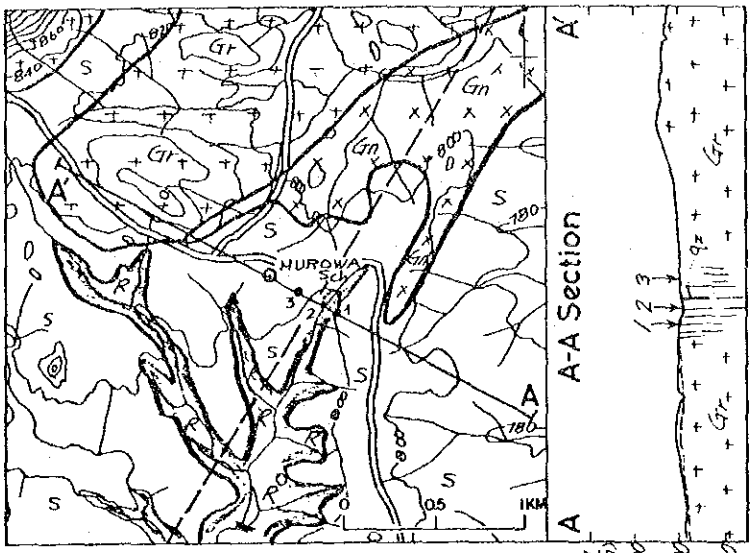
Cultivation area 60%, sparse bush area 40%.

Geology:

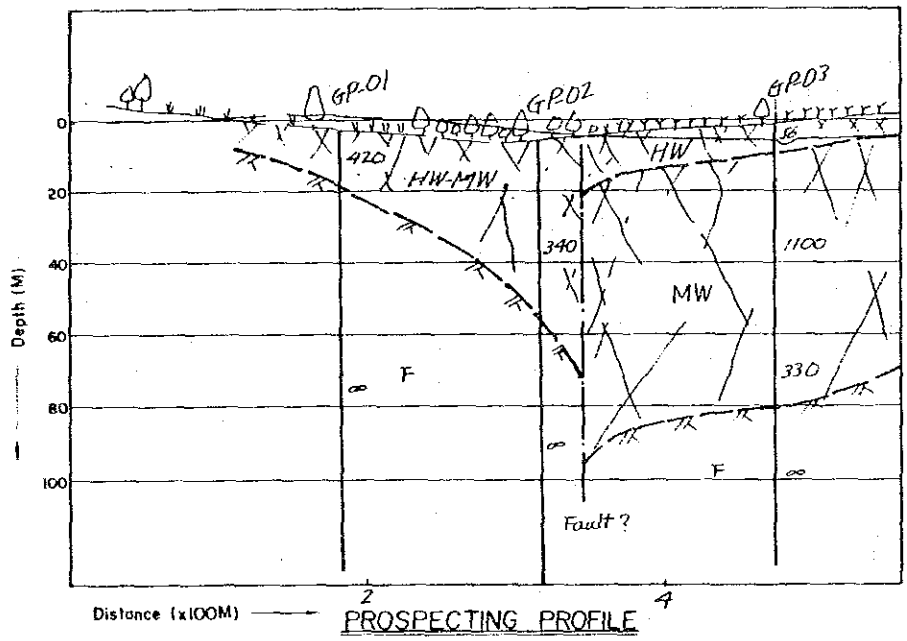
Consists of tonalitic Gneiss and potash Granite. The fault which cross the center of the area extends north-westward.

Points of geophysical survey:

Arranged in the crossing direction to the fault with Quartz vein.



GEOLOGICAL PLAN AND PROFILE



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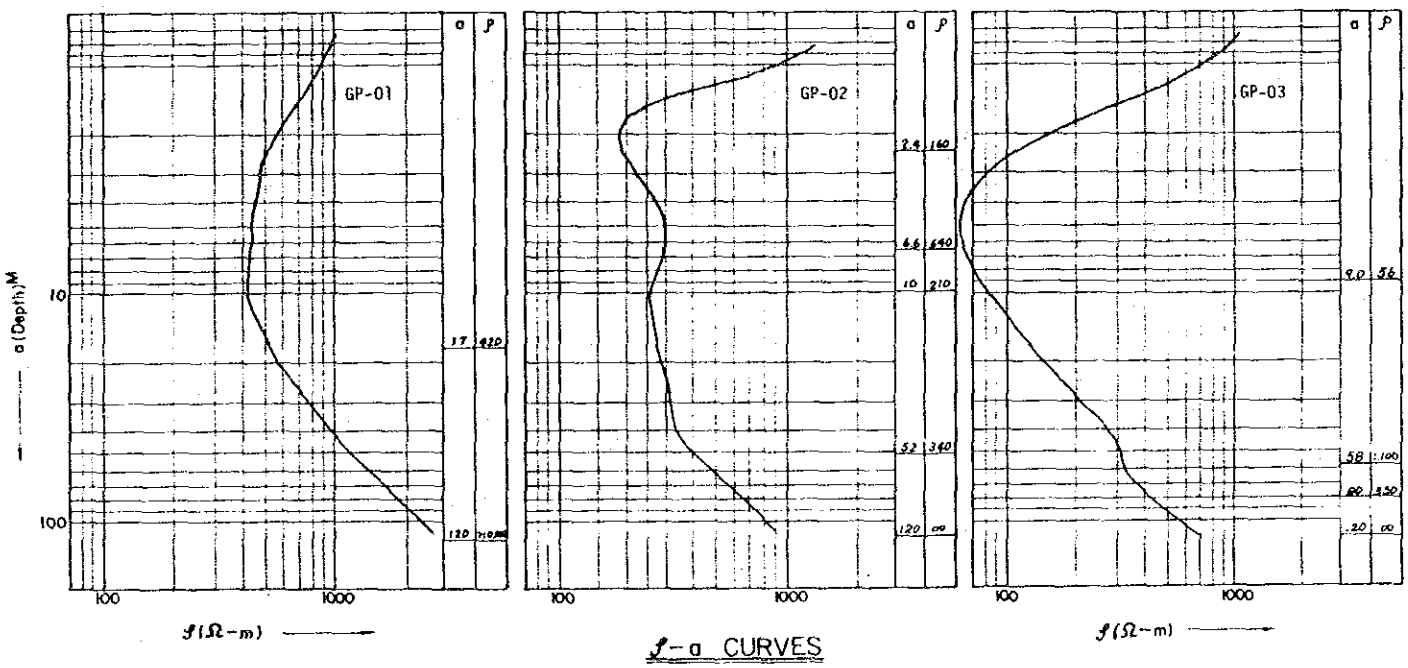


ρ-a CURVES

図3－2－11 GEOLOGICAL SURVEY NAME OF SITE : MAKOTORE Sch. (JD01)

Explanation

Topography:

Plane, and slopes gently from north to south. Rocks outcrop in a small area along the streams.

Vegetation:

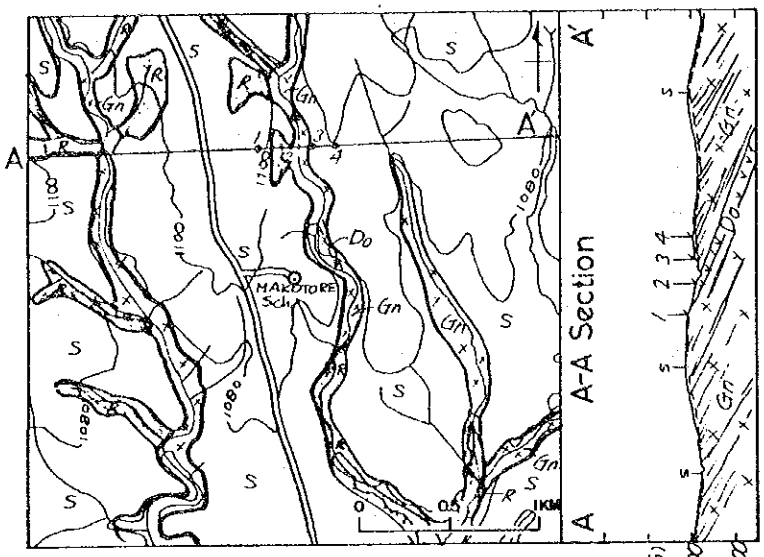
Cultivation area 50%, sparse bush area 50%.

Geology:

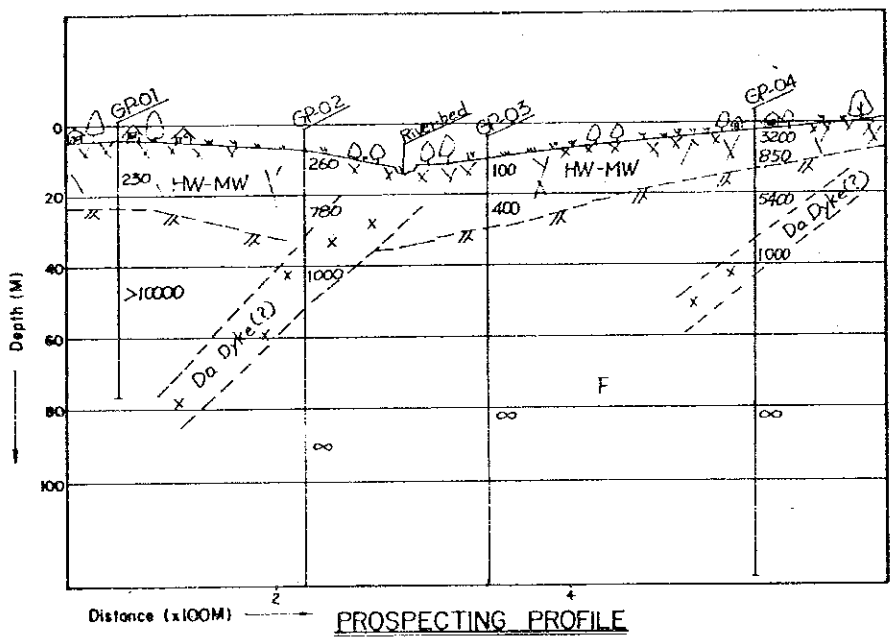
Consists of granitic Gneiss which is mostly overlain by dark grey, fine grained sand with gravel. Airphoto trend line and Dolerite dyke strike NNW-N20°W and dip vertical to 40°E.

Points of geophysical survey:

Arranged in a depression in a wide watershed which is on the contact zone of the Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



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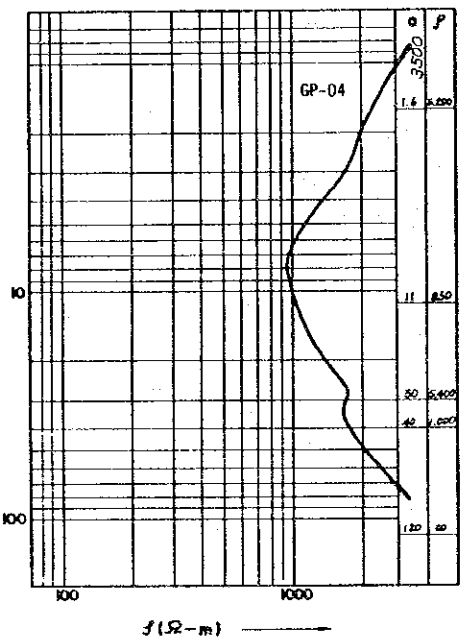
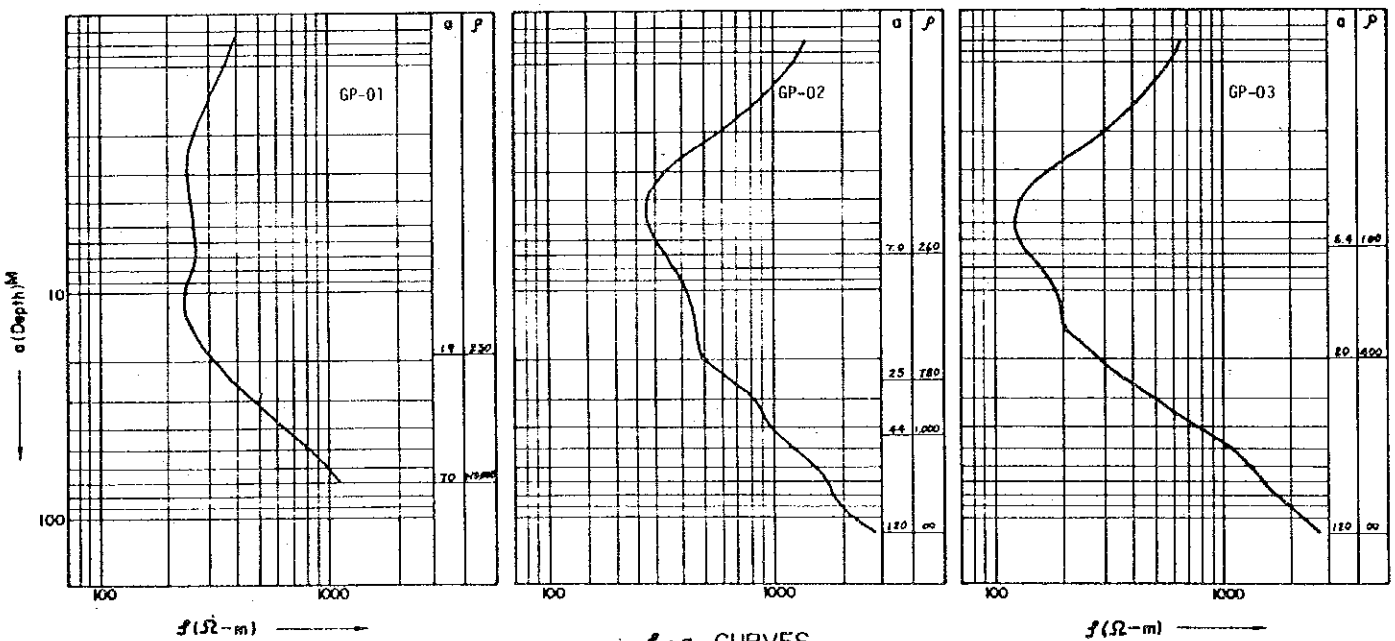




f－a CURVES

Explanation

Topography:

On the east side of MAZIVISA B.C. is flat plane. On the west side of MAZIVISA B.C. is SHAMBA Mt. (1,344.2 m).

Vegetation:

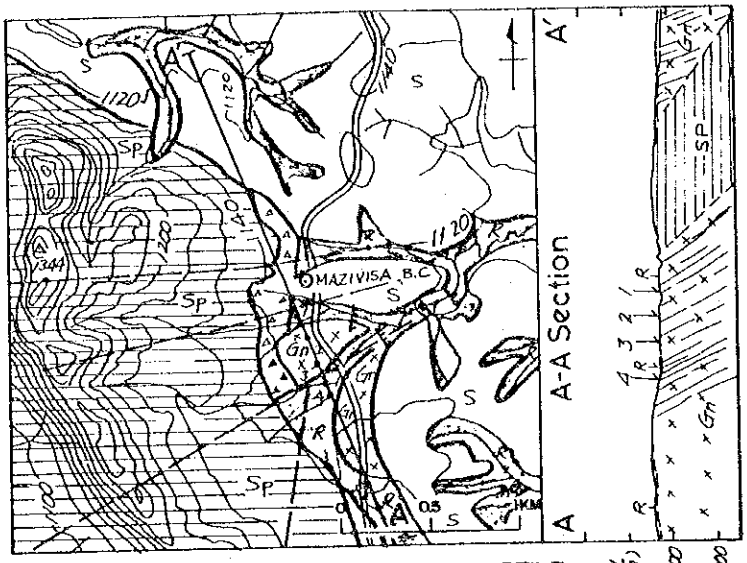
Cultivation area 40%, sparse bush area 60%.

Geology:

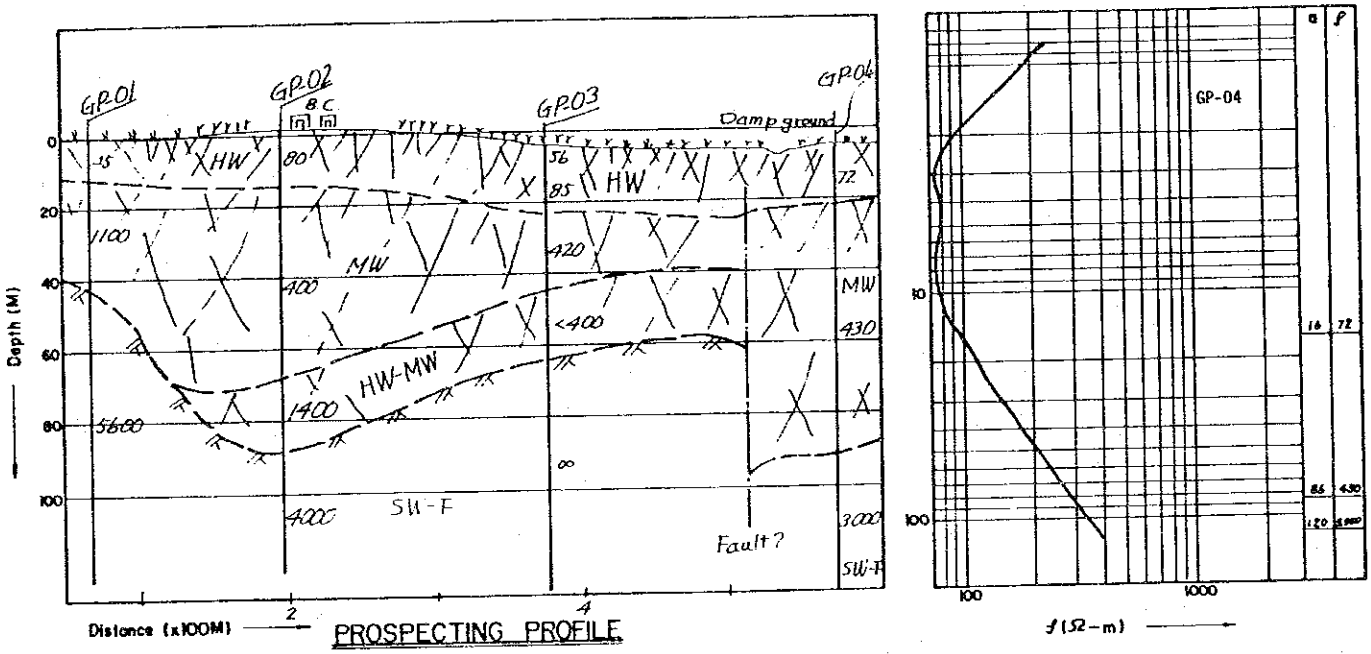
SHAMBA Mt. consists of Serpentinite. Flat plane consists of tonalitic Gneiss which is overlain by light grey, fine grained sand. Tonalitic Gneiss is well weathered and has many joints. Faults trend ENE and EW.

Points of geophysical survey:

Arranged in a depression which has moist soil and shear zone of the faults.



GEOLOGICAL PLAN AND PROFILE



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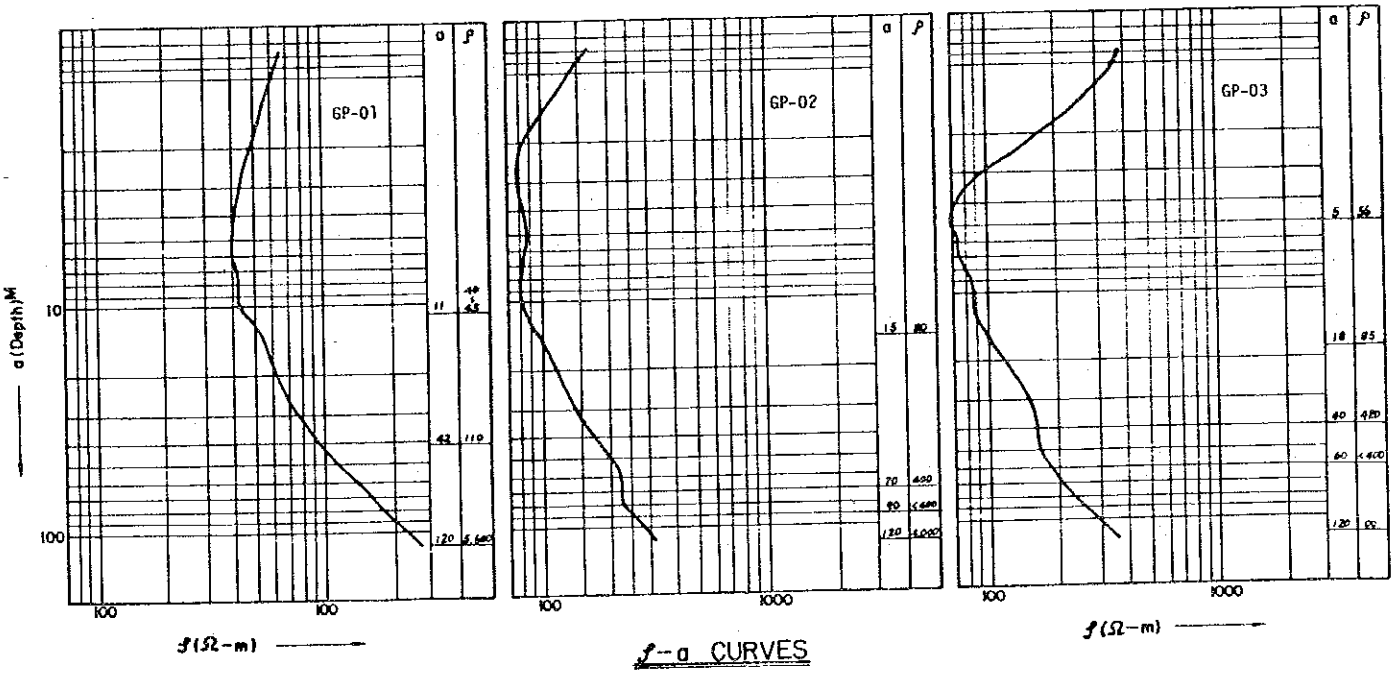
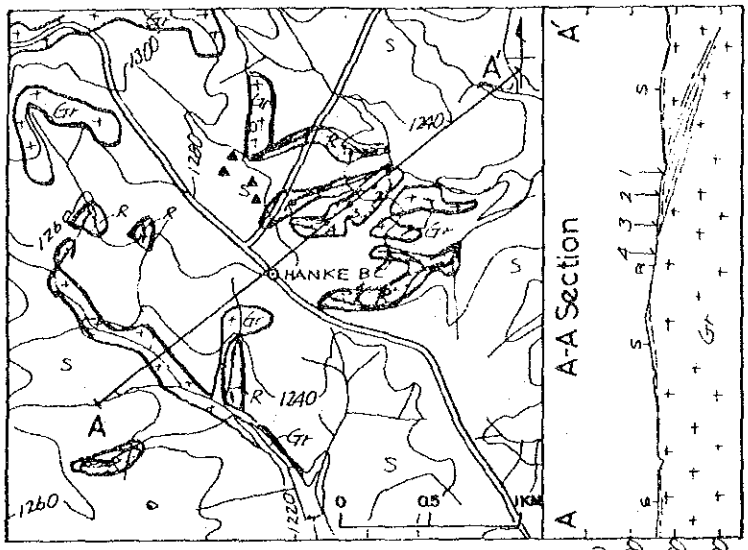


ρ--a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Plane, slopes gently from NW to SE. Rocks outcrop in a limited area.

Vegetation:

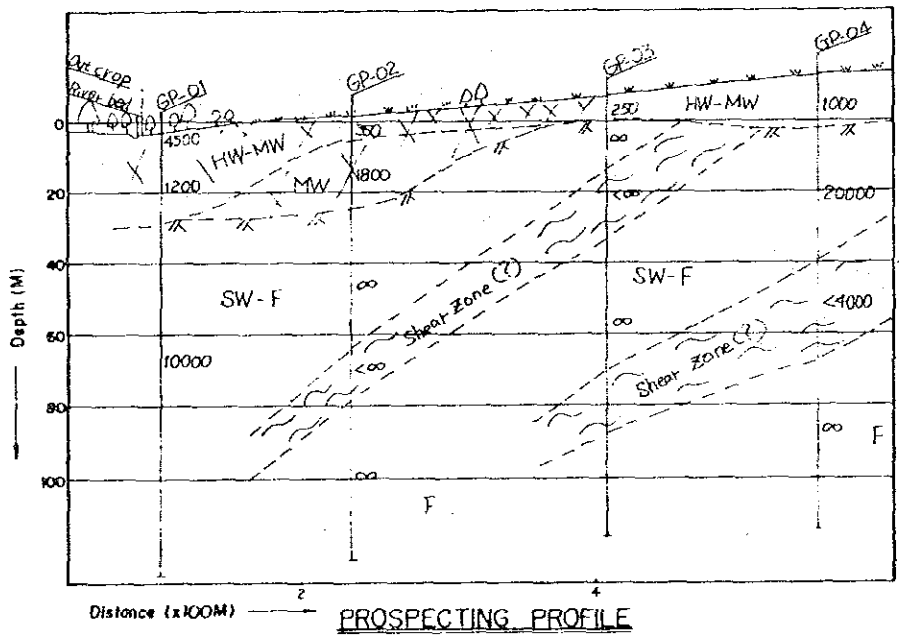
Cultivation area 40%, sparse bush area 60%.

Geology:

Consists of biotite rich coarse grained Granite which is blocky and has many joints. These joints strike NE and dip vertical. Soil consists of light grey, medium grained sand.

Points of geophysical survey:

Arranged in a depression which has well wooded moist soils and many joints.



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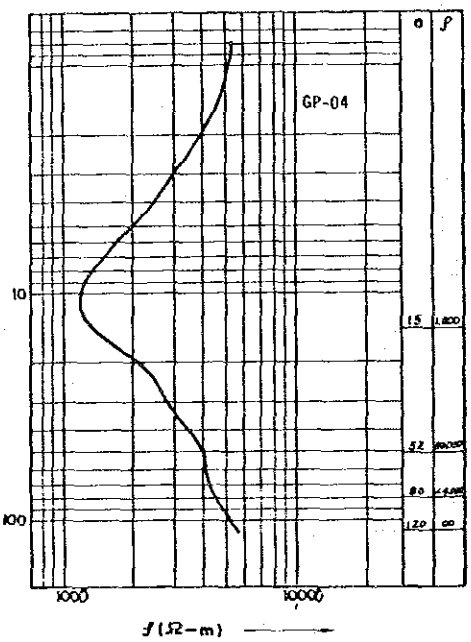
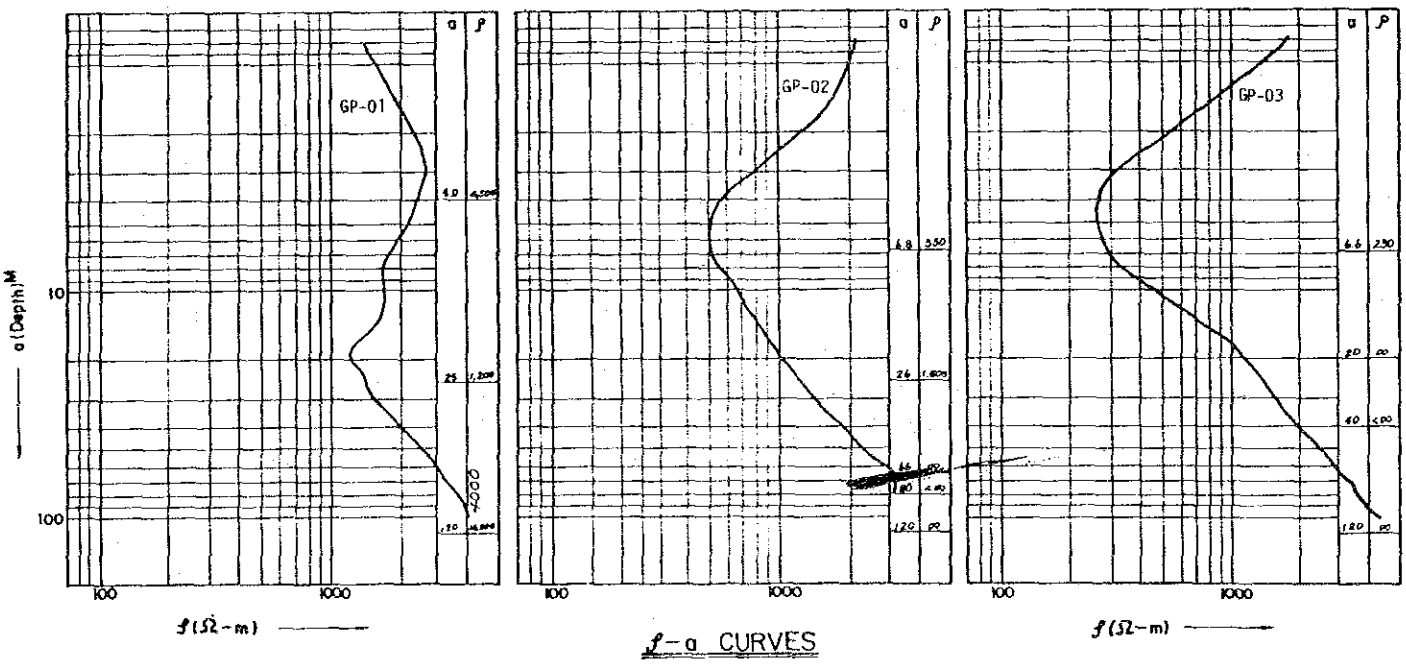




ρ-σ CURVES

Explanation

Topography:

Flat plane, slopes gently northward.

Vegetation:

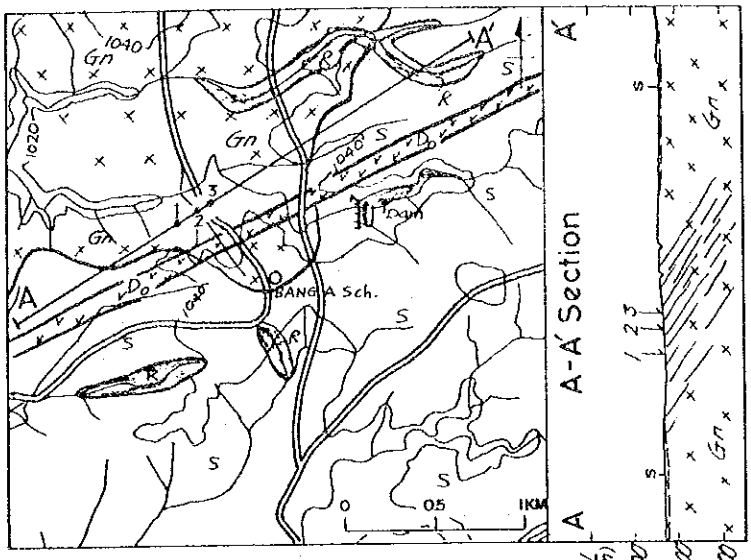
Cultivation area 30%, sparse bush area 70%.

Geology:

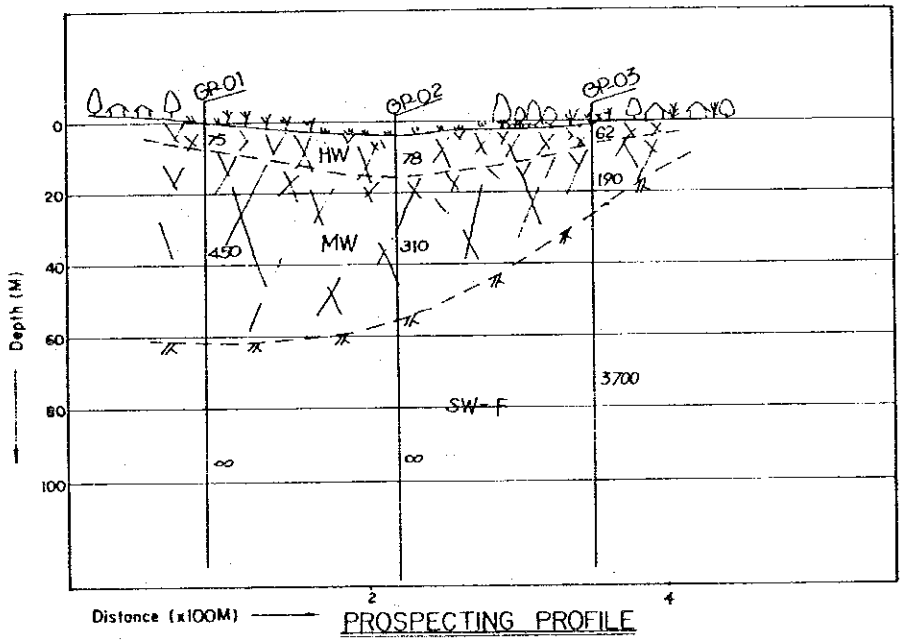
Consists of massive, granitic Gneiss and Dolerite dyke. Dolerite dyke strikes N60°W and dips 70°NW. Soil consists of yellowish white, medium grained sand.

