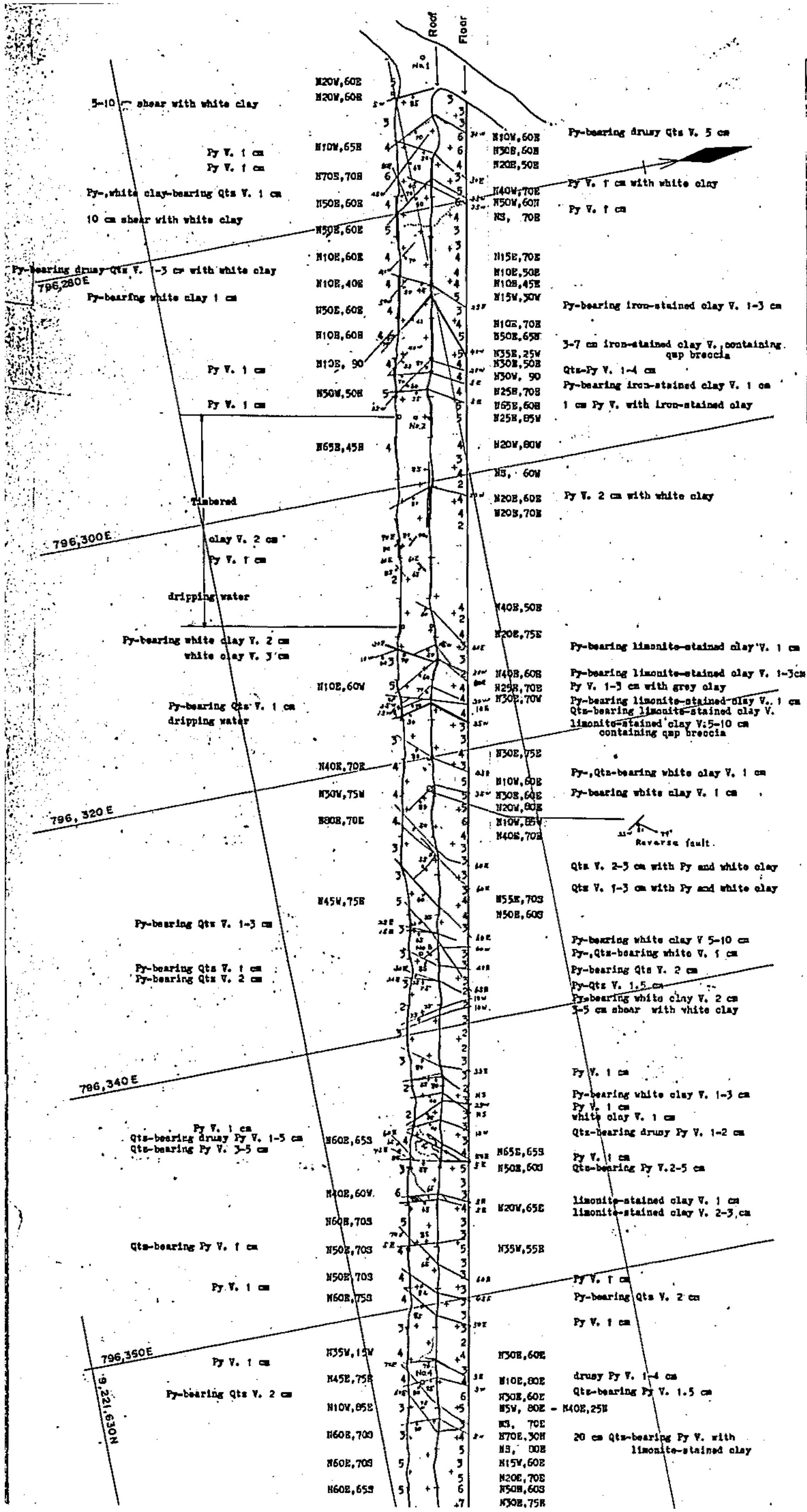
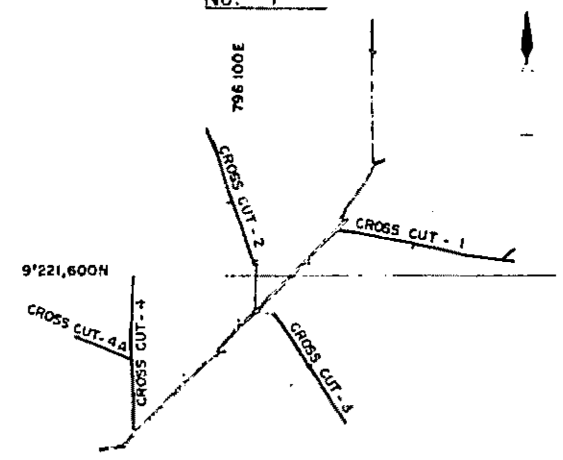


SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	MINERALIZATION Py	Dis.or Cu min D:V	RATIO Cc:Cp	OTHERS	ALTERATION (SPG, BIOT, SILI, SERI, ARGI, CHLO, OTHERS)	PHENOCRYSTS Fel m/m x m/m	Qtz m/m x m/m	Euhedral Bi m/m x m/m	REMARKS
										3	≫		Mt					
											≥							
3101	3.0	0.11	0.05	0.007						1				2 3 4 3 2				
3102	3.0	0.14	0.07	0.005									Mt					
3103	3.0	0.13	0.04	0.005	nil	0.1	6.80	6.41	61.5	2	>						1 x 1.5	
3104	3.0	0.12	0.04	0.005									Mt				3 x 3.5 / 2.5 x 3	
3105	3.0	0.10	0.03	0.007										3 3 2			4 x 4	
3106	3.0	0.09	0.04	0.005						1							3 x 4.5	
3107	3.0	0.14	0.04	0.005									Mt				1.5 x 2 / -0.5	
3108	3.0	0.09	0.03	0.003	nil	0.1	7.30	5.30	60.6	2	>						3.5 x 4	
3109	3.0	0.15	0.04	0.008						1 / 3						2.5 x 5	2 x 2.5	
3110	3.0	0.12	0.05	0.003						2			Mt	2 2 3 4			2 x 2.5	
3111	3.0	0.16	0.03															O Sample No.3101 north side
3112	3.0	0.12	0.04														1 x 1.5	
3113	3.0	0.09	0.03	0.002	nil	tr	6.57	3.78	63.3	1	>		Mt				1 x 1.5	
3114	3.0	0.22	0.06							1							1.5 x 2 / 2 x 3	O Sample No.3102 north side
3115	3.0	0.26	0.10								≪						1 x 1	
3116	3.0	0.09	0.03														2 x 2.5	limonite stain on surface
3117	3.0	0.06	0.04							2	>		Mt				0.5 x 0.5 / 2.5 x 2.5	O Sample No.3103 north side
3118	3.0	0.13	0.06	tr	nil	0.1	6.77	3.96	62.1					4 3 3 3			2 x 3.5	
3119	3.0	0.07	0.03							1							3.5 x 3.5 / 2.5 x 3.5	
3120	3.0	0.20	0.05								>						0.5 x 0.5	
3121	3.0	0.16	0.07							4			Mt	3 4 3 2				
3122	3.0	0.50	0.16							3	≥		Bn Mt					
3123	3.0	0.43	0.06	0.002	tr	0.1	10.0	6.71	65.8		>		Bn Mt	4 3 3 2		2.5 x 4	2.5 x 4	
3124	3.0	0.64	0.20							2	≥		Mt			2.5 x 6	fog / fog	
3125	3.0	0.77	0.19							4	< / >							
3126	3.0	0.74	0.10							3	≫			1 3 4 2				
3127	3.0	0.80	0.16							2	≤						2 x 2	
3128	3.0	0.56	0.16	0.003	nil	0.1	10.6	7.79	63.1				Mt	3 3 2			1.5 x 2	
3129	3.0	0.95	0.08							1	> / ≫							O Sample No.3104 north side
3130	3.0	0.09	0.22							2	≥ / ≫		Mt Hm / Mt				2 x 2.5 / fog	
3131	3.0	1.14	0.12								>		Bn Mt					
3132	3.0	0.09	0.21							3	≫		Mt / Bn Mt					
3133	3.0	0.67	0.15	tr	nil	0.1	10.4	7.97	59.9		>		Mt	1 4 3 2				
3134	3.0	0.66	0.09															

PLATE 3-2-1

GEOLOGICAL SURVEY OF MICHIQUILLAY AREA, REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF CROSS CUT No. 1



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Scale 1 : 200

INDEX

ASSAY

- T-Cu % — Total Copper
- S-Cu % — Acid Soluble Copper
- MoS2 % — Molybdenum Sulphide
- Au oz/t — Gold
- Ag oz/t — Silver
- Fe % — Iron
- S % — Sulphur
- SiO2 % — Silica

ALTERATION

- BIOT ········ Biotitization
- SILI ········ Silicification
- SERI ········ Sericitization
- ARGI ········ Argillization
- CHLO ········ Chloritization
- SPG ········ Supergene
- Ep ········ Epidote
- P-Fel ········ Pink Feldspar
- Limo ········ Limonitization

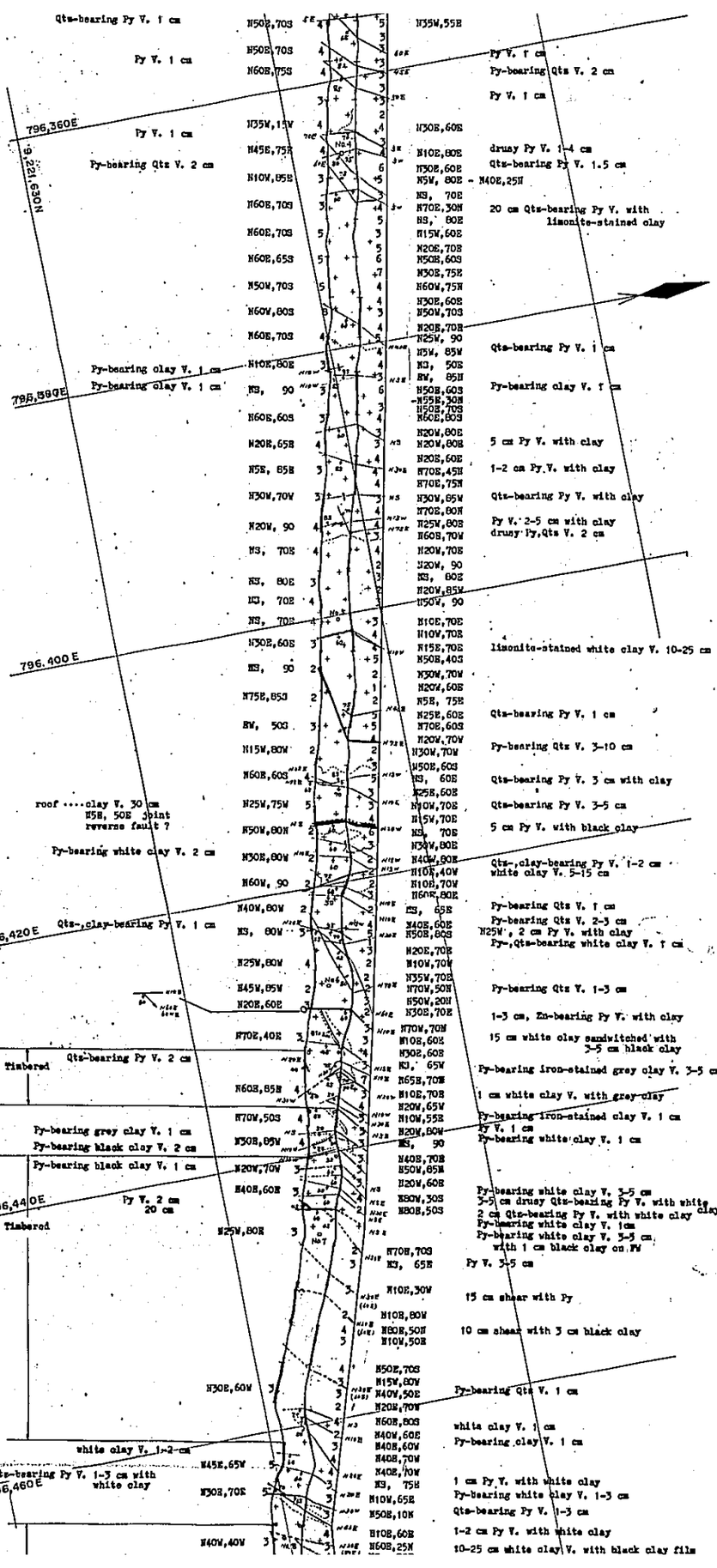
MINERALIZATION

- Bn ···· Bornite
- Cc ···· Chalcocite
- Cp ···· Chalcopyrite
- Cv ···· Covelline
- En ···· Enargite
- Py ···· Pyrite
- Mo ···· Molybdenum
- Pb ···· Galena
- Zn ···· Sphalerite
- Hm ···· Hematite
- Mt ···· Magnetite
- Qtz ···· Quartz

Occurrence of Cu ores
D. V ······ in Dissemination, in Veins
Ratio of Cu ores
Cc Cp ······ Chalcocite : Chalcopyrite

FRACTURING

- /. 5 cm : vein with its width
- 1, 2, 3, ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.
- N60E, 70S Major trend : Given for the most frequent fractures in the square.



3120	3.0	0.56	0.16	0.003	nil	0.1	10.6	7.79	63.1	2	M	Mt	3 3 2
3129	3.0	0.95	0.08							1	>		
3130	3.0	0.89	0.22								M	Mt	
3131	3.0	1.14	0.12							2	M	Mt	
3132	3.0	0.89	0.21								>	Bn	
3133	3.0	0.87	0.15	tr	nil	0.1	10.4	7.97	59.9	3	>	Mt	1 4 3 2
3134	3.0	0.66	0.09								M	Bn	
3135	3.0	0.66	0.04									Mt	
3136	3.0	0.84	0.19									Bn	
3137	3.0	0.59	0.11									Bn	
3138	3.0	0.77	0.13	tr	nil	0.1	7.82	6.44	63.4	2	>	Mt	2 3 3 3
3139	3.0	0.89	0.10									Bn	
3140	3.0	0.92	0.08								M	Mt	
3141	3.0	0.95	0.07							3	>	Im	4 3 2 2 3 P-Fel
3142	3.0	0.79	0.09								M		
3143	3.0	0.84	0.06	0.002	nil	0.1	5.42	4.09	65.3	2	>		P-Fel
3144	3.0	1.09	0.07								M		
3145	3.0	0.95	0.06								>	Mt	P-Fel
3146	3.0	0.79	0.12								M		
3147	3.0	0.74	0.06								>		1 3 3
3148	3.0	0.74	0.06	tr	nil	0.1	4.48	3.40	65.8	3	>		
3149	3.0	0.69	0.07							2	M	Mt	4 2 2 2 3 P-Fel
3150	3.0	0.59	0.14							1	>		
3151	3.0	0.61	0.13							2	M		3 3 2 2 3
3152	3.0	0.57	0.17							1	>	Mt	
3153	3.0	0.54	0.10	0.002	nil	0.1	5.21	3.60	65.5	2	>		P-Fel
3154	3.0	0.54	0.07								M	Mt	
3155	3.0	0.59	0.10								>	Bn	
3156	3.0	0.43	0.10									Mt	
3157	3.0	0.66	0.06										P-Fel
3158	3.0	0.54	0.05	0.002	nil	0.1	6.36	4.31	64.0	3	>	Bn	
3159	3.0	0.66	0.09								<		2 4 3
3160	3.0	0.55	0.09							2	>		
3161	3.0	0.27	0.08										P-Fel
3162	3.0	0.29	0.08							1	>	Mt	3 1 3 3 3
3163	3.0	0.37	0.10	tr	nil	0.1	5.32	3.02	64.9	2	>		
3164	3.0	0.48	0.20								M	Mt	2 4 3
3165	3.0	0.87	0.19							3	M		
3166	3.0	0.46	0.12							2	>		3 1 1 2 3 P-Fel
												Mt	

4.5 x 2	
2 x 2.5	O Sample No.3104 north side
fng	
1.5x1.5	
1 x 2	O Sample No.1432 north side
1 x 1.5	
1 x 2	
1 x 5	
2.5 x 3	
2.5 x 3	
4 x 7	
3 x 4	
2.5 x 3	
4 x 5	
2 x 2.5	
2 x 4	limonite stain on surface
2 x 2	
3 x 8	
2 x 2	
5 x 7	
4.5 x 5	
1 x 2	
4 x 5	
3 x 3	
2 x 2	
4 x 4.5	
3 x 3.5	
4.5 x 5	
3.5x3.5	
3 x 3.5	
3 x 4	
2 x 2.5	

Cp···· Chalcopyrite Zn·····Sphalerite Ratio of Cu ores

Cv·····Covellite Hm·····Hematite Cc Cp·····Chalcocite : Chalcopyrite

En····Enargite Mt·····Magnetite

Py····Pyrite Qtz···· Quartz

FRACTURING

/ . 5 cm : vein with its width

1 , 2 , 3 , ····· Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.

N60E , 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

Quartz Monzonite Porphyry (q m p)

Green Copper stain

Hematite stain

40E/70 Vein and Fissure more than 1cm thick

Place sampled

•No3 Surveying Spad

COLOR

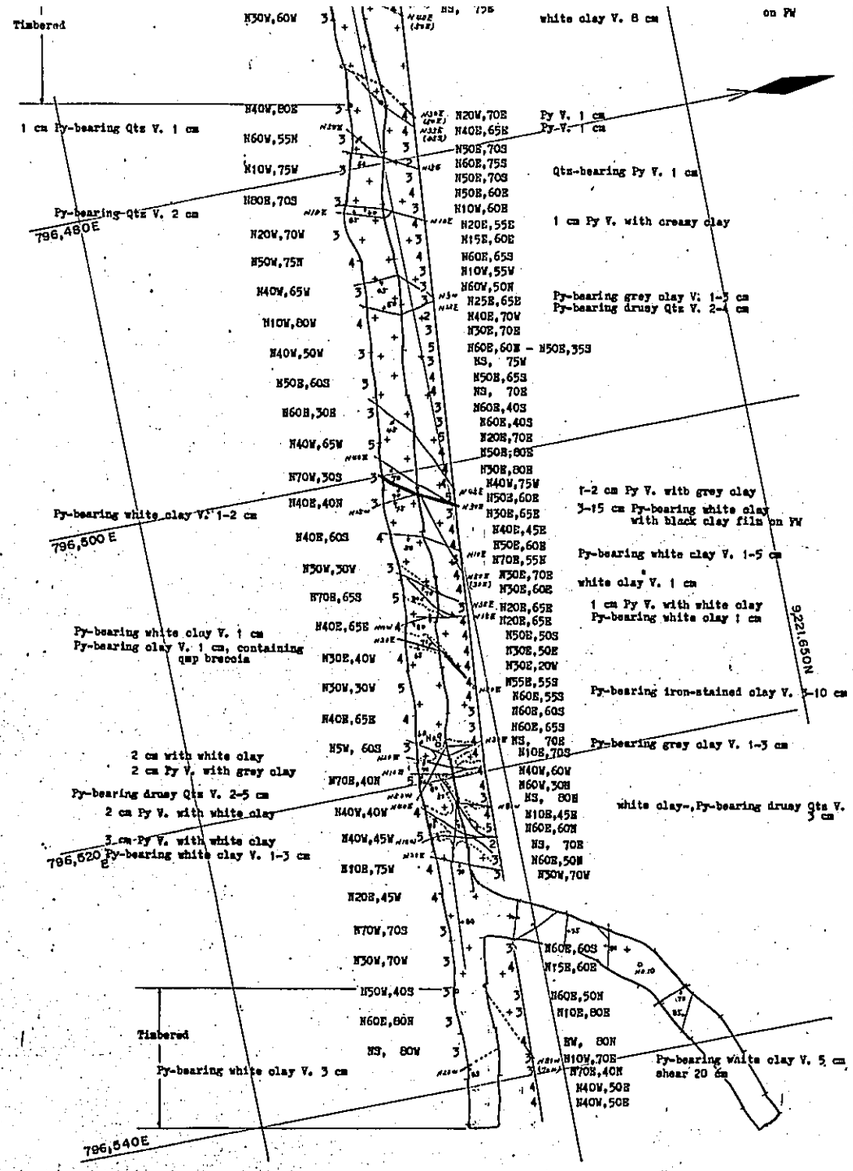
blk ····· black
blu ····· blue
brn ····· brown
drk ····· dark
gry ····· gray
grn ····· green
lgh ····· light
purp ····· purple
red ····· red
wht ····· white
yel ····· yellow

GRANULARITY

fng ····· fine grained
mdg ····· medium grained
c s g ····· coarse grained

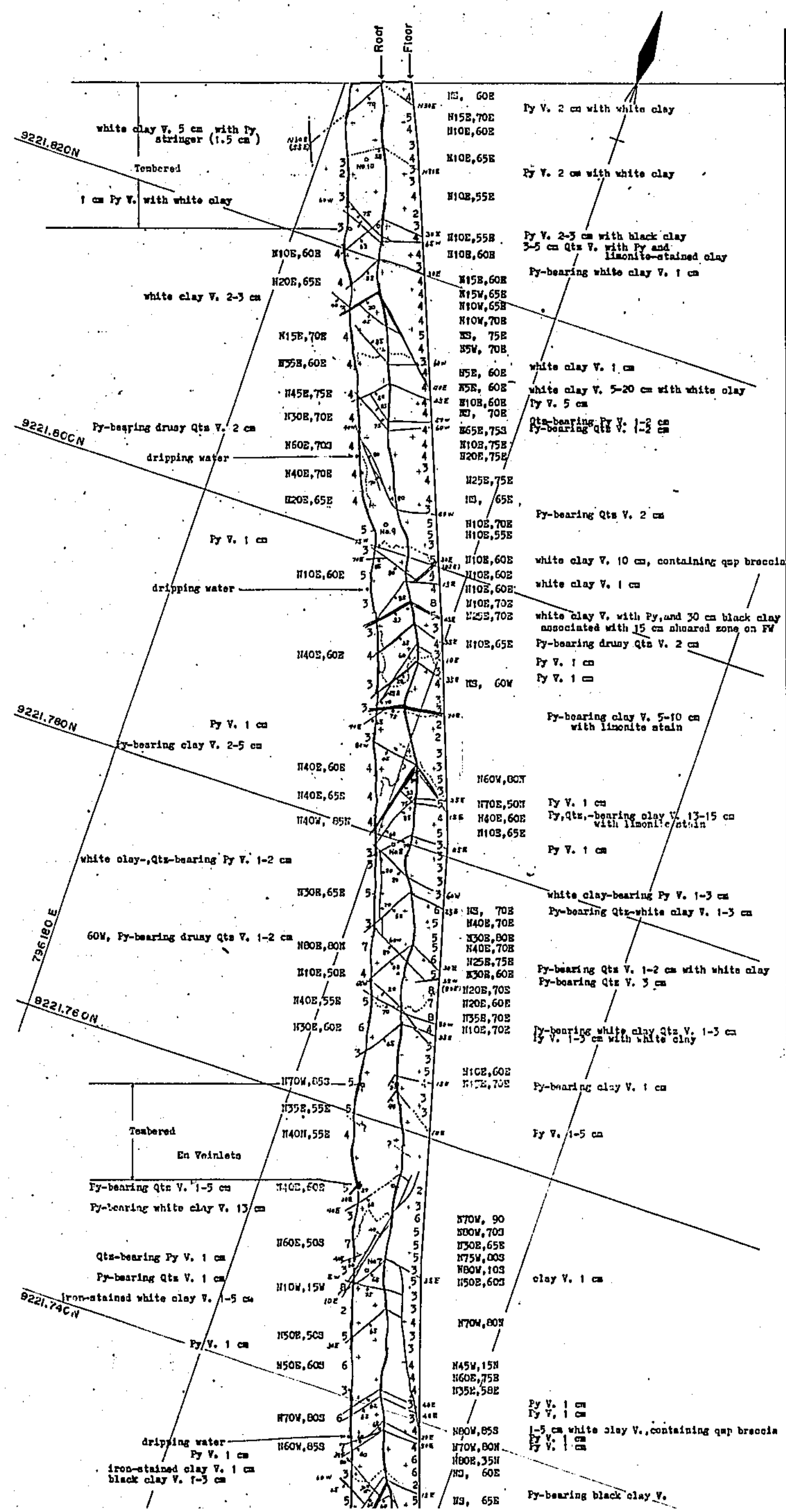
3158	3.0	0.54	0.05	0.002	nil	0.1	6.36	4.31	64.0
3159	3.0	0.66	0.09						
3160	3.0	0.55	0.09						
3161	3.0	0.27	0.08						
3162	3.0	0.29	0.08						
3163	3.0	0.37	0.10	tr	nil	0.1	5.32	3.82	64.9
3164	3.0	0.40	0.20						
3165	3.0	0.87	0.19						
3166	3.0	0.46	0.12						
3167	3.0	0.27	0.11						
3168	3.0	0.47	0.16	0.002	nil	0.1	6.04	3.70	65.8
3169	3.0	0.69	0.11						
3170	3.0	0.46	0.09						
3171	3.0	0.61	0.14						
3172	3.0	0.61	0.11						
3173	3.0	0.51	0.12	0.003	nil	0.1	4.48	1.34	63.7
3174	3.0	0.43	0.14						
3175	3.0	0.46	0.20						
3176	3.0	0.49	0.10						
3177	3.0	0.54	0.13						
3178	3.0	0.61	0.07	0.012	nil	0.1	4.06	2.49	65.5
3179	3.0	0.69	0.07						
3180	3.0	1.16	0.15						
3181	3.0	1.05	0.20						
3182	3.0	1.18	0.15						
3183	3.0	1.00	0.11	0.020	nil	0.1	3.96	2.55	63.8
3184	3.0	1.30	0.13						
3185	3.0	0.87	0.10						
3186	3.0	0.66	0.10						
3187	3.0	0.77	0.08						
3188	3.0	0.70	0.10	0.032	nil	0.1	4.20	2.41	66.0
3189	3.0	0.69	0.13						
3190	3.0	0.61	0.08						