Points of geophysical survey:

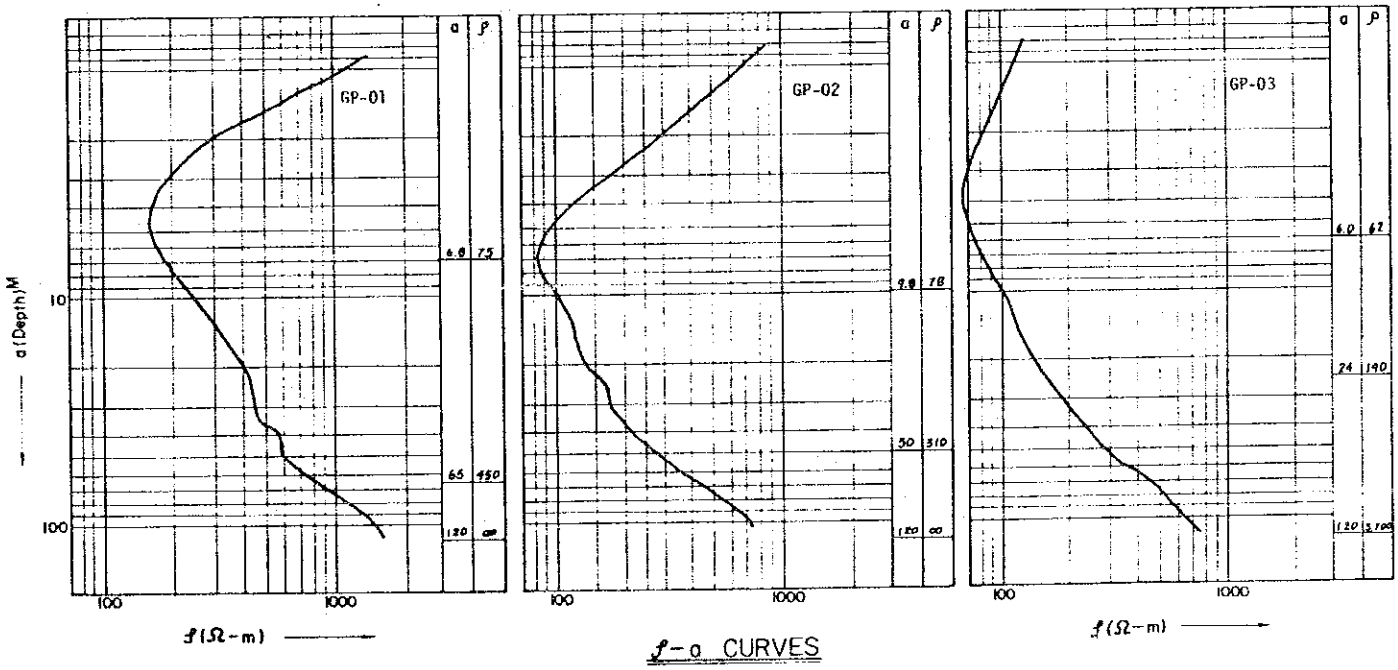
Arranged along the contact shear zone of Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



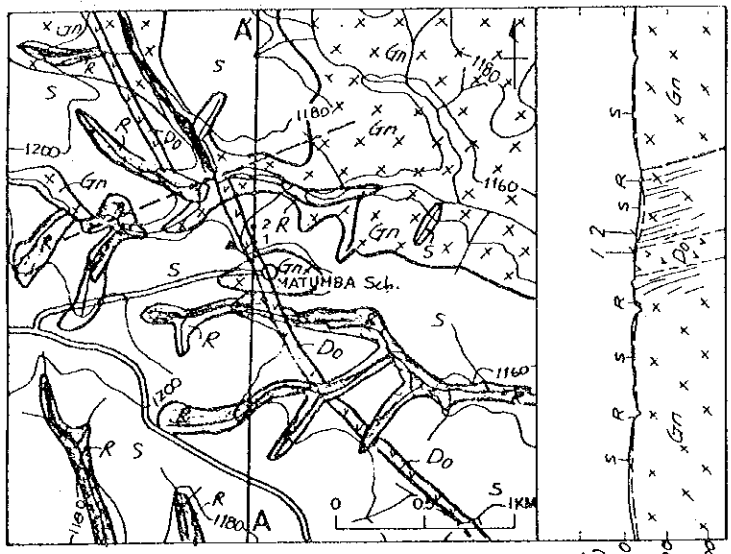
PROSPECTING PROFILE



ρ-a CURVES

図3－2－11 GEOLOGICAL SURVEY NAME OF SITE : MATUMBA Sch. (JD05)

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Flat Plane.

Vegetation:

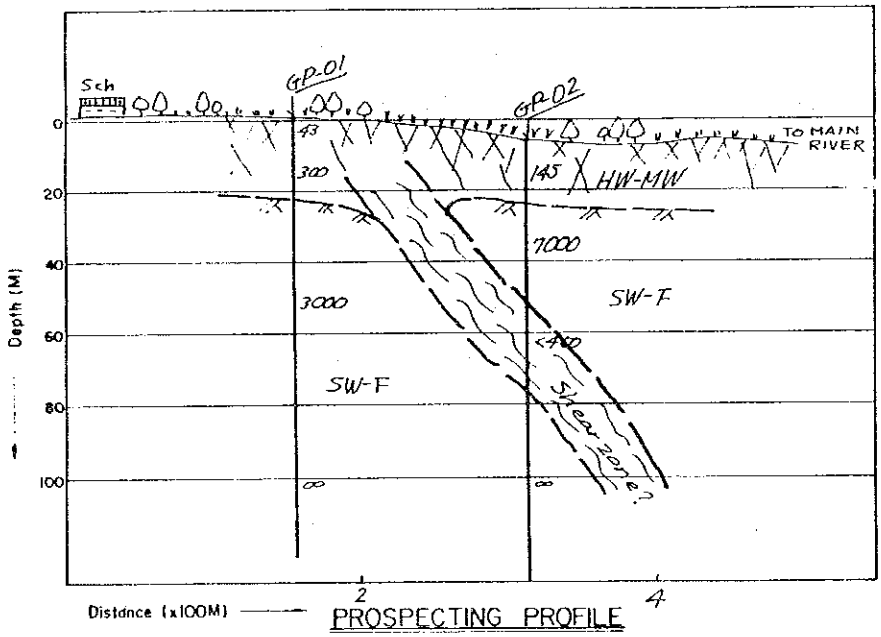
Cultivation area 75%, sparse bush area 25%.

Geology:

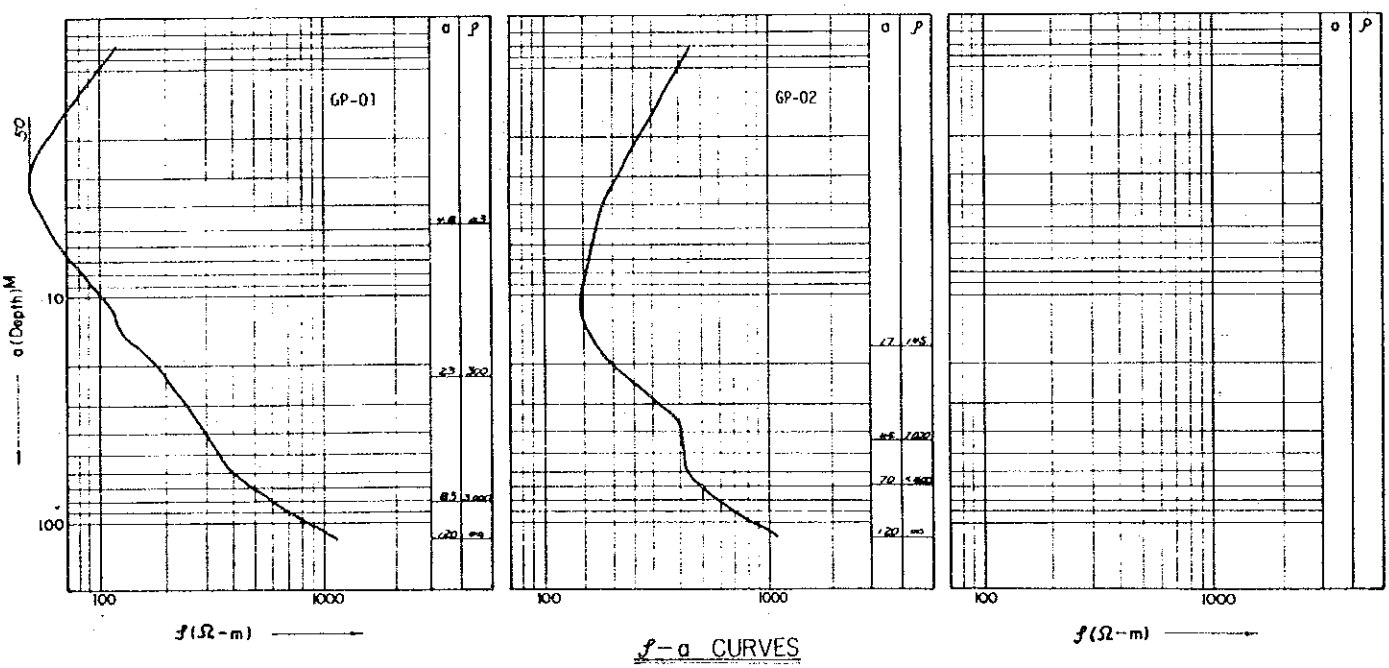
Consists of massive, medium grained, granitic Gneiss and Dolerite dyke. Gneiss is partly blocky by weathering, but mostly massive. Dolerite dyke strikes NW and dips NE. Soil consists of reddish brown, fine grained sand.

Points of geophysical survey:

Arranged along the contact shear zone of Dolerite dyke.

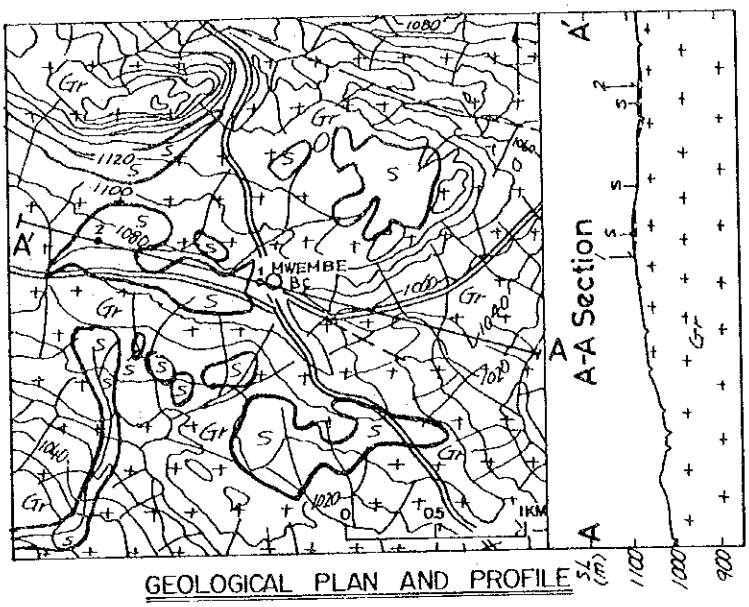


PROSPECTING PROFILE



ρ－a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Hilly. Dwalas and bornhardts occur at places. Drainage system is of parallel pattern.

Vegetation:

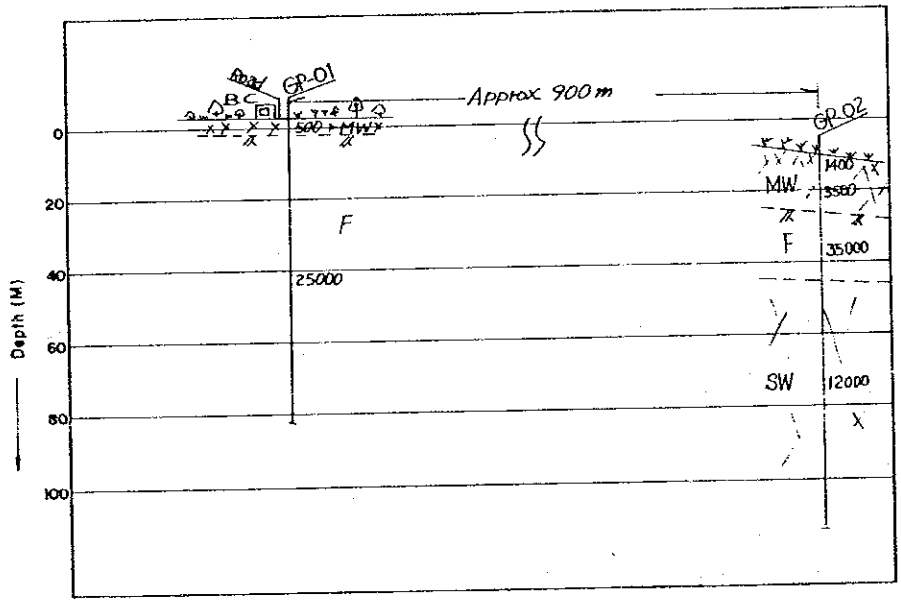
Cultivation and rock area 25%, sparse bush area 75%.

Geology:

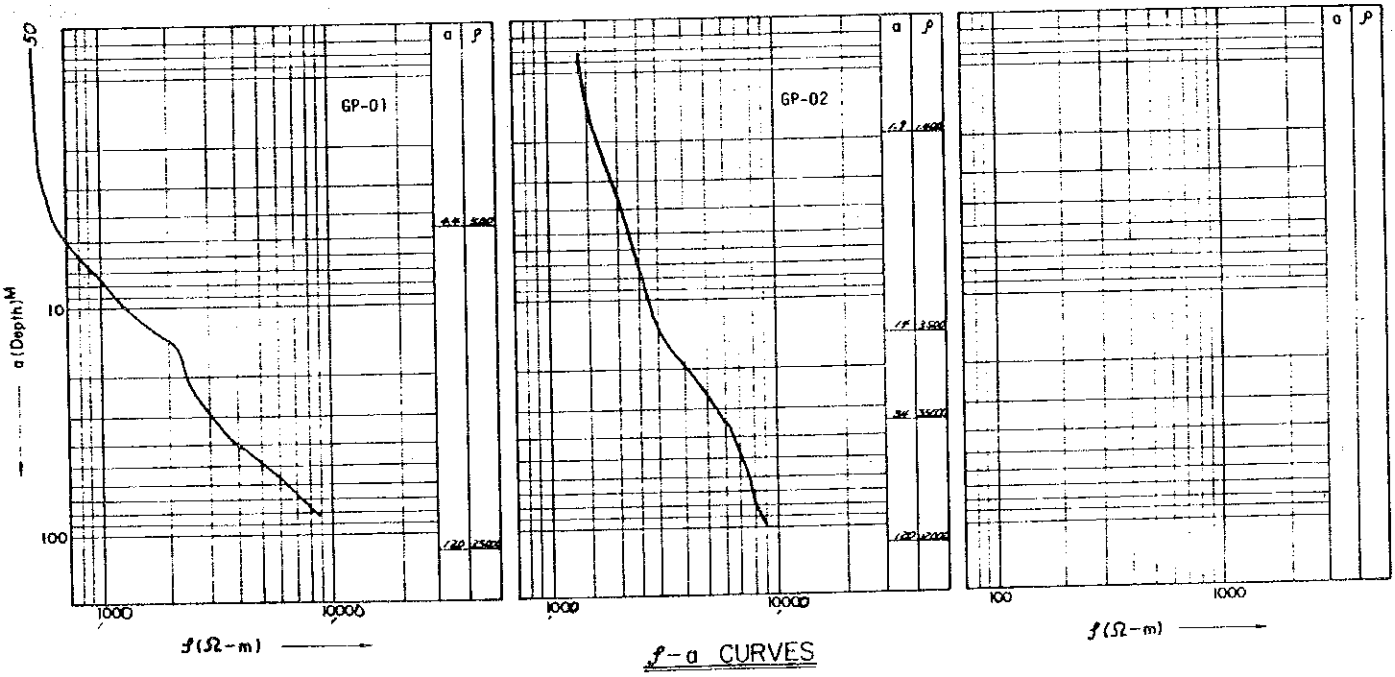
Consists of massive, potash Granite. Fault trends NNW.

Points of geophysical survey:

Two points were taken on the fault which trends WNW.



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

Hilly, and slopes from east to west. Dwalas, bornhardts and castle koppies occur at places. The major streams are eroded along faults. Drainage system is of parallel pattern.

Vegetation:

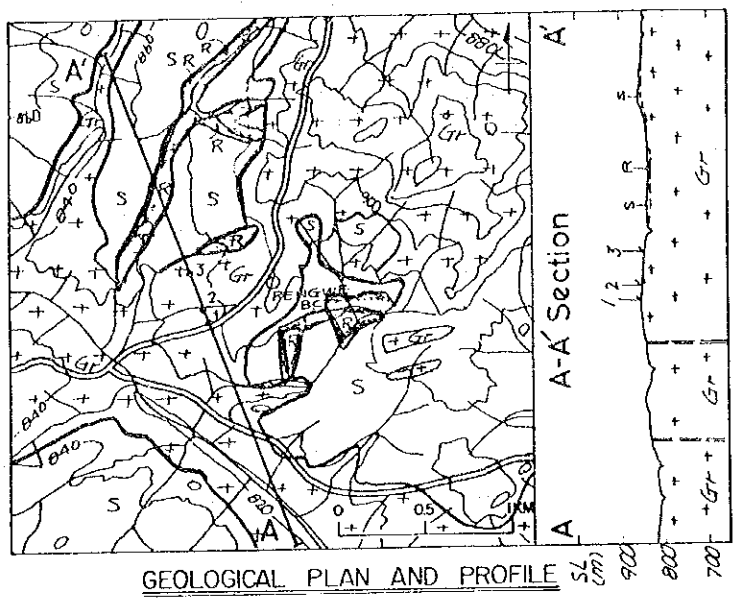
Cultivation and rock area 40%, sparse bush area 60%.

Geology:

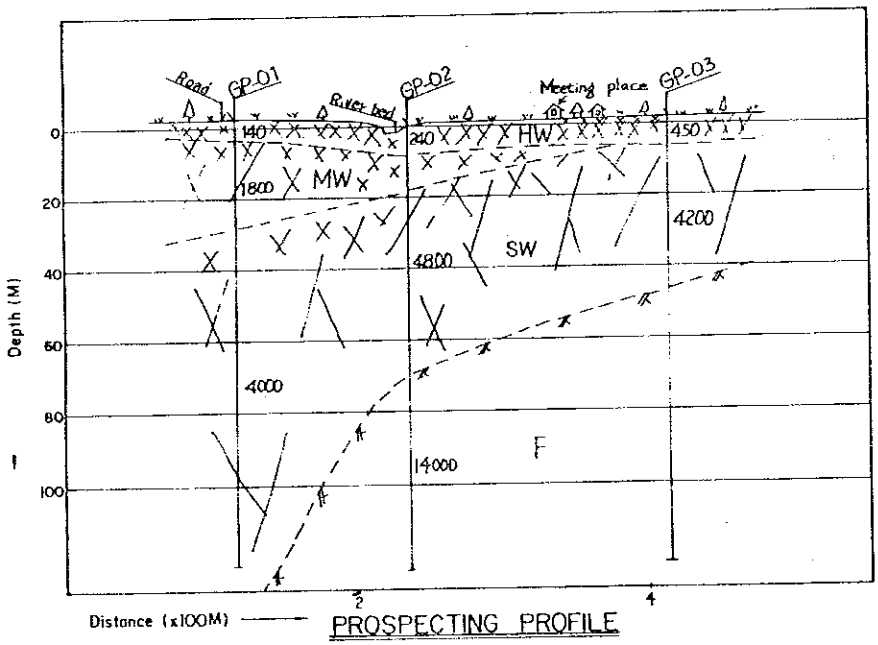
Consists of massive, potash Granite. There are many of the major faults which trend NW and NE. Soil consists of light grey, fine grained sand.

Points of geophysical survey:

Arranged in a depression and on the shear zone of the fault.



GEOLOGICAL PLAN AND PROFILE



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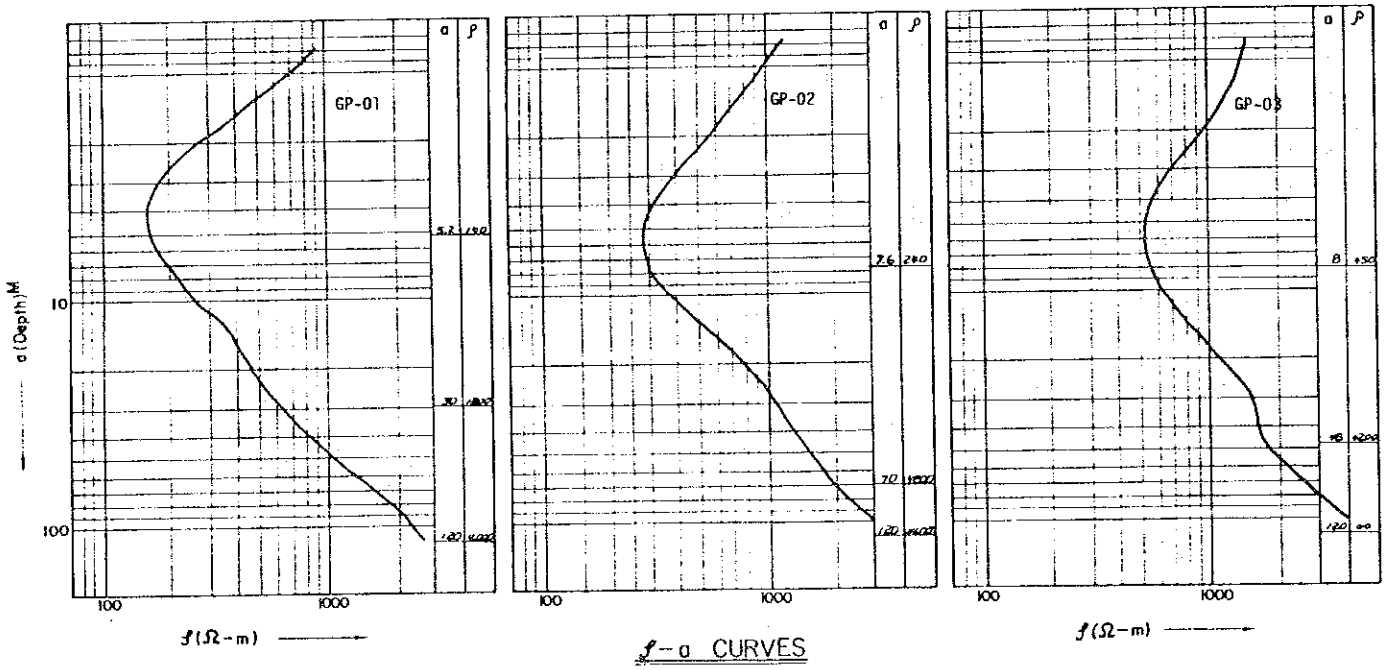


ρ-a CURVES

Explanation

Topography:

Plane, rounded. Major streams are roughly parallel to one another in the direction of EW.

Vegetation:

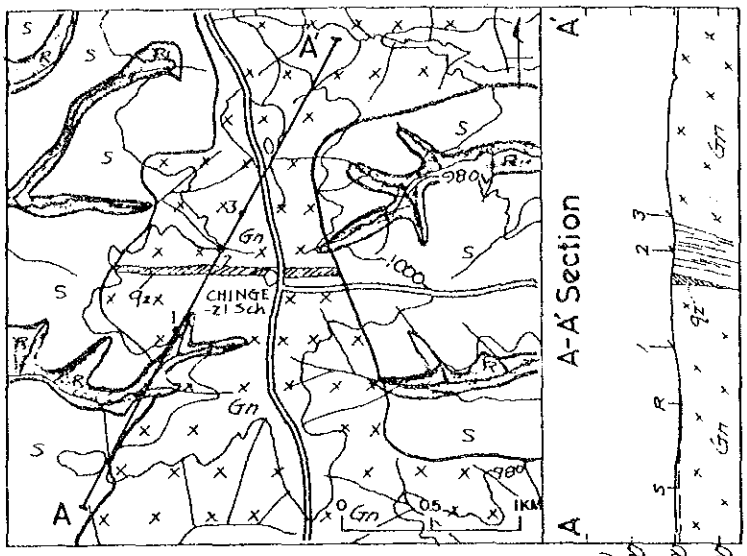
Cultivation and rock area 35%, sparse bush and orchard 65%.

Geology:

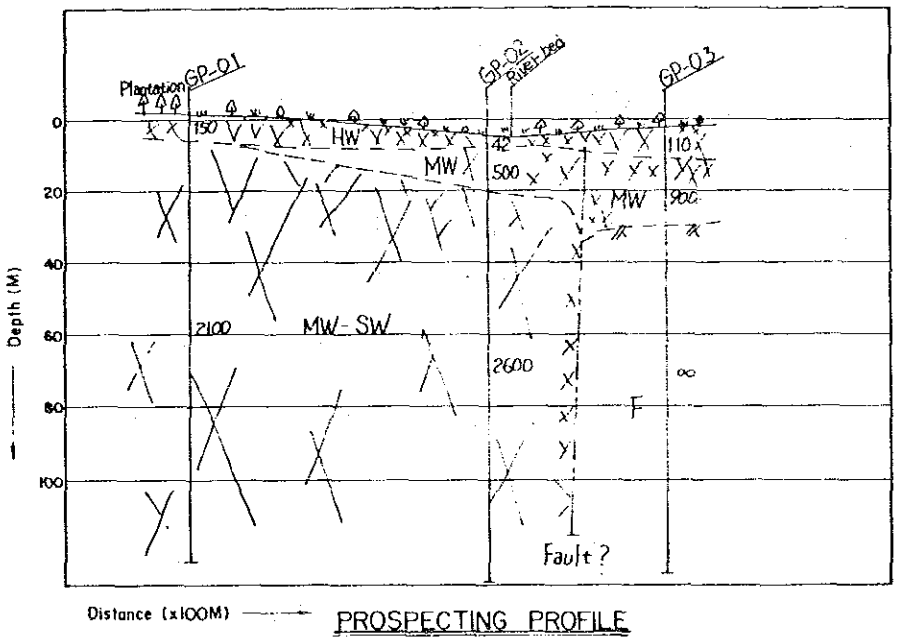
Consists of granitic Gneiss and Quartz vein. Soil consists of coarse grained sand with gravel of quartzite.

Points of geophysical survey:

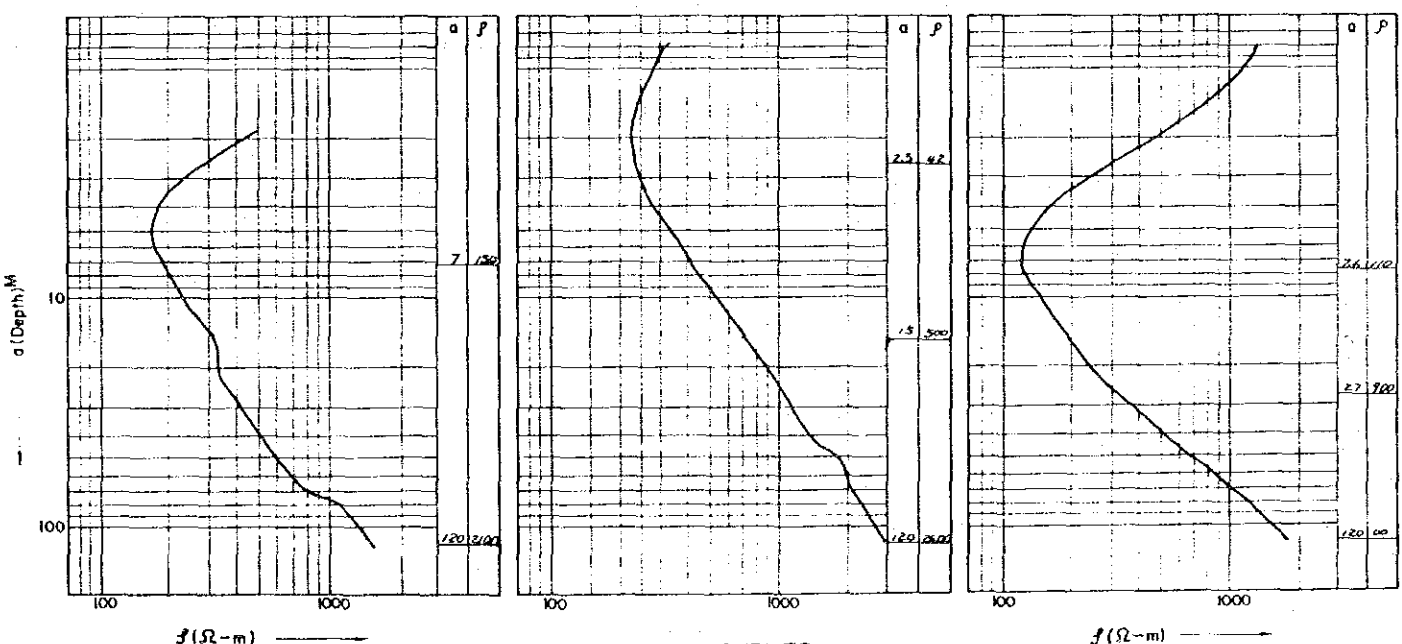
Arranged on the shear zone of Quartz vein.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ－a CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : MVUMBURA Sch. (JE04)

Explanation

Topography:

Mostly flat plane except the bank of BUBYE Rv. where dwalas and castle koppies occur at places.

Vegetation:

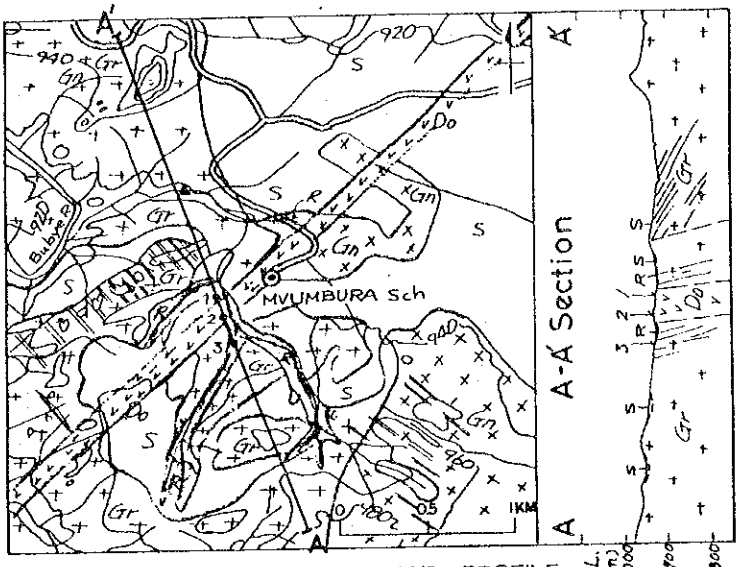
Cultivation area 50%, sparse bush area 50%.

Geology:

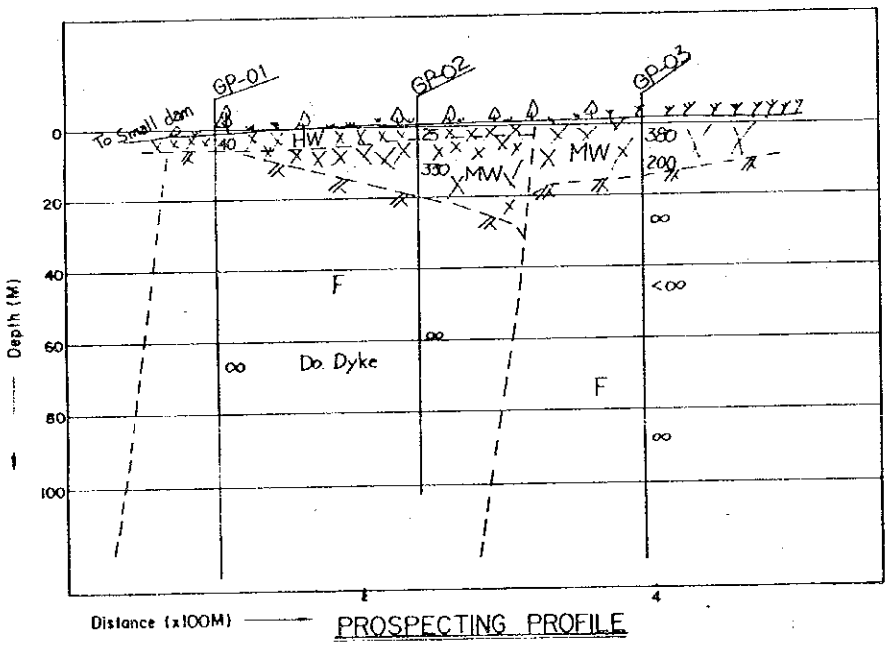
Consists of tonalitic Gneiss, potash Granite and Dolerite dyke. Gneiss and Granite have airphoto trend lines in a NW trend, and Dolerite dyke has N50°E strike.

points of geophysical survey:

Arranged in a depression which has the contact shear zone of Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



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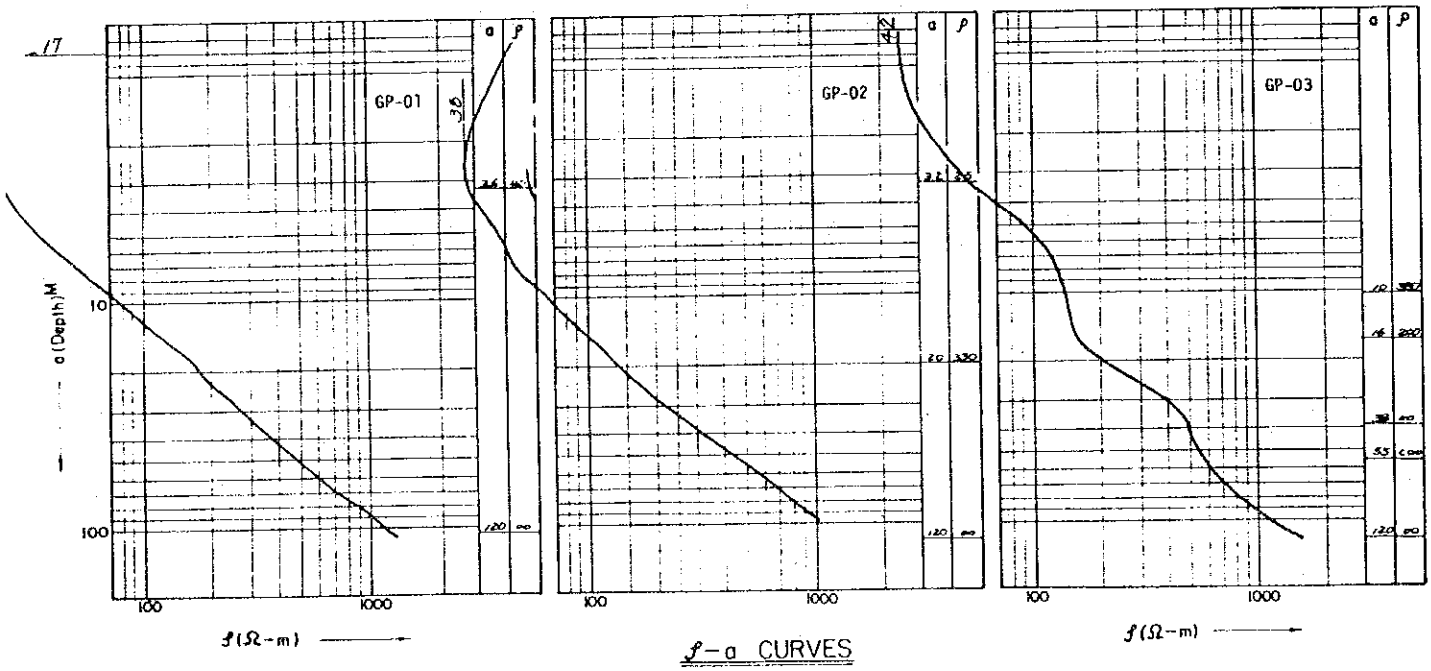


ρ－a CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : MBIRASHAVA Sch. (JE05)

Explanation

Topography:

On the north side it is hilly, and on the south side it is rounded plane. Drainage system is of parallel pattern, and the major streams are eroded along faults.

Vegetation:

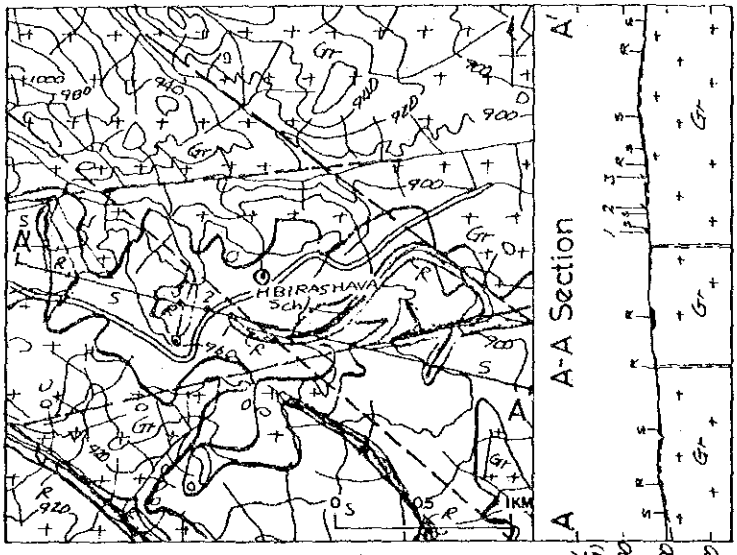
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

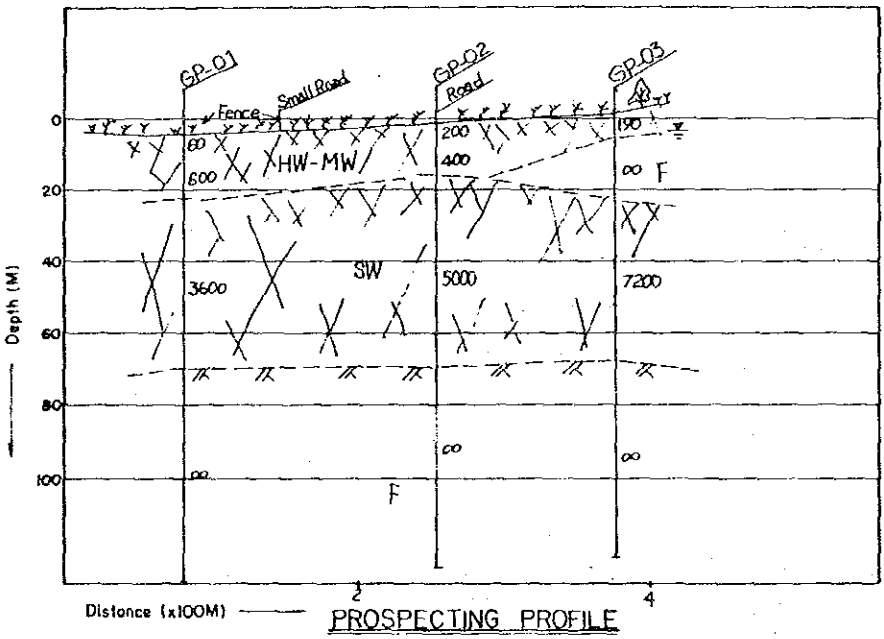
Consists of massive potash Granite. There are many of the major faults which trend NW and EW.

Points of geophysical survey:

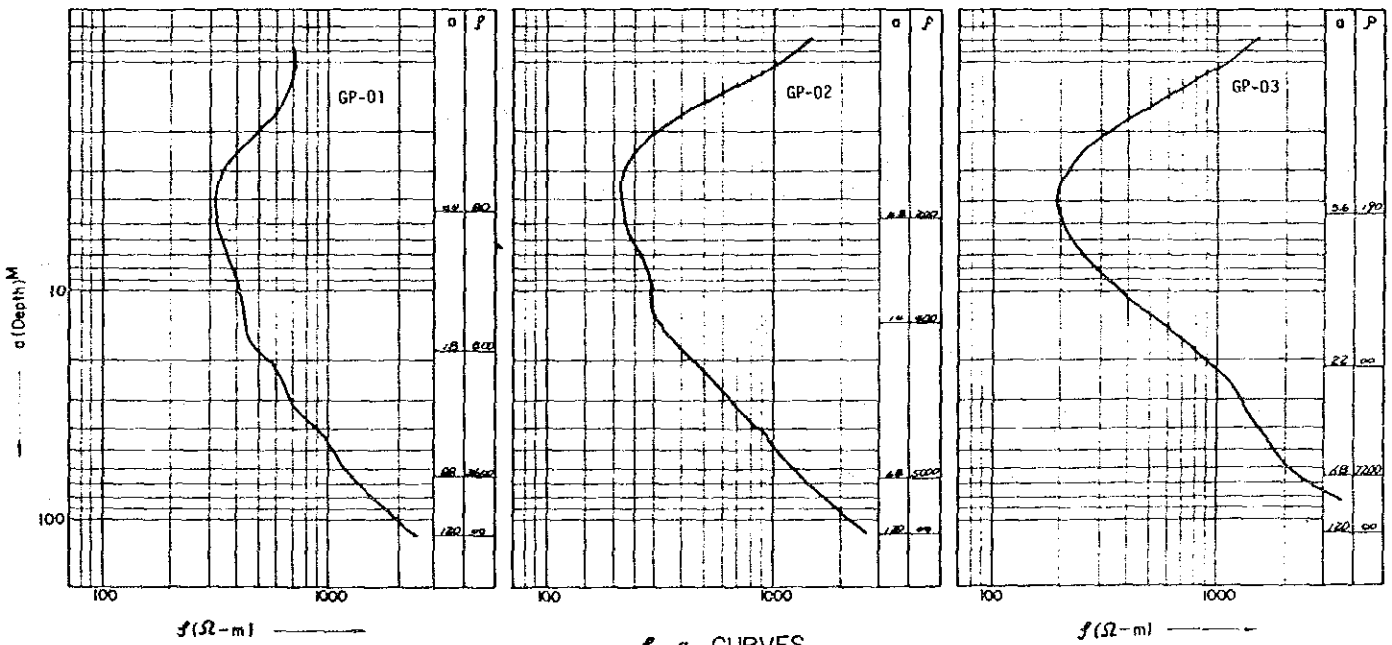
Arranged in a depression which has the shear zone of the major fault.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

On the south side lies a long narrow ridge which has a north-east trend. On the north side it is flat plane.

Vegetation:

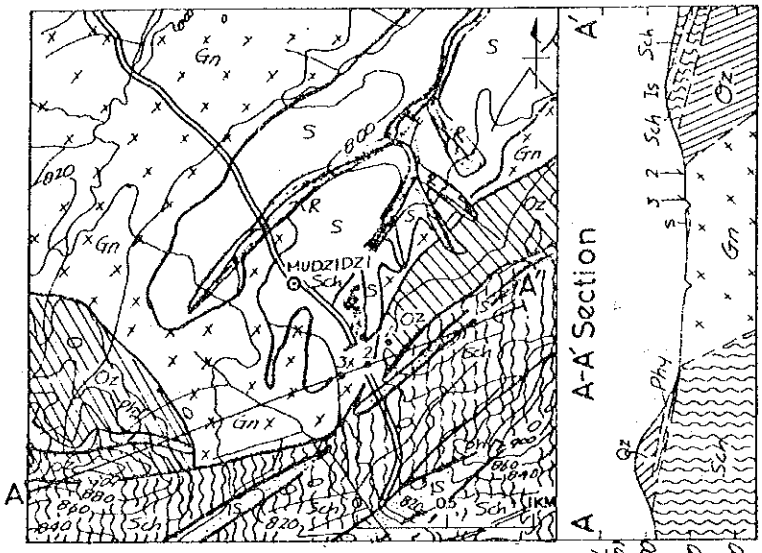
Cultivation area 30%, sparse bush and plantation area 70%.

Geology:

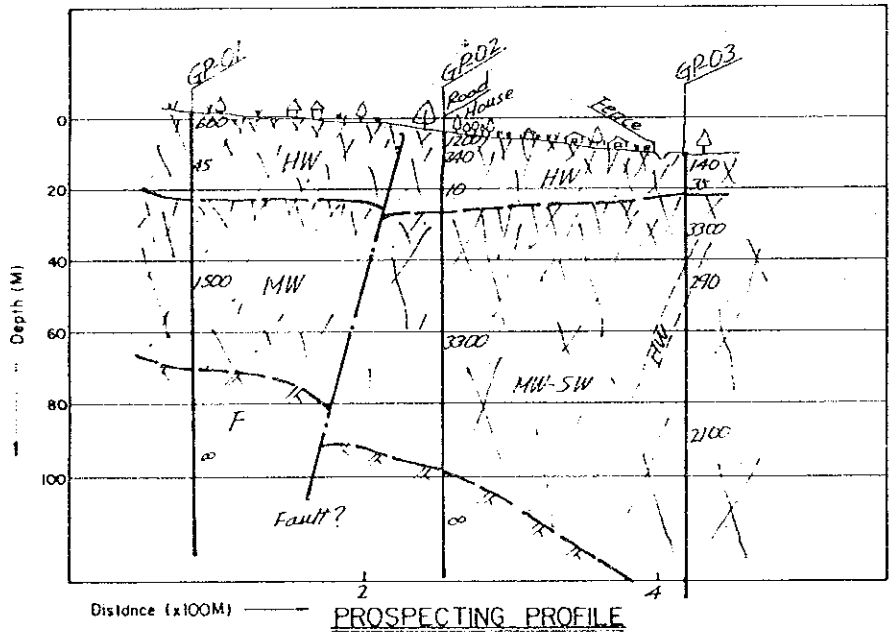
Consists of Schist Complex (Schist, Phyllite, Ironstone, Quartzite) and tonalitic Gneiss. Schist Complex has a NW trend and is generally vesicular.

Points of geophysical survey:

Arranged in a depression and along the boundary of Schist Complex and Gneiss.



GEOLOGICAL PLAN AND PROFILE



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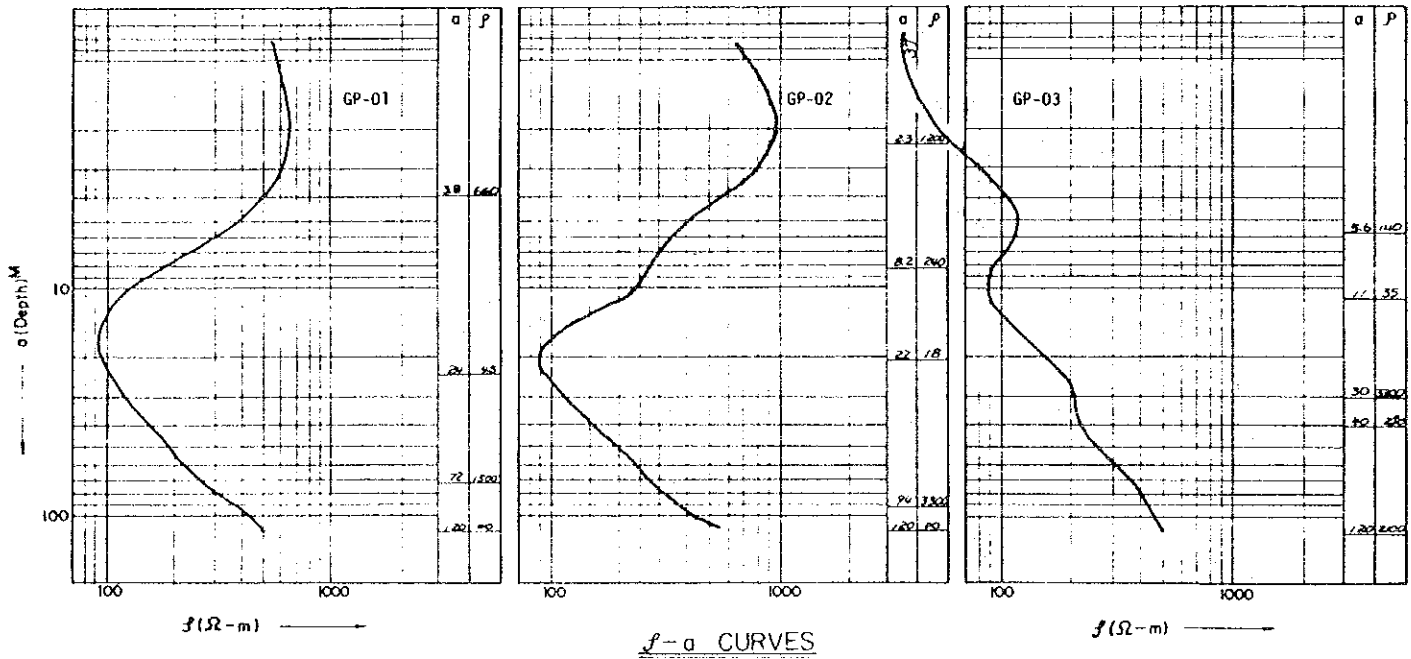


ρ - a CURVES

Explanation

Topography:

Hilly. The major streams are eroded along faults, and drainage system is parallel pattern.

Vegetation:

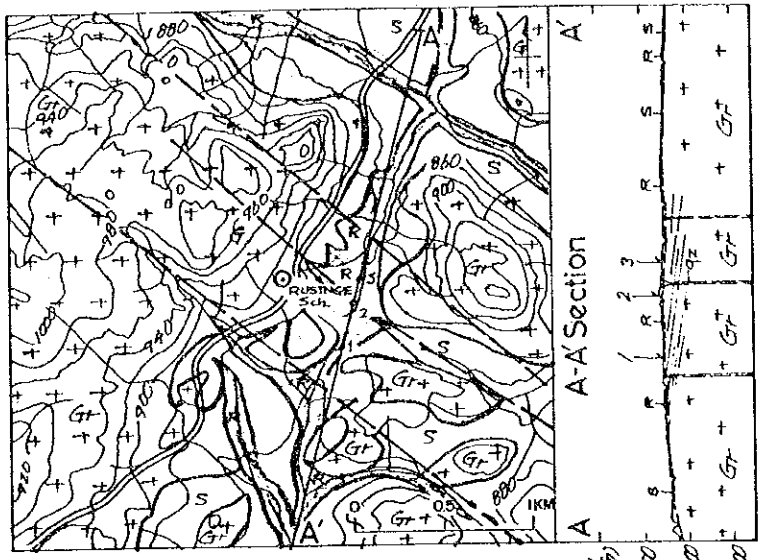
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

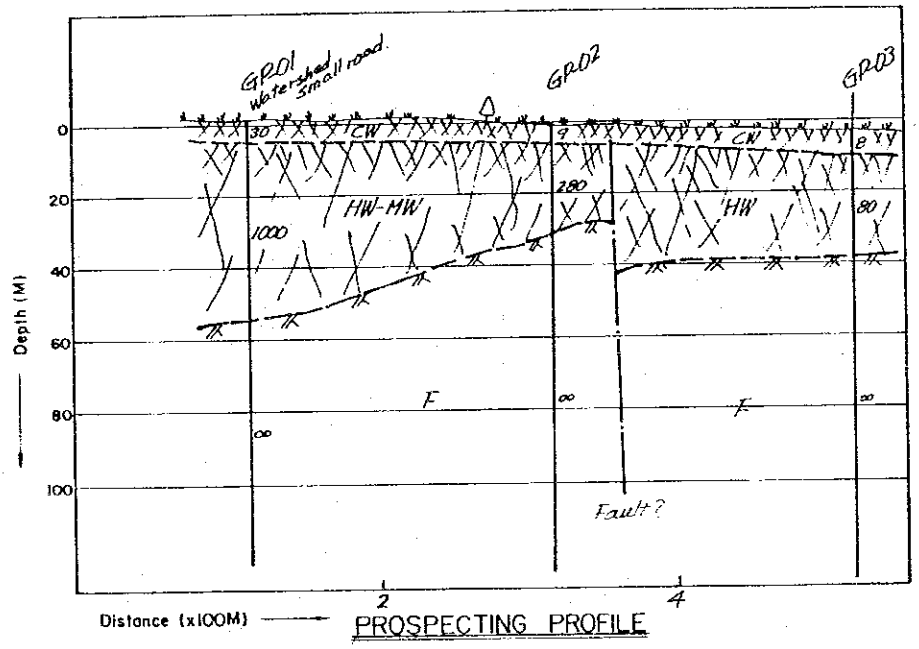
Consists of potash Granite which has NW trend.

Points of geophysical survey:

Arranged in the valley and in the crossing direction to the faults and Quartz vein.



GEOLOGICAL PLAN AND PROFILE



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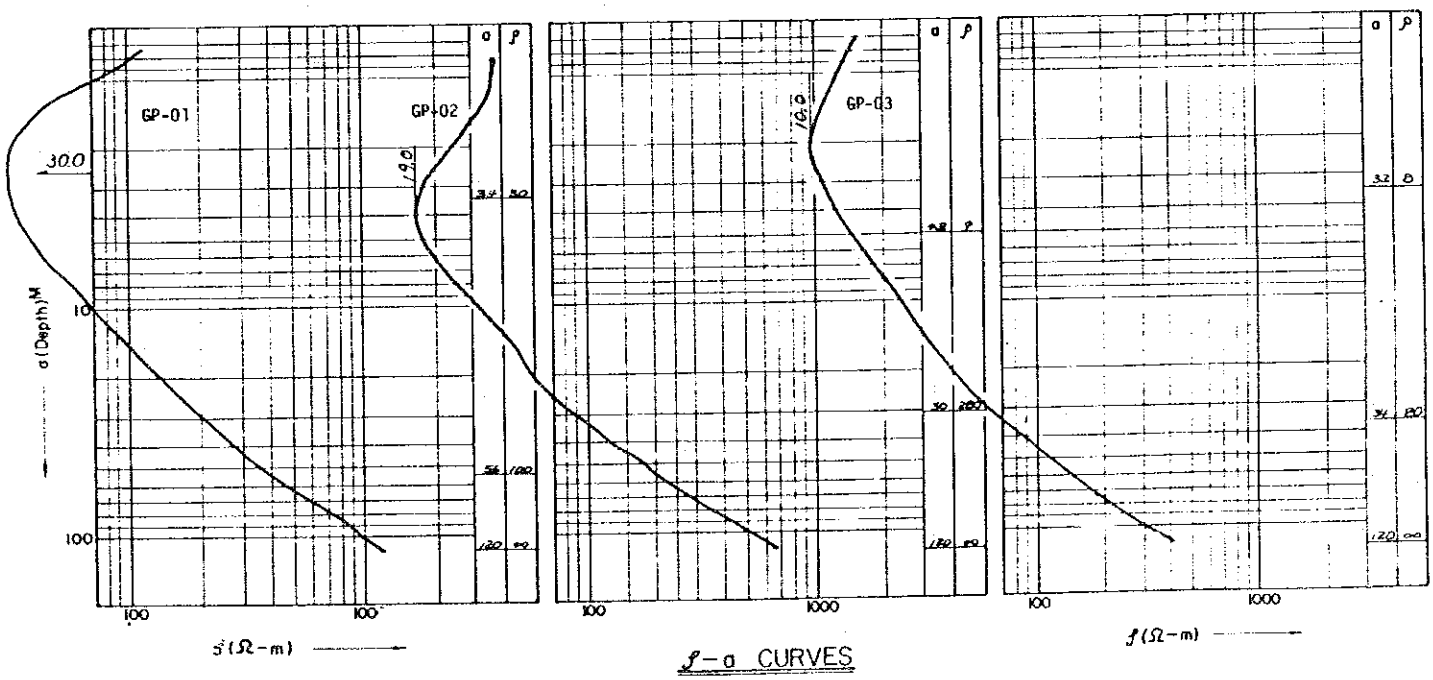
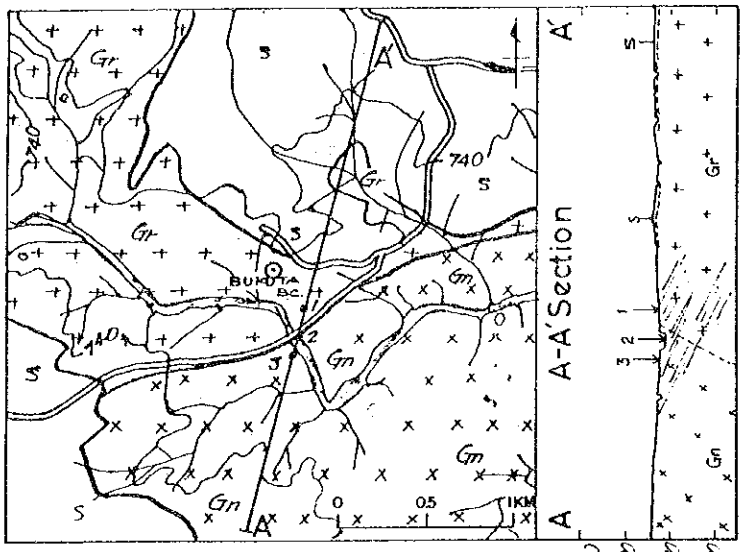


ρ-a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Rounded plane. The major stream is MUCHINGWIZI Rv.

Vegetation:

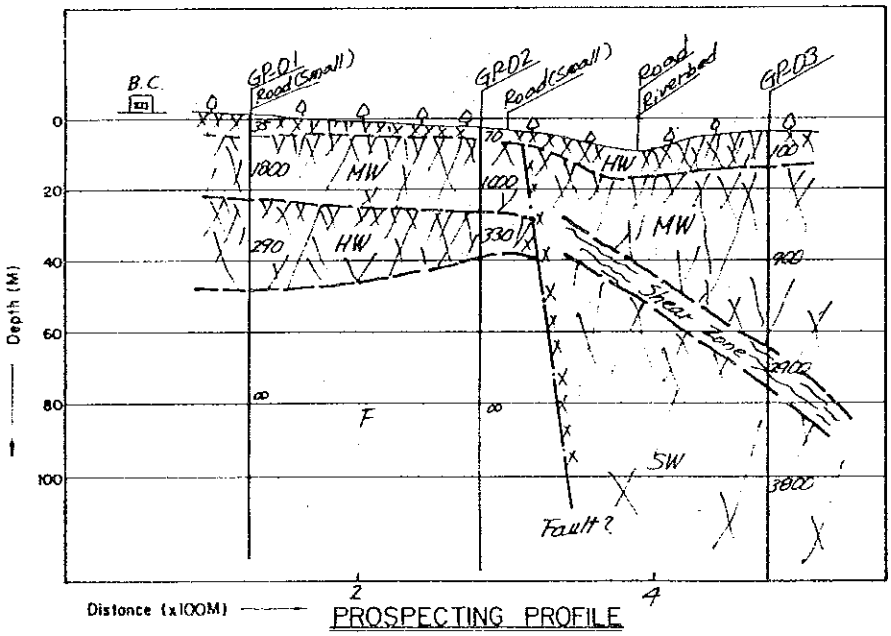
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

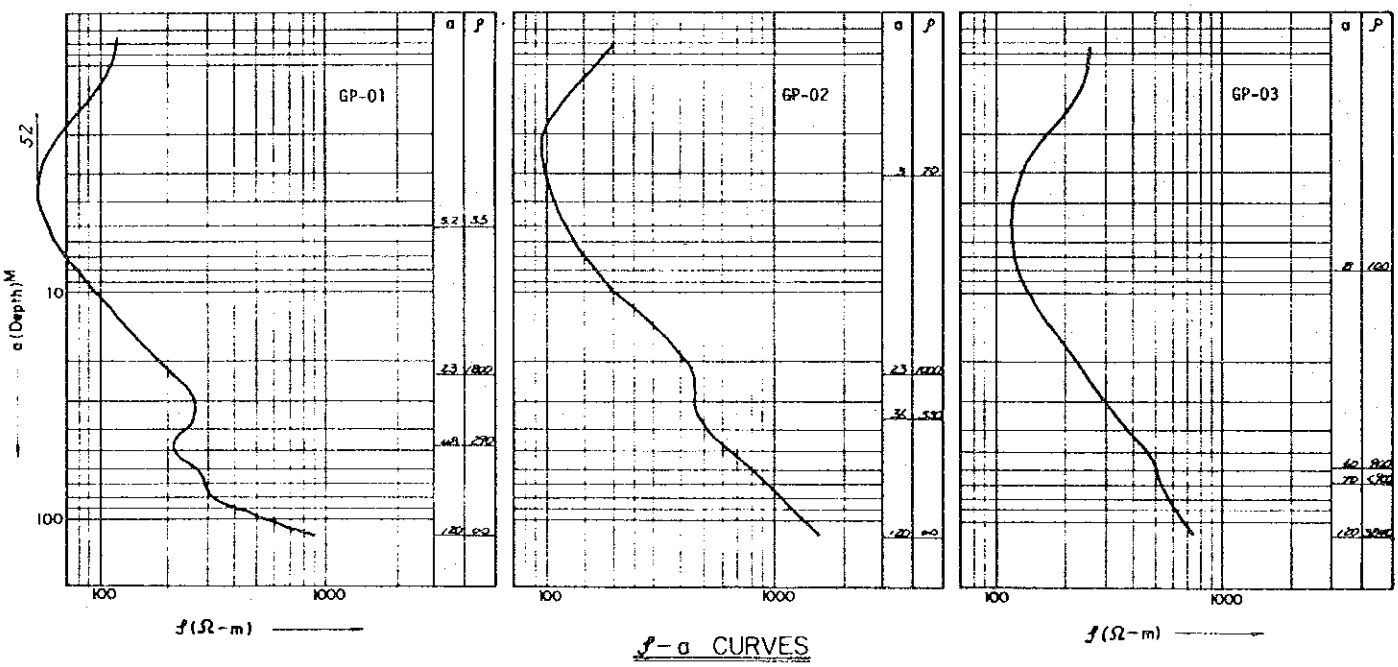
Consists of granulitic Gneiss and massive, coarse grained Granite.

Points of geophysical survey:

Arranged near the boundary of Gneiss and Granite.



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

On the north-west side it is hill of dwala, and on the south-east side it is plane.

Vegetation:

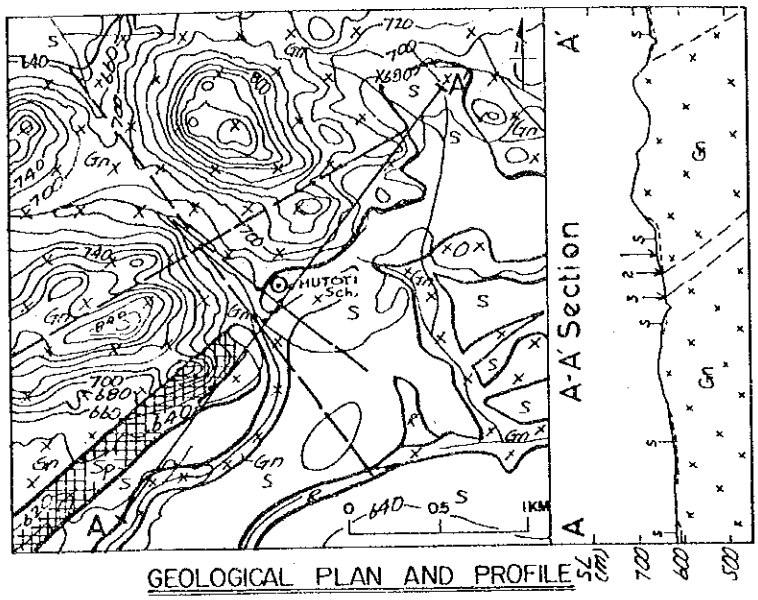
Cultivation area 50%, dense bush area 50%.

Geology:

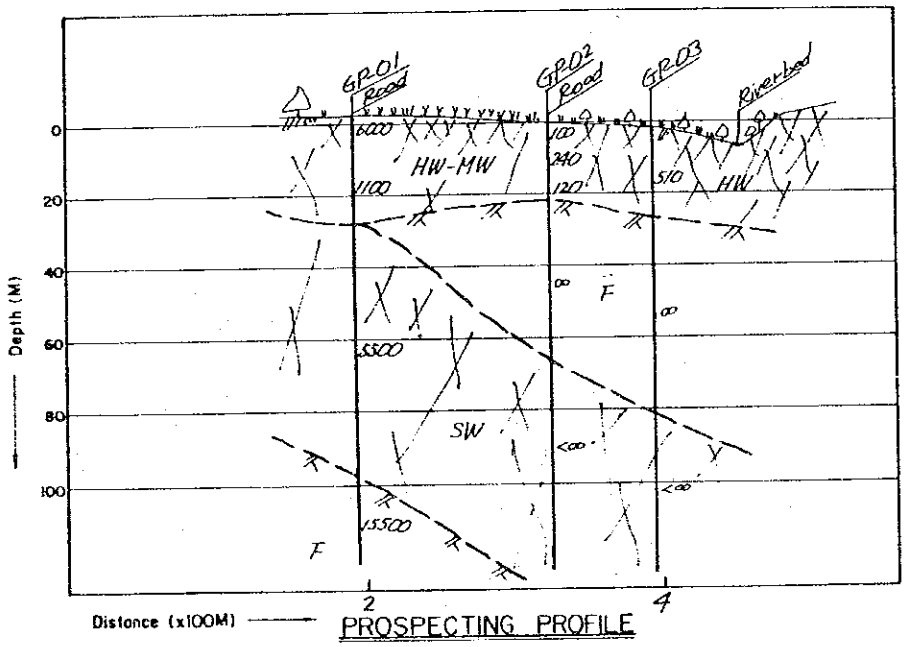
Consists of granulitic Gneiss and Ultramafic rock which has NE trend. Gneiss has the major faults in NW strike. Soil consists of yellowish brown, fine grained sand.