3191	3.0	1.10	0.19							>
3192	3.0	0.68	0.09							≥
									2	≫
3193	3.0	1.15	0.11	0.042	nil	0.1	3.86	2.37	65.0	>
										≥



3167	3.0	0.27	0.11								
3168	3.0	0.47	0.16	0.002	nil	0.1	6.04	3.70	65.8		
3169	3.0	0.69	0.11								
3170	3.0	0.46	0.09								
3171	3.0	0.61	0.14								
3172	3.0	0.61	0.11								
3173	3.0	0.51	0.12	0.003	nil	0.1	4.48	1.34	63.7		
3174	3.0	0.43	0.14								
3175	3.0	0.46	0.20								
3176	3.0	0.49	0.10								
3177	3.0	0.54	0.13								
3178	3.0	0.61	0.07	0.012	nil	0.1	4.06	2.49	65.5		
3179	3.0	0.69	0.07								
3180	3.0	1.16	0.15								
3181	3.0	1.05	0.20								
3182	3.0	1.18	0.15								
3183	3.0	1.00	0.11	0.020	nil	0.1	3.96	2.55	63.8		
3184	3.0	1.30	0.13								
3185	3.0	0.87	0.10								
3186	3.0	0.66	0.10								
3187	3.0	0.77	0.08								
3188	3.0	0.70	0.10	0.032	nil	0.1	4.20	2.41	66.0		
3189	3.0	0.69	0.13								
3190	3.0	0.61	0.08								
3191	3.0	1.10	0.19								
3192	3.0	0.68	0.09								
3193	3.0	1.15	0.11	0.042	nil	0.1	3.86	2.37	65.0		
3194	3.0	0.66	0.08								
3195	3.0	0.72	0.13								
3196	3.0	0.86	0.06								
3197	3.0	0.84	0.06								
3198	3.0	0.69	0.13	0.038	nil	0.1	3.75	1.94	64.3		
3199	3.0	0.95	0.17								

Sample No.1818 north side

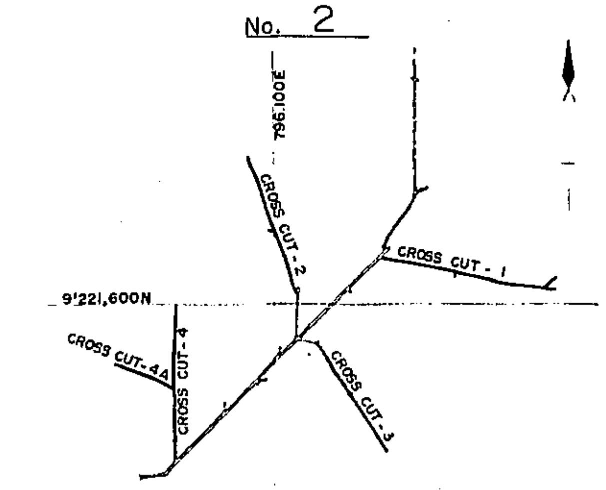


SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Pr	D:V	OTHERS	BIOT	SILI	SERI	ARGI	CHLO	Fel m/m x m/m	Biot m/m x m/m	REMARKS
3277	1.10	0.99	0.05	0.010	nil	0.1	4.69	3.54	64.9	2	≤									
3276	3.0	0.83	0.04							1	>									
3275	3.0	0.72	0.05							2										
3274	3.0	0.80	0.11								< ≥			3	3	4				
3273	3.0	0.82	[illegible]	[illegible]	nil	0.1	5.63	5.02	64.4	1	≤									limonite stain on surface
3272	3.0	1.17	0.14								<									
3271	3.0	0.70	0.05								≥			2	4	4				
3270	3.0	1.25	0.34																	
3269	3.0	0.93	0.07								<									
3268	3.0	1.39	0.14	0.005	nil	0.1	6.31	5.09	[illegible]	2			3.	2	2	4		2.5 x 4	4 x 5	o Sample No.3206 east side
3267	3.0	1.79	0.14																	
3266	3.0	1.40	0.12								>	Cv								
3265	3.0	1.03	0.14							4 2	<			3	3	3				
3264	3.0	0.89	0.06							3	≥	Cv								
3263	3.0	0.87	0.08	0.005	tr	0.1	6.77	6.05	65.5	2	>			2	3	3				limonite stain on surface
3262	3.0	0.97	0.07							3	≪	Bn		4	3		2			
3261	3.0	0.82	0.03							2	> <			4	3	2	2			
3260	3.0	0.72	0.05	0.005						3	>	Bn								
3259	3.0	0.67	0.06	0.005						4 3	≥ ≤	Cv								
3258	3.0	1.51	0.05	0.017	0.03	0.1	7.50	7.30	65.2		≥			4	3	3				
3257	3.0	0.87	0.05	0.022							≪									
3256	3.0	0.92	0.04	0.010						2	≫ ≪									
3255	3.0	0.86	0.05	0.037							>									
3254	3.0	0.80	0.04	0.013							≥			3	4	4				o Sample No.3205 east side
3253	3.0	0.74	0.04	0.017	0.02	0.2	[illegible]	5.31	[illegible]	3 2	≪									
3252	3.0	0.69	0.04	0.023							>			3	4	4				
3251	3.0	0.52	0.02	0.018																o Sample No.3204 east side
3250	3.0	0.97	0.12	0.020						2	≤			4	2	1				
3249	3.0	0.77	0.04	0.023							≪									
3248	3.0	0.69	0.03	0.042	nil	0.1	6.32	6.40	66.1	3 2	>	Bn		4	4	4			3 x 5	o Sample No.3203 east side
3247	3.0	0.69	0.03	0.077						3 2	≪ <									
3246	3.0	0.90	0.03	0.017						3	≫									
3245	3.0	0.50	0.04	0.013						2	>									
3244	3.0	0.74	0.06	0.010							≥			4	3	3				
3243	3.0	0.79	0.06	0.017	0.03	tr	8.70	7.59	65.0	3	>									

PLATE 3-2-2

GEOLOGICAL SURVEY OF MICHIQUILLAY AREA, REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF CROSS CUT No. 2



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GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

T-Cu	%	Total Copper
S-Cu	%	Acid Soluble Copper
MoS2	%	Molybdenum Sulphide
Au	oz/t	Gold
Ag	oz/t	Silver
Fe	%	Iron
S	%	Sulphur
SiO2	%	Silica

ALTERATION

BIOT ········ Biotitization
SILI ········ Silicification
SERI ········ Sericitization
ARGI ········ Argillization
CHLO ········ Chloritization
SPG ········ Supergene
Ep ········ Epidote
P-Fel ········ Pink Feldspar
Limo ········ Limonitization

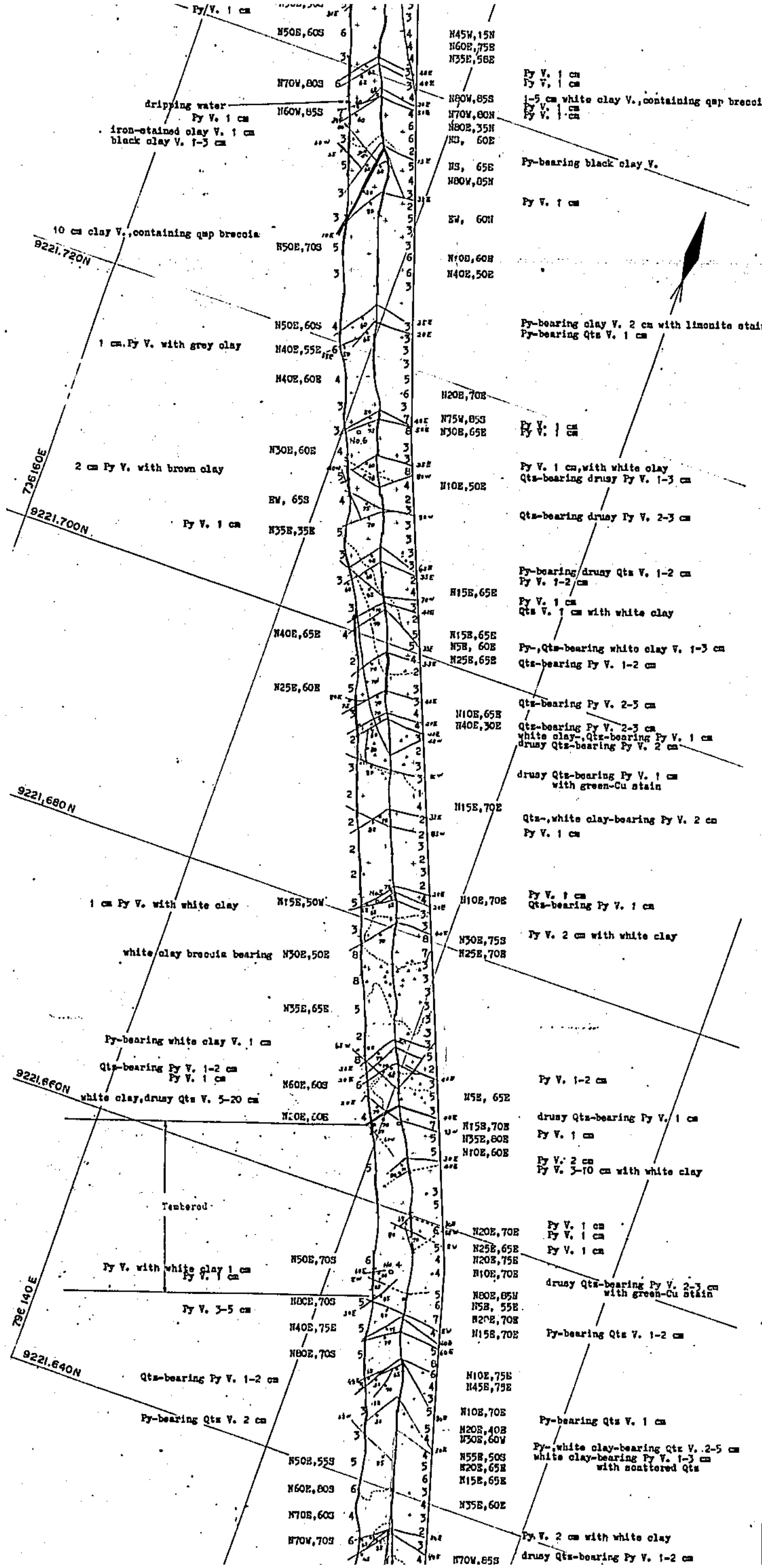
MINERALIZATION

Bn····Bornite
Cc····Chalcocite
Cp····Chalcopyrite
Cv····Covelline
En····Enargite
Py····Pyrite
Mo····Molybdenum
Pb····Galena
Zn····Sphalerite
Hm····Hematite
Mt····Magnetite
Qtz····Quartz

Occurrence of Cu ores
D : V····In Dissemination : in Veins
Ratio of Cu ores
Cc:Cp····Chalcocite : Chalcopyrite

FRACTURING

V. 5 cm : vein with its width
1, 2, 3, ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10 cm x 10 cm square.
N60E, 70S Major trend : Given for the most frequent fractures in the square.



3247	3.0	0.69	0.03	0.077					
3246	3.0	0.50	0.03	0.017					
3245	3.0	0.50	0.04	0.012					
3244	3.0	0.74	0.06	0.010					
3243	3.0	0.79	0.06	0.012	0.03	tr	8.70	7.59	63.0
3242	3.0	0.92	0.04	0.035					
3241	3.0	0.68	0.03	0.010					
3240	3.0	1.41	0.03	0.010					
3239	3.0	1.18	0.04	0.010					
3238	3.0	0.74	0.03	0.010	0.03	0.2	6.95	6.51	63.1
3237	3.0	1.25	0.03	0.007					
3236	3.0	1.48	0.21	0.008					
3235	3.0	0.92	0.06	0.005					
3234	3.0	0.79	0.33	0.010					
3233	3.0	0.43	0.05	0.003	0.01	0.1	8.20	7.50	63.4
3232	3.0	0.46	0.09	0.015					
3231	3.0	0.77	0.10	0.015					
3230	3.0	0.59	0.04	0.005					
3229	3.0	1.07	0.04	0.003					
3228	3.0	0.69	0.03	0.002	0.03	0.1	9.10	9.24	64.2
3227	3.0	1.15	0.02	0.003					
3226	3.0	1.35	0.03	0.002					
3225	3.0	1.10	0.04	0.003					
3224	3.0	0.61	0.03	0.008					
3223	3.0	1.07	0.05	0.002	0.02	0.1	8.65	6.07	64.3
3222	3.0	0.64	0.05	0.003					
3221	3.0	0.60	0.02	0.008					
3220	3.0	0.32	0.02	0.005					
3219	3.0	0.24	0.04	0.005					
3218	3.0	0.23	0.05	0.009	0.02	0.1	6.78	6.07	62.9
3217	3.0	0.70	0.04	0.005					
3216	3.0	0.20	0.03	0.007					
3215	3.0	0.20	0.03	0.005					
3214	3.0	0.19	0.03	0.005					
3213	3.0	0.17	0.05	0.003	0.01	0.1	6.40	6.29	63.9
3212	3.0	0.13	0.05	0.005					
3211	3.0	0.20	0.05	0.006					
3210	3.0	0.26	0.07	0.005					
3209	3.0	0.21	0.05	0.005					
3208	3.0	0.17	0.04	[illegible]	[illegible]	[illegible]	6.7?	[illegible]	[illegible]

2 x 2

o Sample No.2500 east side

o Sample No.3202 east side

advanced limonite stain along almost every vein or veinlet

Py ···· Pyrite Qtz ···· Quartz

FRACTURING

V. 5 cm : vein with its width

1, 2, 3, ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.

N60E, 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

Quartz Monzonite Porphyry (qmp)

Vein and Fissure more than 1cm thick

Green Copper stain

Place sampled

Hematite stain

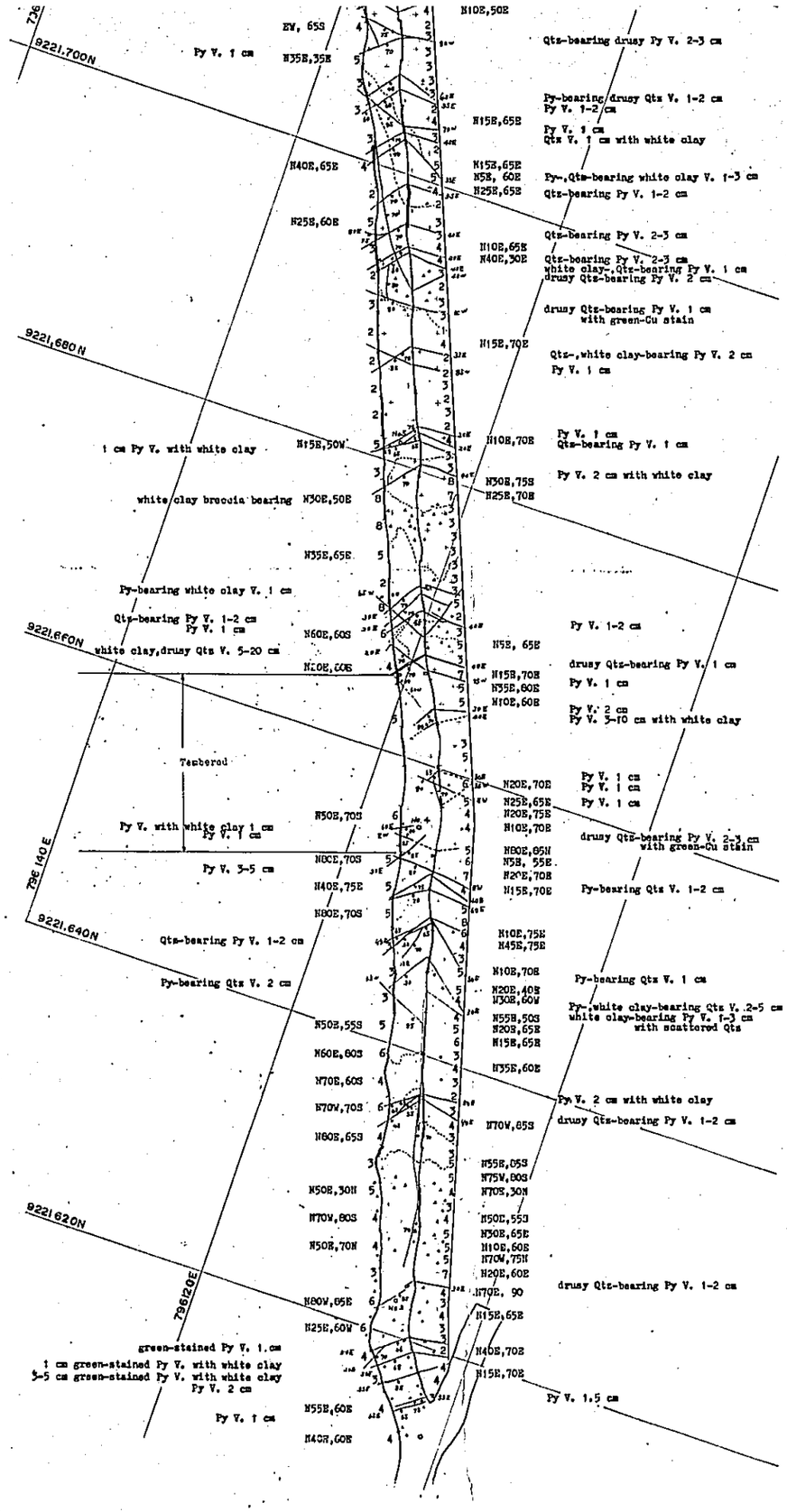
Surveying Spad

COLOR

blk ········ black
blu ········ blue
brn ········ brown
drk ········ dark
gry ········ gray
grn ········ green
lgh ········ light
purp ········ purple
red ········ red
wht ········ white
yel ········ yellow

GRANULARITY

fng ········ fine grained
mdg ········ medium grained
csg ········ coarse grained



3234	3.0	0.79	0.33	0.010						2	»	
3233	3.0	0.43	0.05	0.025	0.01	0.1	8.20	7.50	63.4	3	>	
3232	3.0	0.46	0.09	0.015						2	≥	
3231	3.0	0.77	0.10	0.015						1	>	
3230	3.0	0.59	0.04	0.005						4	»	
3229	3.0	1.07	0.04	0.005						3	>	
3228	3.0	0.69	0.05	0.022	0.03	0.1	9.10	9.24	64.2	2		
3227	3.0	1.15	0.02	0.003						1	>	
3226	3.0	1.35	0.03	0.002						2		
3225	3.0	1.10	0.04	0.003						3		
3224	3.0	0.61	0.03	0.008								
3223	3.0	1.07	0.05	0.002	0.02	0.1	8.85	6.07	64.3	2	>	
3222	3.0	0.64	0.05	0.003							»	
3221	3.0	0.60	0.02	0.000						4		
3220	3.0	0.32	0.02	0.005						3		
3219	3.0	0.24	0.04	0.005						2	>	
3218	3.0	0.23	0.06	0.005	0.02	0.1	6.78	6.07	62.9			
3217	3.0	0.70	0.04	0.005							>	
3216	3.0	0.20	0.03	0.007						2	<	
3215	3.0	0.20	0.03	0.005							≥	
3214	3.0	0.19	0.03	0.005						3	>	
3213	3.0	0.17	0.05	0.003	0.01	0.1	6.40	6.29	63.9	2	>	
3212	3.0	0.13	0.05	0.005							≥	
3211	3.0	0.20	0.05	0.008								
3210	3.0	0.26	0.07	0.005						2	>	
3209	3.0	0.21	0.05	0.005								
3208	3.0	0.17	0.04	0.002	tr	nil	6.75	6.49	64.9			
3207	3.0	0.56	0.04	0.003						4	≥	
3206	3.0	0.92	0.08	0.003						5	>	
3205	3.0	0.61	0.11	0.007								
3204	3.0	1.02	0.07	0.003						4	»	
3203	3.0	0.95	0.15	0.003	tr	0.1	10.1	10.9	61.1			
3202	3.0	0.92	0.14	0.007						2	>	
3201	3.0	0.64	0.09	0.013						3	»	

Bn
Bn
Cc
Cc
Cy
Cy
Cy
Bn
Cc

3 3 3
2 2 3 2
3 3 3
2 x 2
4 3 2
3 2 2 2 2
4 3 2
3 3 3
4 3
3 3 2
3 3 3
3 3 2
4 3 2
3 4 2
4 3 2