Points of geophysical survey:

Arranged on the shear zone of the major faults.



GEOLOGICAL PLAN AND PROFILE



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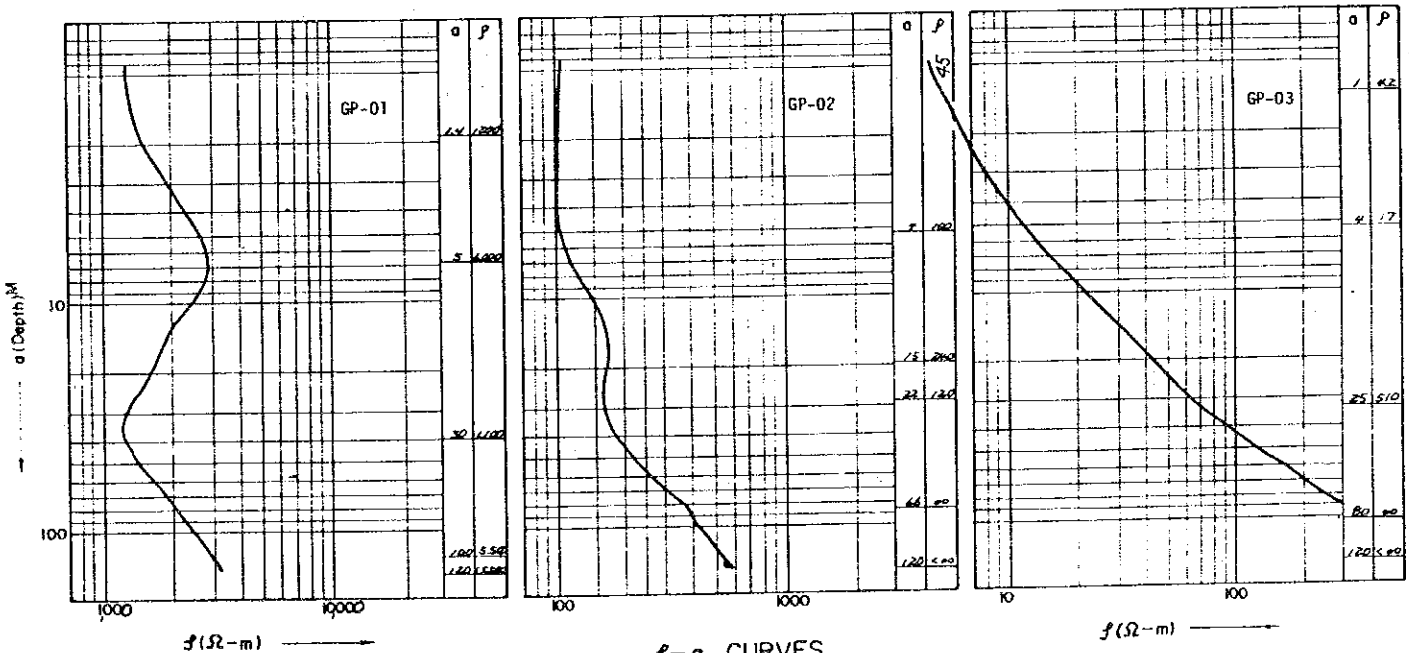


ρ-a CURVES

Explanation

Topography:

Composed largely of flat plane except north-west part which is hilly and slopes gently to MUSAVEZI Rv.

Vegetation:

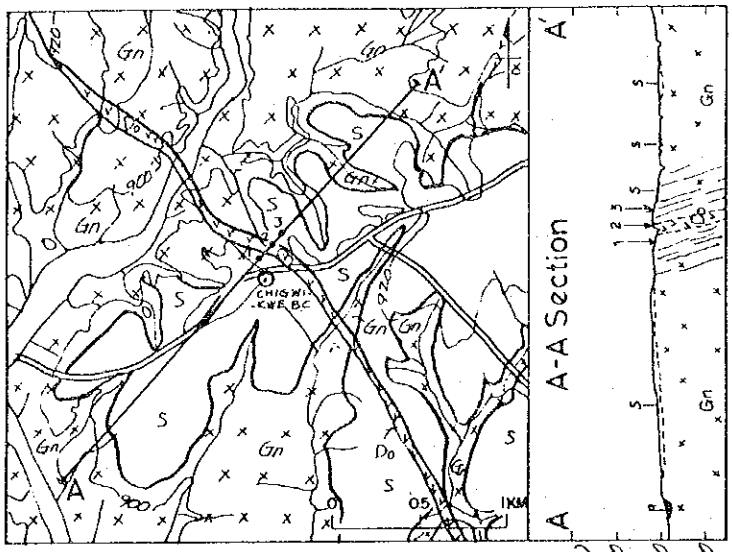
Cultivation and rock area 55%, sparse bush area 45%.

Geology:

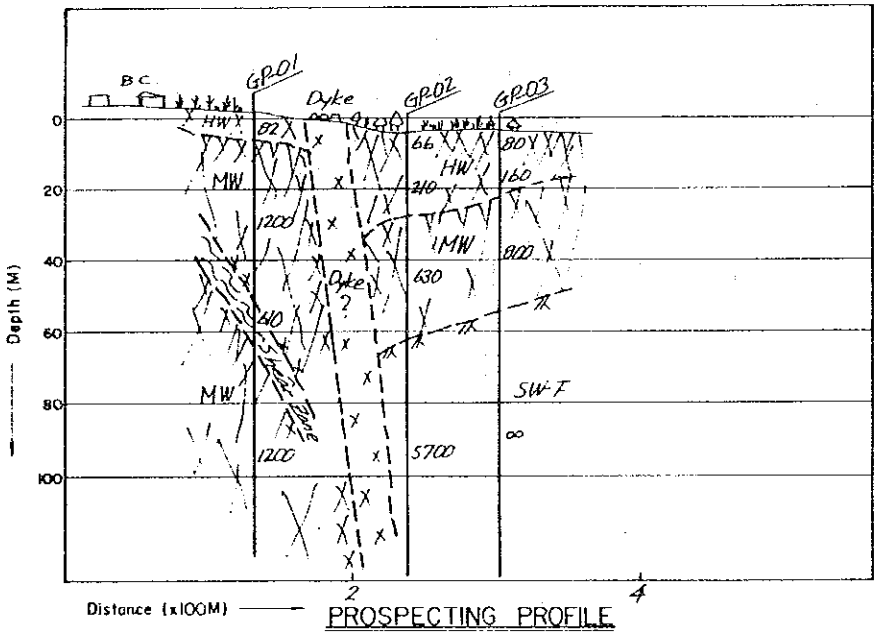
Consists of tonalitic Gneiss and Dolerite dyke. Dolerite dyke has NW trend.

Points of geophysical survey:

Arranged in a depression and on the contact shear zone of the Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



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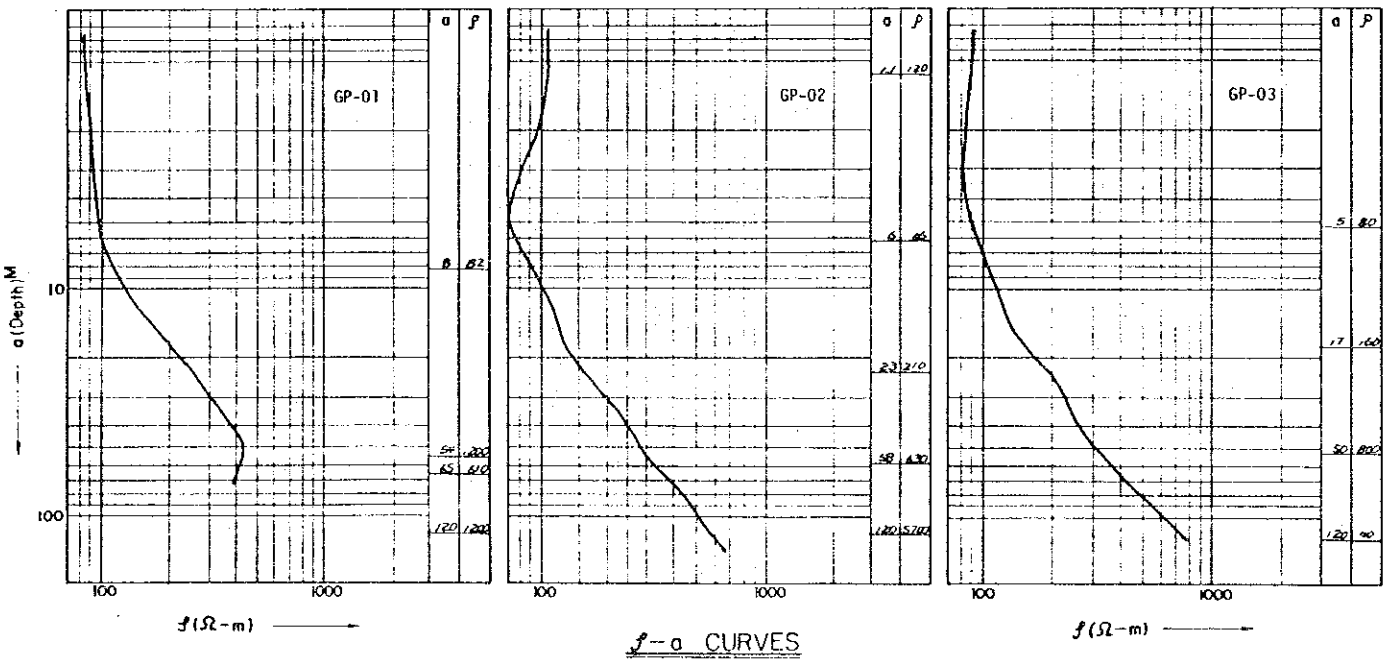
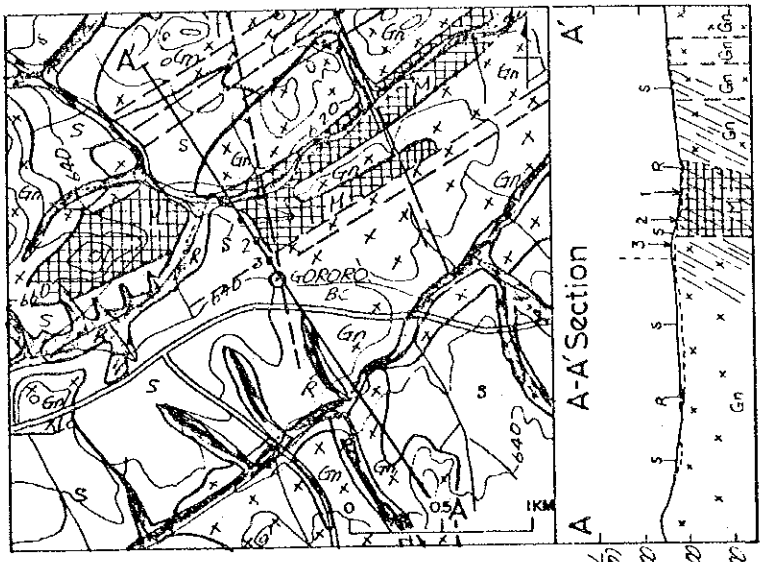


ρ-a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Comparatively plane. Dwalas and castle koppies occur at places. Many of the major streams. The geological structure trend NE and NNW.

Vegetation:

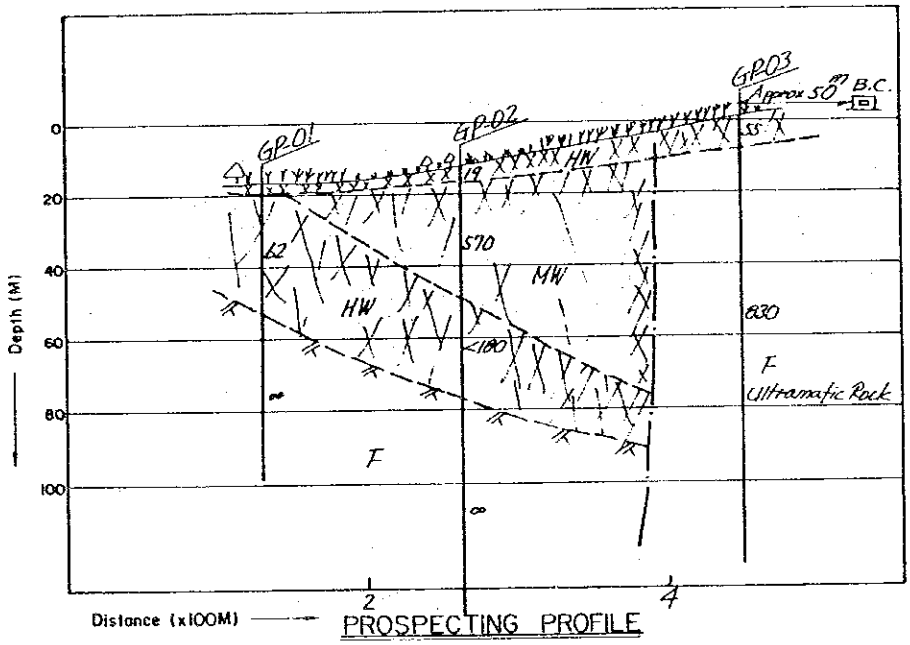
Cultivation and rock area 50%, sparse bush area 50%.

Geology:

Consists of granulitic Gneiss and Ultramafic rock which have NE trend. Soil consists of light grey, fine grained sand.

Points of geophysical survey:

Arranged on the contact shear zone of the Ultramafic rock.



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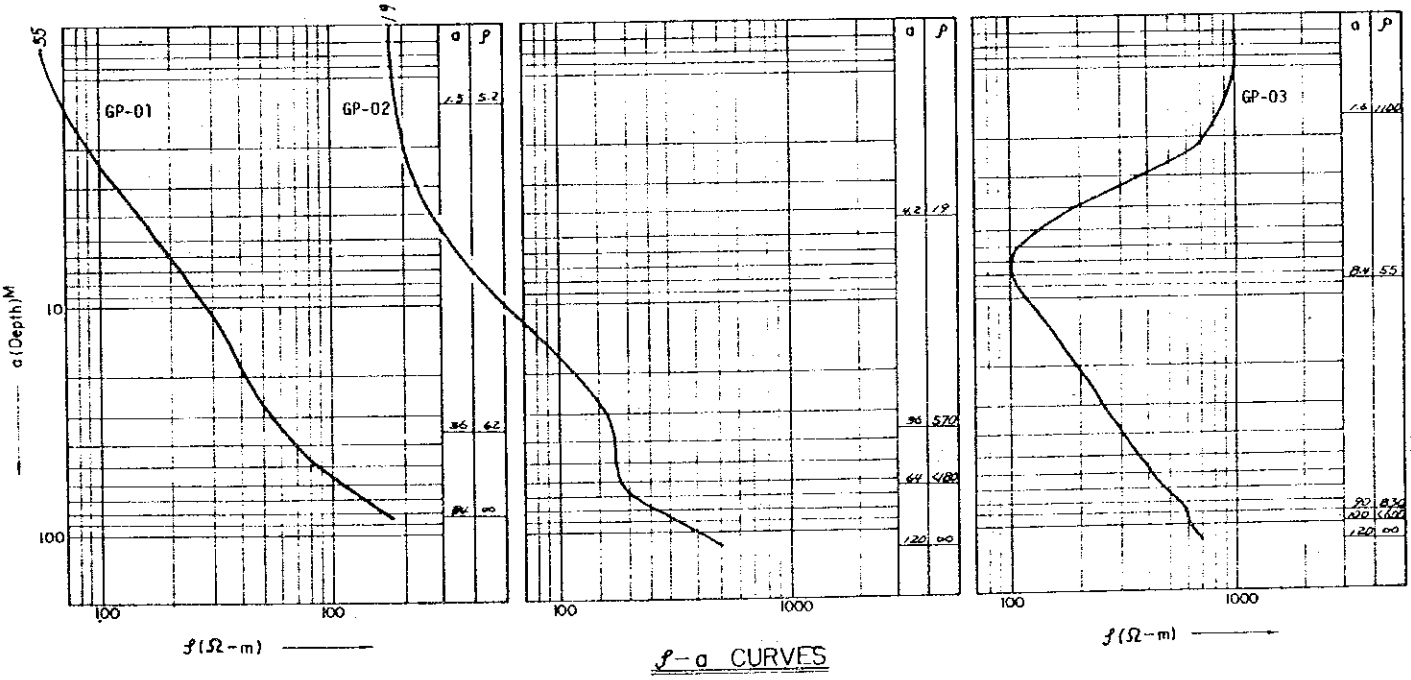


ρ-a CURVES

Explanation

Topography:

Composed largely of flat plane except mountain range on the north-west side.

Vegetation:

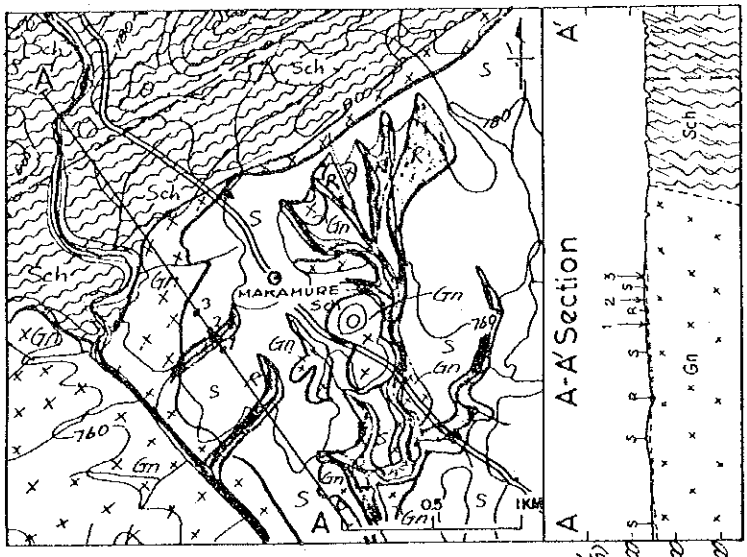
Cultivation area 65%, dense bush are 35%.

Geology:

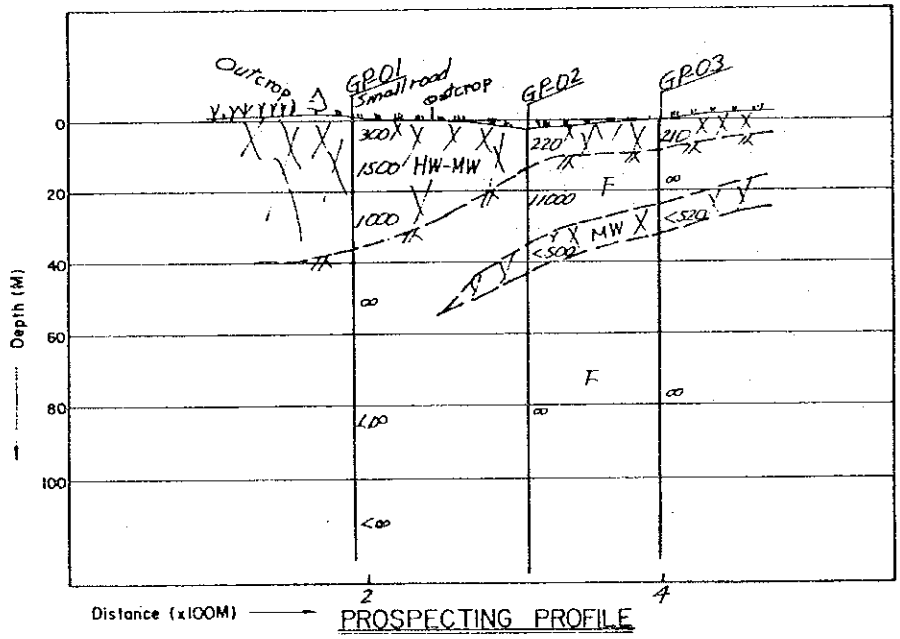
Consists of Schist and massive, tonalitic Gneiss. Schist has airphoto trend line of NE. Soil consists of reddish, medium to coarse grained sand.

Points of geophysical survey:

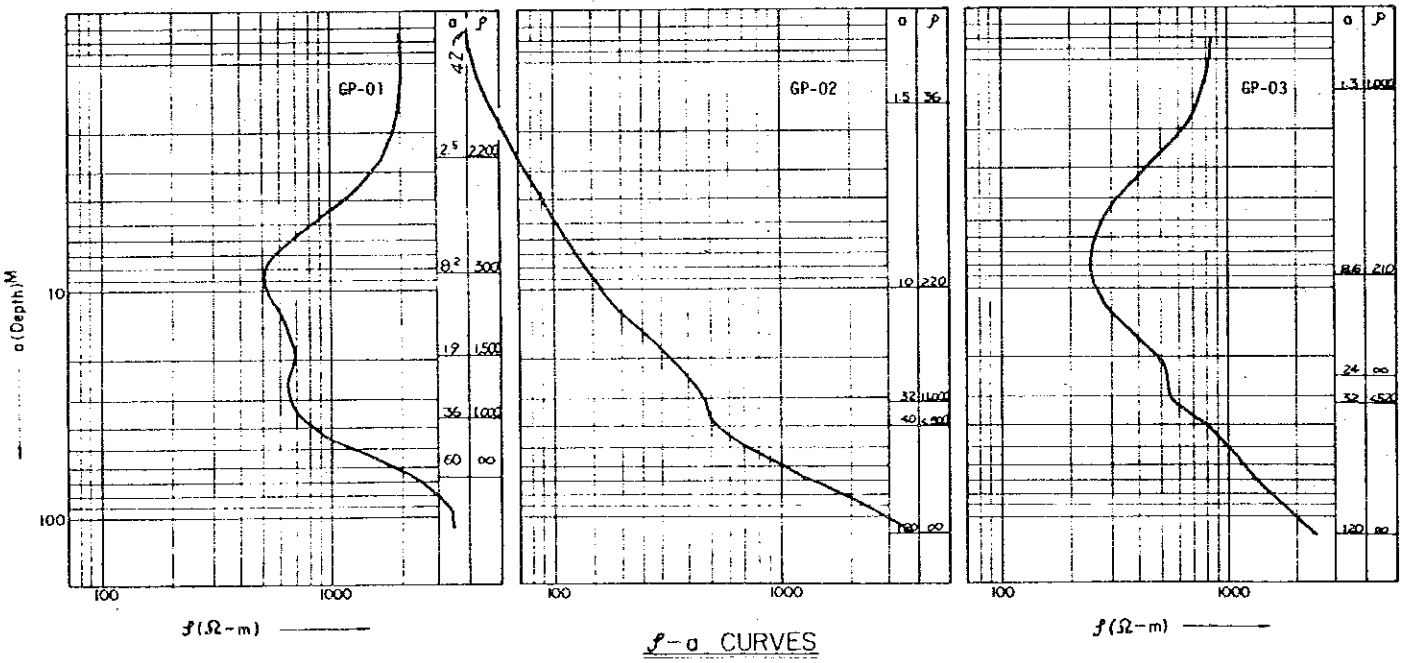
Arranged in a depression which has moist soil and many joints of rock.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ-σ CURVES

Explanation

Topography:

On the west side it is hill of dwalas, and on the east side it is flat plane. These reliefs are in excellent contrast. The major streams are eroded along the faults.

Vegetation:

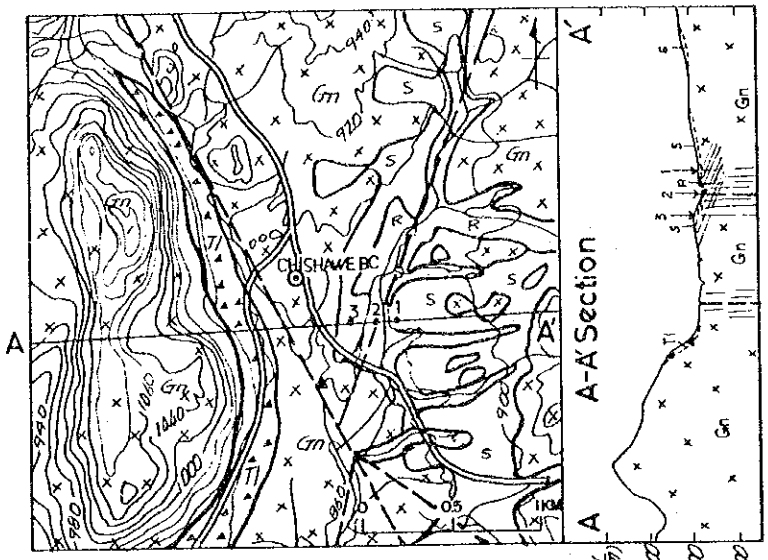
Cultivation area 25%, sparse bush area 75%.

Geology:

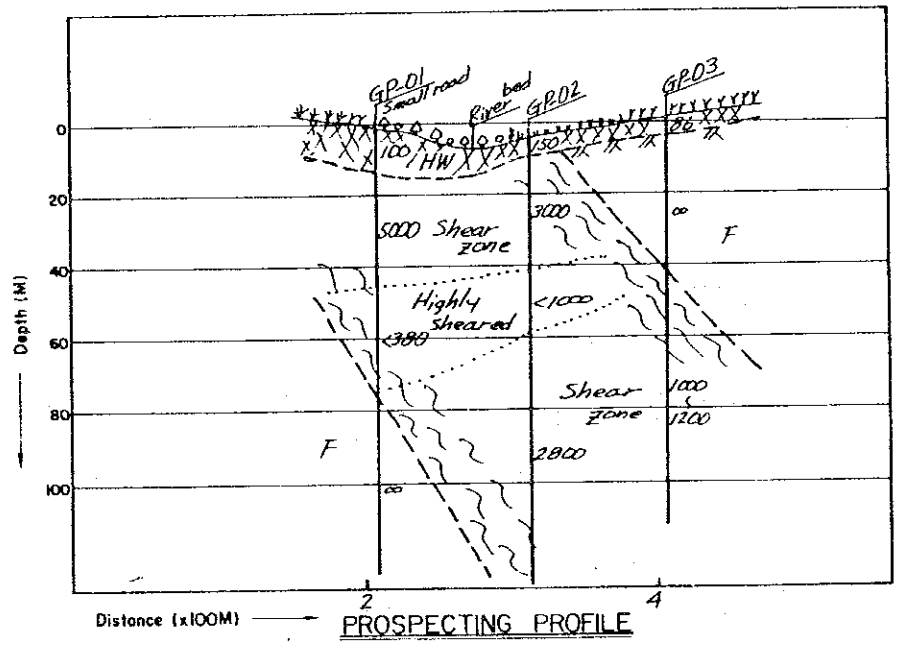
Consists of massive, tonalitic Gneiss, which has faults in NNW and NS trend.

Points of geophysical survey:

Arranged in a depression in a wide watershed which is on the shear zone of the fault.



GEOLOGICAL PLAN AND PROFILE



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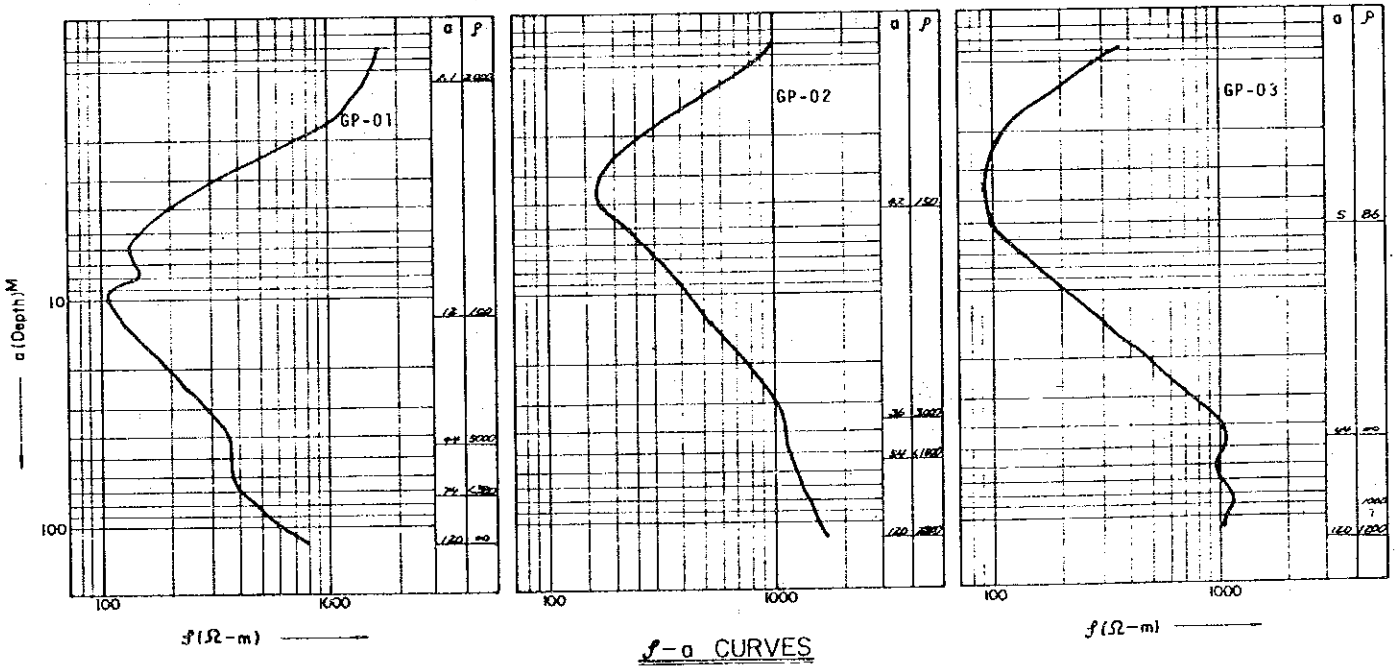
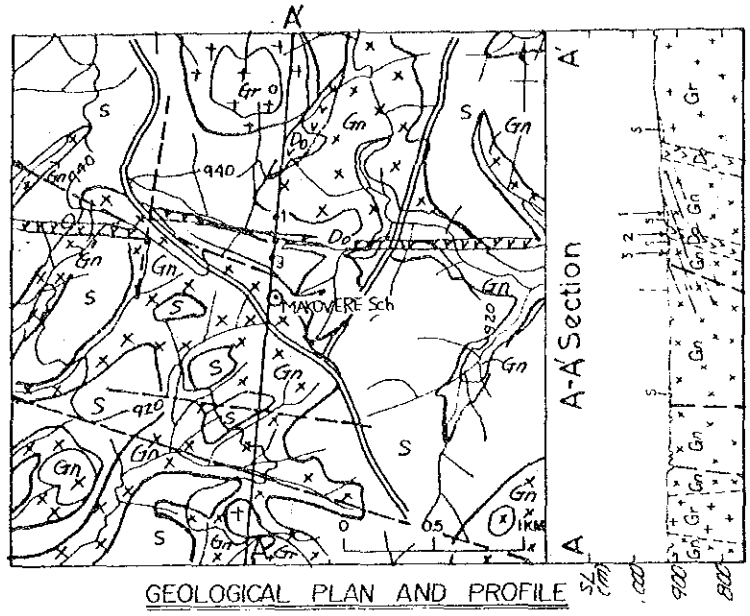


ρ-a CURVES

図3－2－11 GEOLOGICAL SURVEY NAME OF SITE : MAKOVERE Sch. (JF06)



GEOLOGICAL PLAN AND PROFILE

Explanation

Topography:

Flat plane.

Vegetation:

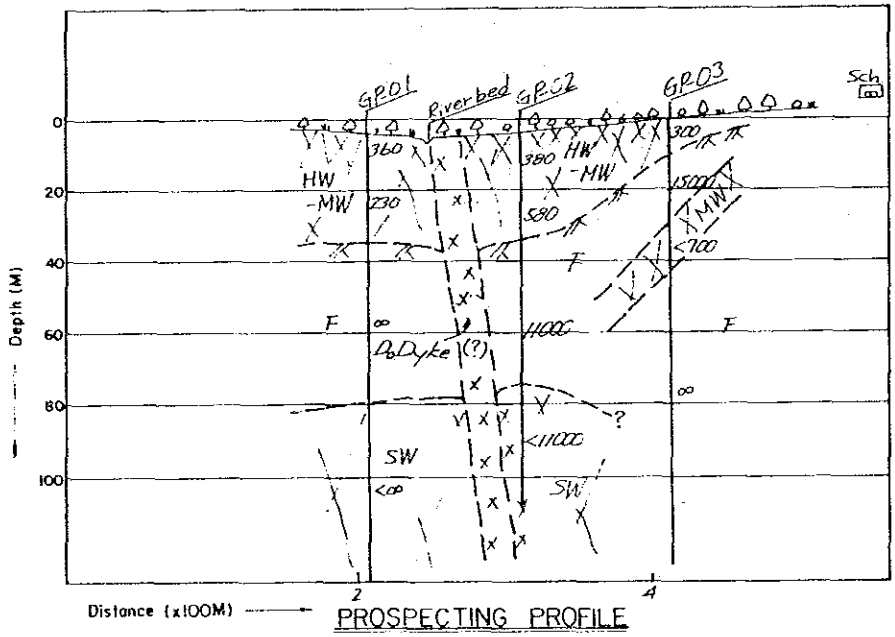
Cultivation area 45%, sparse bush area 55%.

Geology:

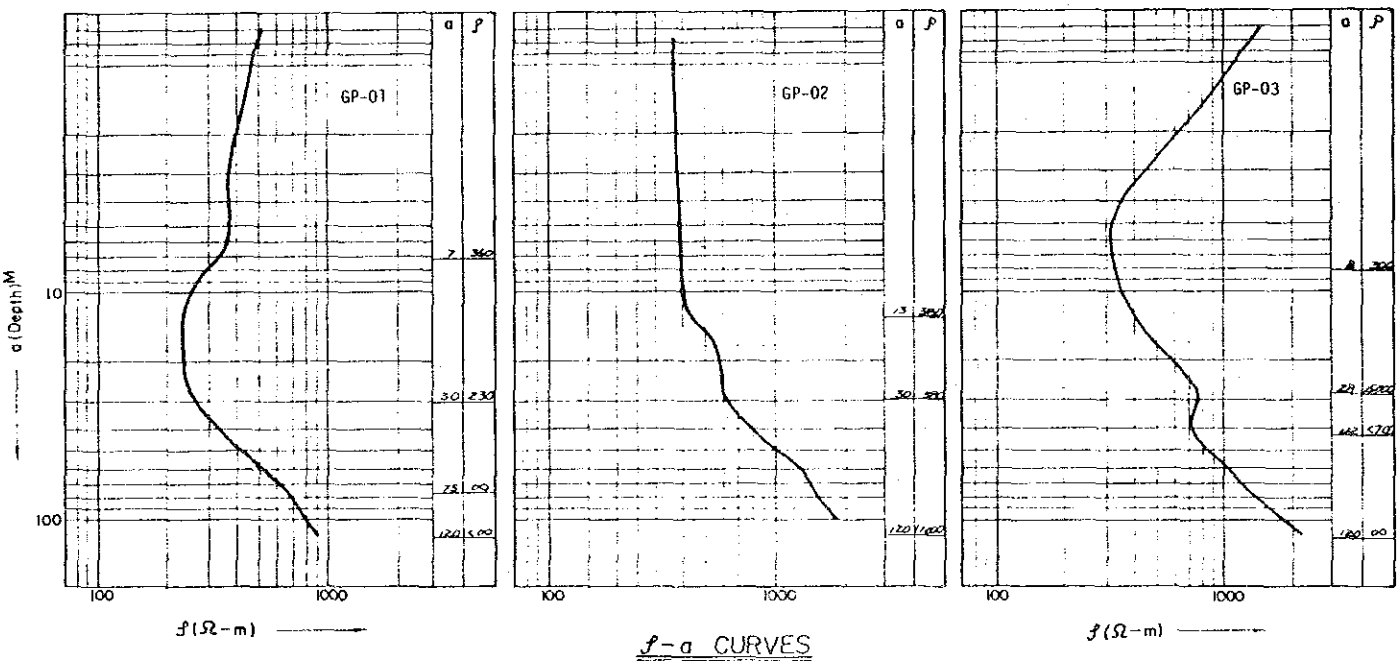
Consists of banded Gneiss, Granite and Dolerite dyke. They have faults in NW trend and airphoto trend lines in N60°E strike. Soil consists of light brown, coarse grained sand with gravel.

Points of geophysical survey:

Arranged on the contact shear zone of Dolerite dyke.



PROSPECTING PROFILE



ρ－a CURVES

Explanation

Topography:

Flat plane.

Vegetation:

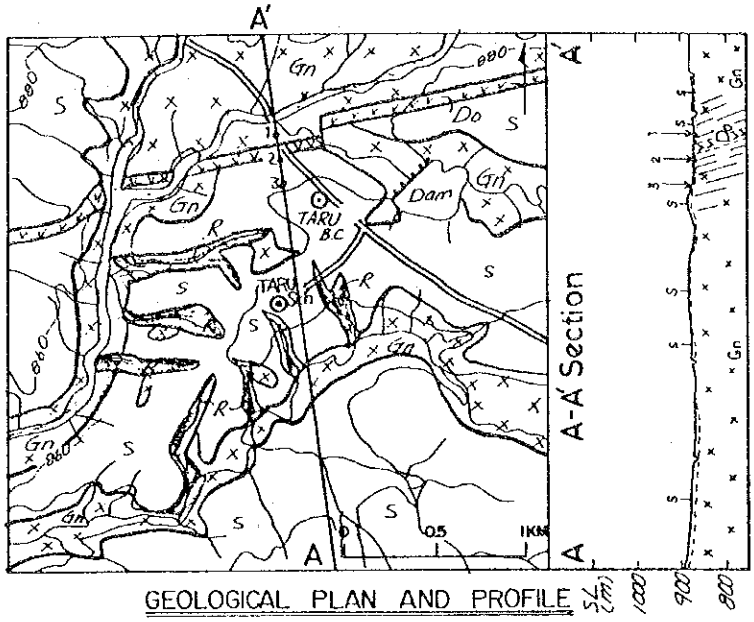
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

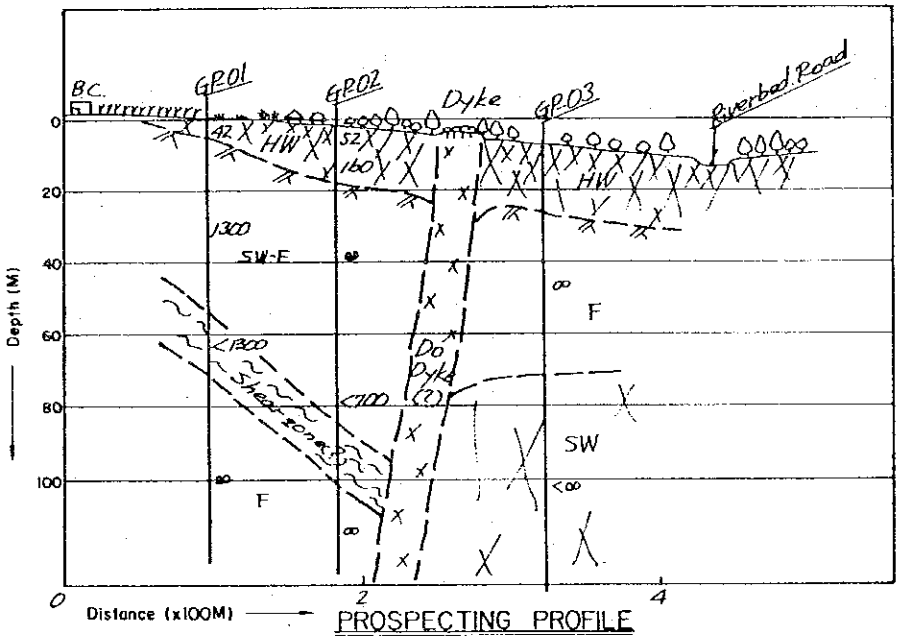
Consists of massive granulitic Gneiss and Dolerite dyke.

Points of geophysical survey:

Arranged on the contact shear zone of Dolerite dyke. This zone has many joints and Quartz vein in N30°E trend.



GEOLOGICAL PLAN AND PROFILE



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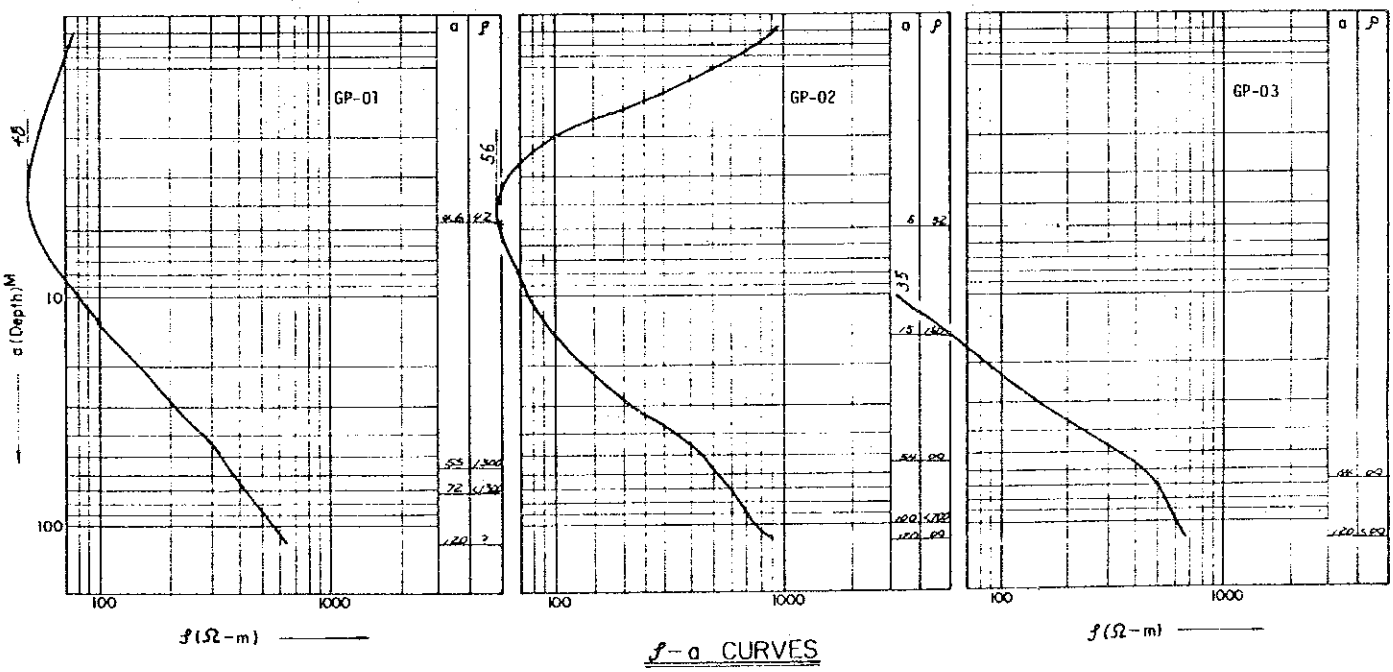


ρ - a CURVES

図3-2-11 GEOLOGICAL SURVEY (NAME OF SITE : BELLA Sch. (JF08))

Explanation

Topography:

Flat plane.

Vegetation:

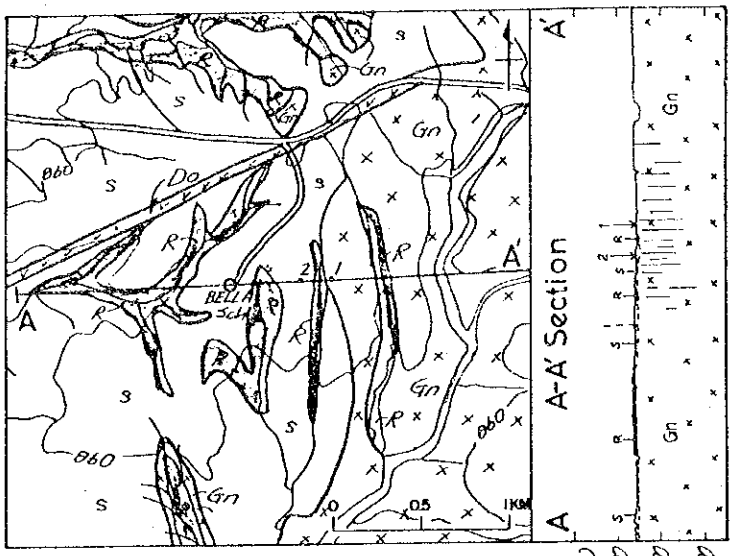
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

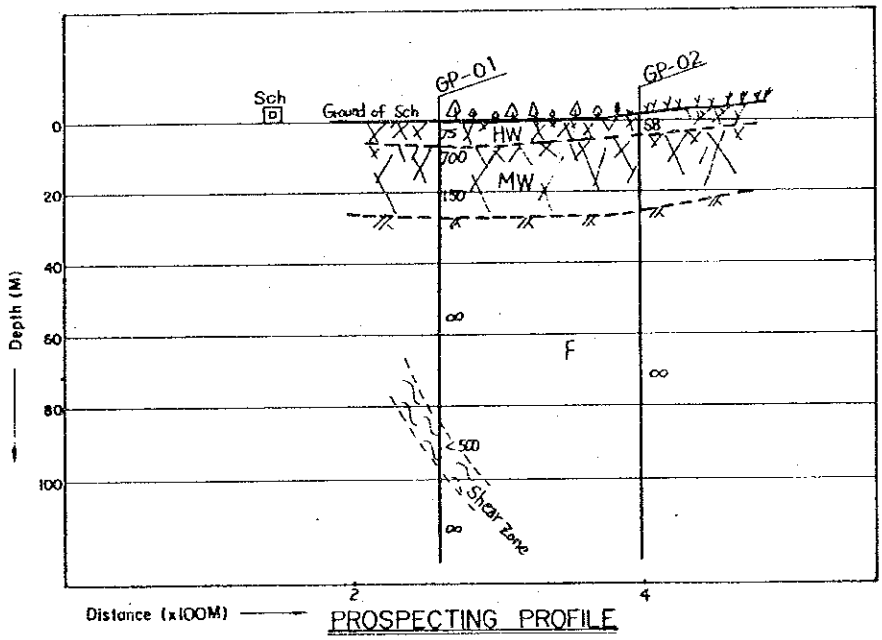
Consists of massive, granulitic Gneiss and Dolerite dyke. Dolerite dyke is blocky.

Points of geophysical survey:

Arranged in a depression which has moist soil and joints.



GEOLOGICAL PLAN AND PROFILE



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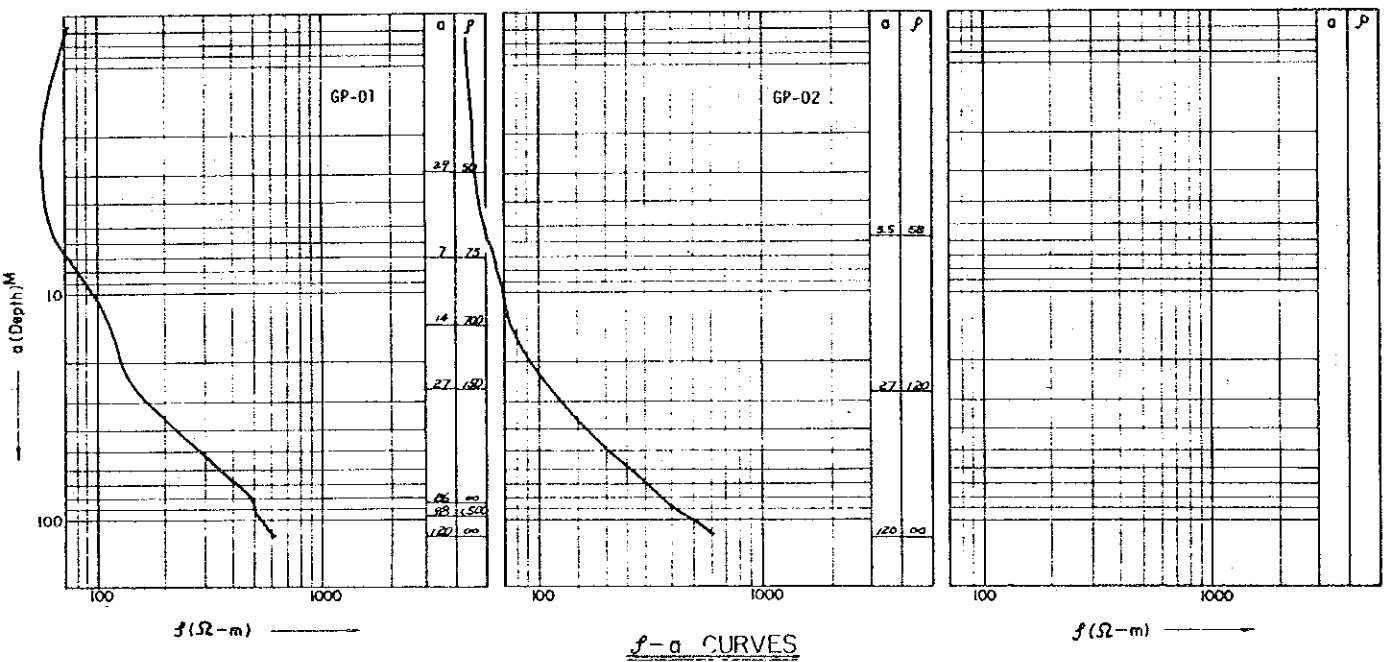
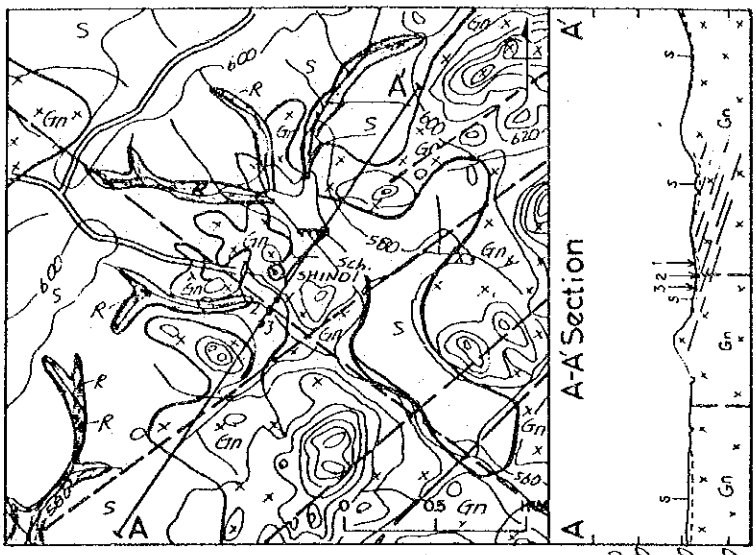


ρ-a CURVES



GEOLOGICAL PLAN AND PROFILE

Explanation

Topography:

On the north-west side flat plane, and on the south-east side hilly. The drainage system is of parallel pattern and the major streams run and erode the ground faults.

Vegetation:

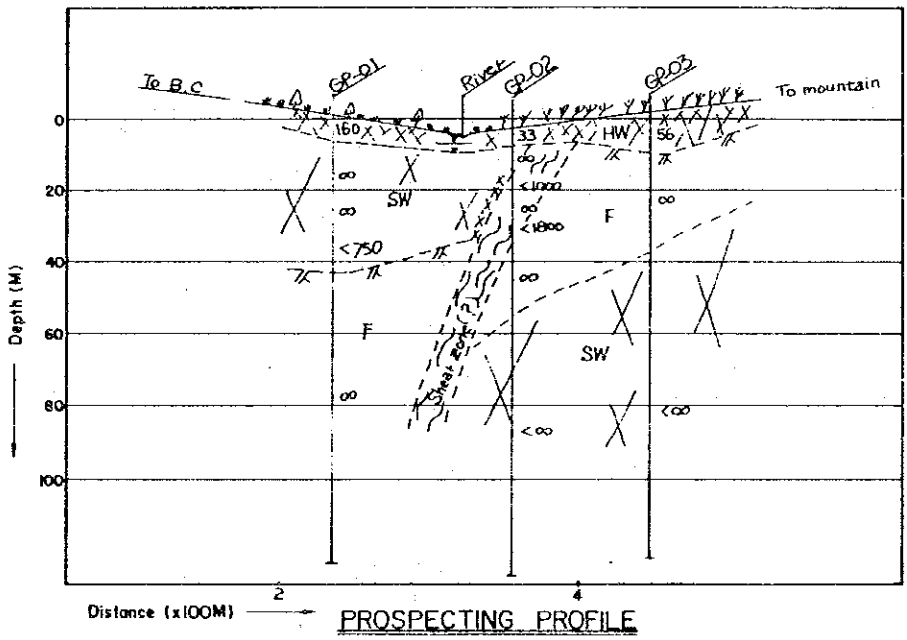
Cultivation and rock area 65%, sparse bush area 35%.

Geology:

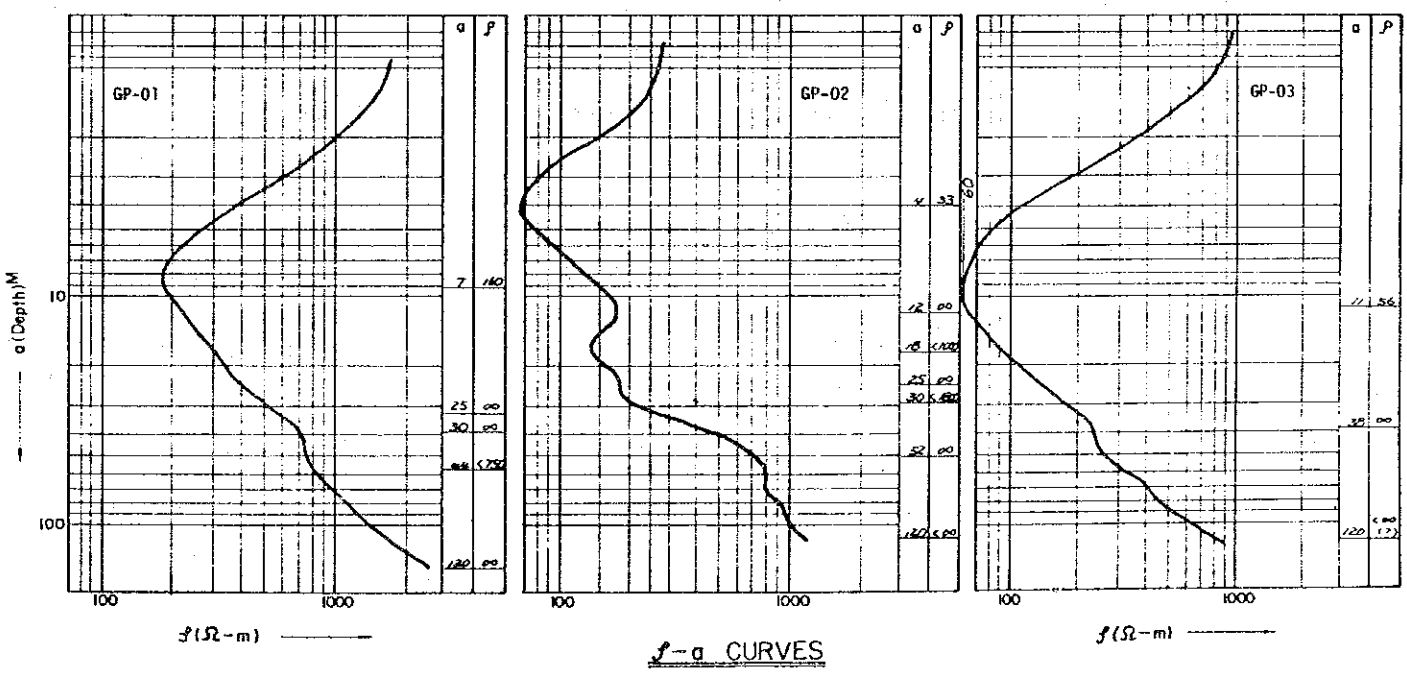
Consists of massive, granulitic Gneiss which has NE airphoto trend line. The major faults trend NW and NE. Soil consists of light greyish, medium grained sand.

Points of geophysical survey:

Arranged in a depression and on the shear zone of the fault.



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

Hilly. These hills have smooth, steep flanks formed by exfoliation. The major streams run and erode the ground faults. BIRI River forms a V-shaped valley.

Vegetation:

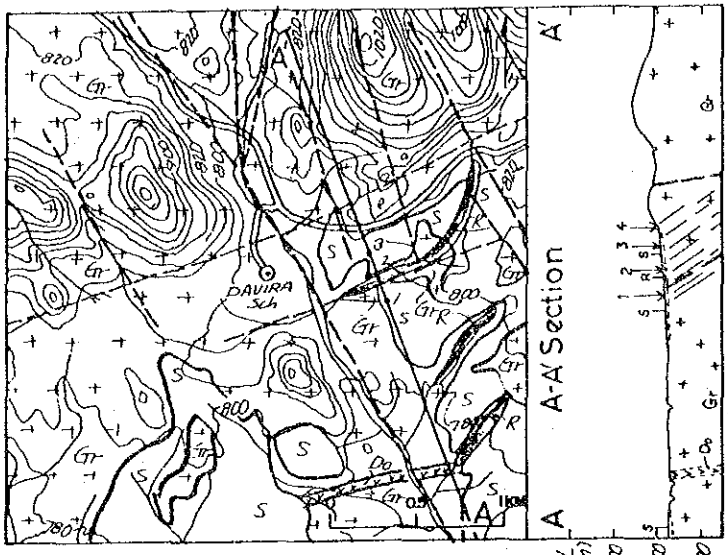
Cultivation and rock 40%, sparse bush area 60%.

Geology:

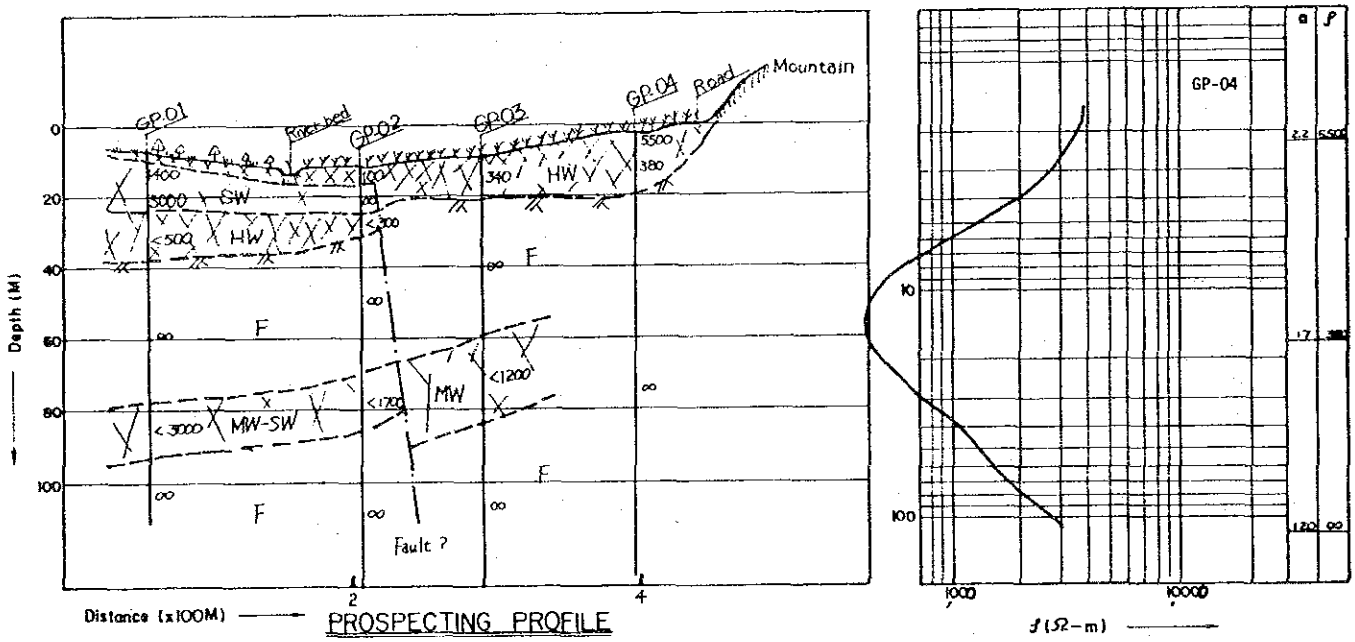
Consists of massive, potash Granite which has many major faults of NNW and EW trends. Soil consists of reddish, coarse grained sand.

Points of geophysical survey:

Arranged in a depression which has moist soil and is on the shear zone of the fault. Rock of this point is blocky.



GEOLOGICAL PLAN AND PROFILE



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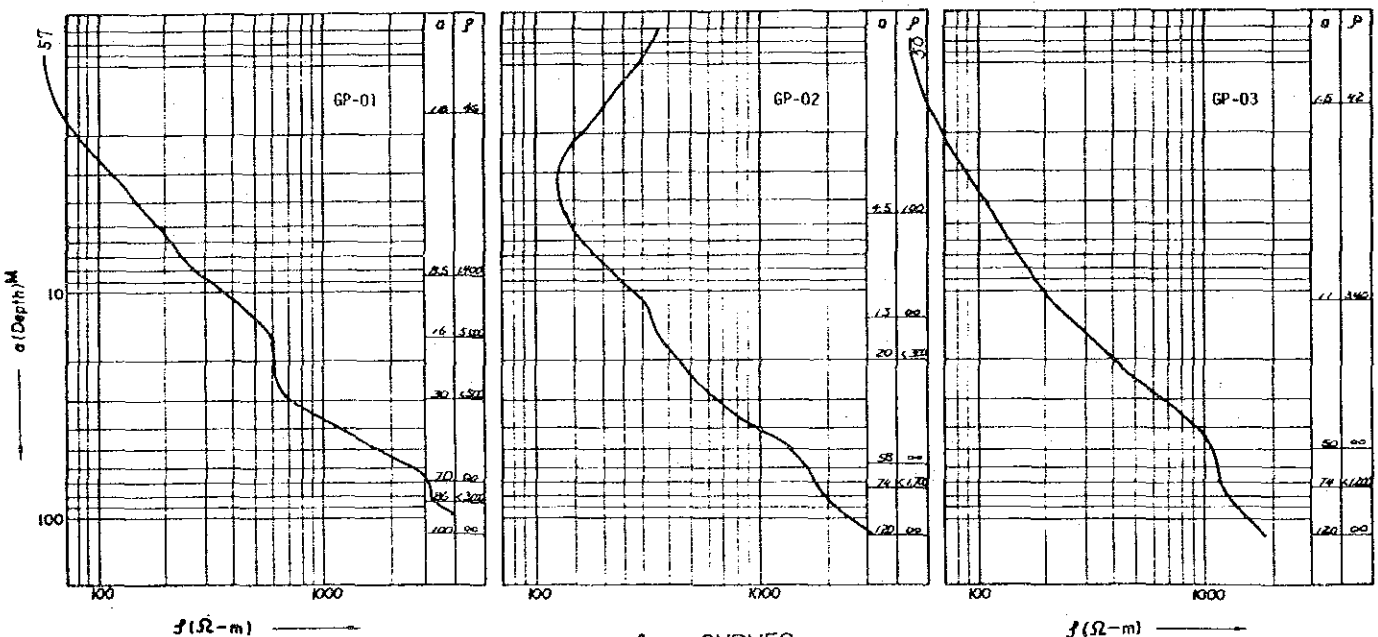


ρ-σ CURVES

図3－2－11 GEOLOGICAL SURVEY NAME OF SITE : DAVIRA B.C. (JF11)

Explanation

Topography:

Hilly. Dwalas have smooth, steep flanks formed by exfoliation. The streams run and erode the ground along faults, and drainage system is of parallel pattern.

Vegetation:

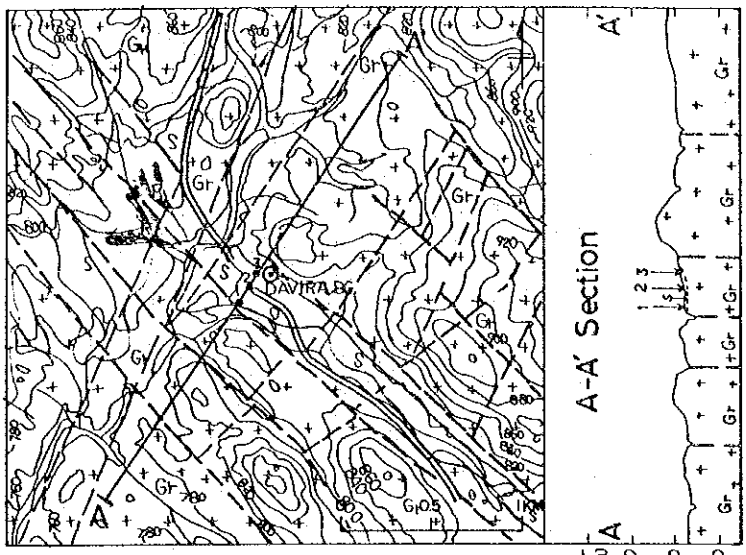
Cultivation area 10%, dense bush area 90%.