○ Sample No.2509 east side

○ Sample No.3202 east side

advanced limonite stain along almost every vein or veinlet

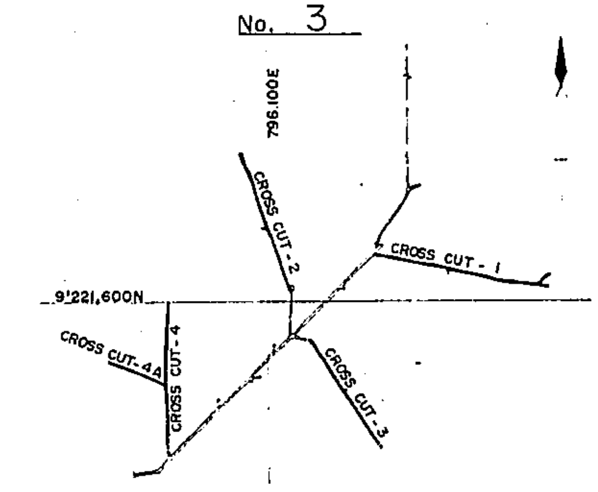
○ Sample No.3201 east side

igh ·····light
purp ····purple
red ·····red
wht ····white
yel ·····yellow

PLATE 3-2-3

GEOLOGICAL SURVEY OF MICHIQUILLAY AREA, REPUBLIC OF PERU

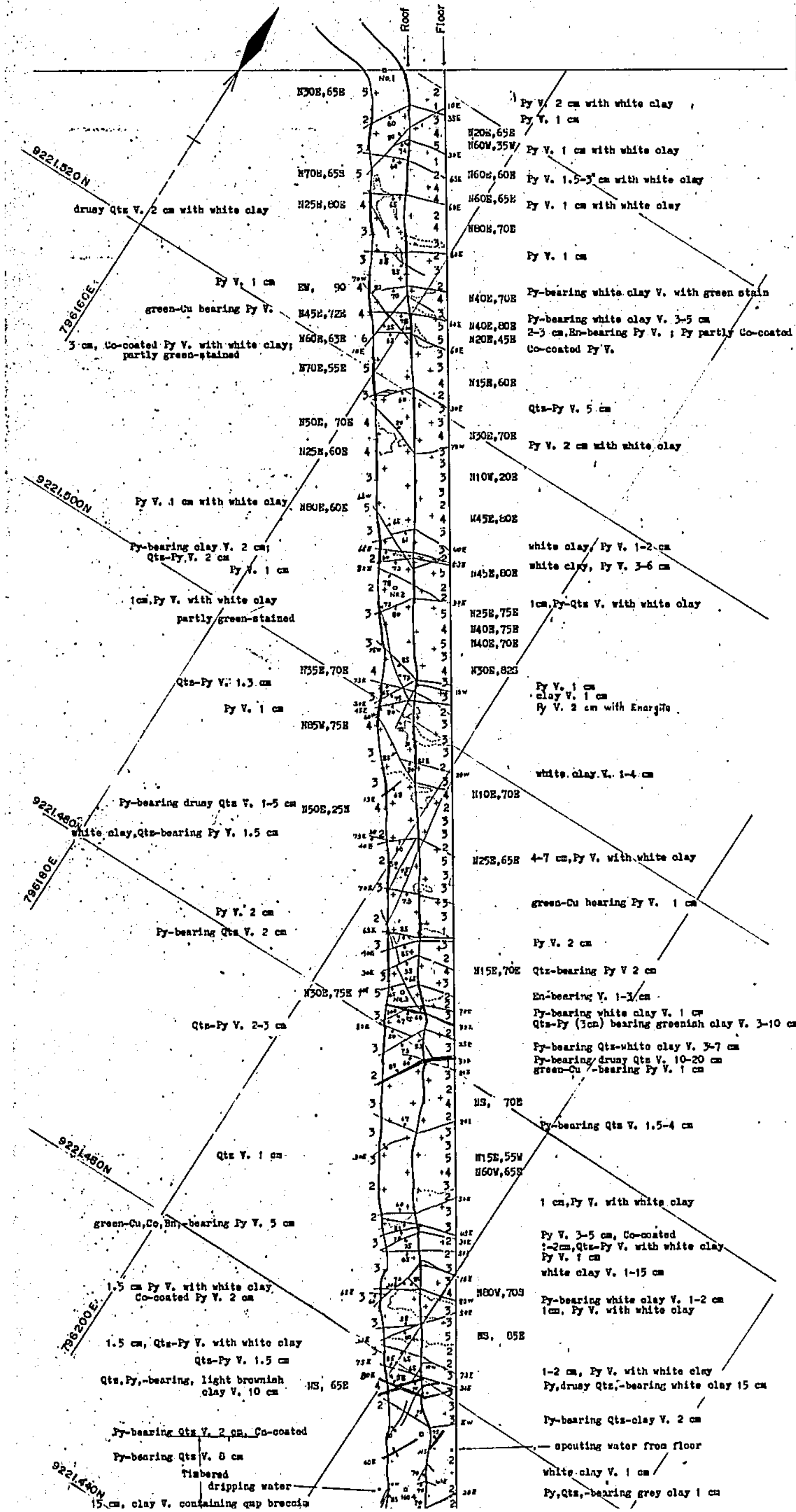
UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF CROSS CUT No. 3



Sponsored by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200



SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	REMARKS
3301	3.0	0.72	0.06	0.012						
3302	3.0	0.61	0.11	0.005						
3303	3.0	0.63	0.14	0.007	0.01	0.1	11.0	10.5	62.0	O Sample No.3301 west side
3304	3.0	0.51	0.11	0.005						
3305	3.0	0.56	0.10	0.005						
3306	3.0	0.56	0.07	0.007						
3307	3.0	0.92	0.05	0.003						2 x 2.5
3308	3.0	0.49	0.07	0.002	nil	0.1	8.30	7.88	72.9	
3309	3.0	0.38	0.09	0.003						
3310	3.0	0.49	0.06	0.002						
3311	3.0	0.46	0.04	0.005						
3312	3.0	0.36	0.04	0.002						
3313	3.0	0.36	0.06	0.007	nil	0.1	9.50	9.54	63.2	O Sample No.3302 west side
3314	3.0	0.30	0.05	0.003						
3315	3.0	0.33	0.05	0.012						
3316	3.0	0.50	0.05	0.005						
3317	3.0	0.30	0.05	0.005						
3318	3.0	0.74	0.07	0.003	nil	0.2	9.70	9.81	65.6	6.5x2.5
3319	3.0	0.60	0.04	0.005						
3320	3.0	0.54	0.05	0.023						O Sample No.3303 west side
3321	3.0	0.37	0.02	0.010						
3322	3.0	0.24	0.03	0.008						
3323	3.0	0.54	0.04	0.008	nil	0.1	7.40	7.93	62.6	
3324	3.0	0.20	0.04	0.012						
3325	3.0	0.31	0.04	0.005						
3326	3.0	0.20	0.03	0.015						
3327	3.0	0.34	0.02	0.003						
3328	3.0	0.39	0.02	0.020	nil	0.1	7.40	7.44	62.2	O Sample No.3304 west side
3329	5.0	0.41	0.03	0.012						
3330	3.0	0.41	0.04	0.022						
3331	3.0	0.24	0.03	0.010						
3332	3.0	0.33	0.05	0.010						
3333	3.0	0.28	0.04	0.020	nil	0.1				
3334	3.0	0.87	0.07	0.005						
3335	3.0	0.39	0.03	0.005						

MINERALIZATION (Py; Occ. of Cu min. D:V; RATIO Cc:Cp; OTHERS) — ALTERATION (SPG, BIOT, SILI, SERI, ARGI, CHLO, OTHERS; TRANSITIONAL ZONE) — PHENOCRYSTS (P-Fel mm x mm, Qtz mm x mm, Euhedral Bi mm x mm)

INDEX

ASSAY

T-Cu	%	Total Copper
S-Cu	%	Acid Soluble Copper
MoS2	%	Molybdenum Sulphide
Au	oz/t	Gold
Ag	oz/t	Silver
Fe	%	Iron
S	%	Sulphur
SiO2	%	Silica

ALTERATION

BIOT ········ Biotitization
SILI ········ Silicification
SERI ········ Sericitization
ARGI ········ Argillization
CHLO ········ Chloritization
SPG ········ Supergene
Ep ········ Epidote
P-Fel ········ Pink Feldspar
Limo ········ Limonitization

MINERALIZATION

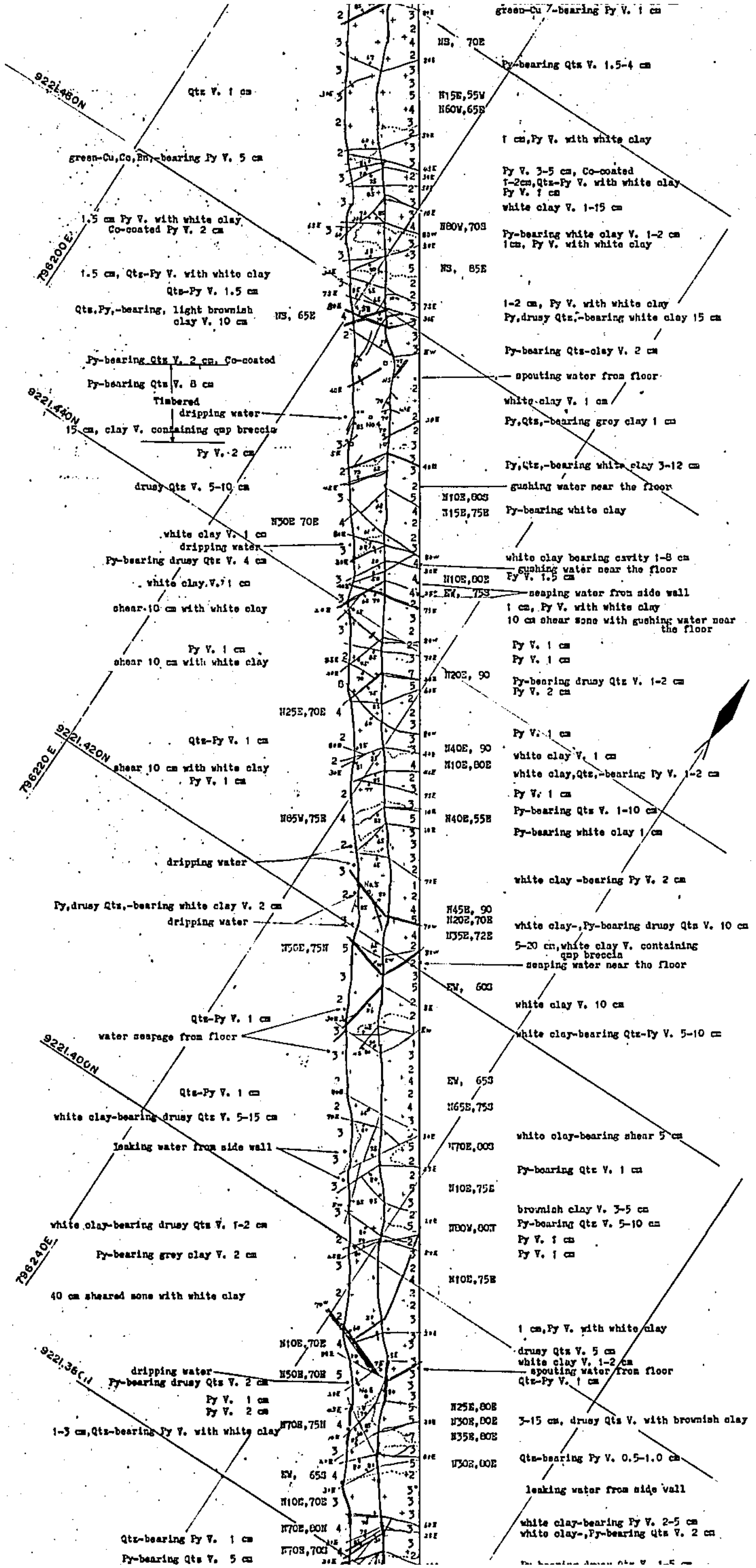
Bn ···· Bornite
Cc ···· Chalcocite
Cp ···· Chalcopyrite
Cv ···· Covelline
En ···· Enargite
Py ···· Pyrite
Mo ···· Molybdenum
Pb ···· Galena
Zn ···· Sphalerite
Hm ···· Hematite
Mt ···· Magnetite
Qtz ···· Quartz

Occurrence of Cu ores
D : V ······ in Dissemination : in Veins
Ratio of Cu ores
Cc:Cp ······ Chalcocite : Chalcopyrite

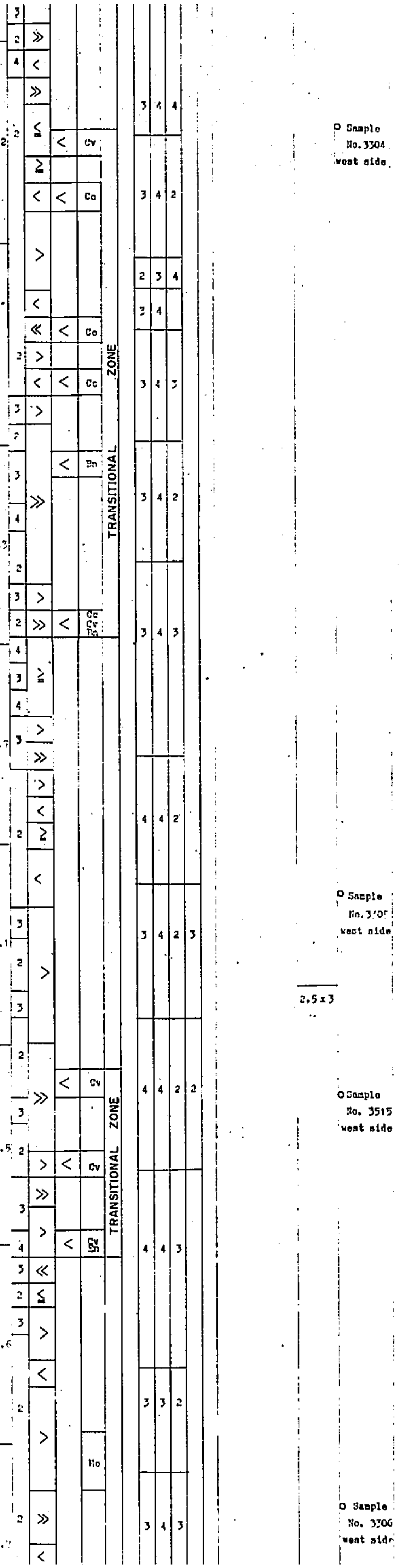
FRACTURING

V. 5 cm : vein with its width
1, 2, 3, ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10 cm x 10 cm square.
N60E, 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS



3325	3.0	0.31	0.04	0.005					
3326	3.0	0.20	0.03	0.015					
3327	3.0	0.34	0.02	0.003					
3328	3.0	0.39	0.02	0.020	nil	0.1	7.40	7.44	62.2
3329	3.0	0.41	0.03	0.012					
3330	3.0	0.41	0.04	0.022					
3331	3.0	0.24	0.03	0.010					
3332	3.0	0.33	0.05	0.010					
3333	3.0	0.28	0.04	0.020	nil	0.1			
3334	3.0	0.87	0.07	0.005					
3335	3.0	0.39	0.03	0.005					
3336	3.0	0.42	0.03	0.007					
3337	3.0	0.68	0.05	0.020					
3338	3.0	0.59	0.04	0.023	nil	0.1	7.50	8.27	63.3
3339	3.0	0.47	0.04	0.010					
3340	3.0	0.46	0.04	0.005					
3341	3.0	0.54	0.08	0.007					
3342	3.0	0.33	0.07	0.007					
3343	3.0	0.34	0.07	0.008	nil	0.2	7.30	8.63	[illegible]
3344	3.0	0.15	0.04	0.008					
3345	3.0	0.15	0.03	0.010					
3346	3.0	0.08	0.03	0.005					
3347	3.0	0.14	0.03	0.027					
3348	3.0	0.16	0.03	0.008	nil	0.1	7.65	7.95	62.1
3349	3.0	0.24	0.05	0.008					
3350	3.0	0.24	0.04	0.013					
3351	3.0	0.30	0.04	0.009					
3352	3.0	0.38	0.03	0.008					
3353	3.0	0.46	0.04	0.017	nil	0.2	6.55	6.87	62.5
3354	3.0	0.20	0.04	0.020					
3355	3.0	0.36	0.07	0.058					
3356	3.0	0.34	0.10	0.012					
3357	3.0	0.21	0.10	0.045					
3358	3.0	0.63	0.04	0.028	nil	0.3	6.75	7.14	62.6
3359	3.0	0.28	0.04	0.038					
3360	3.0	0.42	0.02	0.062					
3361	3.0	0.27	0.03	0.065					
3362	3.0	0.49	0.03	0.145					
3363	3.0	0.41	0.03	0.068	nil	0.1	5.47	[illegible]	[illegible]



S % Sulphur

SiO_2 % Silica

Ep ········· Epidote

P-Fel ······· Pink Feldspar

Limo ······· Limonitization

MINERALIZATION

Bn ···· Bornite

Cc ···· Chalcocite

Cp ···· Chalcopyrite

Cv ···· Covelline

En ···· Enargite

Py ···· Pyrite

Mo ···· Molybdenum

Pb ···· Galena

Zn ···· Sphalerite

Hm ···· Hematite

Mt ···· Magnetite

Qtz ···· Quartz

Occurrence of Cu ores

D : V ······ in Dissemination : in Veins

Ratio of Cu ores

Cc:Cp ····· Chalcocite : Chalcopyrite

FRACTURING

V . 5 cm : vein with its width

1 , 2 , 3 , ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10 cm x 10 cm square.

N60E , 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

Quartz Monzonite Porphyry (q m p)

Green Copper stain

Hematite stain

40E 70 Vein and Fissure more than 1cm thick

Place sampled

Surveying Spad

COLOR

blk ········ black

blu ······· blue

brn ········ brown

drk ········ dark

gry ········ gray

grn ········ green

lgh ········ light

purp ······· purple

red ········ red

wht ······· white

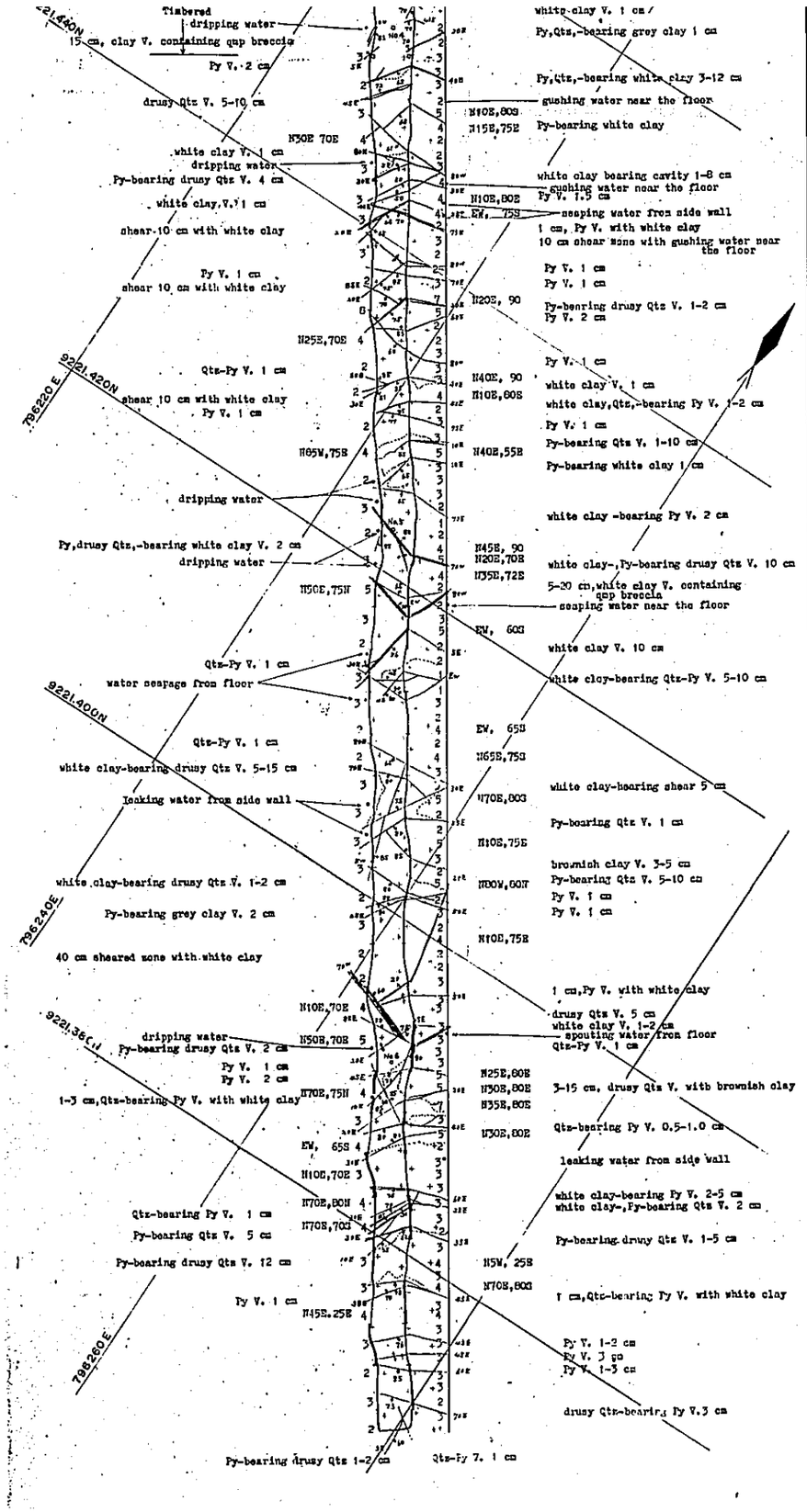
yel ········ yellow

GRANULARITY

fng ········ fine grained

mdg ········ medium grained

csg ········ coarse grained



3335	3.0	0.39	0.03	0.005								
3336	3.0	0.42	0.03	0.007								
3337	3.0	0.68	0.05	0.020								
3338	3.0	0.59	0.04	0.023	nil	0.1	7.50	8.27	63.3			
3339	3.0	0.47	0.04	0.010								
3340	3.0	0.46	0.04	0.005								
3341	3.0	0.54	0.04	0.007								
3342	3.0	0.33	0.07	0.007								
3343	3.0	0.34	0.07	0.008	nil	0.2	7.30	8.63	61.7			
3344	3.0	0.15	0.04	0.008								
3345	3.0	0.15	0.03	0.010								
3346	3.0	0.09	0.03	0.005								
3347	3.0	0.14	0.03	0.027								
3348	3.0	0.16	0.03	0.008	nil	0.1	7.85	7.99	62.1			
3349	3.0	0.24	0.05	0.008								
3350	3.0	0.24	0.04	0.013								
3351	3.0	0.38	0.04	0.009								
3352	3.0	0.38	0.03	0.008								
3353	3.0	0.46	0.04	0.017	nil	0.2	6.55	6.87	62.5			
3354	3.0	0.20	0.04	0.020								
3355	3.0	0.36	0.07	0.058								
3356	3.0	0.34	0.10	0.012								
3357	3.0	0.21	0.10	0.045								
3358	3.0	0.63	0.04	0.028	nil	0.3	6.75	7.14	62.6			
3359	3.0	0.28	0.04	0.030								
3360	3.0	0.42	0.02	0.062								
3361	3.0	0.27	0.03	0.065								
3362	3.0	0.49	0.03	0.145								
3363	3.0	0.41	0.03	0.068	nil	0.1	5.47	5.76	62.7			
3364	3.0	0.35	0.05	0.052								
3365	3.0	0.24	0.03	0.067								
3366	3.0	0.16	0.05	0.058								
3367	3.0	0.11	0.03	0.063	tr	0.3	6.25	7.56	62.1			
3368	1.6	0.22	0.05	0.070								

TRANSITIONAL ZONE

Sample No. 3505 west side

Sample No. 3515 west side

Sample No. 3506 west side

2.5 x 3

in the square.