Geology:

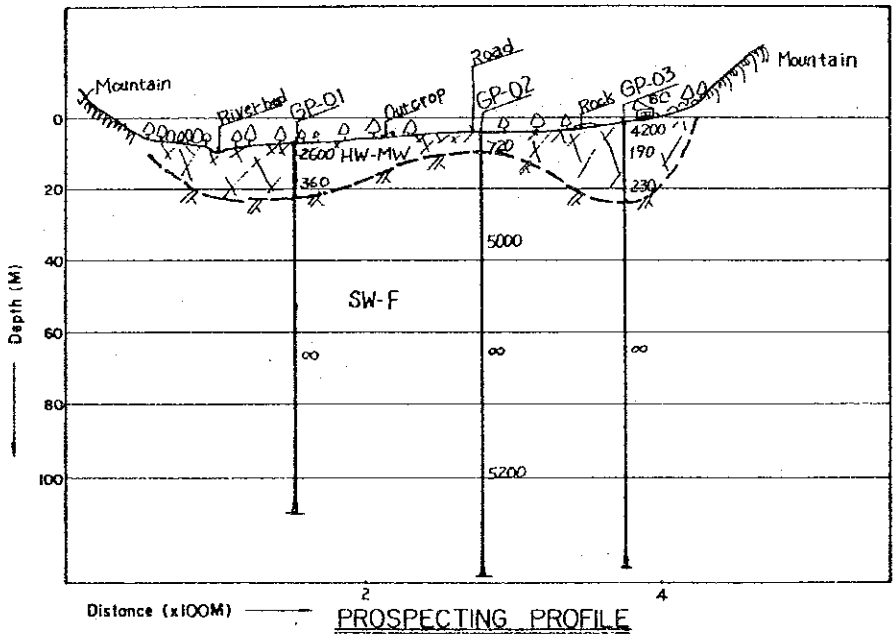
Consists of massive, potash Granite which has many major faults in NW and NE trends.

Points of geophysical survey:

Arranged on the shear zone of the faults.



GEOLOGICAL PLAN AND PROFILE



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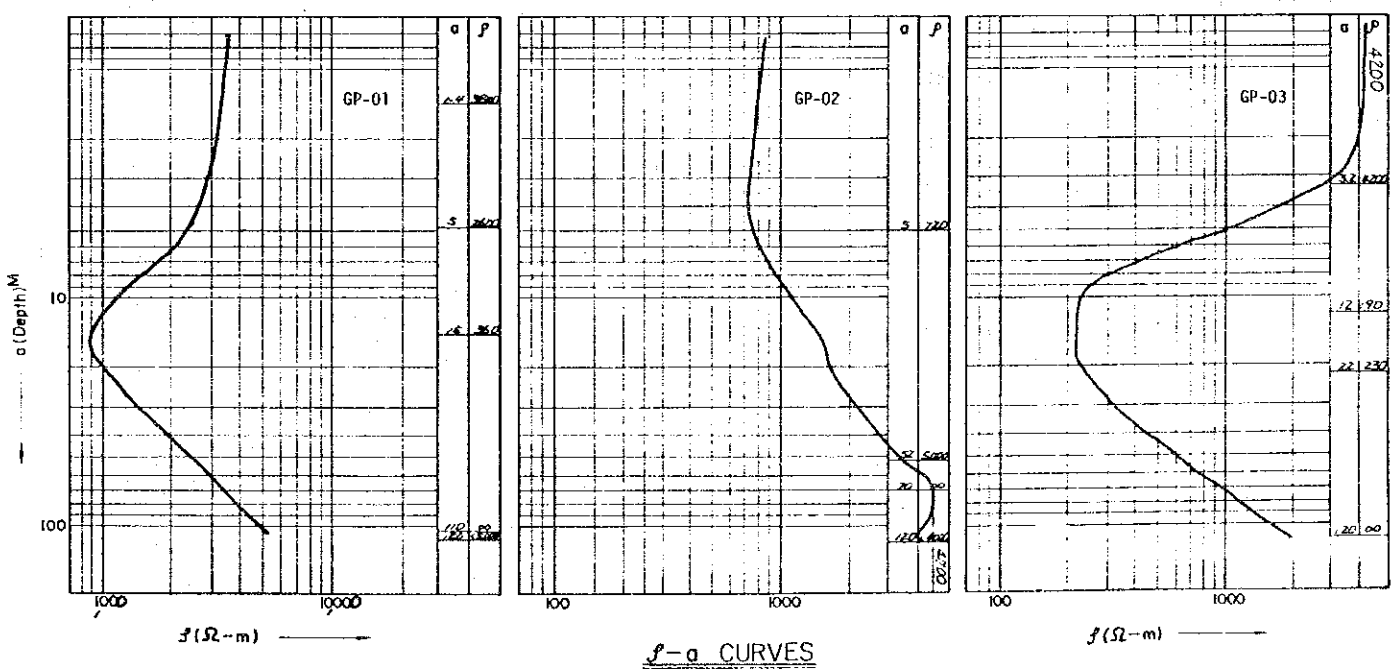
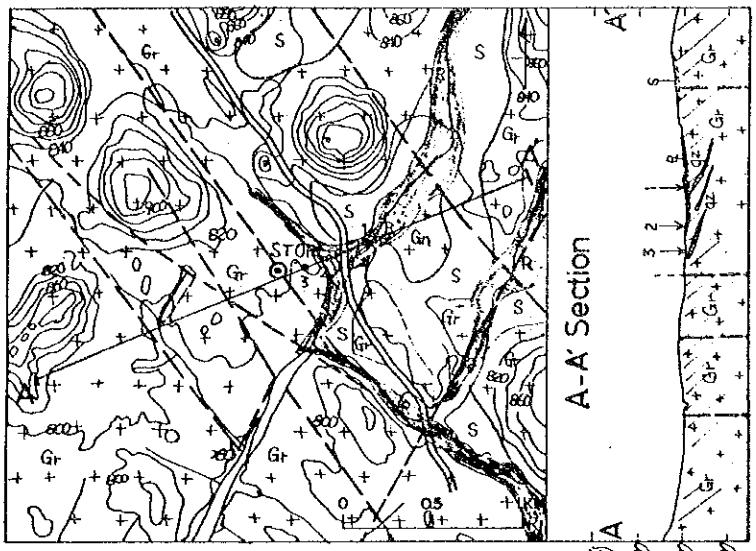


ρ－a CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : STORE (JF12)



GEOLOGICAL PLAN AND PROFILE

Explanation

Topography:

Hilly. The major streams run and erode the ground along faults, and drainage system is of parallel pattern.

Vegetation:

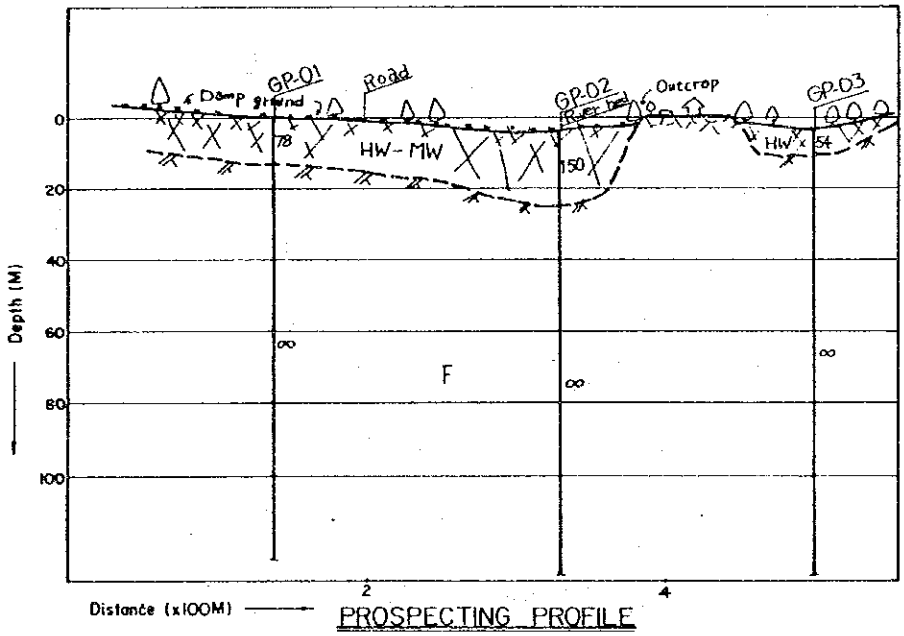
Cultivation area 15%, sparse bush area 85%.

Geology:

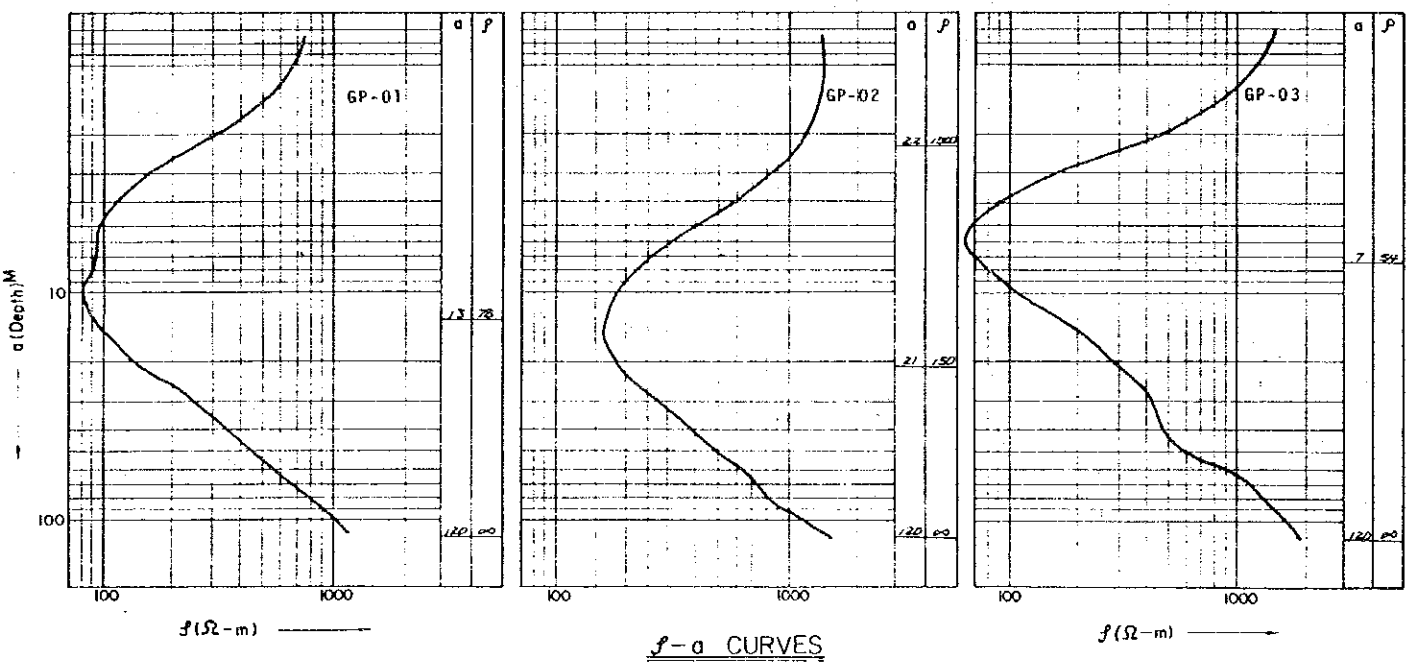
Consists of massive, potash Granite which has many major faults in NW and NE trends. These rocks have joints and many small quartz veins.

Points of geophysical survey:

Arranged on the shear zone of the faults and Quartz vein.



PROSPECTING PROFILE



ρ - a CURVES

Explanation

Topography:

Plane, and rocks outcrop in a limited area.

Vegetation:

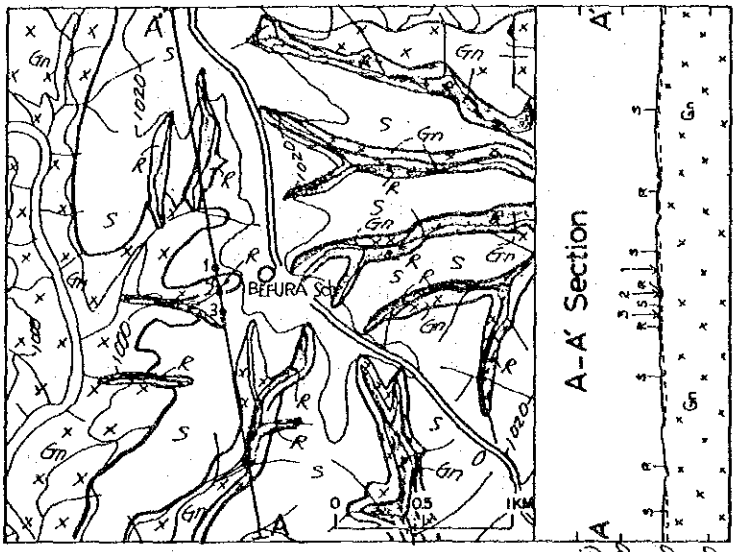
Cultivation area 65%, sparse bush area 35%.

Geology:

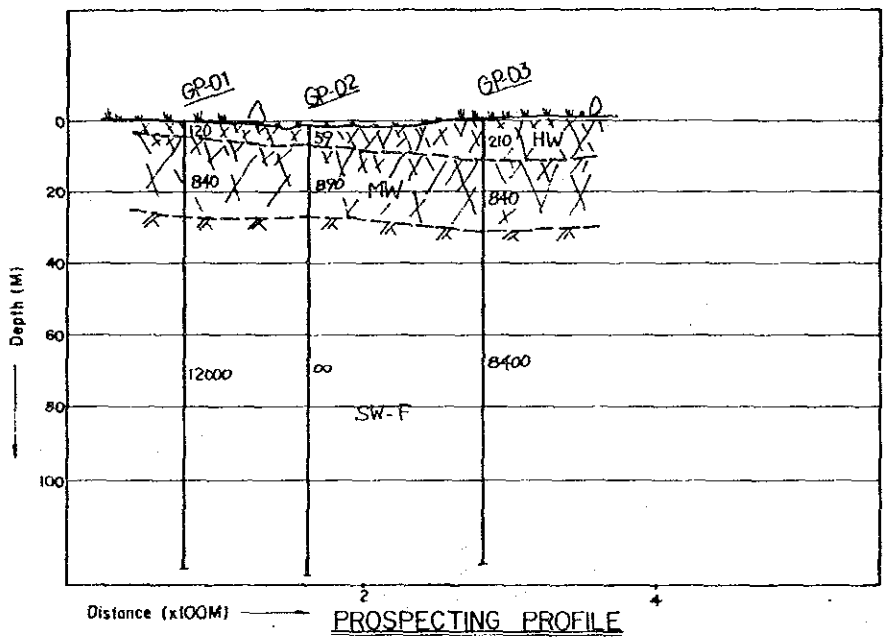
Consists of massive, tonalitic Gneiss which is covered mostly by greyish, medium grained sand.

Points of geophysical survey:

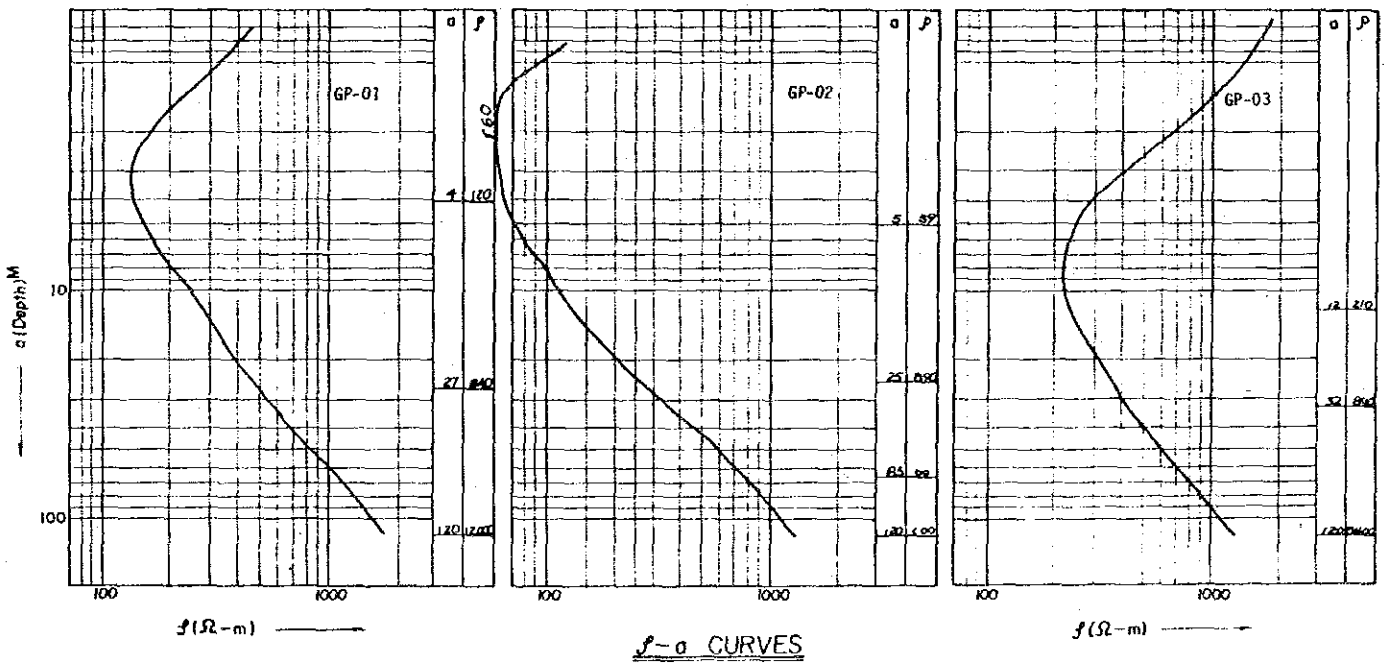
Arranged in a depression which has moist soil and Quartz vein.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

Hilly, Dwalas and bornhardts occur at places. Dolerite dyke and Ultramafic rock effect strongly main stream.

Vegetation:

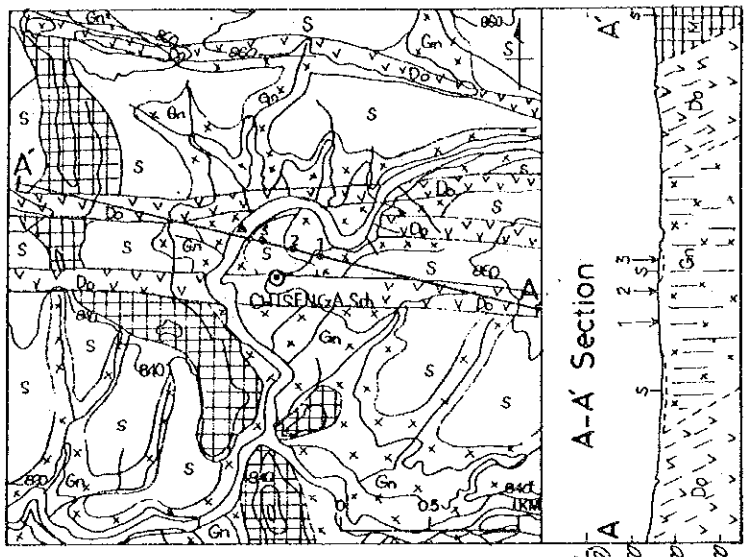
Cultivation area 45%, sparse bush area 55%.

Geology:

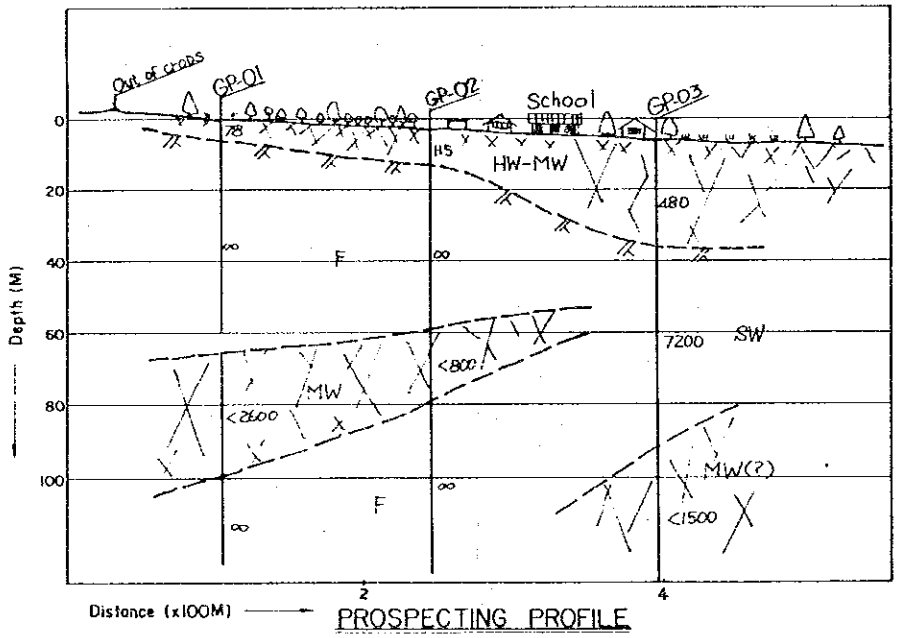
Consists of potash Granite, tonalitic Gneiss, Dolerite dyke and Ultramafic rock. Soil consists of reddish brown, fine to medium grained sand.

Points of geophysical survey:

Arranged on the contact shear zone of Dolerite dyke.



GEOLOGICAL PLAN AND PROFILE



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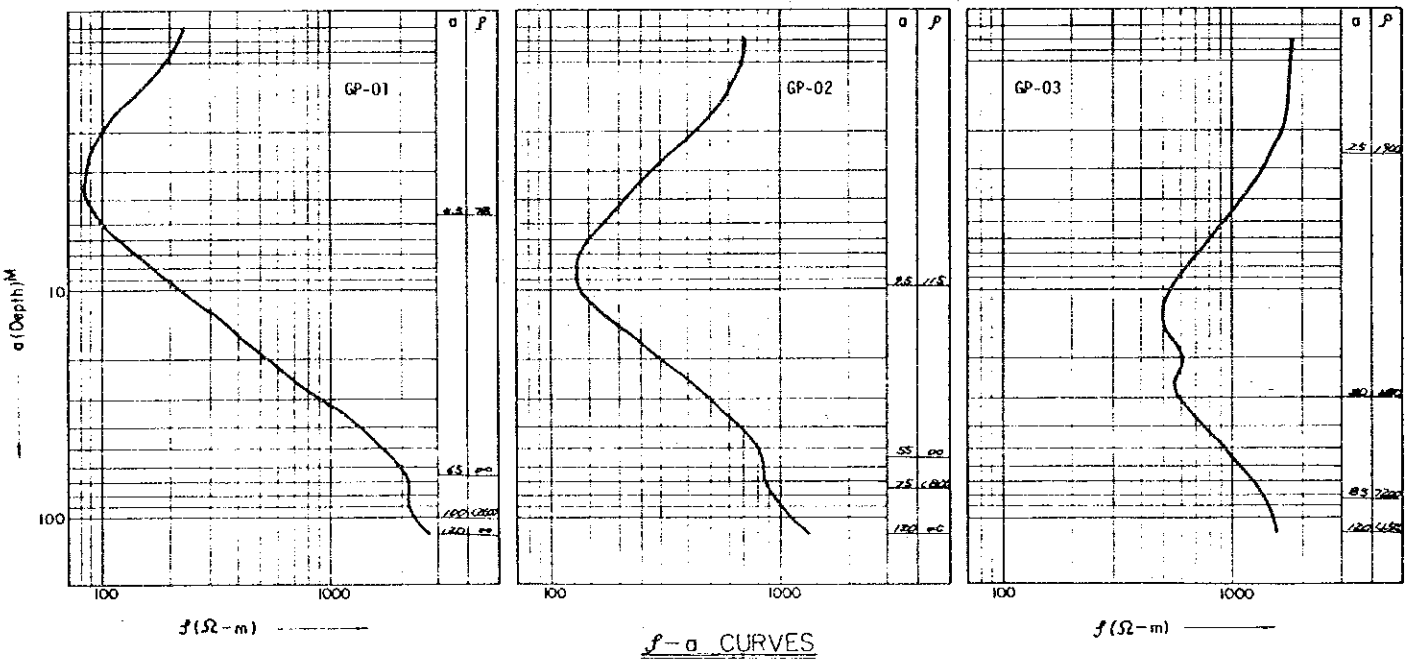


ρ-σ CURVES

図3－2－11 GEOLOGICAL SURVEY NAME OF SITE : MADZIVADONDO B.C. (JF15)

Explanation

Topography:

Comparatively rounded plane, but castle koppies occur at places.

Vegetation:

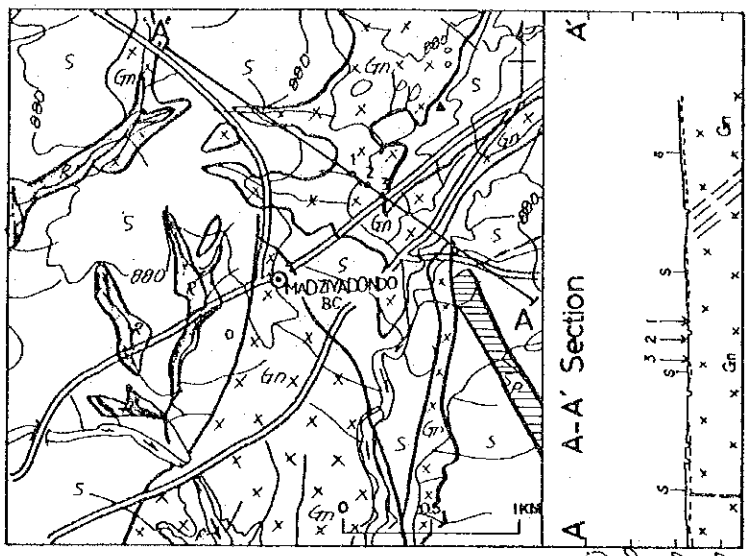
Cultivation and rock area 45%, sparse bush area 55%.

Geology:

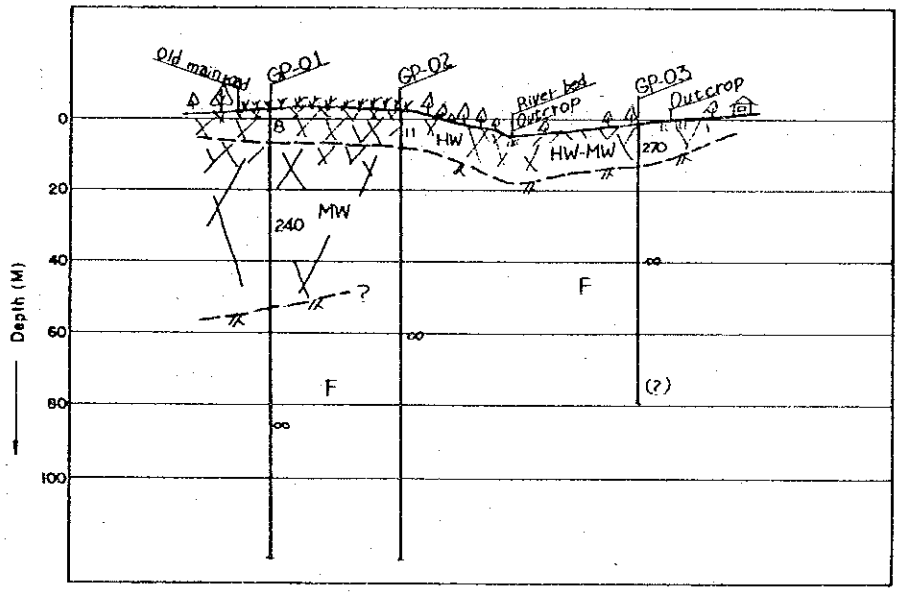
Consists of massive, granitic Gneiss and Serpentinite. Soil consists of light of grey, fine grained sand.

Points of geophysical survey:

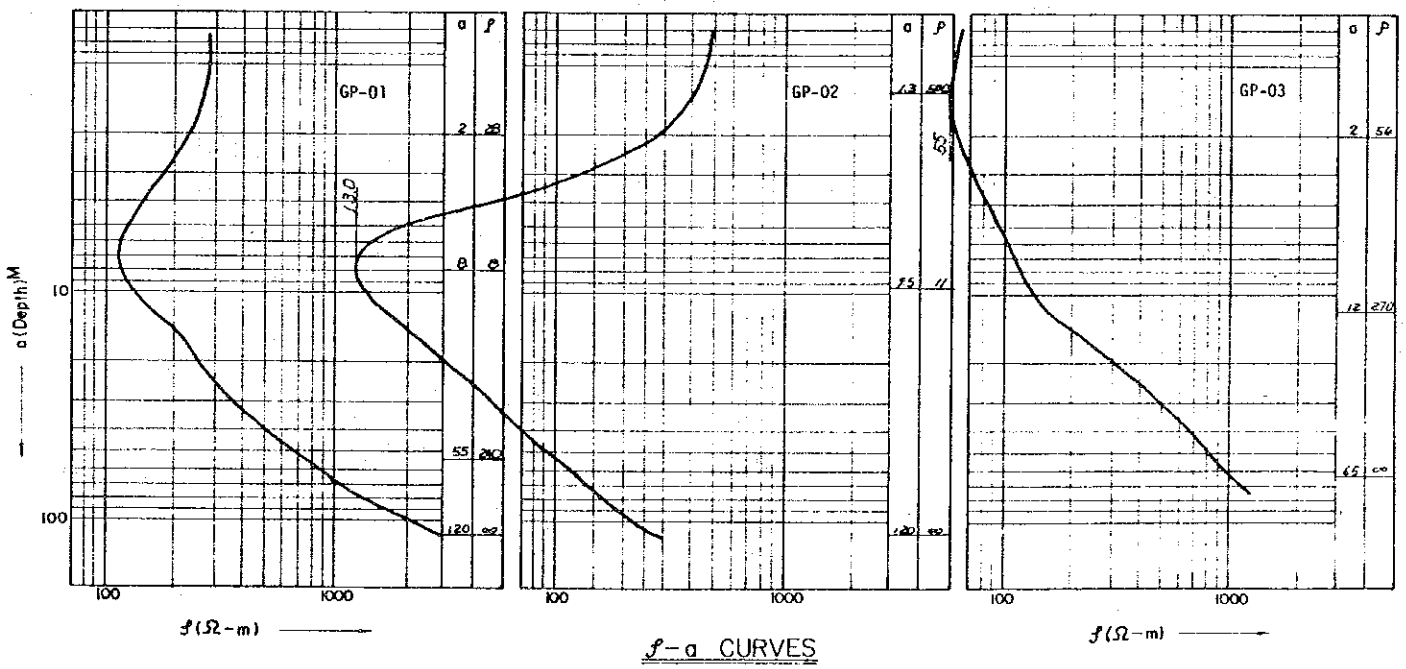
Arranged in a depression in a wide watershed.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ－a CURVES

Explanation

Topography:

Comparatively rounded plane, and slopes gently southward. Exposures of rocks are confined to limited area.

Vegetation:

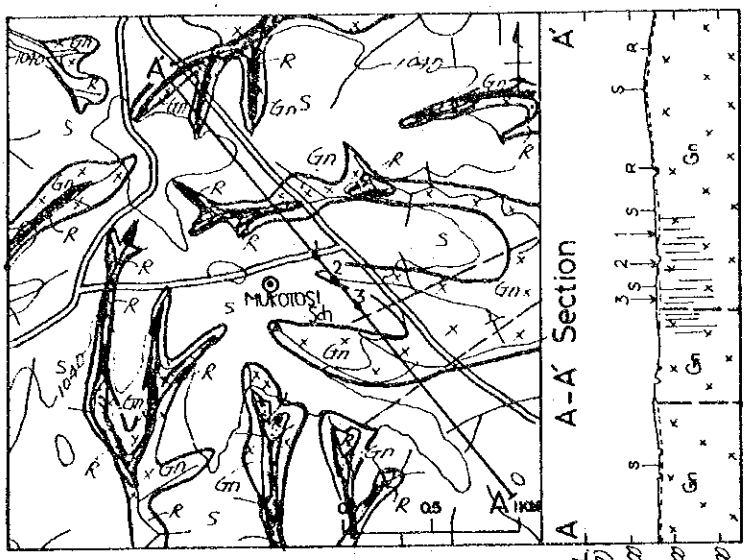
Cultivation and rock area 65%, sparse bush area 35%.