SYMBOLS

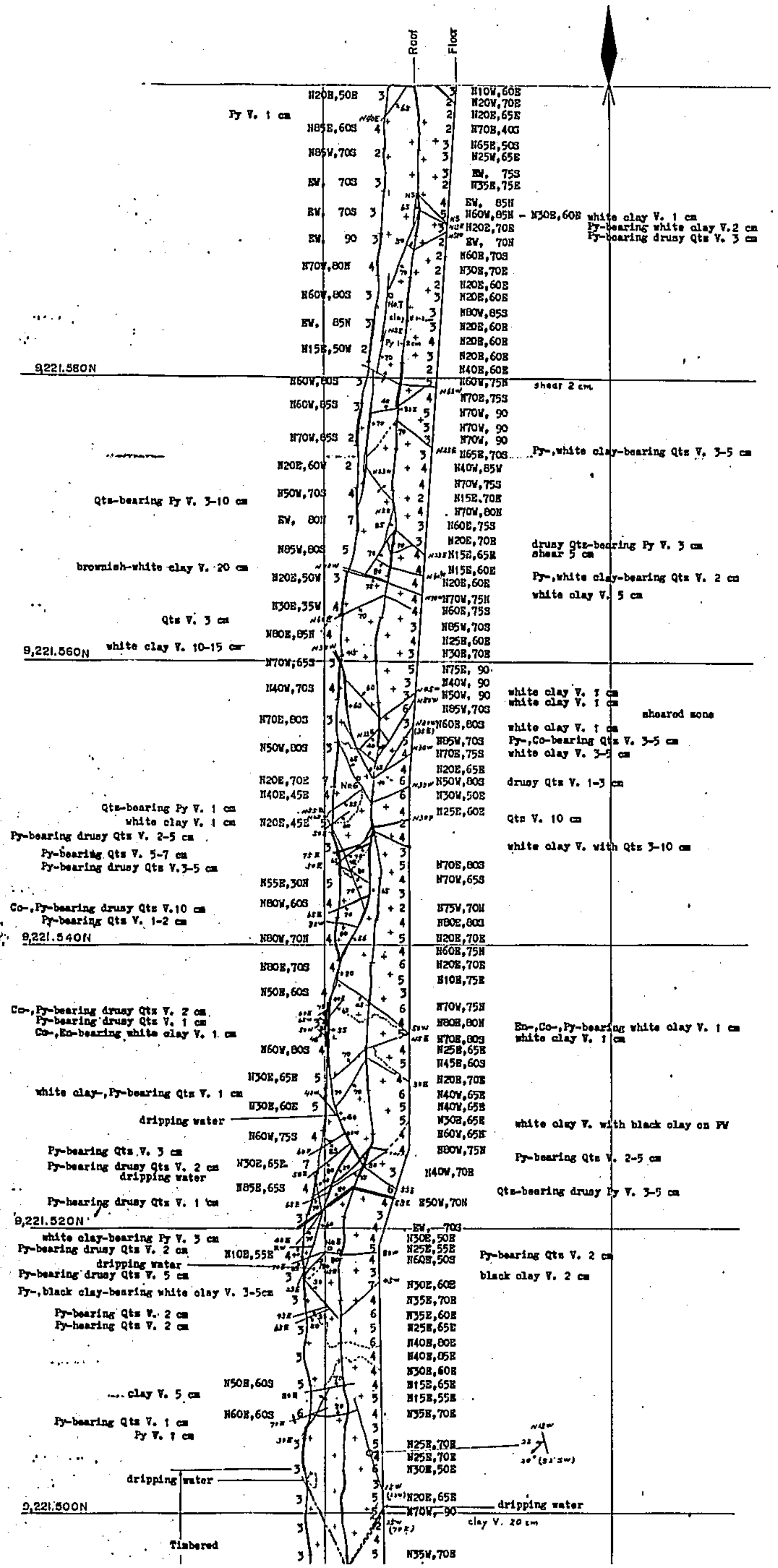
- Quartz Monzonite Porphyry (q m p)
- Green Copper stain
- Hematite stain
- 40E / 70 — Vein and Fissure more than 1cm thick
- Place sampled
- sflod — Surveying Stad

COLOR

- blk ..... black
- blu ..... blue
- brn ..... brown
- drk ..... dark
- gry ..... gray
- grn ..... green
- lgh ..... light
- purp ..... purple
- red ..... red
- wht ..... white
- yel ..... yellow

GRANULARITY

- fng ..... fine grained
- mdg ..... medium grained
- c s g ..... coarse grained

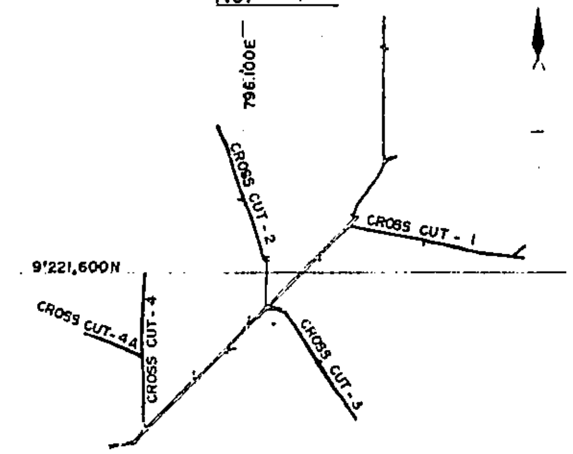


SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Occurrence of Cu min D:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	OTHERS	Fel m/m x m/m	Qtz m/m x m/m	Euhedral Bi m/m x m/m	REMARKS
3479	4.2	1.68	0.13							2	>	all Cc >>				3	4	2						
3478	3.0	0.87	0.11		nil	0.1	6.67	6.89	63.2	3														
3477	3.0	1.02	0.08							4	>>	all Cc											3.5x5.5	
3476	3.0	1.30	0.07							3	>		Co											
3475	3.0	0.72	0.08							4														
3474	3.0	1.40	0.09								≧													
3473	3.0	1.10	0.12		nil	0.1	7.19	7.32	64.0	3	>	P >> V > ; >											3 x 6 ; 1.5 x 3	
3472	3.0	1.20	0.08																					rich in disseminated Py with Co-coating
3471	3.0	1.00	0.10							4	>>					3	4	2						
3470	3.0	1.00	0.09							3	>													
3469	3.0	1.12	0.06							2	≧		Co [illegible]											
3468	3.0	1.20	0.11		tr	0.2	6.88	7.23	66.0		>>	>>												
3467	3.0	1.10	0.10							3	>													
3466	3.0	1.79	0.09								≦		Co											
3465	3.0	1.15	0.09							2	>													
3464	3.0	1.53	0.14							3	>>													
3463	3.0	1.67	0.11		tr	0.1	5.52	5.72	66.0	2	>					3	4	3						
3462	3.0	2.10	0.10							3	>	>	Co								4.5x5.5			
3461	3.0	1.84	0.11							2														
3460	3.0	1.33	0.07								>>	>>												
3459	3.0	1.81	0.12													3	4	3						O Sample No.3405 east side
3458	3.0	2.02	0.12		tr	0.1	5.11	5.03	66.6		≧										3.5x3.5 ; 2 x 4			
3457	3.0	1.25	0.16													3	3	2						
3456	3.0	1.35	0.12								>>	> ; >>				3	3	3						
3455	3.0	1.48	0.07								≦	>									2.5 x 5			
3454	3.0	1.58	0.09								> ; ≦	P > V > ; P > V >>	Co ; Cv			3	3	2	2					
3453	3.0	1.41	0.09		tr	0.1	6.25	5.81	66.3		>>		Co ; Co Cv											
3452	3.0	0.75	0.07								≧	>>				3	3	3						
3451	3.0	1.30	0.20	0.040							>>										2.5x4.5			
3450	3.0	1.20	0.22	0.04?						2	>	>				3	3	2	3					O Sample No.3404 east side
3449	3.0	1.01	0.15	0.05?						3														
3448	3.0	1.35	0.11	0.04?	nil	0.1	5.00	6.10	63.7	2	>>	>>	Co											
3447	3.0	1.38	0.24	0.058						3	< ; >>	>				3	4	4				1.5 x 2		
3446	3.0	0.64	0.17	0.038						2	>							5						

PLATE 3-2-4

GEOLOGICAL SURVEY OF MICHIQUILLAY AREA, REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF CROSS CUT No. 4



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GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

- T-Cu % ····· Total Copper
- S-Cu % ····· Acid Soluble Copper
- MoS2 % ····· Molybdenum Sulphide
- Au oz/t ····· Gold
- Ag oz/t ····· Silver
- Fe % ····· Iron
- S % ····· Sulphur
- SiO2 % ····· Silica

ALTERATION

- BIOT ········ Biotitization
- SILI ········ Silicification
- SERI ········ Sericitization
- ARGI ········ Argillization
- CHLO ········ Chloritization
- SPG ········ Supergene
- Ep ········ Epidote
- P-Fel ········ Pink Feldspar
- Limo ········ Limonitization

MINERALIZATION

- Bn ···· Bornite
- Cc ···· Chalcocite
- Cp ···· Chalcopyrite
- Cv ···· Covelline
- En ···· Enargite
- Py ···· Pyrite
- Mo ···· Molybdenum
- Pb ···· Galena
- Zn ···· Sphalerite
- Hm ···· Hematite
- Mt ···· Magnetite
- Qtz ···· Quartz

Occurrence of Cu ores

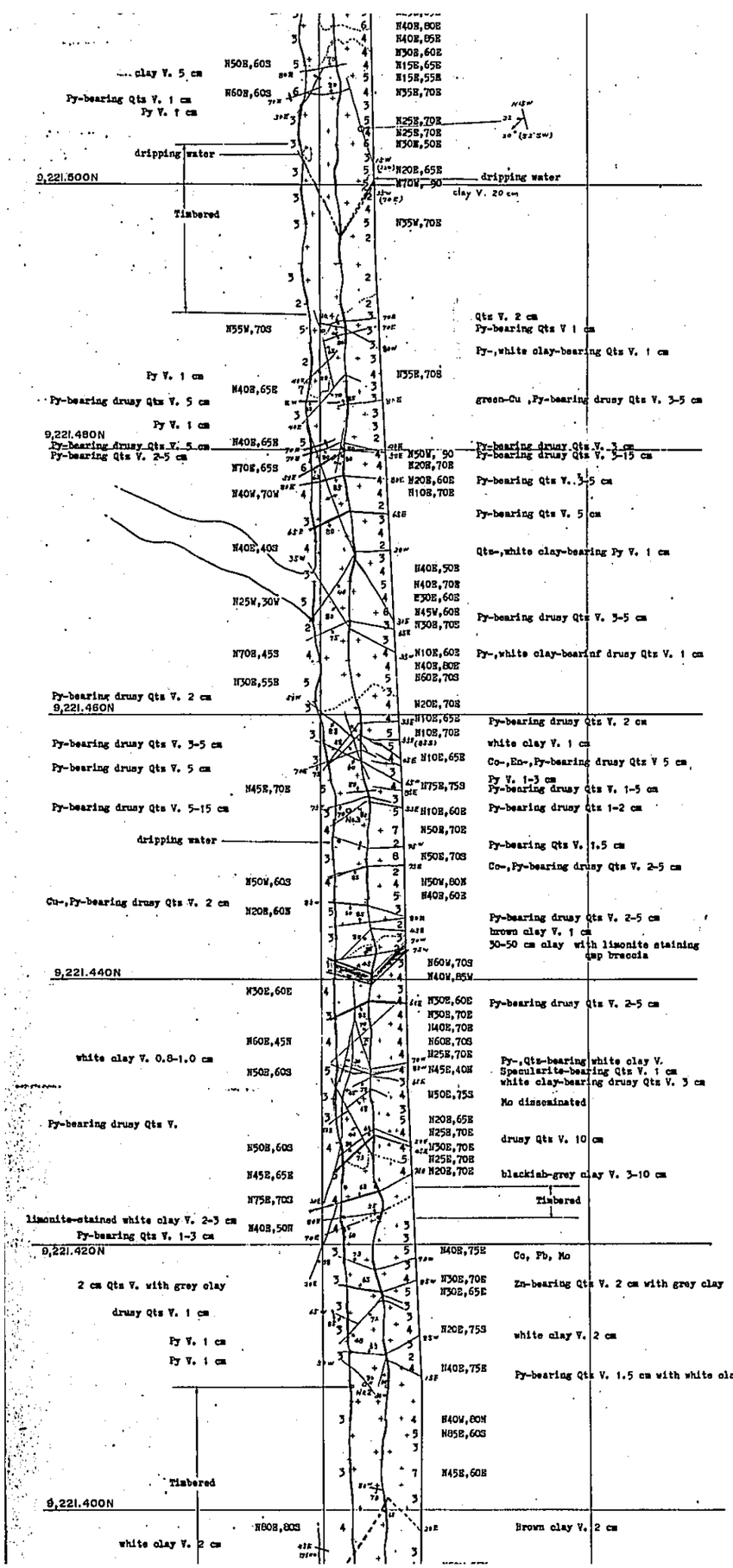
D : V ····· in Dissemination : in Veins

Ratio of Cu ores

Cc : Cp ····· Chalcocite : Chalcopyrite

FRACTURING

- V. 5 cm : vein with its width
- 1, 2, 3, ········ Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.
- N60E, 70S Major trend : Given for the most frequent fractures in the square.



3450	3.0	1.20	0.22	0.043						
3449	3.0	1.01	0.15	0.057						
3448	3.0	1.35	0.11	0.043	nil	0.1	5.00	6.10	63.7	
3447	3.0	1.38	0.24	0.058						
3446	3.0	0.64	0.17	0.038						
3445	3.0	1.05	0.11	0.037						
3444	3.0	1.84	0.04	0.045						
3443	3.0	0.87	0.08	0.050	nil	0.2	5.35	5.14	64.4	
3442	3.0	0.97	0.10	0.048						
3441	3.0	1.76	0.09	0.052						
3440	3.0	1.43	0.10	0.077						
3439	3.0	1.20	0.11	0.063						
3438	3.0	1.33	0.11	0.055	nil	0.2	5.85	5.78	64.1	
3437	3.0	1.52	0.12	0.087						
3436	3.0	1.56	0.16	0.090						
3435	3.0	1.28	0.23	0.070						
3434	3.0	0.95	0.22	0.070						
3433	3.0	1.55	0.30	0.092	tr	0.1	5.25	5.58	6.41	
3432	3.0	1.74	0.30	0.092						
3431	3.0	1.76	0.36	0.137						
3430	3.0	2.07	0.30	0.090						
3429	3.0	2.10	0.45	0.138						
3428	3.0	1.99	0.18	0.058	nil	0.2	4.25	4.27	64.7	
3427	3.0	1.90	0.37	0.078						
3426	3.0	2.38	0.15	0.153						
3425	3.0	2.10	0.12	0.115						
3424	3.0	2.58	0.20	0.153						
3423	3.0	1.26	0.09	0.265	nil	0.2	5.25	5.00	64.7	
3422	3.0	1.81	0.18	0.257						
3421	3.0	0.89	0.10	0.157						
3420	3.0	0.84	0.10	0.217						
3419	3.0	0.69	0.09	0.157						
3418	3.0	0.61	0.14	0.142	nil	0.1	5.75	5.12	64.0	
3417	3.0	0.59	0.12	0.090						
3416	3.0	0.74	0.08	0.093						
3415	3.0	0.49	0.11	0.035						
3414	3.0	0.24	0.04	0.022						
3413	3.0	0.31	0.13	0.038	nil	0.1	6.10	4.00	62.0	
3412	3.0	0.46	0.12	0.080						

ENRICHMENT ZONE

Co
Co Cv
Co
Co Cv Cn
Co
Cv Bn
Cv
Co
Co Pb Mo
Cv
Cv
Cv Mt
Mt

2.5x4.5
1.5 x 2
3.5x2.5
2.5 x 5
2.5x4.5
1.5x1.5
2.5x4
2x2.5
4 x 7
2.5 x 25

O Sample No.3404 east side
O Sample No.3405 east side
O Sample No.3402 east side
limonite stain on surface

En ····Enargite Mt·····Magnetite
Py····Pyrite Qtz····Quartz

FRACTURING

V . 5 cm : vein with its width

1 , 2 , 3 , ····· Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.

N60E , 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

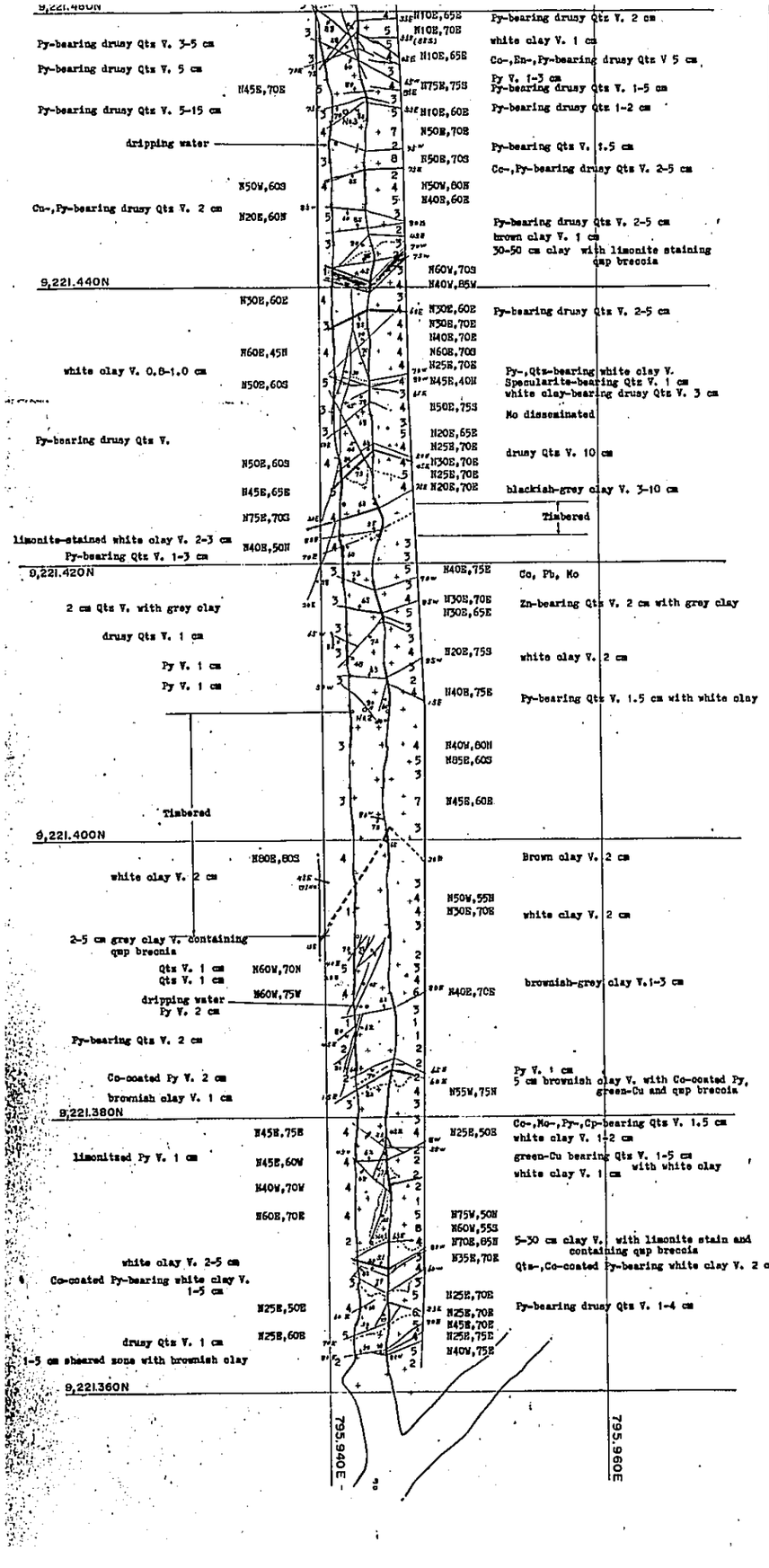
Quartz Monzonite Porphyry (qm p)
Green Copper stain
Hematite stain
40E / 70 Vein and Fissure more than 1cm thick
Place sampled
•No3 Surveying Spad

COLOR

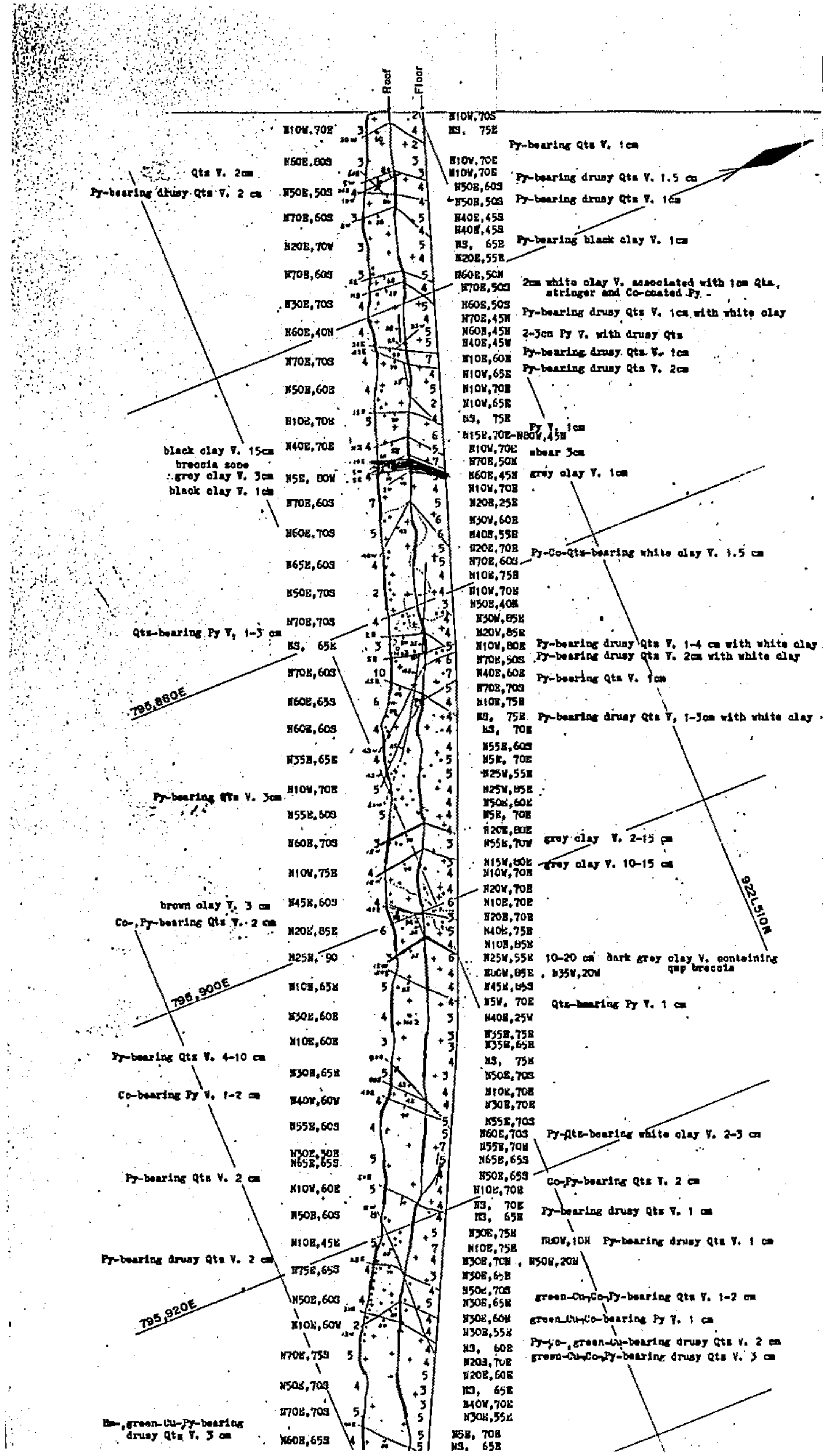
blk ····· black
blu ····· blue
brn ····· brown
drk ····· dark
gry ····· gray
grn ····· green
lgh ····· light
purp ····· purple
red ····· red
wht ····· white
yel ····· yellow

GRANULARITY

fng ····· fine grained
mdg ····· medium grained
c s g ····· coarse grained



3433	3.0	1.55	0.30	0.092	tr	0.1	5.25	5.58	6.41	2 3		≫	Cv										
3432	3.0	1.74	0.30	0.092								>	Co										
3431	3.0	1.76	0.36	0.137							>	>				3	3	3	1				
3430	3.0	2.07	0.30	0.090						2													
3429	3.0	2.10	0.45	0.138								>								2.5 x			
3428	3.0	1.99	0.18	0.058	nil	0.2	4.25	4.27	64.7	1 2													
3427	3.0	1.90	0.37	0.078						3		≥											
3426	3.0	2.38	0.15	0.153						1	≫	>	Co			4	3	3					
3425	3.0	2.10	0.12	0.115						2	>												
3424	3.0	2.58	0.20	0.153						3	≤	≥ ≥								2.5x4.			
3423	3.0	1.26	0.09	0.265	nil	0.2	5.25	5.00	64.7		≥	≥											
3422	3.0	1.81	0.18	0.257						2 2			Cv Bn								1.5x1.		
3421	3.0	0.89	0.10	0.157						3	>		Cv			3	3	2		2.5x4	2x2.5		
3420	3.0	0.84	0.10	0.217						2	<	<	Co Co Pb Mo			2	3	3					○ Sample No.3402 east side
3419	3.0	0.69	0.09	0.157							≥		Cv			3	3	2	3	4 x 7			
3418	3.0	0.61	0.14	0.142	nil	0.1	5.75	5.12	64.0	1	>												
3417	3.0	0.59	0.12	0.090						2													
3416	3.0	0.74	0.08	0.093						1	≥		Cv			3	2	3	3				limonite stain on surface
3415	3.0	0.49	0.11	0.035						2 1			Cv Mt										
3414	3.0	0.24	0.04	0.022						2 1	>		Mt										
3413	3.0	0.31	0.13	0.038	nil	0.1	6.10	4.00	62.0						3			4	3			25x25	
3412	3.0	0.46	0.12	0.080							≥												
3411	3.0	0.61	0.08	0.108							≤			TRANSITIONAL ZONE						4x5.5			
3410	3.0	0.72	0.14	0.142	-					2													
3409	3.0	0.51	0.05	0.122							>		Cv			3	2	2	3				
3408	3.0	0.84	0.07	0.112	nil	0.2	4.95	5.00	64.1	4	<												
3407	3.0	0.61	0.05	0.112						3 2	>					3	3	4					
3406	3.0	0.47	0.08	0.083						3	≥												
3405	3.0	0.59	0.03	0.083						2						3	2	2	3	2.5x2.			limonite stain on surface ○ Sample No.3401 east side
3404	3.0	0.69	0.14	0.080							>												
3403	3.0	0.66	0.05	0.042	nil	0.3	4.95	5.83	62.0	1	≥		Cv			2	3	4	3				
3402	3.0	0.55	0.03	0.057						2	≤ ≥	<	Cv Co Cv			3	1	3	3				limonite stain on surface
3401	3.0	0.54	0.10	0.060						3	>		Cc Cv			3	4	3	3				