Geology

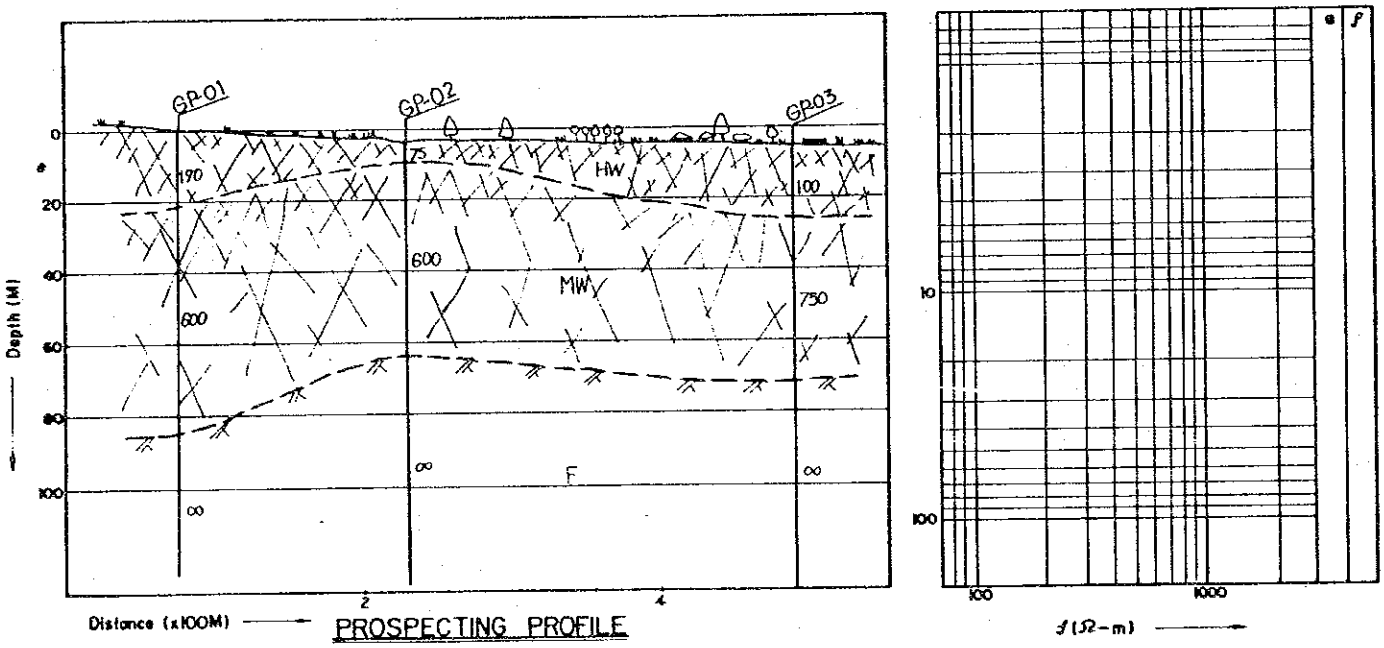
Consists of massive tonalitic Gneiss. Soil consists of yellowish grey, medium grained sand.

Points of geophysical survey:

Arranged in a depression which has moist soil and is on the shear zone of the fault.



GEOLOGICAL PLAN AND PROFILE



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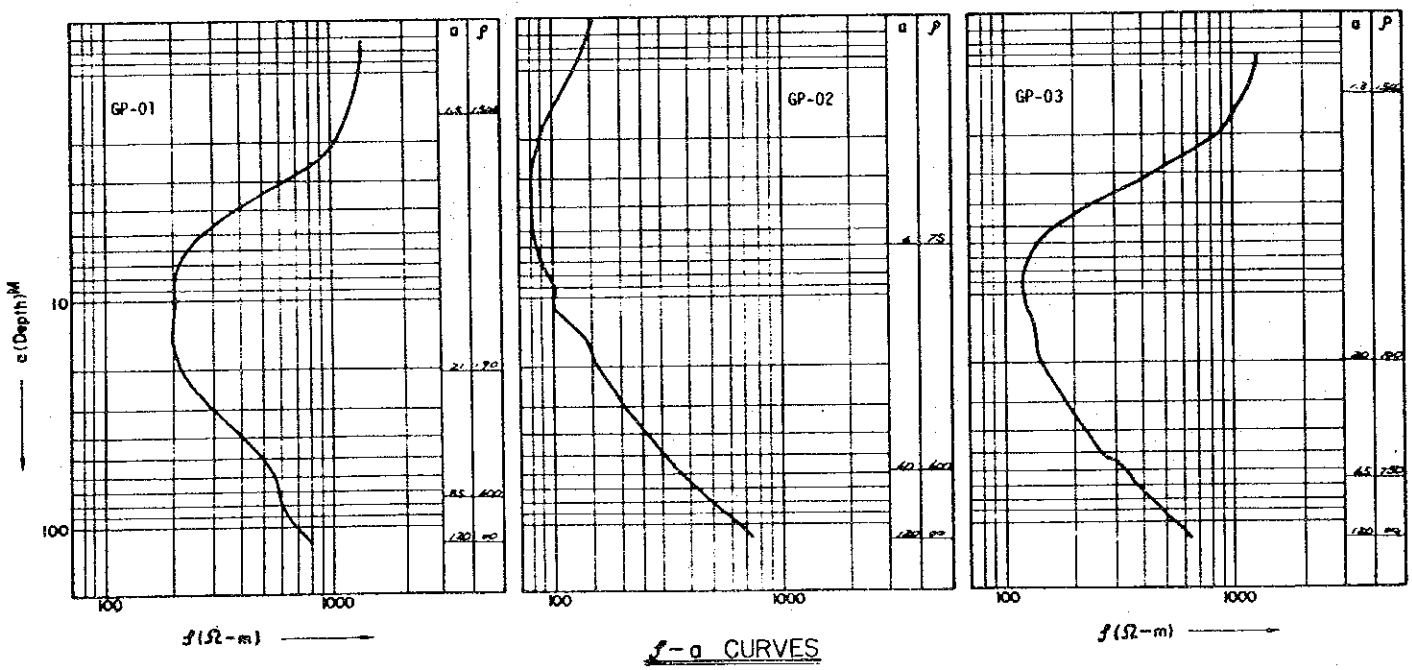


ρ-a CURVES

Explanation

Topography:

Comparatively rounded plane, and slopes gently to the RUNDE Rv. Dwalas occur at places.

Vegetation:

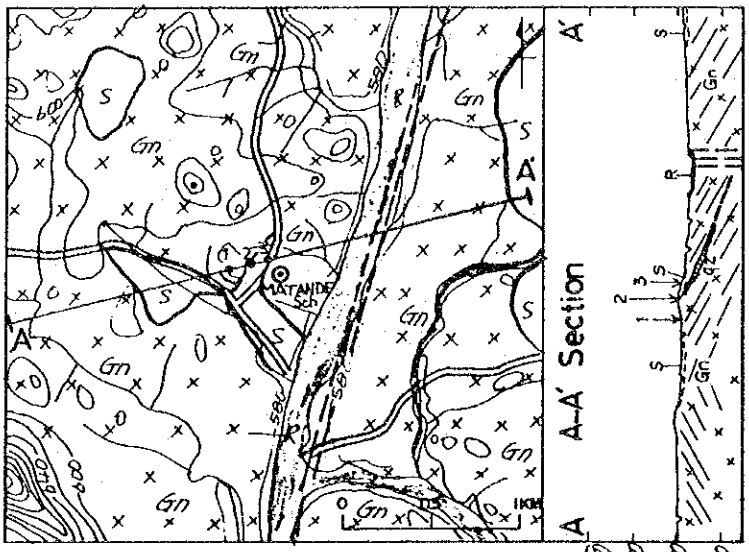
Cultivation area 10%, sparse bush area 90%.

Geology:

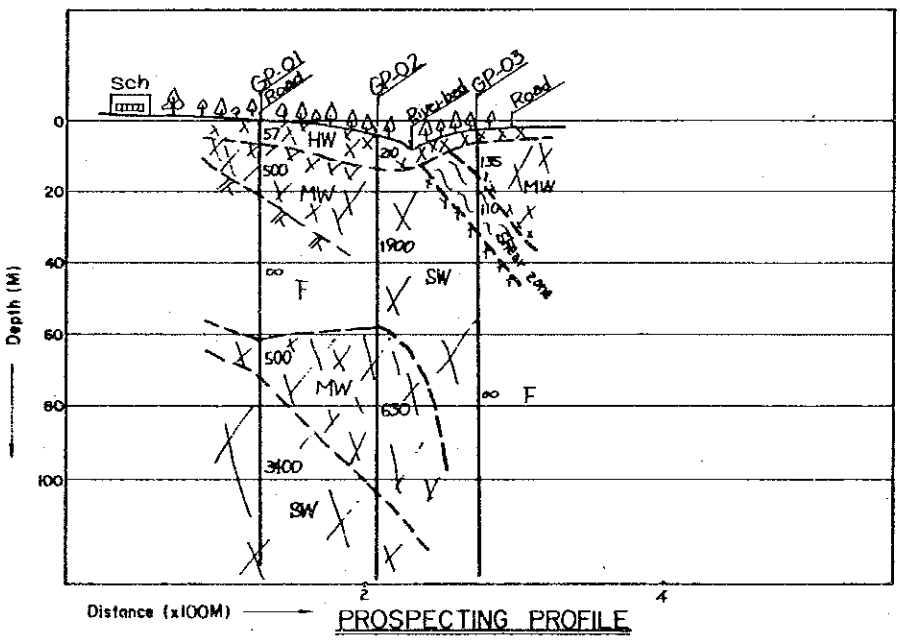
Consists of granulitic Gneiss which has joints and airphoto trend line in NE strike. There is a major fault in a direction parallel to the RUNDE Rv. Soil consists of light grey, medium to coarse sand.

Points of geophysical survey:

Arranged in a depression which has joints, thin vein of Quartz and Serpentinite.



GEOLOGICAL PLAN AND PROFILE



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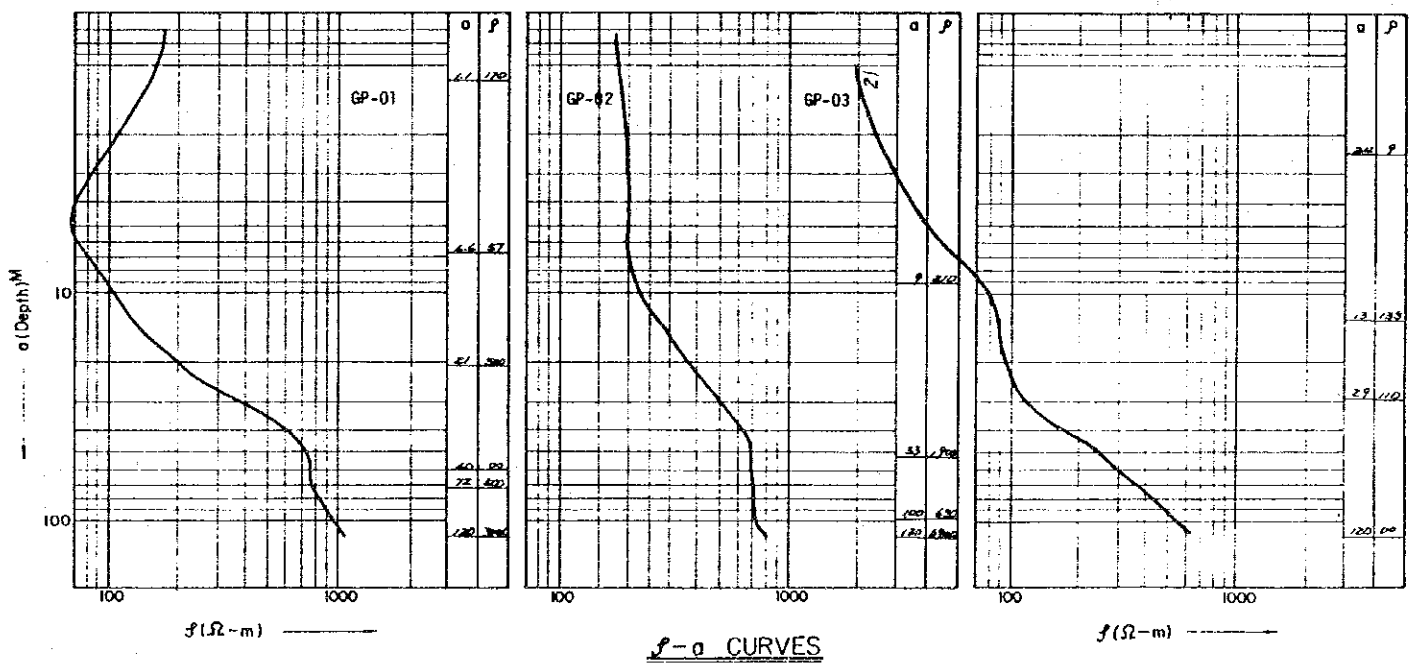


ρ-a CURVES

図3-2-11 GEOLOGICAL SURVEY NAME OF SITE : MASOGWE Sch. (JG02)

Explanation

Topography:

Comparatively rounded plane, and dwalas occur at places.

Vegetation:

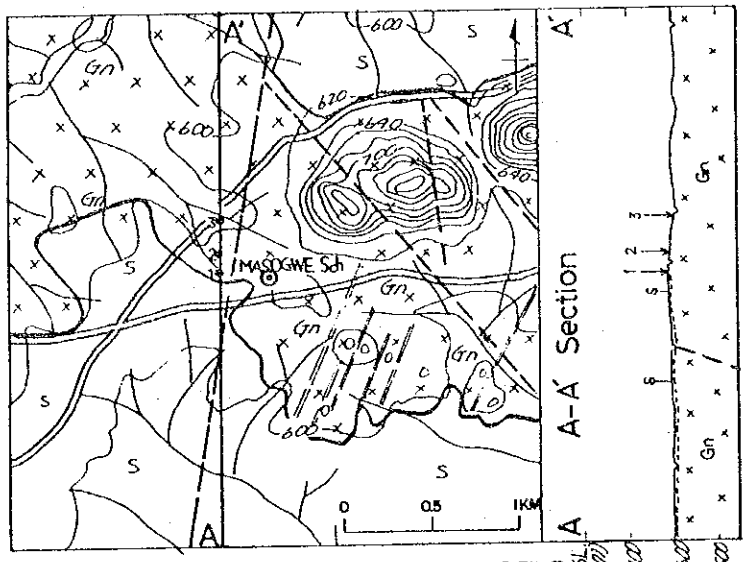
Cultivation area 50%, sparse bush area 50%.

Geology:

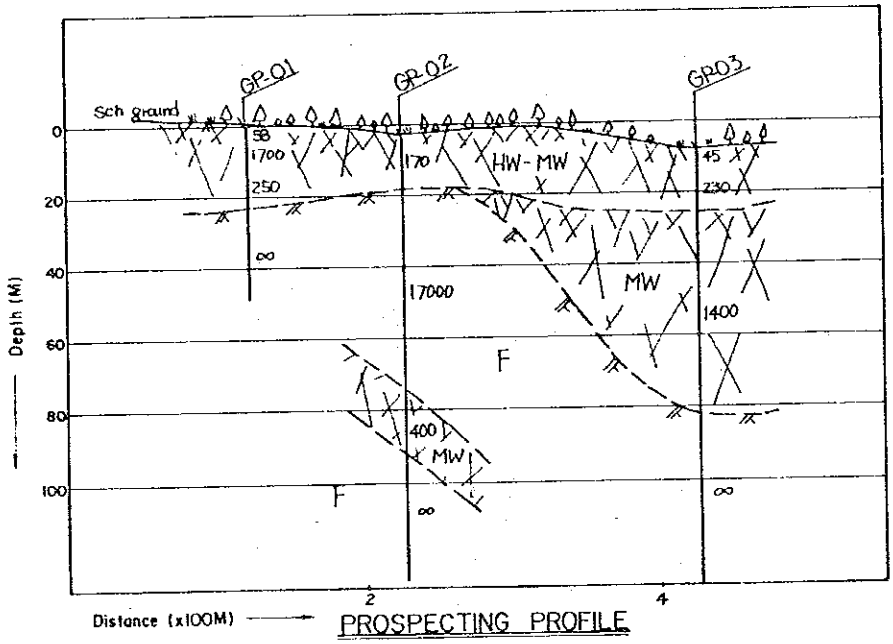
Consists of massive, granulitic Gneiss which has faults and airphoto trend lines in NW and NE strikes. Soil consists of light grey, fine grained sand.

Points of geophysical survey:

Arranged in a depression which has joints and thin veins of Quartz.



GEOLOGICAL PLAN AND PROFILE



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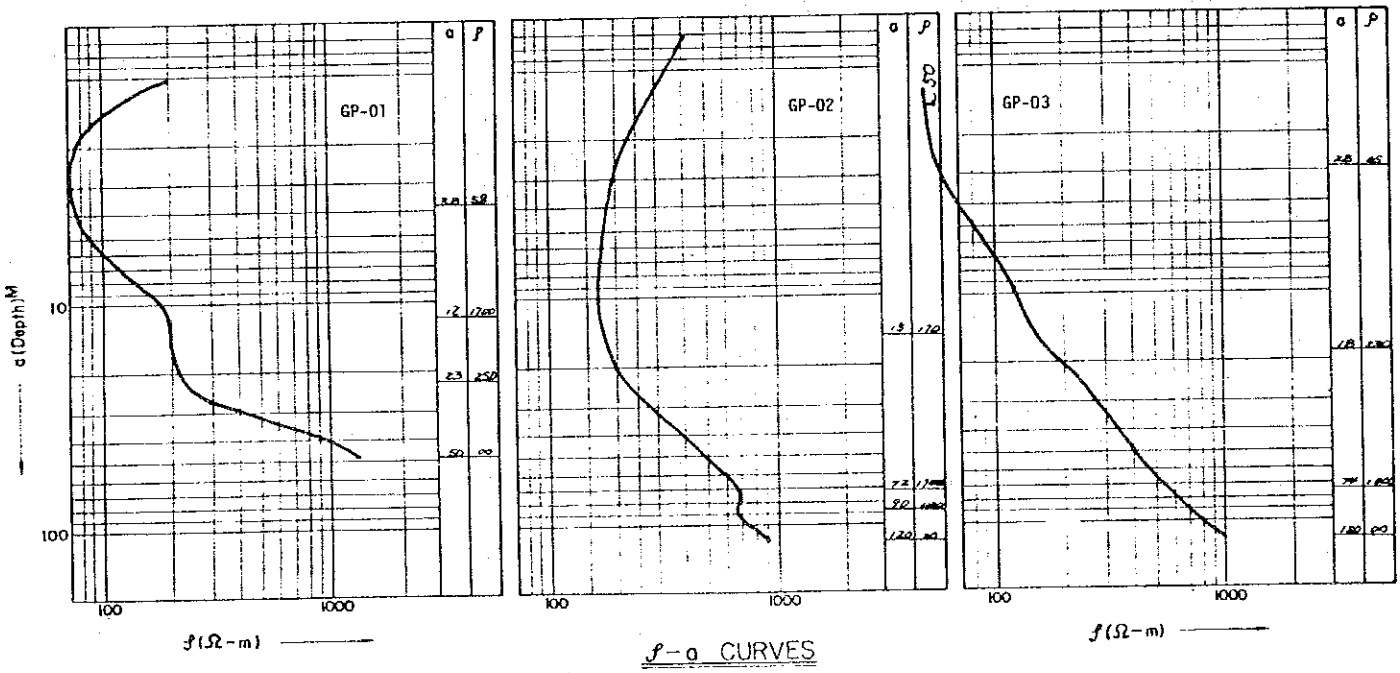


ρ - a CURVES

Explanation

Topography:

Comparatively rounded plane, and dwalas and castle koppies occur at places.

Vegetation:

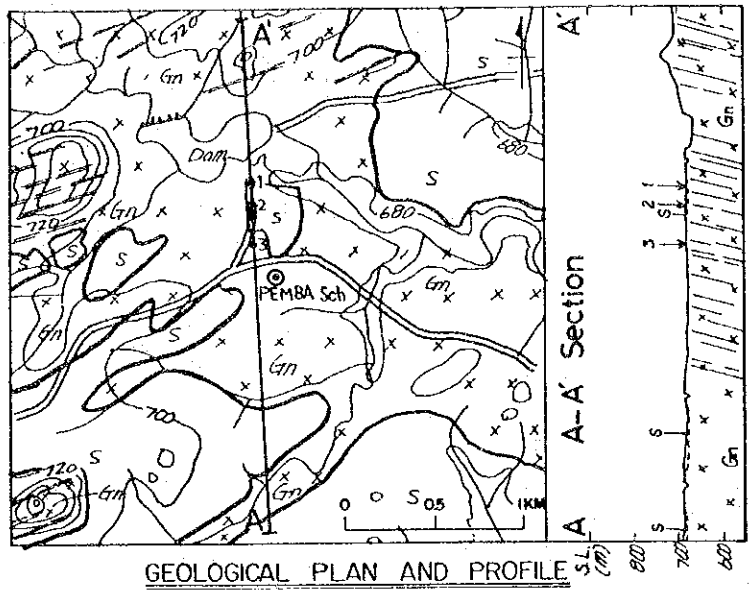
Cultivation area 40%, sparse bush area 60%.

Geology:

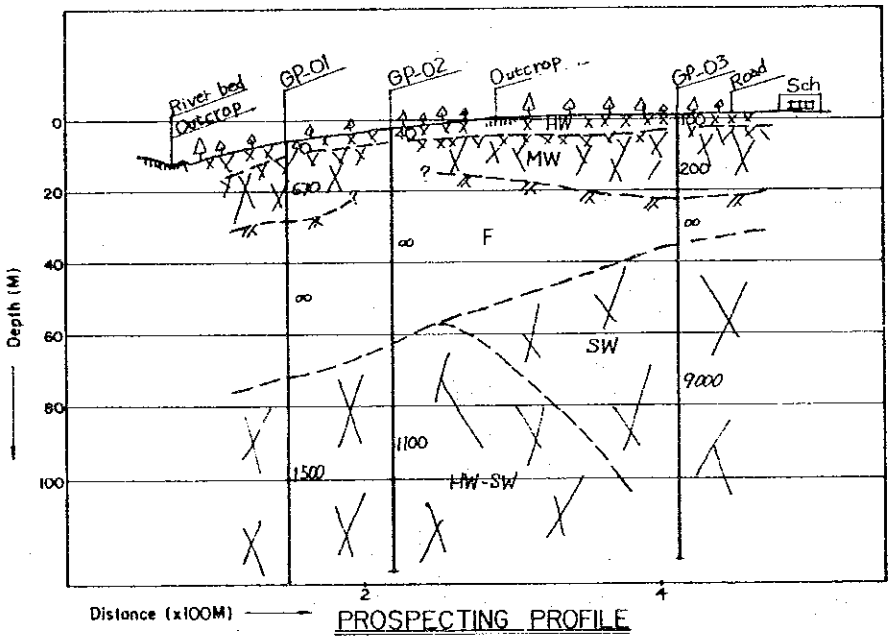
Consists of massive, tonalitic Gneiss which has airphoto trend lines in WNW strike.

Points of geophysical survey:

Arranged in a depression which has moist soil, joints and thin Quartz veins.



GEOLOGICAL PLAN AND PROFILE



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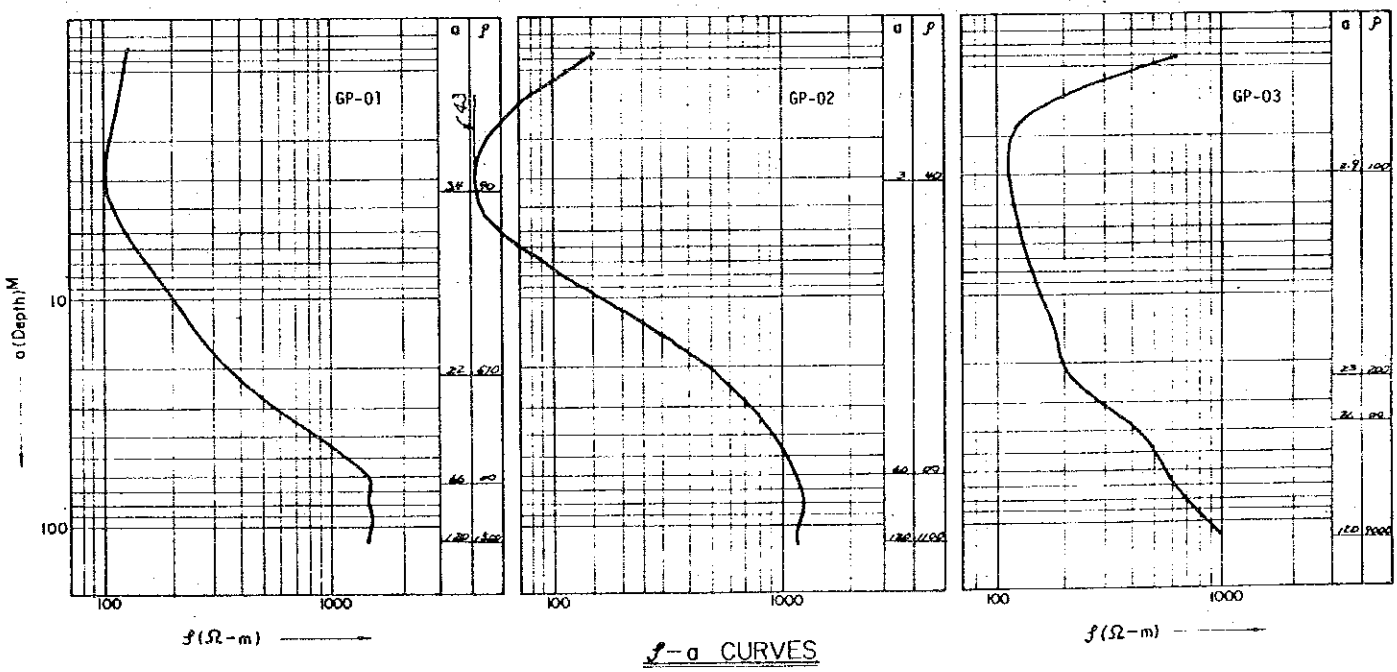


ρ - a CURVES

Explanation

Topography:

Comparatively rounded plane, and dwalas and castle koppies occur at places.

Vegetation:

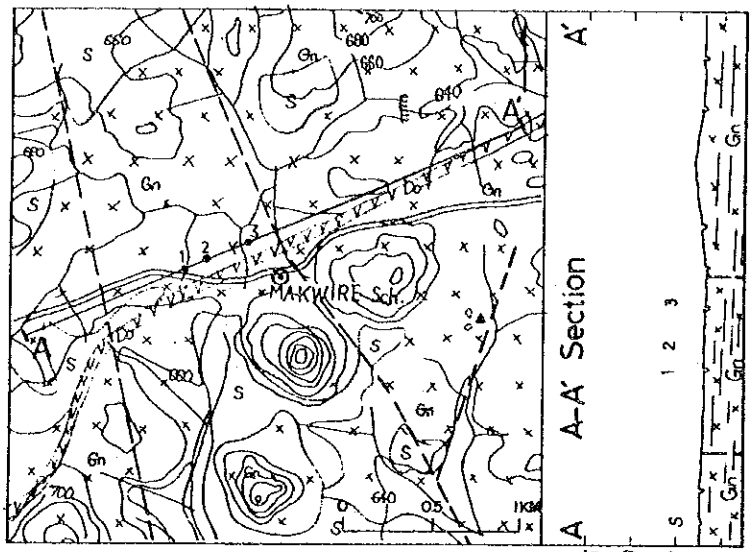
Cultivation area 30%, sparse bush area 70%.

Geology:

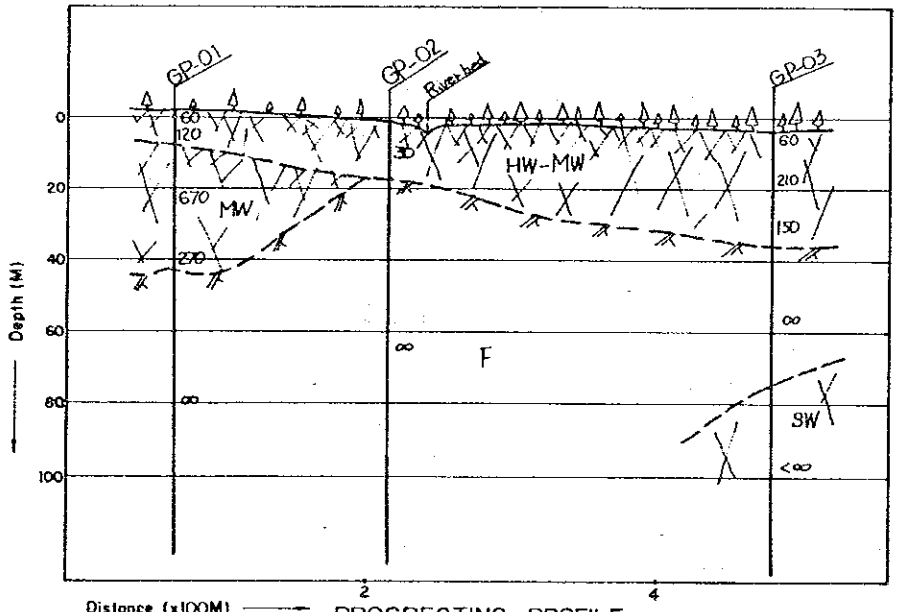
Consists of tonalitic Gneiss and Dolerite dyke. Gneiss has airphoto trend lines in NE strike, major faults in NNW strike. This rock has many joints.

Points of geophysical survey:

Arranged in a depression which has moist soil and on the contact shear zone of Dolerite dyke and faults.



GEOLOGICAL PLAN AND PROFILE



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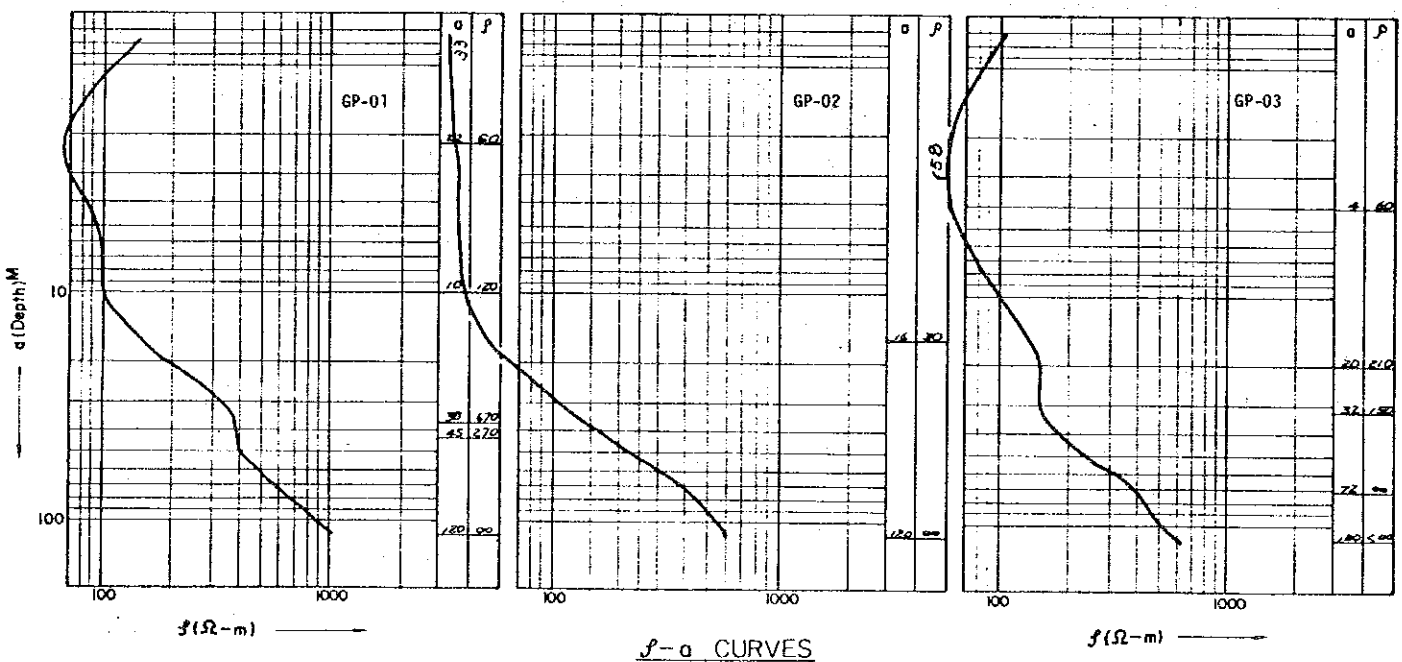


ρ-a CURVES

Explanation

Topography:

Comparatively rounded plane, dwalas and bornhardts occur at places.

Vegetation:

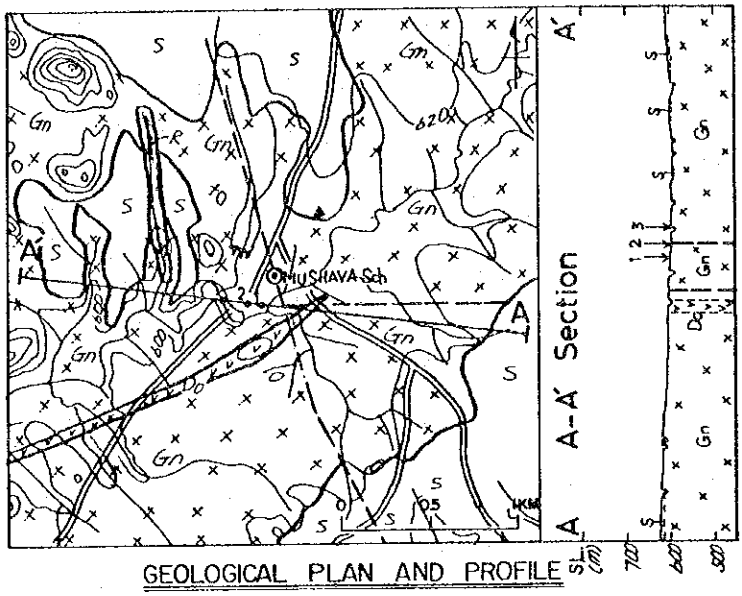
Cultivation area 25%, sparse bush area 75%.

Geology:

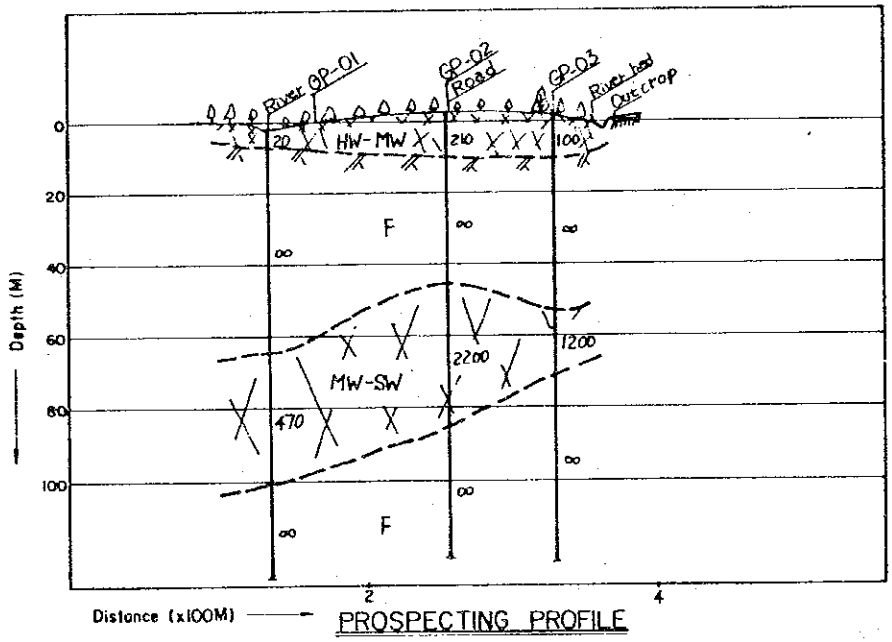
Consists of granulitic Gneiss and Dolerite dyke. Gneiss has major faults in NNW and EW strike. Soil consists of reddish grey, grained sand.

Points of geophysical survey:

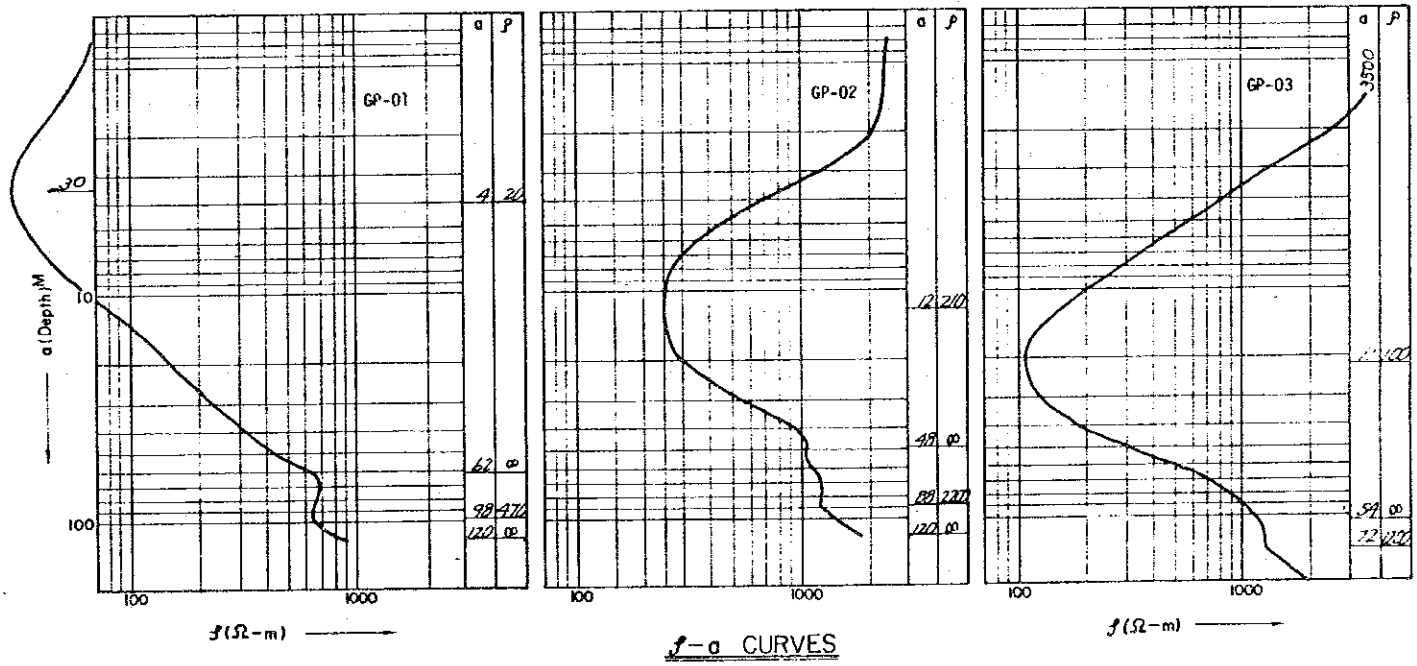
Arranged in a depression and on the contact shear zone of Dolerite dyke and faults.



GEOLOGICAL PLAN AND PROFILE



PROSPECTING PROFILE



ρ-a CURVES

Explanation

Topography:

Hilly, dwalas, and castle koppies occur at places. Rocks outcrop well.

Vegetaiton:

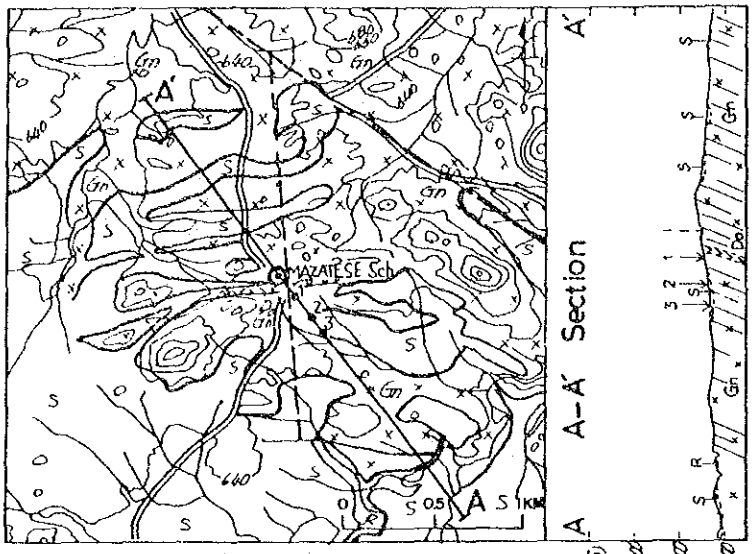
Cultivation and rock area 35%, sparse bush area 65%.

Geology:

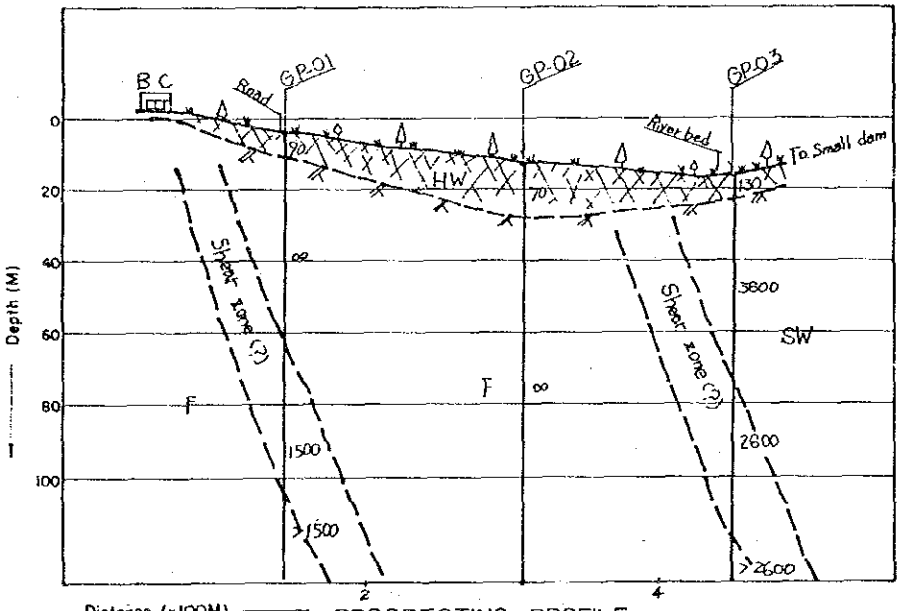
Consists of granulitic Gneiss and Dolerite dyke. Gneiss has airphoto trend line in ENE strike and major fault in N strike.

Points of geophysical survey:

Arranged in a depression and on the contact shear zone of Dolerite dyke and the fault.



GEOLOGICAL PLAN AND PROFILE



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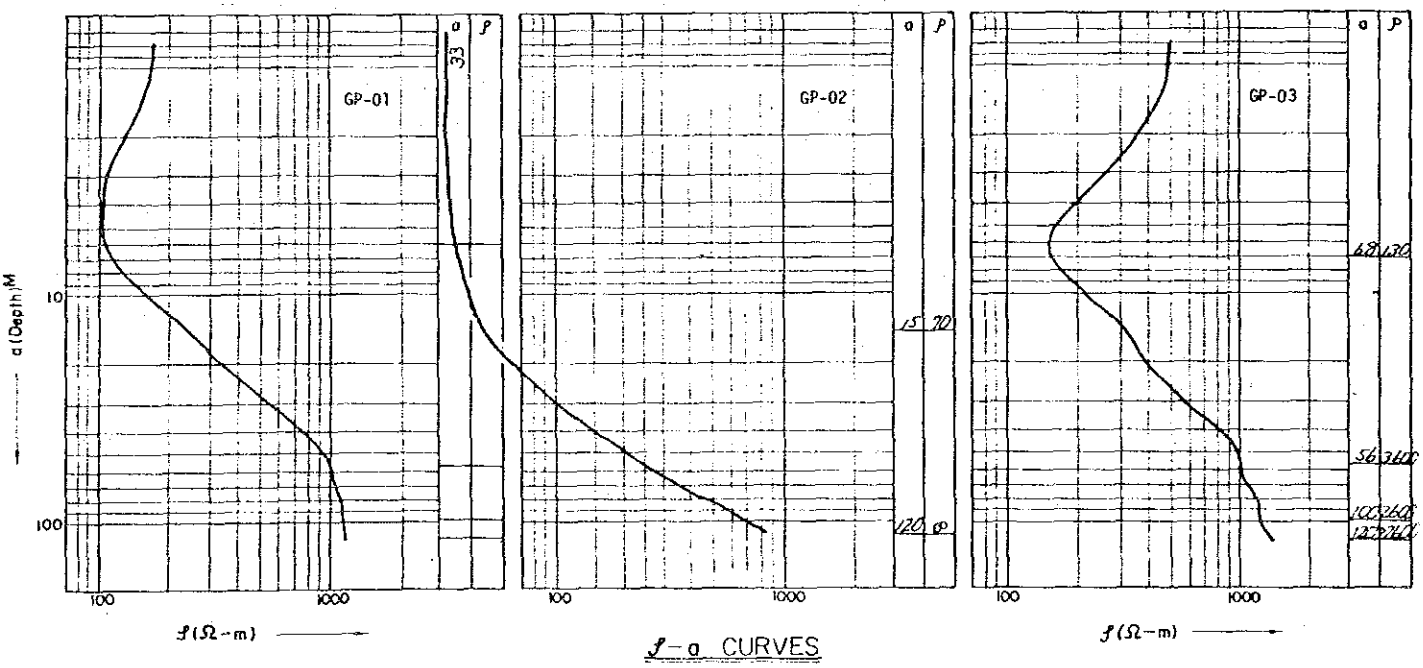


ρ-a CURVES

Explanation

Topography:

Hilly, dwalas and castle koppies occur at places. The MWENEZI River drains across the area from north-west to south-east direction.

Vegetation:

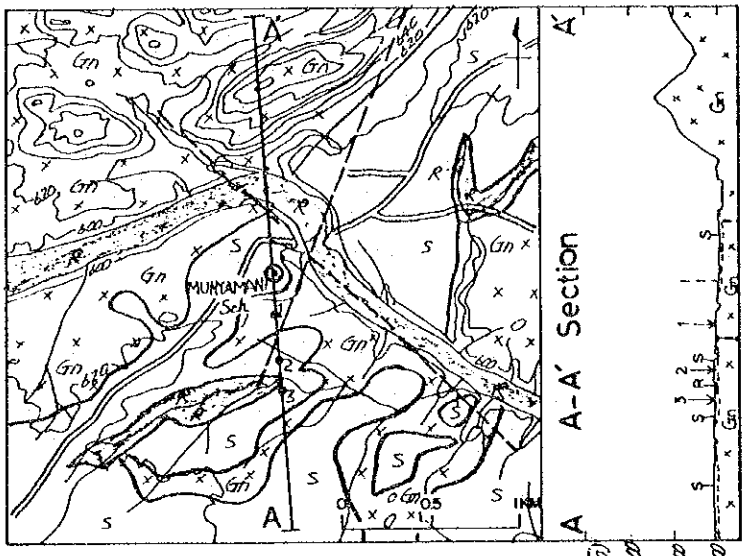
Cultivation area 50%, sparse bush area 50%.

Geology:

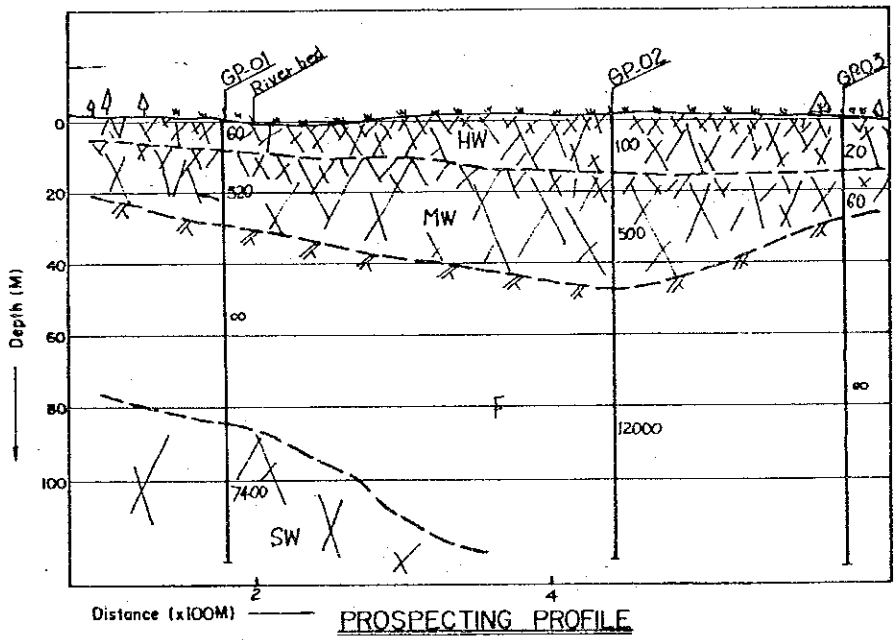
Consists of massive, granulitic Gneiss.

Points of geophysical survey:

Arranged in a depression which has moist soil and is on the shear zone of the fault.



GEOLOGICAL PLAN AND PROFILE



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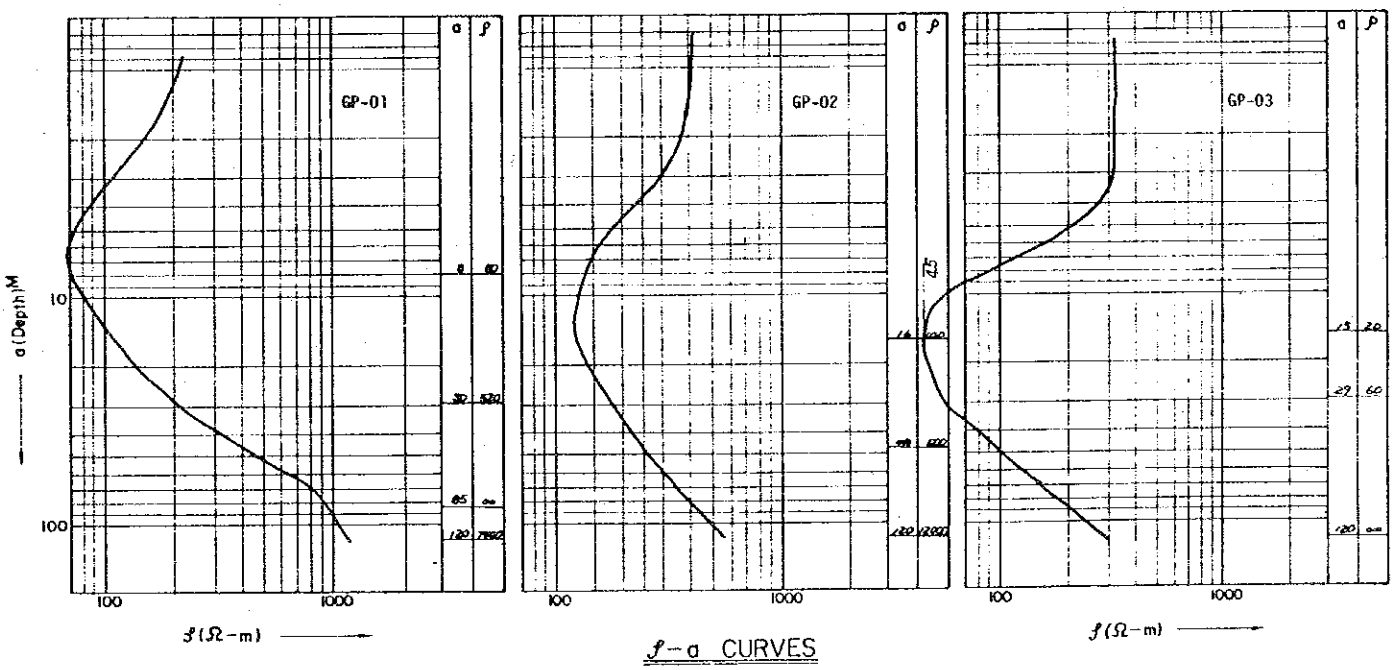
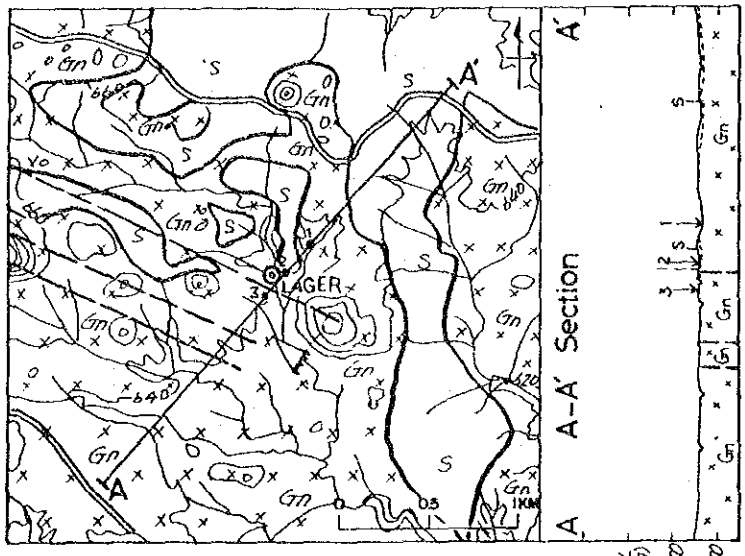


ρ-a CURVES

Explanation



GEOLOGICAL PLAN AND PROFILE

Topography:

Hilly, dwalas and castle koppies occur at places. Rock outcrops well.

Vegetation:

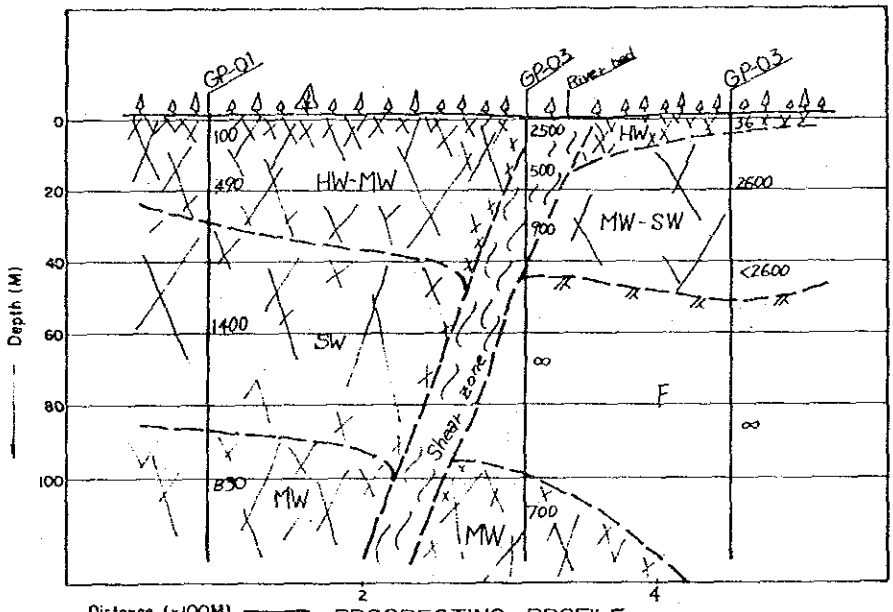
Cultivation area 35%, sparse bush area 65%.

Geology:

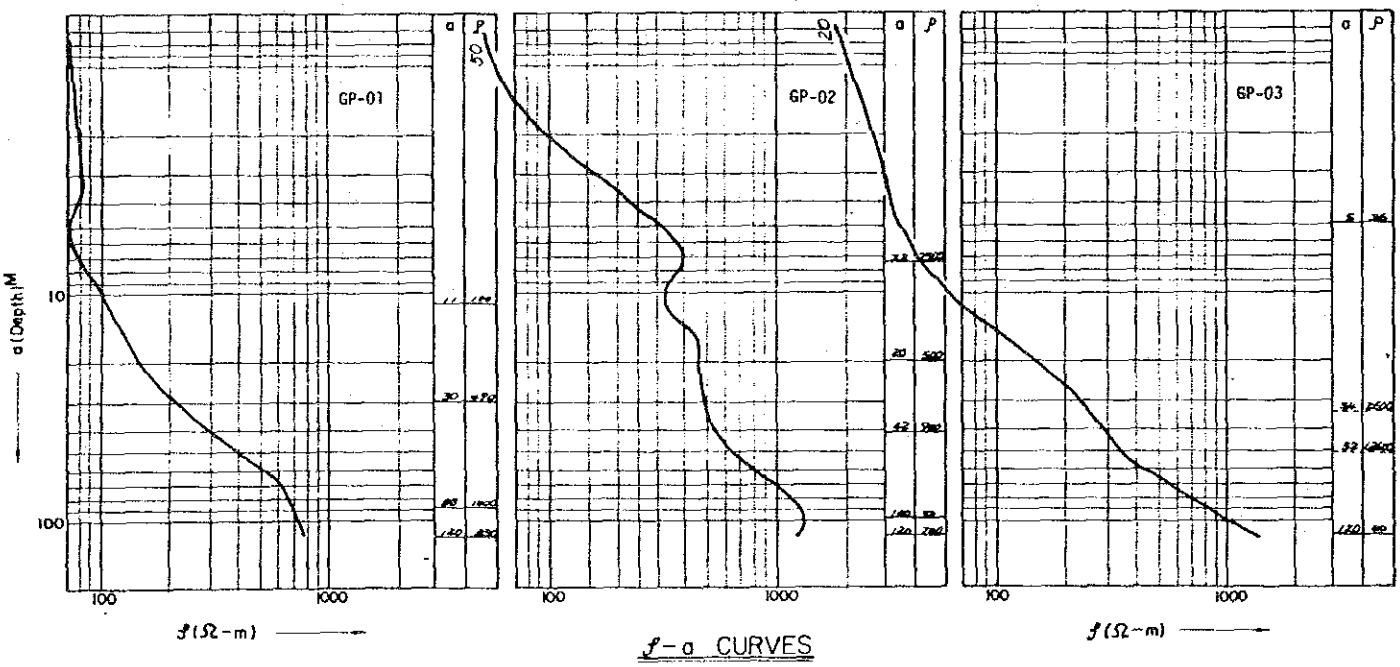
Consists of massive, granulitic Gneiss which has major faults in NW strike.

Points of geophysical survey:

Arranged in a depression which has moist soil and is on the shear zone of the fault.



PROSPECTING PROFILE



ρ - a CURVES

図3-2-11 GEOLOGICAL SURVEY (NAME OF SITE : CHEHOMA B.C. (JH04)

Explanation

Topography:

Comparatively hilly, the range of the hills which are composed of Ultramafic rocks is like a horse-shoe. The MUSHAWE River. Drains across the area from east to west direction.

Vegetation:

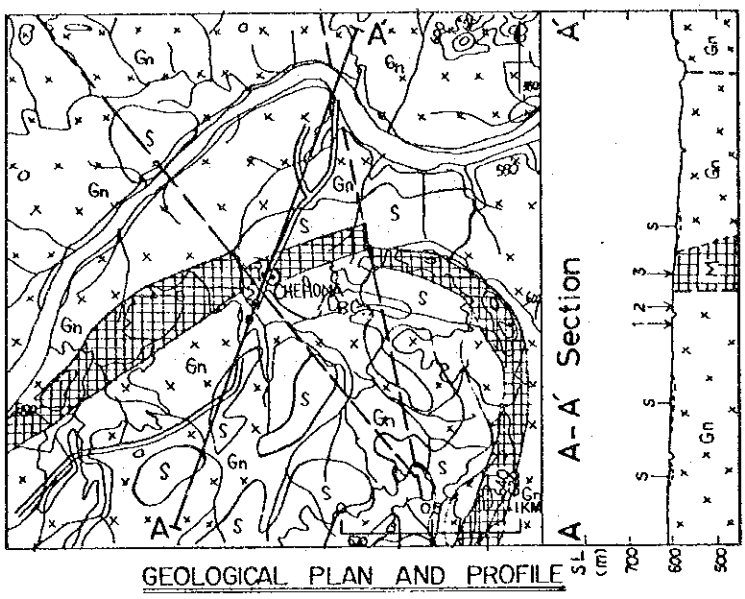
Cultivation and rock area 20%, sparse and dense bush area 80%.

Geology:

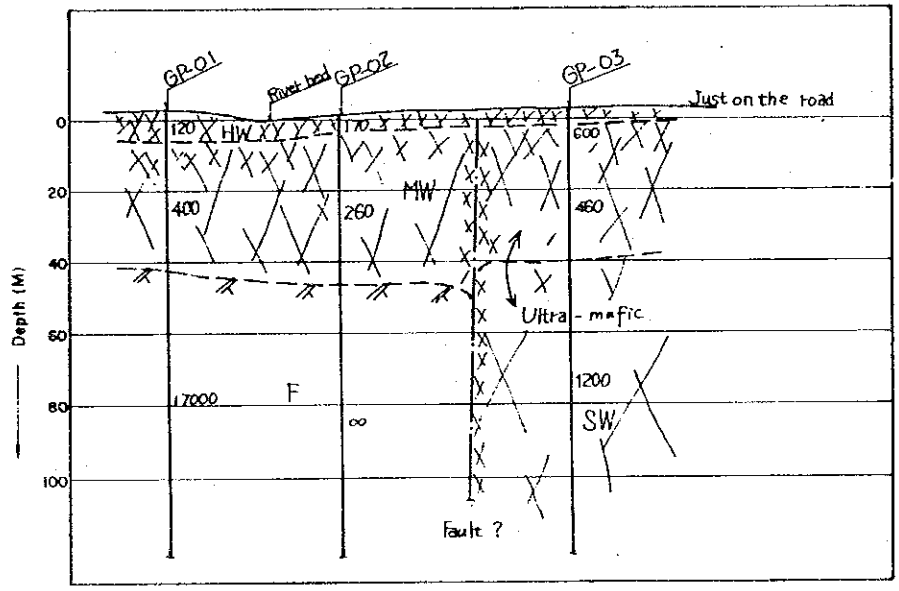
Consists of massive, granulitic Gneiss and Ultramafic rock. Gneiss has two major faults which trend northward and north-westward.

Points of geophysical survey:

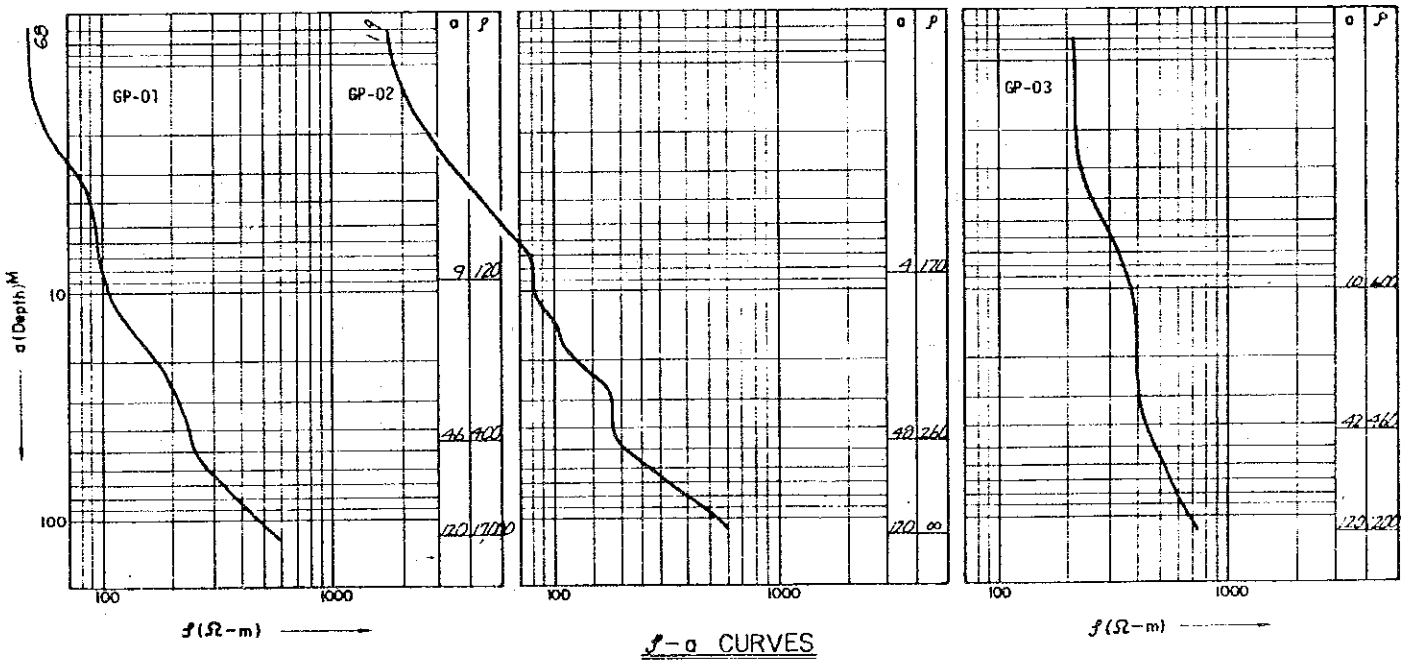
Arranged in a depression in a wide watershed, and on the contact shear zone of the Ultramafic rock and the faults.



GEOLOGICAL PLAN AND PROFILE



Distance (x100M) ——→ PROSPECTING PROFILE



ρ-a CURVES