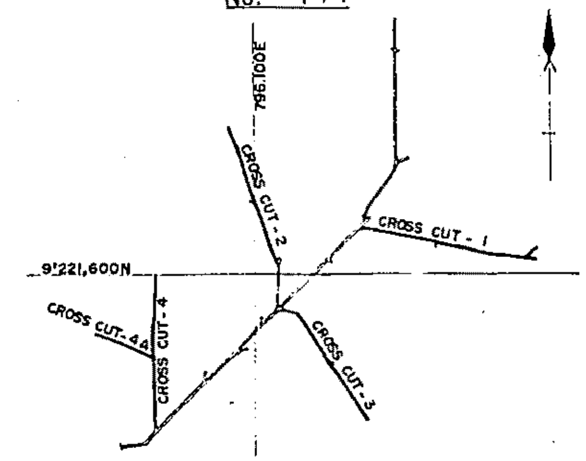


ASSAY										MINERALIZATION				ALTERATION							PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Cu D:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	OTHERS	Fel m/m x m/m	Qtz m/m x m/m	Euhedral bi m/m x m/m	
3533	4.0	0.74	0.08							3	> / »	<										2.5 x 3 / 3 x 4.5		
3532	3.0	0.87	0.05		tr	0.1	5.31	4.84	65.7	2	≥		Cc	TRANSITIONAL ZONE		3	4	3				5 x 6	1.5 x 2	
3531	3.0	1.16	0.08									>										2 x 3		
3530	3.0	1.45	0.11							3		D » V >												
3529	3.0	1.53	0.11								»	D » V ≥ / <				3	4	3						
3528	3.0	0.89	0.05		tr	0.1	5.31	4.82	65.0	3		≥ / <							1					
3527	3.0	1.02	0.12								≥		Cc											
3526	3.0	1.63	0.18								>	>	Cc En									2 x 2		
3525	3.0	2.17	0.12							2	» / ≥	» / »	Cc											
3524	3.0	1.53	0.14									»				4	4	3						
3523	3.0	1.63	0.12		nil	0.1	5.42	5.14	66.4	3	> / »	D »	Cc Bn			4	3	2						
3522	3.0	1.45	0.10								>	V >				3	3	2	2					
3521	3.0	1.86	0.11								» / ≥	»	Cc											remarkable network Qtz veinlets
3520	3.0	1.50	0.10							4		>	Cc Bn			4	4	3						
3519	3.0	0.75	0.08							3	»	»												Sample No. 3521 south side
3518	3.0	1.68	0.06		nil	0.1	5.52	5.04	66.?	4	>	> / D > V ≥												
3517	3.0	1.56	0.18								»	>	Cc			3	3	3						
3516	3.0	1.68	0.07							3	>	» / ≥			2	3	2	2	3				1.5 x 2	
3515	3.0	1.02	0.15								≥	>				2	4	4				3 x 3	2.5 x 3	
3514	3.0	1.61	0.23							4	»	» / >												
3513	3.0	0.94	0.12		nil	0.1	5.63	5.30	66.?			≥												
3512	3.0	0.99	0.10							3	>	D » V ≥	Cc Bn	ENRICHMENT ZONE										
3511	3.0	1.05	0.17																					
3510	3.0	1.63	0.12								»	»												
3509	3.0	1.45	0.17							2			Cc			4	3	3						
3508	3.0	1.35	0.25		nil	0.1	4.79	4.34	66.0	4	>	>												
3507	3.0	1.71	0.15							3	»													
3506	3.0	2.04	0.11							2														
3505	3.0	1.66	0.29									»												
3504	3.0	1.81	0.21							3	>													
3503	3.0	1.35	0.08		tr	0.1	5.00	4.44	64.3	2			Cc Bn											

PLATE 3-2-5

GEOLOGICAL SURVEY OF MICHIQUILLAY AREA, REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF CROSS CUT No. 4A



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GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

- T-Cu % ····· Total Copper
- S-Cu % ····· Acid Soluble Copper
- MoS2 % ····· Molybdenum Sulphide
- Au oz/t ····· Gold
- Ag oz/t ····· Silver
- Fe % ····· Iron
- S % ····· Sulphur
- SiO2 % ····· Silica

ALTERATION

- BIOT ········ Biotitization
- SILI ········ Silicification
- SERI ········ Sericitization
- ARGI ········ Argillization
- CHLO ········ Chloritization
- SPG ········ Supergene
- Ep ········ Epidote
- P-Fel ········ Pink Feldspar
- Limo ········ Limonitization

MINERALIZATION

- Bn ···· Bornite
- Cc ···· Chalcocite
- Cp ···· Chalcopyrite
- Cv ···· Covelline
- En ···· Enargite
- Py ···· Pyrite
- Mo ···· Molybdenum
- Pb ···· Galena
- Zn ···· Sphalerite
- Hm ···· Hematite
- Mt ···· Magnetite
- Qtz ···· Quartz

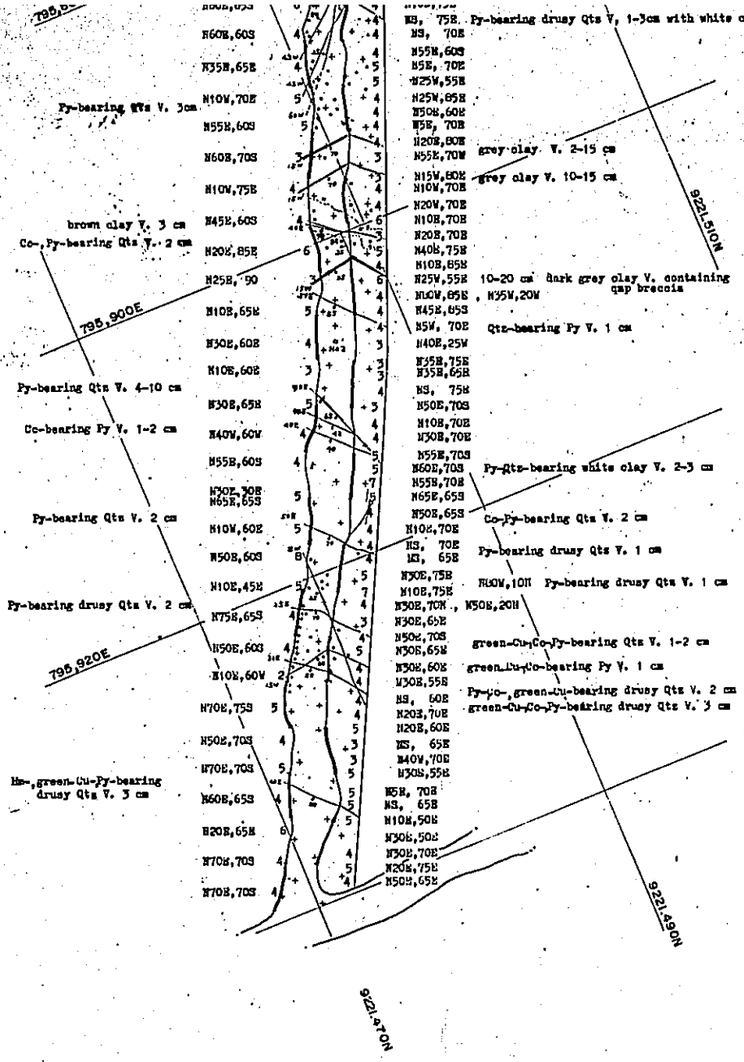
Occurrence of Cu ores

D : V ····· In Dissemination : In Veins

Ratio of Cu ores

Cc:Cp ····· Chalcocite : Chalcopyrite

FRACTURING



3520	3.0	1.50	0.10							4						4	4	3				network Qts veinlets
3519	3.0	0.75	0.08							3	»	»										
3518	3.0	1.68	0.06		nil	0.1	5.52	5.04	[illegible]	4	>	> b > v ≥										Sample No.[illegible] south side
3517	3.0	1.56	0.18								»	>	Cc			3	3	3				
3516	3.0	1.68	0.07							3	>	» ≥			2	3	2	2	3		1.5x2	
3515	3.0	1.02	0.15								≥	>				2	4	4		3 x 3	2.5x3	
3514	3.0	1.61	0.23							4	»	» >										
3513	3.0	0.94	0.12		nil	0.1	5.63	5.30	66.3			≥										
3512	3.0	0.99	0.10							3	>	b » v ≥	Cc Bn	ENRICHMENT ZONE								
3511	3.0	1.05	0.17																			
3510	3.0	1.63	0.12								»	»										
3509	3.0	1.45	0.17							2			Cc			4	3	3				
3508	3.0	1.35	0.25		nil	0.1	4.79	4.34	66.0	4	>											
3507	3.0	1.71	0.15							3	»	>										
3506	3.0	2.04	0.11							2												
3505	3.0	1.66	0.29									»										
3504	3.0	1.81	0.21							3	>		Cc Bn									
3503	3.0	1.35	0.08		tr	0.1	5.00	4.44	64.3	2												
3502	3.0	1.20	0.06							1												
3501	3.0	0.89	0.20							4												

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

T-Cu	%	Total Copper
S-Cu	%	Acid Soluble Copper
MoS2	%	Molybdenum Sulphide
Au	oz/t	Gold
Ag	oz/t	Silver
Fe	%	Iron
S	%	Sulphur
SiO2	%	Silica

ALTERATION

BIOT ········· Biotitization
SILI ········· Silicification
SERI ········· Sericitization
ARGI ······· Argillization
CHLO ······· Chloritization
SPG ········· Supergene
Ep ········· Epidote
P-Fel ······· Pink Feldspar
Limo ······· Limonitization

MINERALIZATION

Bn ··· Bornite
Cc ··· Chalcocite
Cp ····· Chalcopyrite
Cv ····· Covelline
En ···· Enargite
Py ····· Pyrite

Mo ···· Molybdenum
Pb ···· Galena
Zn ····· Sphalerite
Hm ···· Hematite
Mt ····· Magnetite
Qtz ···· Quartz

Occurrence of Cu ores
D : V······ in Dissemination : in Veins

Ratio of Cu ores
Cc:Cp····· Chalcocite : Chalcopyrite

FRACTURING

V. 5 cm : vein with its width

1, 2, 3, ········· Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.

N60E, 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

+ + +	Quartz Monzonite Porphyry (qmp)	40E .70	Vein and Fissure more than 1cm thick
▲ ▲ ▲	Green Copper stain	\\ \\	Place sampled
■ ■ ■	Hematite stain	∘No3	Surveying Spad

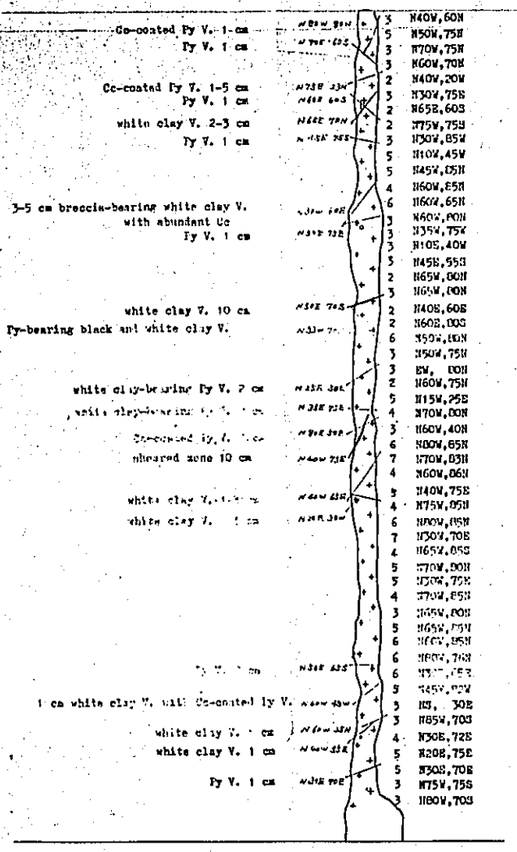
COLOR

blk ········ black
blu ······· blue
brn ········ brown
drk ········ dark
gry ········ gray
grn ········ green
lgh ········ light
purp ······· purple
red ········ red
wht ······· white
yel ········ yellow

GRANULARITY

fng ········ fine grained
mdg ········ medium grained
csg ·········· coarse grained

RAISE No 2



SAMPLE No	WIDTH m	T.Cu %	S.Cu %	MoSz %	Au oz/t	Ag oz/t	Fe %	S %	SiOz %
4217	3.0	0.59	0.05	0.003					
4216	3.0	0.95	0.05	0.005					
4215	3.0	0.61	0.05	0.015					
4214	3.0	1.87	0.09	0.020					
4213	3.0	1.07	0.04	0.003	nil	0.2	10.5	10.2	62.0
4212	3.0	0.70	0.05	0.005					
4211	3.0	1.71	0.06	0.015					
4210	3.0	1.71	0.08	0.003					
4209	3.0	1.38	0.06	0.005					
4208	3.0	1.05	0.05	0.003	nil	0.1	9.95	9.89	62.3
4207	3.0	0.77	0.05	0.003					
4206	3.0	1.48	0.05	0.003					
4205	3.0	1.05	0.09	0.002					
4204	3.0	1.12	0.05	0.003					
4203	3.0	0.66	0.08	0.007	nil	0.1	10.2	9.65	62.6
4202	3.0	0.59	0.04	0.003					
4201	3.0	1.10	0.08	0.003					

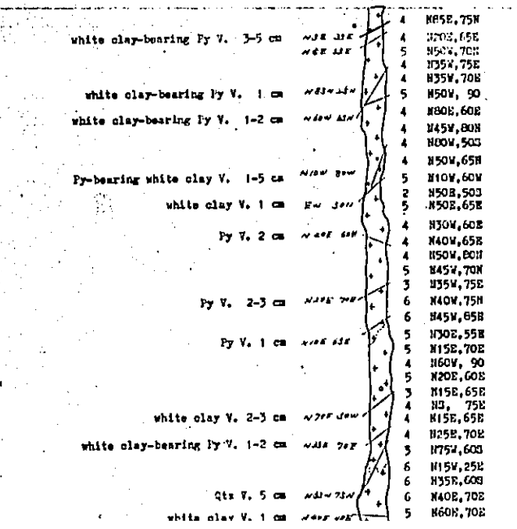
MINERALIZATION: Py; Occ of Cu min D:V; RATIO Cc:Cp; OTHERS: Cc, Bn, Cc Bn, Cc Bn sph-Cu, Cc Bn, Bn, Cc, Cc

ALTERATION: SPG, BIOT, SILI, SERI, ARGI, CHLO, OTHERS

PHENOCRYSTS	Fel $m_m \times m_m / m_n$	Qtz $m_m \times m_m / m_n$	Euhedral Bl $m_m \times m_m / m_n$
	3 x 5	1 x 1 very rare	

REMARKS: mostly Cc-coated Py

RAISE No. 3



SAMPLE No	WIDTH m	T.Cu %	S.Cu %	MoSz %	Au oz/t	Ag oz/t	Fe %	S %	SiOz %
4311	3.0	[illegible]	0.06	0.018					
4310	3.0	0.89	0.03	0.015					
4309	3.0	1.36	0.04	0.013					
4308	3.0	1.02	0.04	0.020	tr	0.1	7.46	6.64	66.0
4307	3.0	1.18	0.04	0.010					
4306	3.0	0.87	0.04	0.012					
4305	3.0	1.15	0.04	0.025					
4304	3.0	0.82	0.04	0.023					
4303	3.0	0.79	0.03	0.015	tr	0.1	5.59	5.08	63.8
4302	3.0	0.84	0.04	0.028					
4301	3.0	1.10	0.01	0.015					

MINERALIZATION: Py; Occ of Cu min D:V; RATIO Cc:Cp; OTHERS: Cc, Cc

ALTERATION: SPG, BIOT, SILI, SERI, ARGI, CHLO, OTHERS

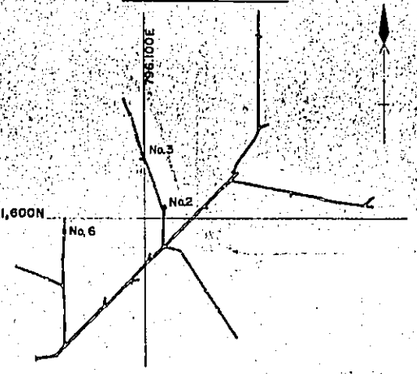
PHENOCRYSTS	Fel $m_m \times m_m / m_n$	Qtz $m_m \times m_m / m_n$	Euhedral Bl $m_m \times m_m / m_n$
	3 x 5		2 x 3

REMARKS: remarkable net work Qtz

PLATE 4

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF RAISE No. 2, 3 and 6



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GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

T-Cu	%	Total Copper
S-Cu	%	Acid Soluble Copper
MoSz	%	Molybdenum Sulphide
Au	oz/t	Gold
Ag	oz/t	Silver
Fe	%	Iron
S	%	Sulphur
SiOz	%	Silica

ALTERATION

BIOT·····Biotitization
SILI·····Silicification
SERI·····Sericitization
ARGI·····Argillization
CHLO·····Chloritization
SPG·····Supergene
Ep ····· Epidote
P-Fel·····Pink Feldspar
Limo·····Limonitization

MINERALIZATION

Bn····Bornite
Cc····Chalcocite
Cp·····Chalcopyrite
Cv·····Covelline
En····Enargite
Py·····Pyrite
Mo····Molybdenum
Pb····Galena
Zn·····Sphalerite
Hm····Hematite
Mt·····Magnetite
Qtz····Quartz

Occurrence of Cu ores
D : V·····in Dissemination : in Veins
Ratio of Cu ores
Cc:Cp·····Chalcocite : Chalcopyrite

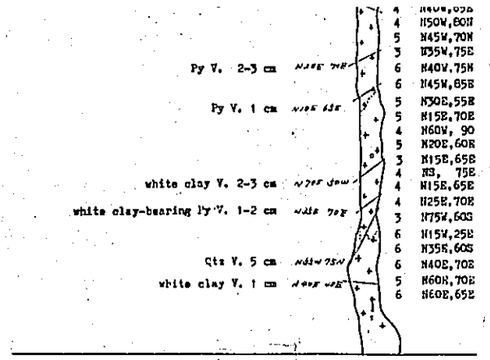
FRACTURING

V. 5 cm : vein with its width

1 , 2 , 3 , ····· Intensity : Numbers of fissures, veins and veinlets, observed in each 10 cm x 10 cm square.

N60E , 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS



4306	3.0	0.67	0.04	0.012						3	<													
4305	3.0	1.15	0.04	0.025	tr	0.1	5.59	5.08	62.8		≫													
4304	3.0	0.82	0.04	0.023						2	≤ >					3	4	3						
4303	3.0	0.79	0.03	0.015						3	<					3	3	2						
4302	3.0	0.84	0.04	0.026							>		Cc			3	3	4						
4301	3.0	1.10	0.01	0.015							≫		Cc											

RAISE No. 6

ASSAY										MINERALIZATION				ALTERATION							PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T-Cu %	S-Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Occ of Cumin D : V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	OTHERS	Fel m/m x m/m	Qtz m/m x m/m	Euhedral Bt m/m x m/m	
4610	3.0	1.20	0.05	0.013	nil	0.1	4.68	4.64	62.6	3 2	>	>	Cc	ENRICHMENT ZONE			3	4			5 x 7	2.5 x 4	2 x 3	
4609	3.0	1.71	0.07	0.025						3	≫					3	3	2						
4608	3.0	0.95	0.06	0.018						2														
4607	3.0	1.40	0.09	0.028																				
4606	3.0	1.94	0.09	0.015						3	≥					3	3	3						
4605	3.0	1.30	0.09	0.012	nil	0.1	4.89	5.00	63.1	2	≫					3	4	2						
4604	3.0	1.33	0.07	0.020						3	≥													
4603	3.0	1.55	0.10	0.008							>													
4602	3.0	1.64	0.13	0.010						2 3	≫													
4601	3.0	1.79	0.15	0.013						2	≥													

En----Enargite Mt-----Magnetite

Py-----Pyrite Qtz----Quartz

FRACTURING

V. 5 cm	:	vein with its width
1, 2, 3, --------- intensity	:	Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.
N60E, 70S Major trend	:	Given for the most frequent fractures in the square.

SYMBOLS

+ + +	Quartz Monzonite Porphyry (qmp)	40E / 70	Vein and Fissure more than 1cm thick
▲	Green Copper stain	\\	Place sampled
■	Hematite stain	•No3	Surveying Spad

COLOR

blk --------- black
blu ------- blue
brn -------- brown
drk -------- dark
gry -------- gray
grn -------- green
lgh -------- light
purp ------- purple
red --------- red
wht ------- white
yel -------- yellow

GRANULARITY

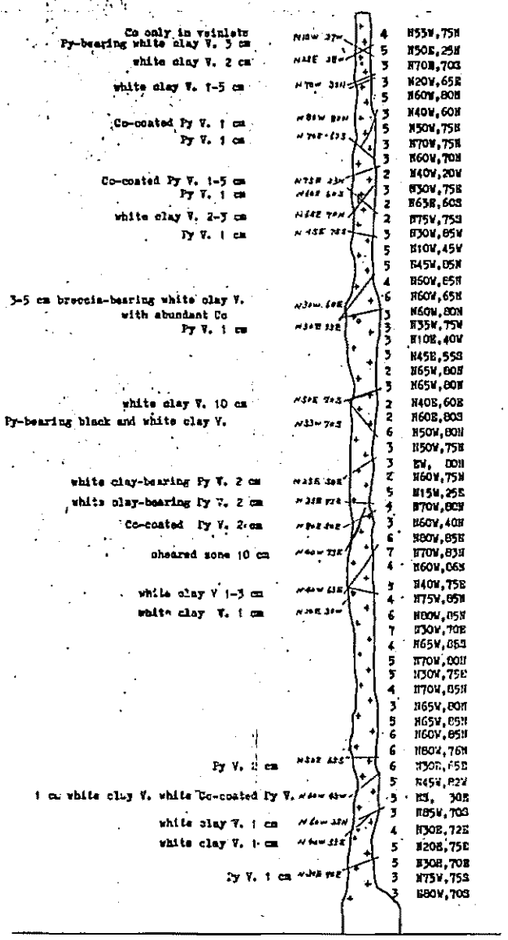
fng -------- fine grained
mdg -------- medium grained
csg ---------- coarse grained

RAISE No. 2

RAISE No. 3

RAISE No. 6

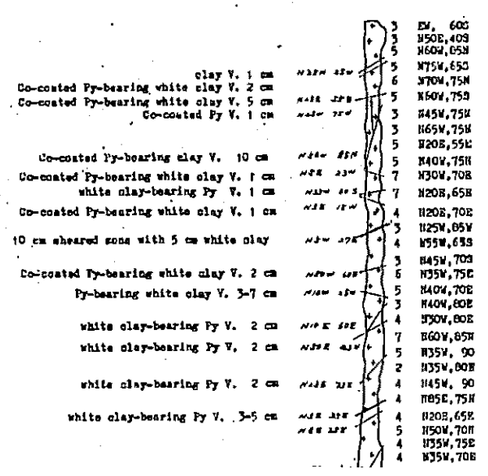
RAISE No 2



ASSAY										MINERALIZATION				ALTERATION						PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T.Cu %	S.Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Occ of Cu min D:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	Fel	Qtz	Euhedral Bi	
4219	4.0	0.89	0.08	0.002						4	<	<	Co										mostly Co-coated Py
4218	3.0	1.23	0.09	0.003						3	≫		Co, Cu-Co										
4217	3.0	0.59	0.05	0.003	nil	0.1	9.84	9.90	63.6		≥												
4216	3.0	0.95	0.05	0.005						4	>												
4215	3.0	0.61	0.05	0.005						3	<	<	Co			3	3	2					
4214	3.0	1.87	0.09	0.020						4	>												
4213	3.0	1.07	0.04	0.003	nil	0.2	10.3	10.2	62.0		≫												
4212	3.0	0.70	0.05	0.005						3	>									3 x 5	1 x 1 very rare		
4211	3.0	1.71	0.08	0.005						4	≥	<	Co										
4210	3.0	1.71	0.08	0.003						3													
4209	3.0	1.38	0.06	0.005						4	>												
4208	3.0	1.05	0.05	0.003	nil	0.1	9.95	9.89	62.3	3													
4207	3.0	0.77	0.05	0.003						2	≫	<	Co Bn										
4206	3.0	1.48	0.05	0.003									Co Bn Cp Cv										
4205	3.0	1.05	0.09	0.002						3	>												
4204	3.0	1.12	0.05	0.003							≤	<	Co Bn			4	3	2					
4203	3.0	0.66	0.08	0.007	nil	0.1	10.2	9.65	62.6		≥												
4202	3.0	0.59	0.04	0.003						4	≤		Co										
4201	3.0	1.10	0.08	0.003						2	>	<	Co										
										3	≫												

TRANSITIONAL ZONE

RAISE No. 3



ASSAY										MINERALIZATION				ALTERATION						PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T.Cu %	S.Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Occ of Cu min D:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	Fel	Qtz	Euhedral Bi	
4319	4.0	2.58	0.09							2	>												widely limonite-coated on the footwall especially strong along joints
4318	3.0	3.96	0.18	0.012	0.02	0.2	9.07	10.6	63.6		≥												
4317	3.0	3.35	0.19							3	≤												
4316	3.0	2.35	0.07								≫					3	4	2					
4315	3.0	1.76	0.11							2	>												
4314	3.0	1.48	0.08							3	≥												
4313	3.0	1.38	0.10	0.012	0.02	0.1	7.40	8.50	66.4	4	>	>	Co										
4312	3.0	0.82	0.07	0.013							≥												
4311	3.0	1.67	0.06	0.018						3	<									3 x 5			
											≫												

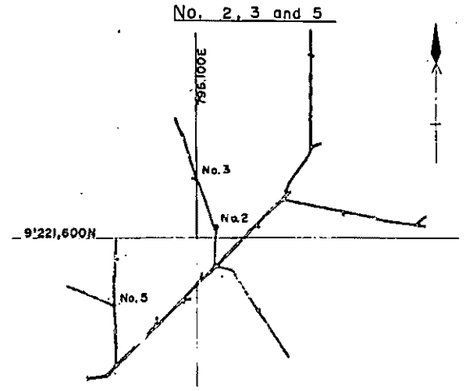
ENRICHMENT ZONE

PLATE 3-2-6

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

UNDERGROUND GEOLOGICAL SKETCH AND ASSAY MAP OF RAISE

No. 2, 3 and 5



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GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

Scale 1 : 200

INDEX

ASSAY

T-Cu	%	Total Copper
S-Cu	%	Acid Soluble Copper
MoSz	%	Molybdenum Sulphide
Au	oz/t	Gold
Ag	oz/t	Silver
Fe	%	Iron
S	%	Sulphur
SiOz	%	Silica

ALTERATION

BIOT ····· Biotitization
SILI ····· Silicification
SERI ····· Sericitization
ARGI ····· Argillization
CHLO ····· Chloritization
SPG ····· Supergene
Ep ····· Epidote
P-Fel ····· Pink Feldspar
Limo ····· Limonitization

MINERALIZATION

Bn ···· Bornite
Cc ···· Chalcocite
Cp ···· Chalcopyrite
Cv ···· Covellite
En ···· Enargite
Py ···· Pyrite
Mo ···· Molybdenum
Pb ···· Galena
Zn ···· Sphalerite
Hm ···· Hematite
Mt ···· Magnetite
Qtz ···· Quartz

Occurrence of Cu ores
D : V ····· in Dissemination : in Veins
Ratio of Cu ores
Cc:Cp ····· Chalcocite : Chalcopyrite

FRACTURING

V. 5 cm : vein with its width

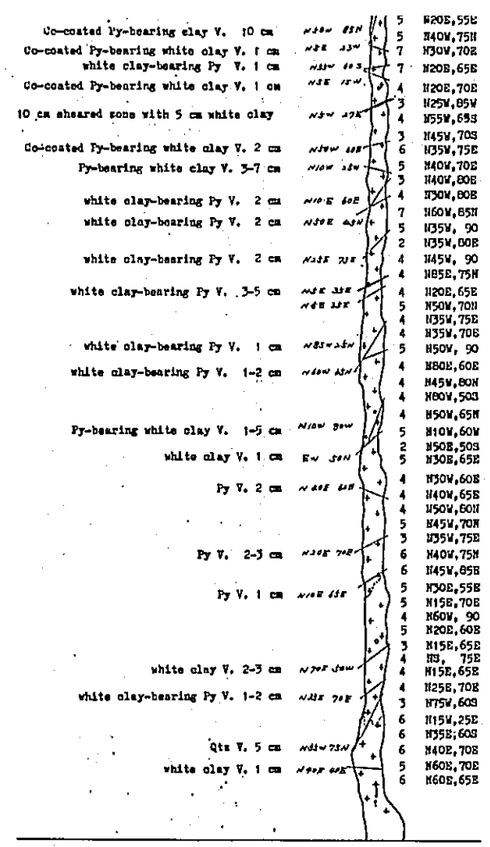
1 , 2 , 3 , ····· Intensity : Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.

N60E , 70S Major trend : Given for the most frequent fractures in the square.

SYMBOLS

Quartz Monzonite Porphyry (q m p)

40E/70 Vein and Fissure more than



4317	3.0	3.35	0.15								≤			ENRICHMENT ZONE		3	4	2						joints
4316	3.0	2.35	0.07							2	≫ >													
4315	3.0	1.76	0.11							3	≥													
4314	3.0	1.48	0.08							4	> ≫													
4313	3.0	1.38	0.10	0.012	0.02	0.1	7.40	8.50	66.4	3	≥	>	Cc											
4312	3.0	0.82	0.07	0.013							< >													
4311	3.0	1.07	0.06	0.018							< ≫										3 x 5			
4310	3.0	0.89	0.03	0.015																				
4309	3.0	1.30	0.04	0.013							>			TRANSITIONAL ZONE									2 x 3	
4308	3.0	1.02	0.04	0.020	tr	0.1	7.46	6.64	65.0	4	≤													remarkable net work Qtz
4307	3.0	1.18	0.04	0.010						3	>	>												
4306	3.0	0.67	0.04	0.012							<													
4305	3.0	1.15	0.04	0.025							≫													
4304	3.0	0.82	0.04	0.023						2	≤					3	4	3						
4303	3.0	0.79	0.03	0.015	tr	0.1	5.59	5.08	62.8		> <													
4302	3.0	0.84	0.04	0.028						3	>	>	Cc			3	3	2						
4301	3.0	1.10	0.01	0.015							≫	>	Cc											
																3	3	4						

Cv·····Covelline
En·····Enargite
Py·····Pyrite
Hm·····Hematite
Mt·····Magnetite
Qtz·····Quartz
Cc:Cp·····Chalcocite : Chalcopyrite

FRACTURING

V. 5 cm	:	vein with its width
1, 2, 3, ········· Intensity	:	Numbers of fissures, veins and veinlets, observed in each 10cm x 10cm square.
N60E, 70S Major trend	:	Given for the most frequent fractures in the square.

SYMBOLS

+ + +	Quartz Monzonite Porphyry (q m p)	40E ✗ 70	Vein and Fissure more than 1cm thick
▲▲▲	Green Copper stain	⧵⧵	Place sampled
■■■	Hematite stain	•No3	Surveying Spad

COLOR

blk ········ black
blu ········ blue
brn ········ brown
drk ········ dark
gry ········ gray
grn ········ green
lgh ········ light
purp ········ purple
red ········ red
wht ········ white
yel ········ yellow

GRANULARITY

fng ········ fine grained
mdg ········ medium grained
csg ········ coarse grained

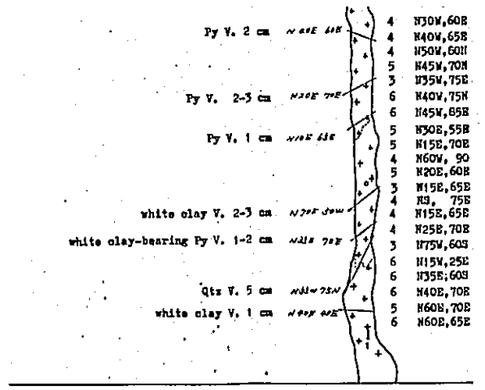
RAISE No. 5

ASSAY										MINERALIZATION				ALTERATION							PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T_Cu %	S_Cu %	MoS2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO2 %	Py	Occ of Cu min D:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	OTHERS	Fel m/m x m/m	Qtz m/m x m/m	Euhedral Bi m/m x m/m	
4507	2.0	1.46	0.16	0.062	tr	0.2	5.42	5.53	66.3	2				ENRICHMENT ZONE										
4506	3.0	1.20	0.08							3			Hc Cc								4.5 x 7	3 x 4.5		
4505	3.0	1.33	0.06								≫													Qtz : very rare
4504	3.0	2.10	0.08									≧	Cc Cv			3	3	3						
4303	3.0	1.71	0.11	0.045	0.01	0.1	5.21	5.25	66.4		>													
4302	3.0	1.79	0.09								≫		Hc Cc											limonite stain on surface
4301	3.0	1.07	0.07								>													
													Cc Cv											

RAISE No. 2

RAISE No. 3

RAISE No. 5



4307	3.0	1.18	0.04	0.010						3	>	>		TRANSITIONAL ZONE										
4306	3.0	0.87	0.04	0.012							<													
4305	3.0	1.15	0.04	0.025	tr	0.1	5.59	5.08	62.8		≫													
4304	3.0	0.82	0.04	0.023						2	≤					3	4	3						
4303	3.0	0.79	0.03	0.015							> <													
4302	3.0	0.84	0.04	0.026						3	>	>	Cc			3	3	2						
4301	3.0	1.10	0.01	0.015							≫	>	Cc											
																3	3	4						

RAISE No. 5

ASSAY										MINERALIZATION				ALTERATION							PHENOCRYSTS			REMARKS
SAMPLE No	WIDTH m	T_Cu %	S_Cu %	MoS_2 %	Au oz/t	Ag oz/t	Fe %	S %	SiO_2 %	Py	Ocs of Cu min O:V	RATIO Cc:Cp	OTHERS	SPG	BIOT	SILI	SERI	ARGI	CHLO	OTHERS	Fel m/m x m/m	Qtz m/m x m/m	Euhedral Bi m/m x m/m	
4507	2.0	1.46	0.16	0.062	tr	0.2	5.42	5.53	66.3	2				ENRICHMENT ZONE							4.5 x 7	3 x 4.5		
4506	3.0	1.20	0.08							3			Hd Cc											
4505	3.0	1.33	0.06	0.045	0.01	0.1	5.21	5.25	66.4		≫													Qtz : very rare
4504	3.0	2.10	0.08								>	≥	Cc Cv			3	3	3						
4303	3.0	1.71	0.11																					limonite stain on surface
4302	3.0	1.79	0.09								≫		Hd Cc											
4301	3.0	1.07	0.07								>													
													Cc Cv											

COLOR	
blk	black
blu	blue
brn	brown
drk	dark
gry	gray
grn	green
lgh	light
purp	purple
red	red
wht	white
yel	yellow

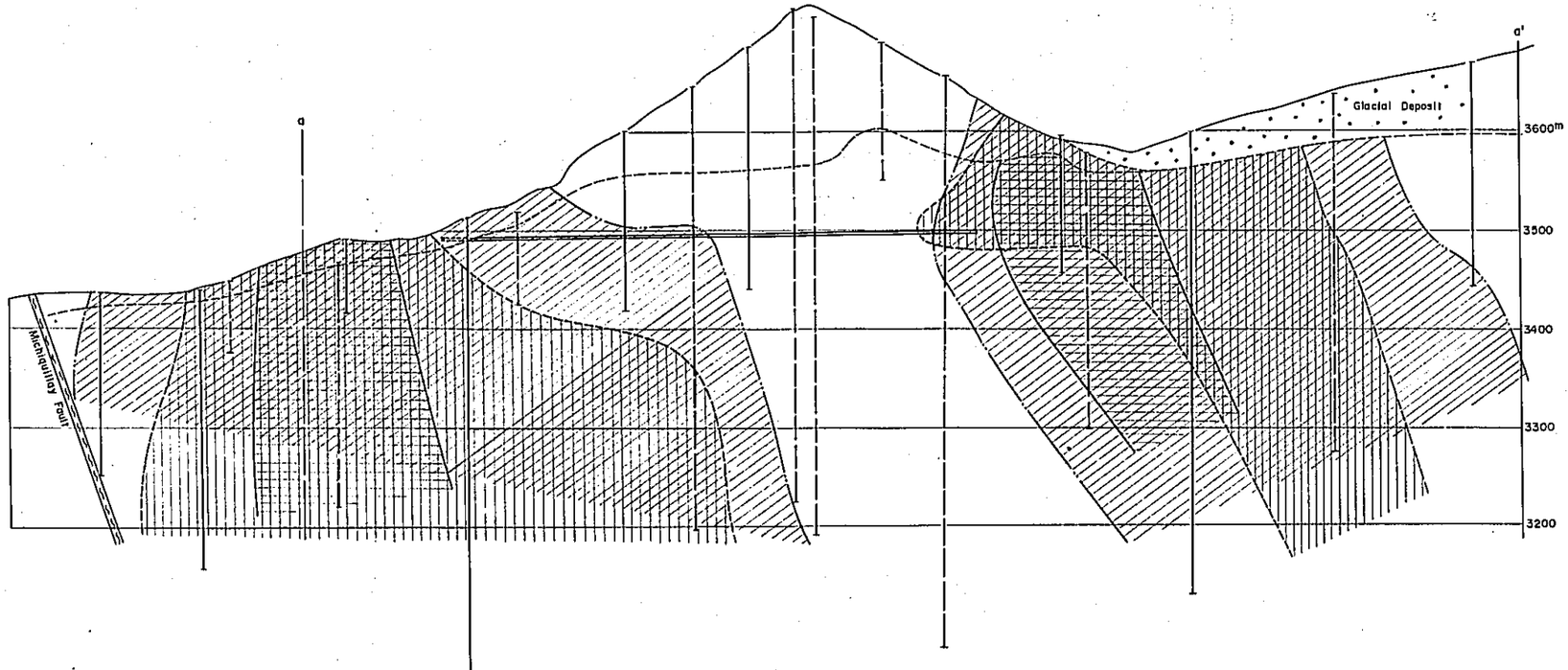
GRANULARITY	
fng	fine grained
mdg	medium grained
csg	coarse grained

RAISE No. 2

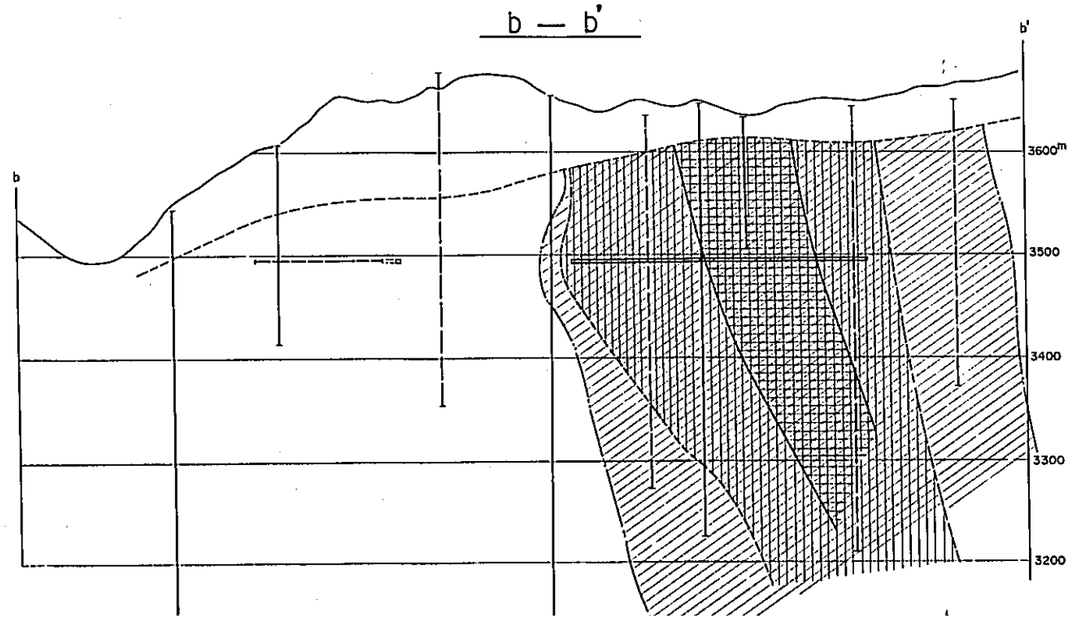
RAISE No. 3

RAISE No. 5

a — a'


a
a'
Glacial Deposit
Michiquiloy Fault
3600m
3500
3400
3300
3200

b — b'


b
b'
3600m
3500
3400
3300
3200

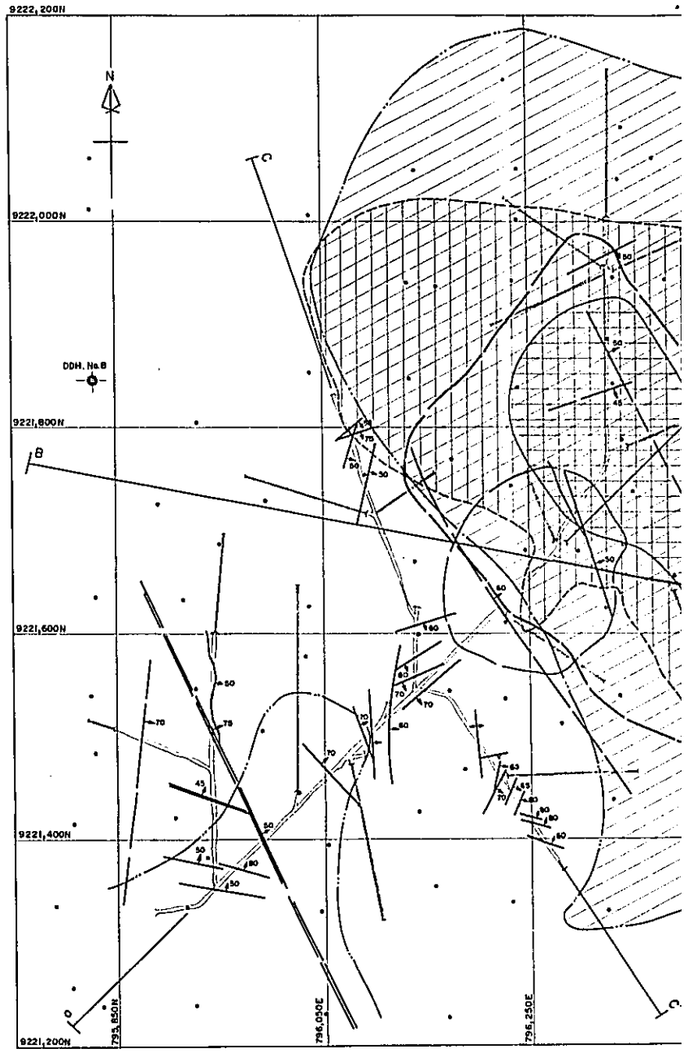

9222,200N
9222,000N
9221,800N
9221,600N
9221,400N
9221,200N
N
DDH. No.8
A
B
C
D
795,850E
796,050E
796,250E

PLATE 4 – 1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

ALTERATION MAP OF
THE 3500M LEVEL MICHIQUILLAY

0 100 200 300M

SCALE 1 : 3,000

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GOVERNMENT OF JAPAN

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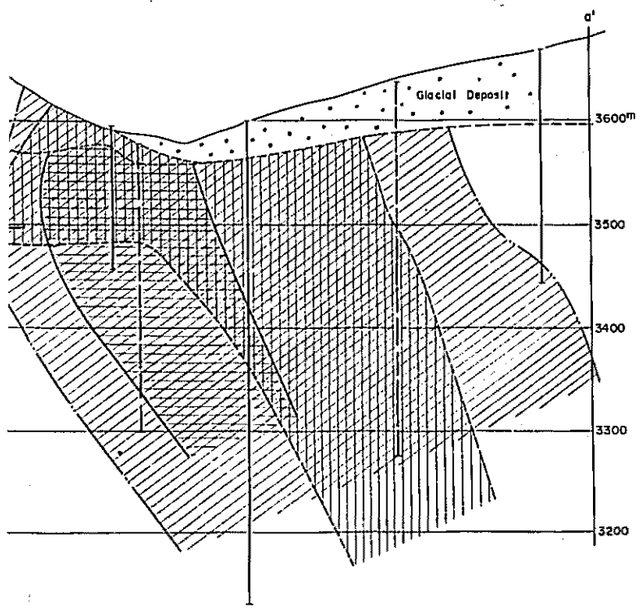
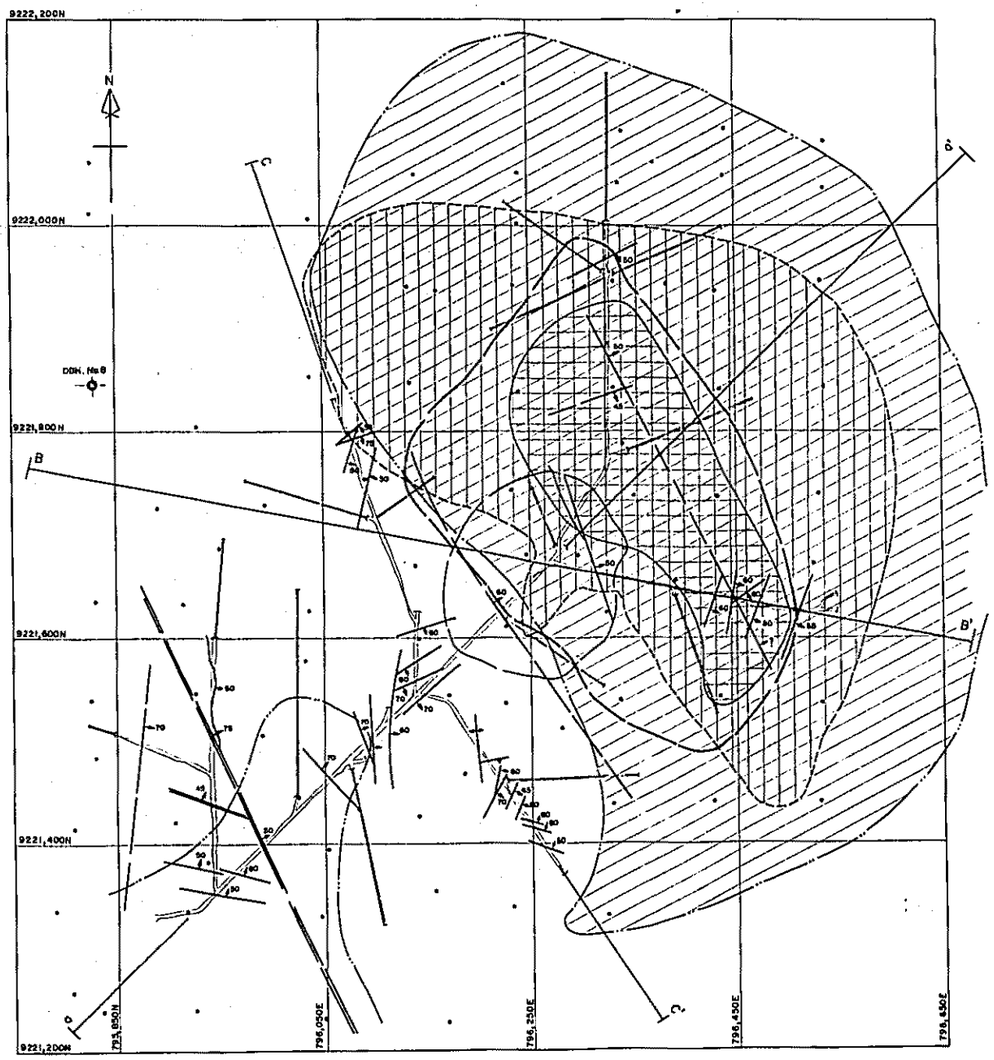
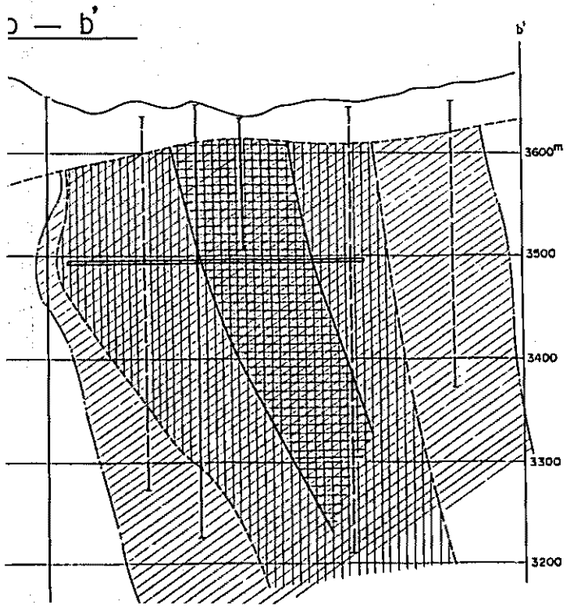
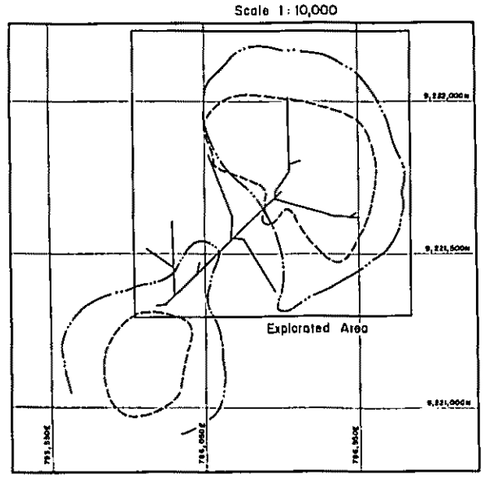






INDEX MAP OF MICHIQUILLY DEPOSIT

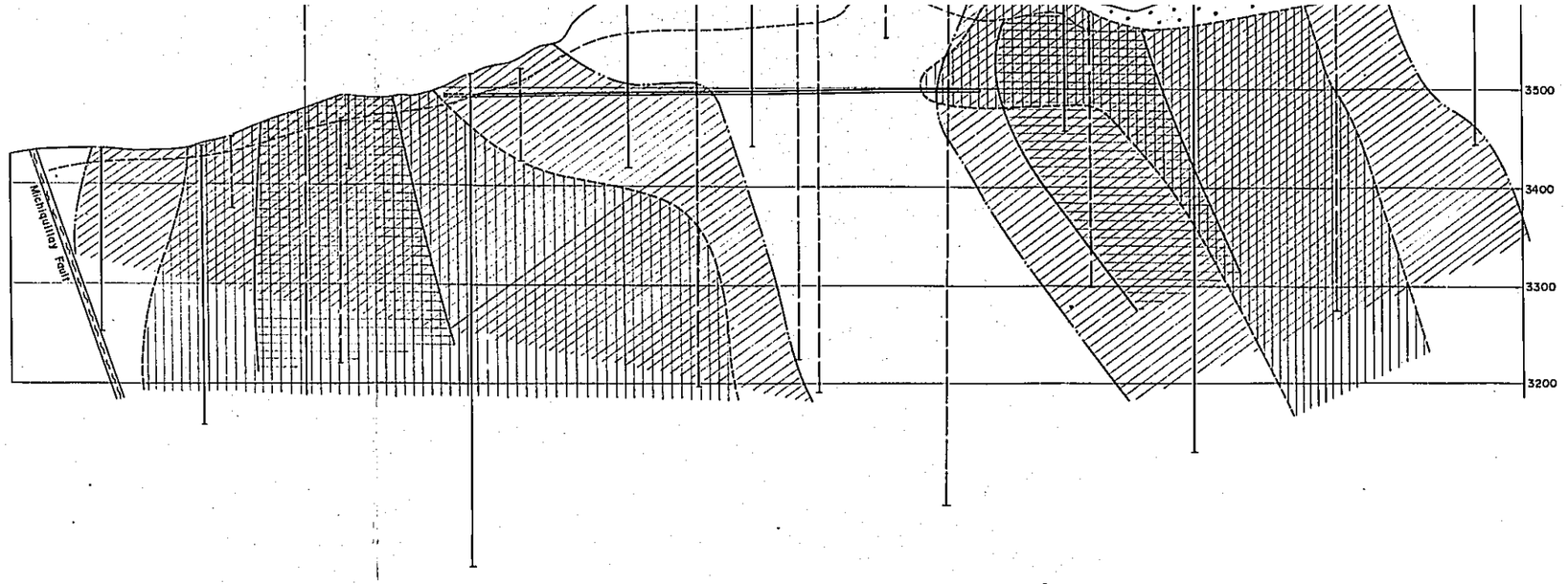
Scale 1 : 10,000



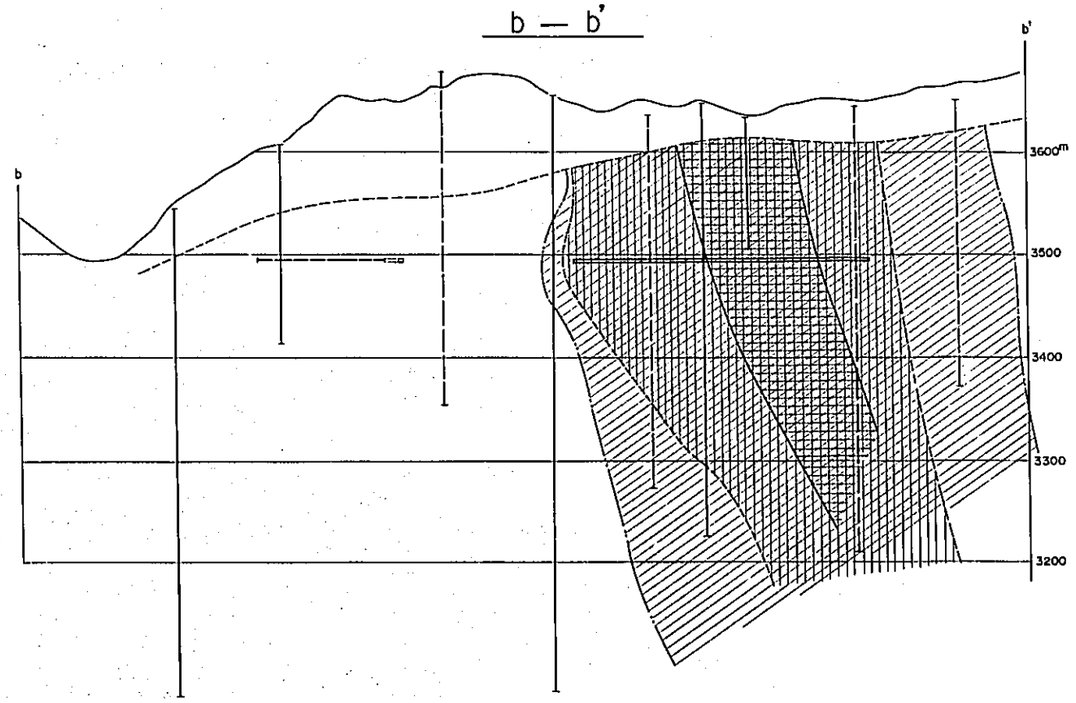
LEGEND

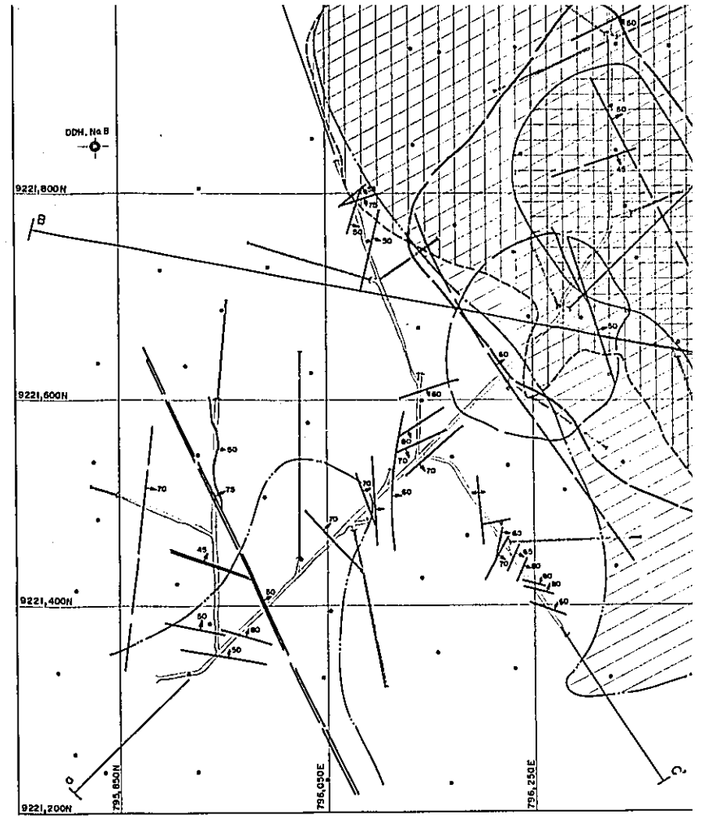
Biotite Zone

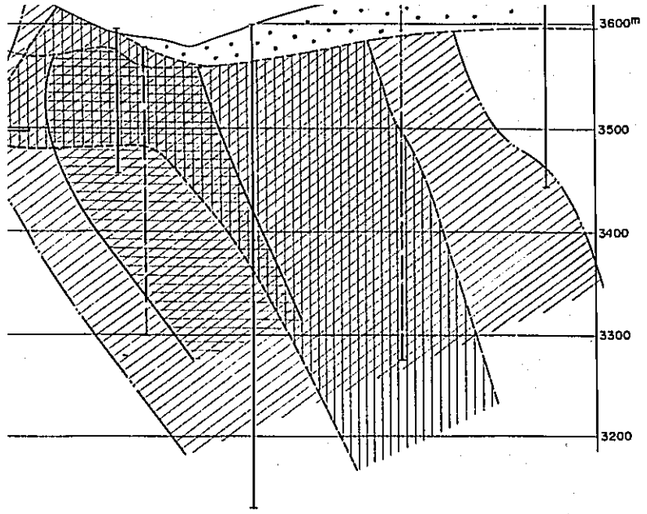
Magnetite Zone


Michiquillay Fault
3500
3400
3300
3200

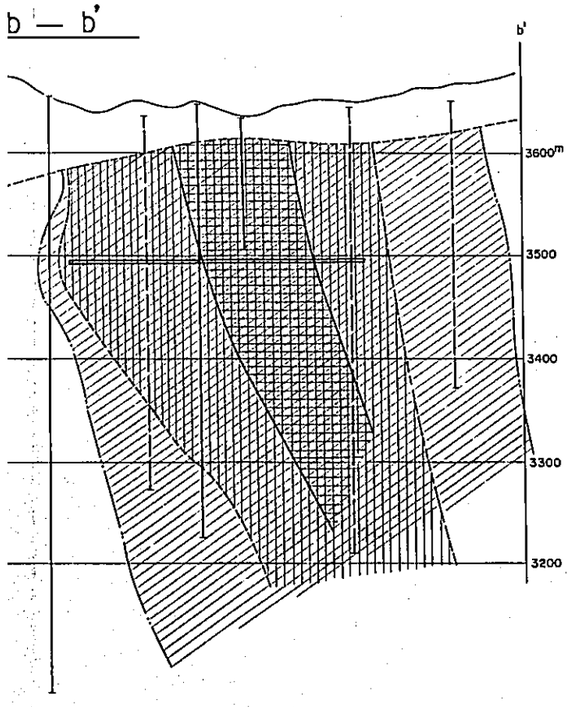
b — b'

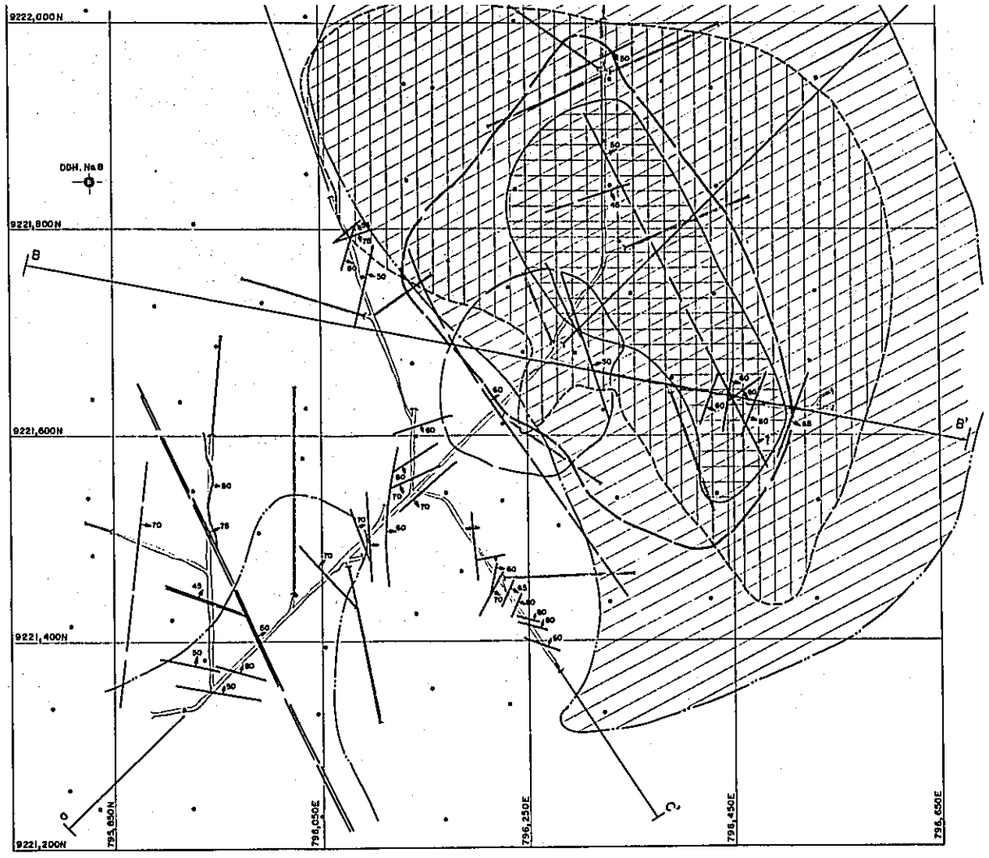

b
b'
3600m
3500
3400
3300
3200


DDH. No 8
9221,800N
9221,600N
9221,400N
9221,200N
795,850E
795,650E
795,250E
B
C



b — b'





ALTERATION MAP OF THE 3500M LEVEL MICHIQUILLAY

0 100 200 300M

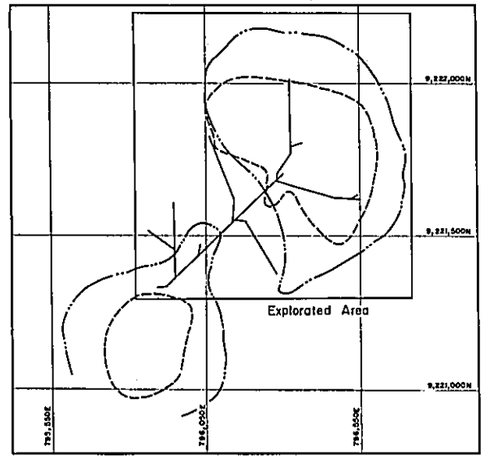
SCALE 1 : 3,000

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

INDEX MAP OF MICHIQUILLY DEPOSIT

Scale 1 : 10,000



LEGEND

- Biotite Zone
- Chlorite Zone
- Pink Feldsar Zone
- Magnetite Zone
- Argillized Zone
- Tunnel
- Drill Hole
- Previous Surface Drill Hole (by ASARCO)
- Surface Drill Hole
- 60 Fault and Fissure

9'222,200 N

9'222,100 N

9'222,000 N

9'221,900 N

9'221,800 N

9'221,700

DDH-1
144.30 mts.

DDH-2
118.15 mts.

DDH-3
114.91mts.

DDH-14
123.80 mts.

DDH-5
129.90 mts.

DDH-7
79.15 mts.

DDH-15
121.95 mts.

DDH-16
67.67 mts.

DDH-13
93.95 mts.

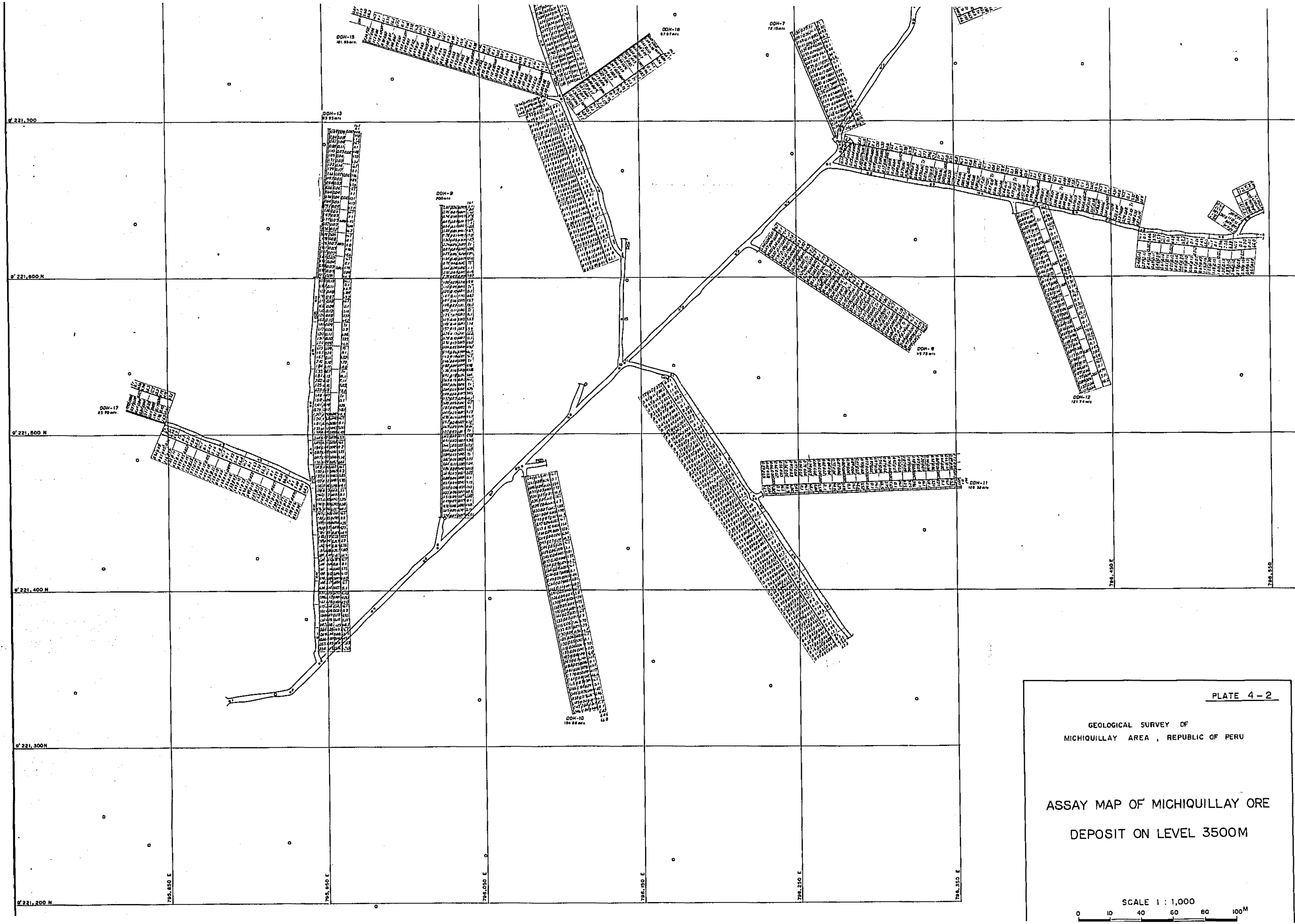


PLATE 4 - 2

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

ASSAY MAP OF MICHIQUILLAY ORE DEPOSIT ON LEVEL 3500M

SCALE 1 : 1,000

0 10 40 60 80 100M

9'221,600 N

9'221,500 N

9'221,400 N

9'221,300N

9'221,200 N

795,850 E

795,950 E

796,050 E

796,150 E

796,250 E

796,350 E

DDH-17
23.70 m/s.

DDH-6
113.75 m/s.

DDH-12
121.74 m/s

DDH-11
126.52 m/s

DDH-10
134.96 m/s.

LEGEND

115	0.07	0.289	Ni%	T-Cu%	S-Cu%	MoS2%	Au oz/t
			0.1				Ag oz/t
			6.42				Fe %
			5.46				S %
			56.6				SiO2 %

----- TUNNEL

---- DRILL HOLE

----- PREVIOUS SURFACE DRILL HOLE (BY ASARCO)

----- SURFACE DRILL HOLE

PLATE 4 – 2

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

ASSAY MAP OF MICHIQUILLAY ORE DEPOSIT ON LEVEL 3500M

SCALE 1 : 1,000

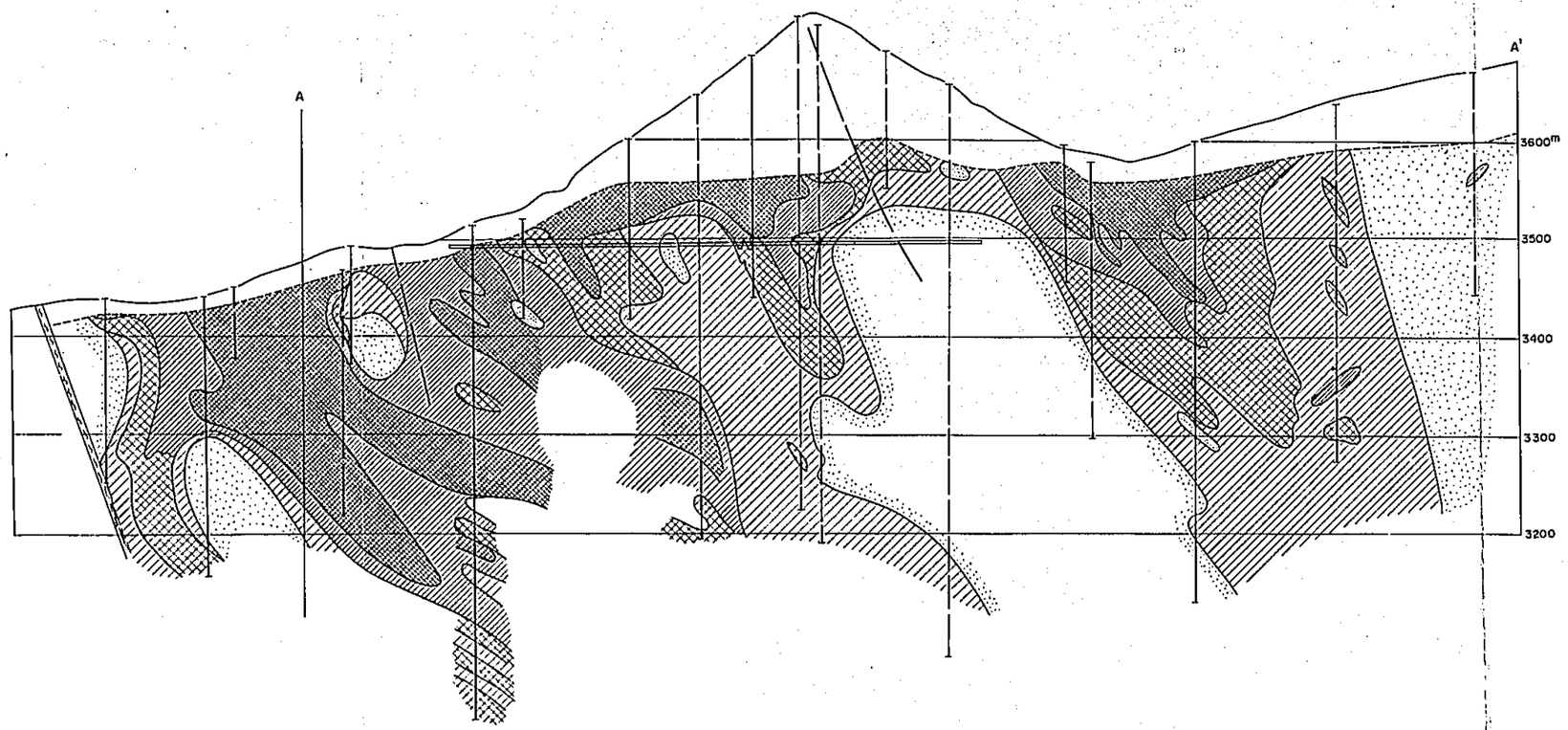
0 10 40 60 80 100M

Sponcer by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

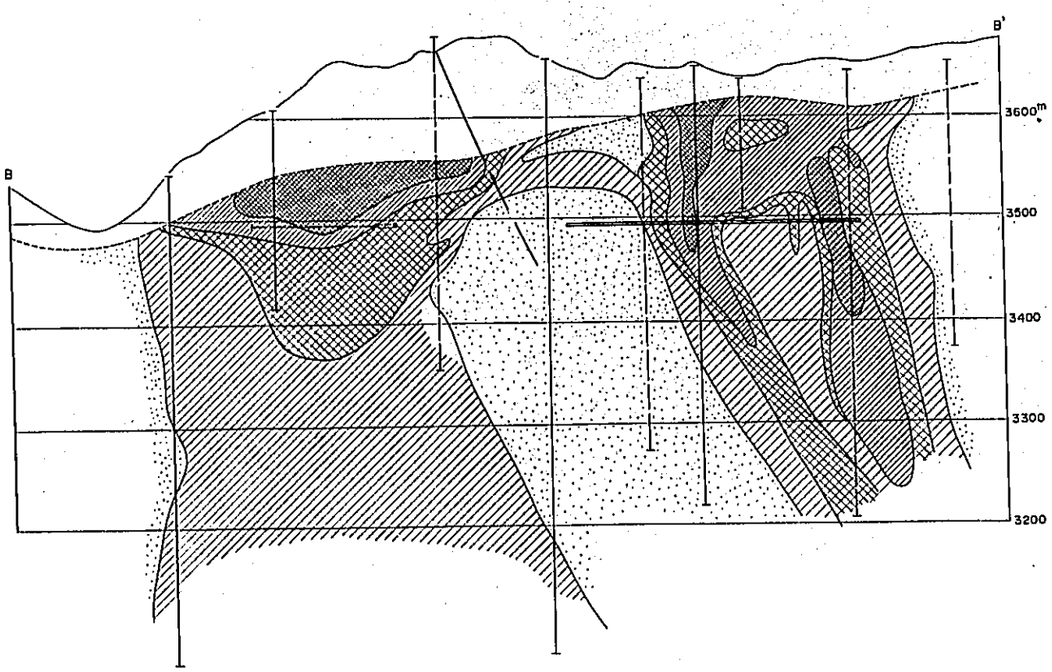
Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

VERTICAL ASSAY SPECTRA OF Cu

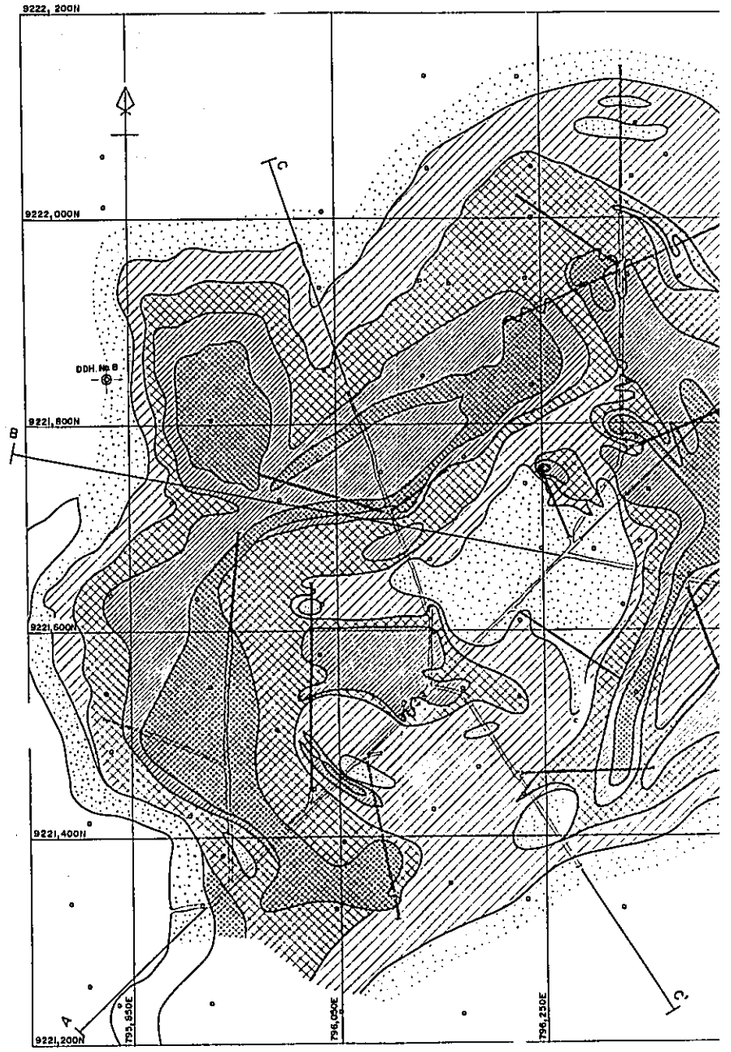
A — A'



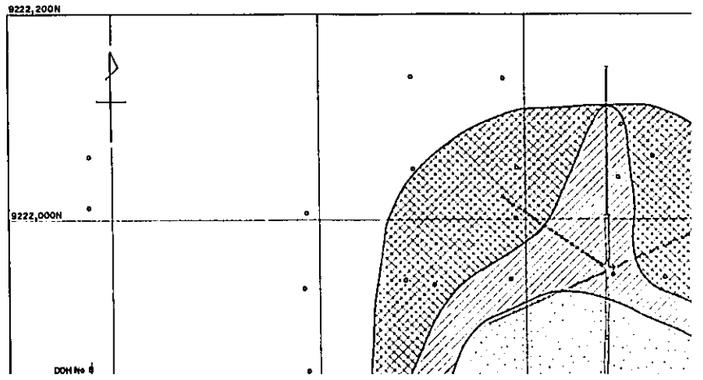
B — B'



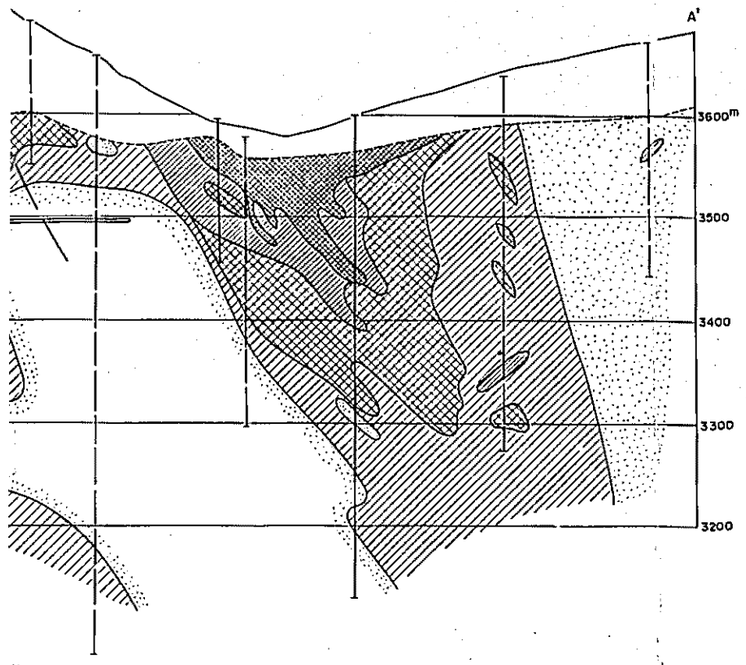
ASSAY SPECTRUM OF Cu



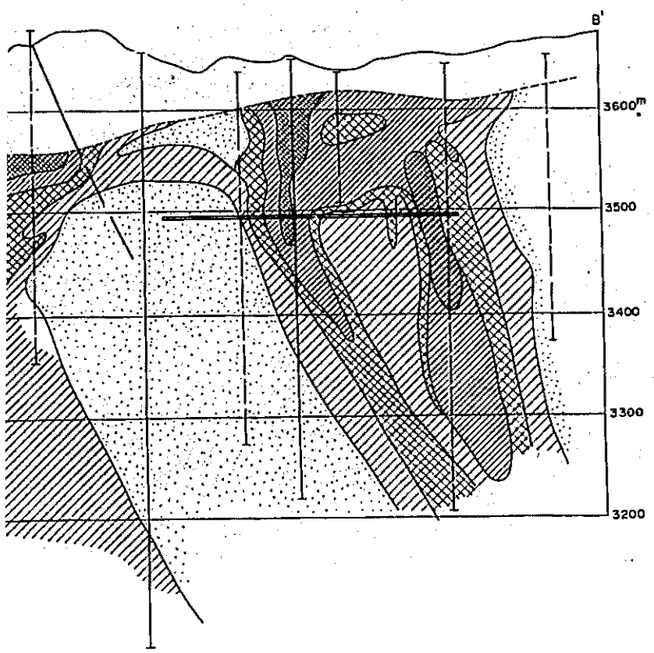
ASSAY SPECTRUM OF MoS_2



SPECTRA OF Cu



B — B'



ASSAY SPECTRUM OF Cu

ASSAY SPECTRUM OF $Mo S_2$

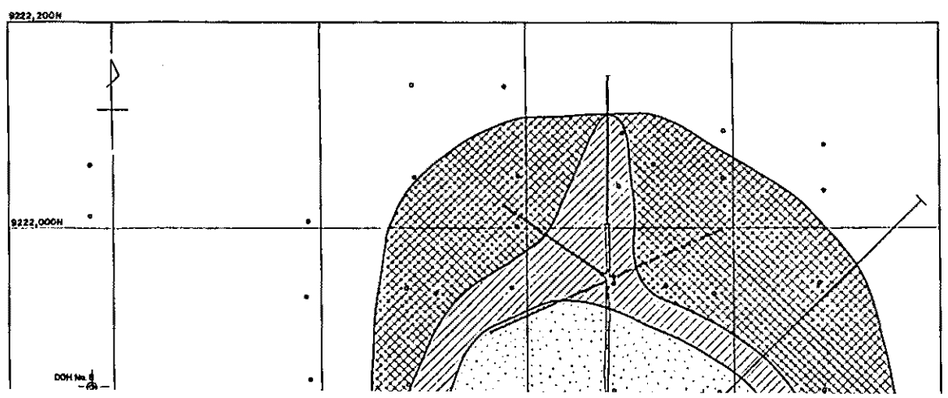


PLATE 4-3

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

ASSAY SPECTRA OF Cu AND MoS_2 ON LEVEL 3500M MICHIQUILLAY ORE DEPOSIT

0 100 200 300M

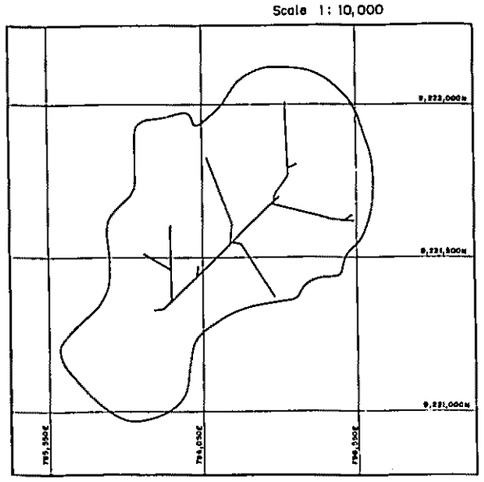
SCALE 1 : 3,000

Spancer by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

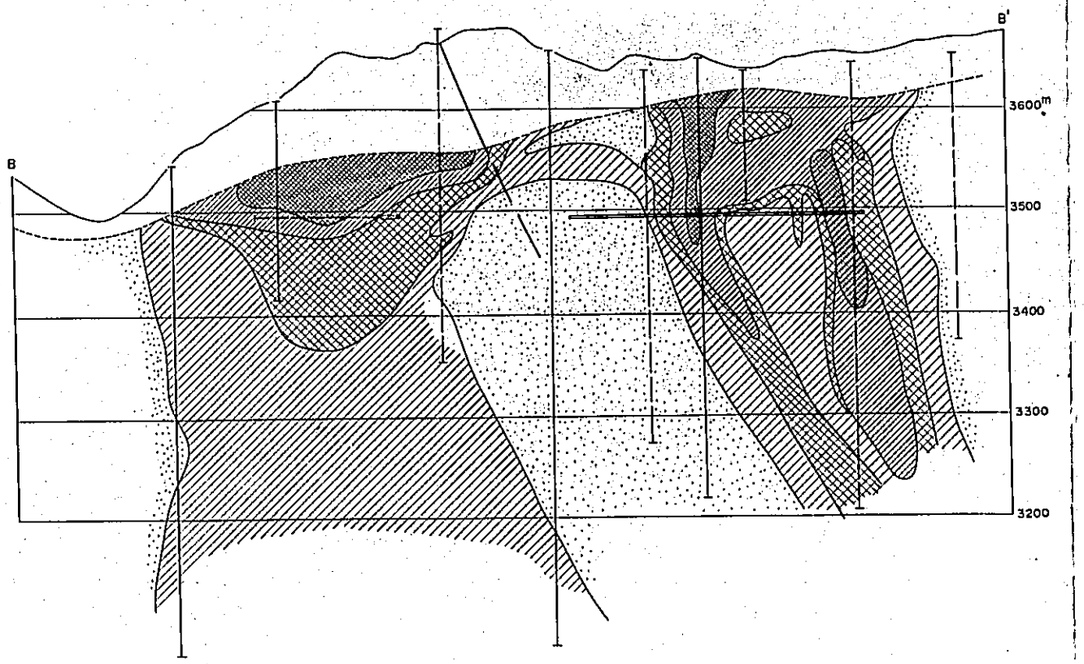
Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

INDEX MAP OF MICHIQUILLY ORE DEPOSIT

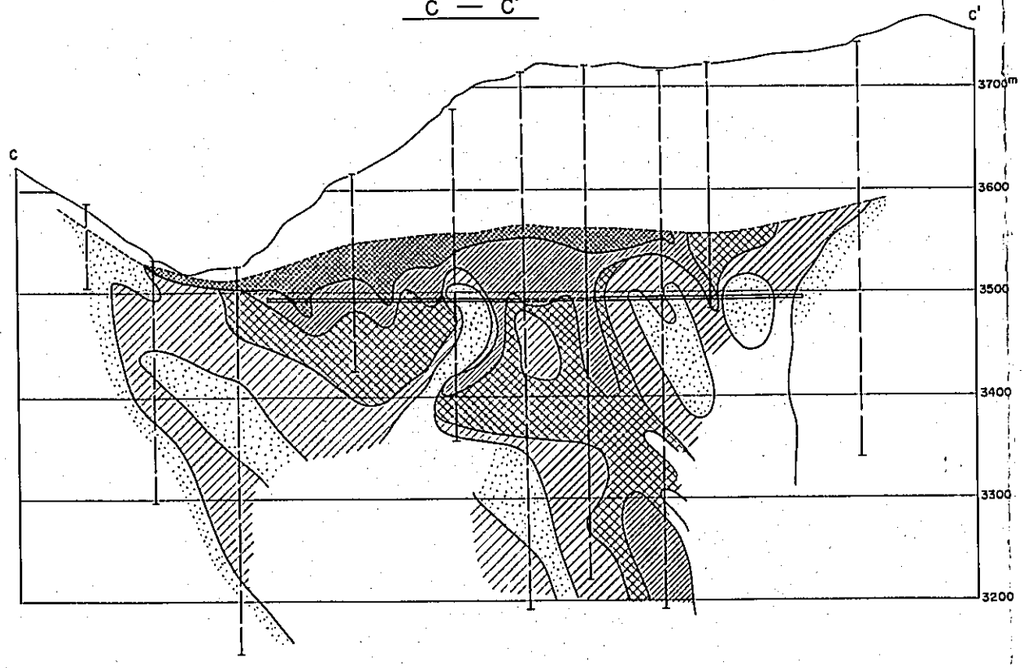
Scale 1 : 10,000

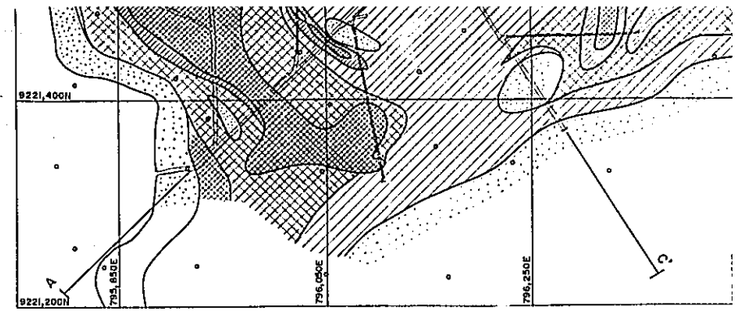


B — B'

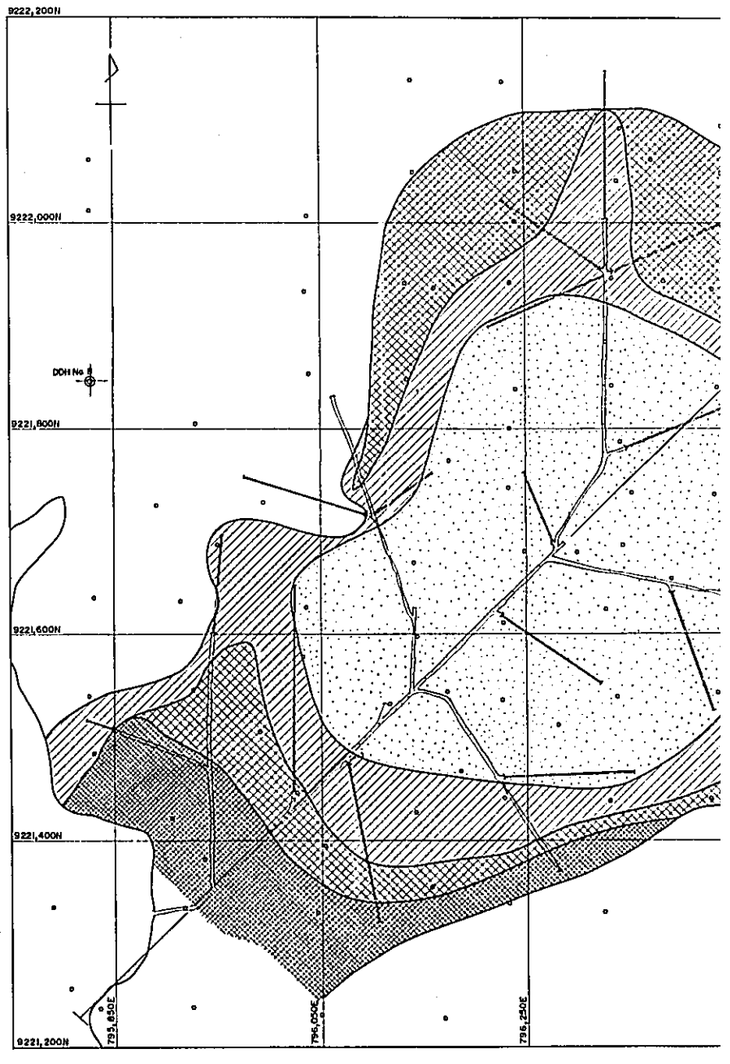


C — C'

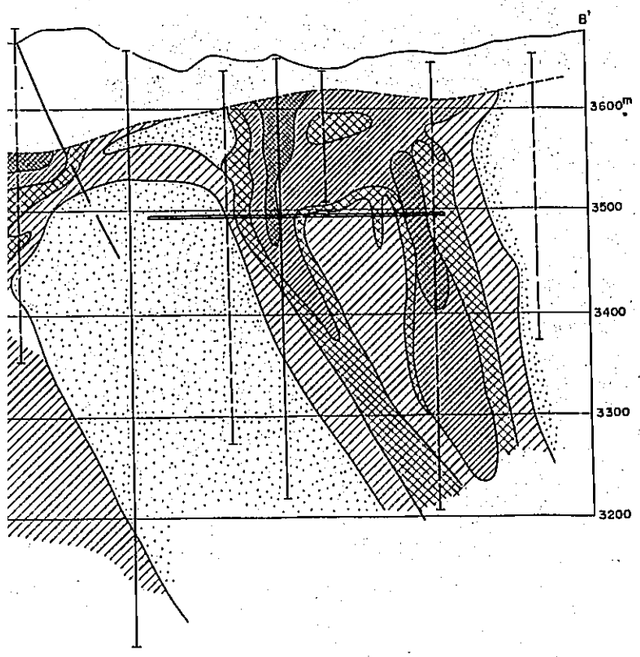




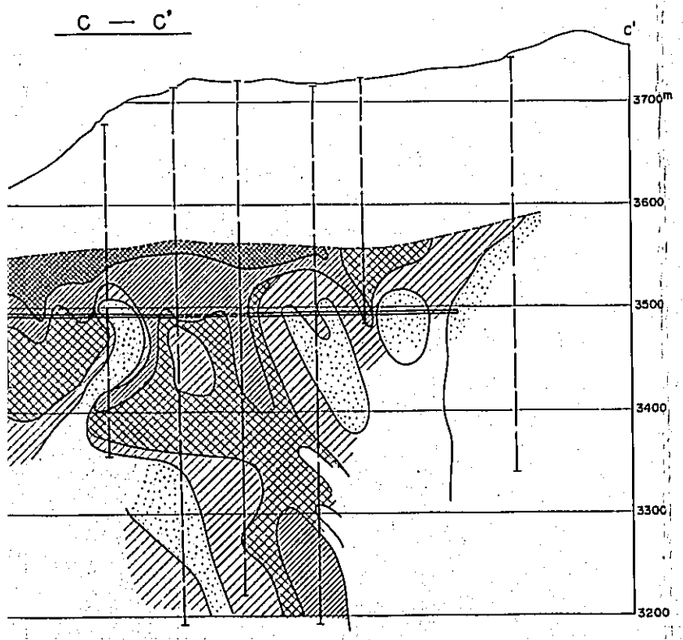
ASSAY SPECTRUM OF $Mo S_2$

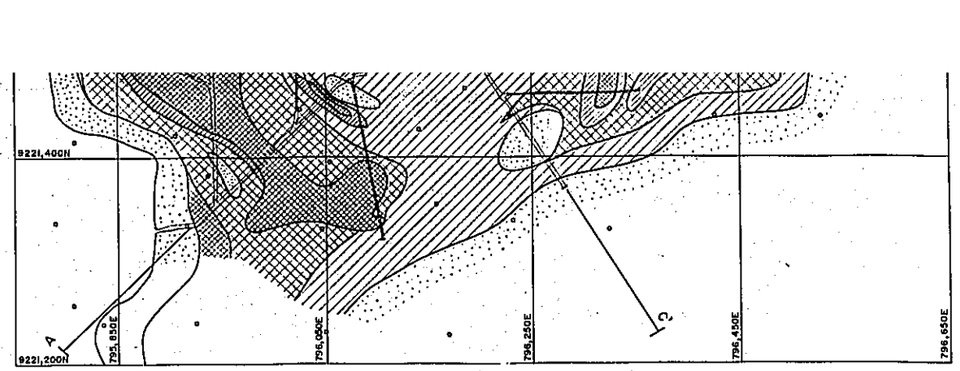


B — B'

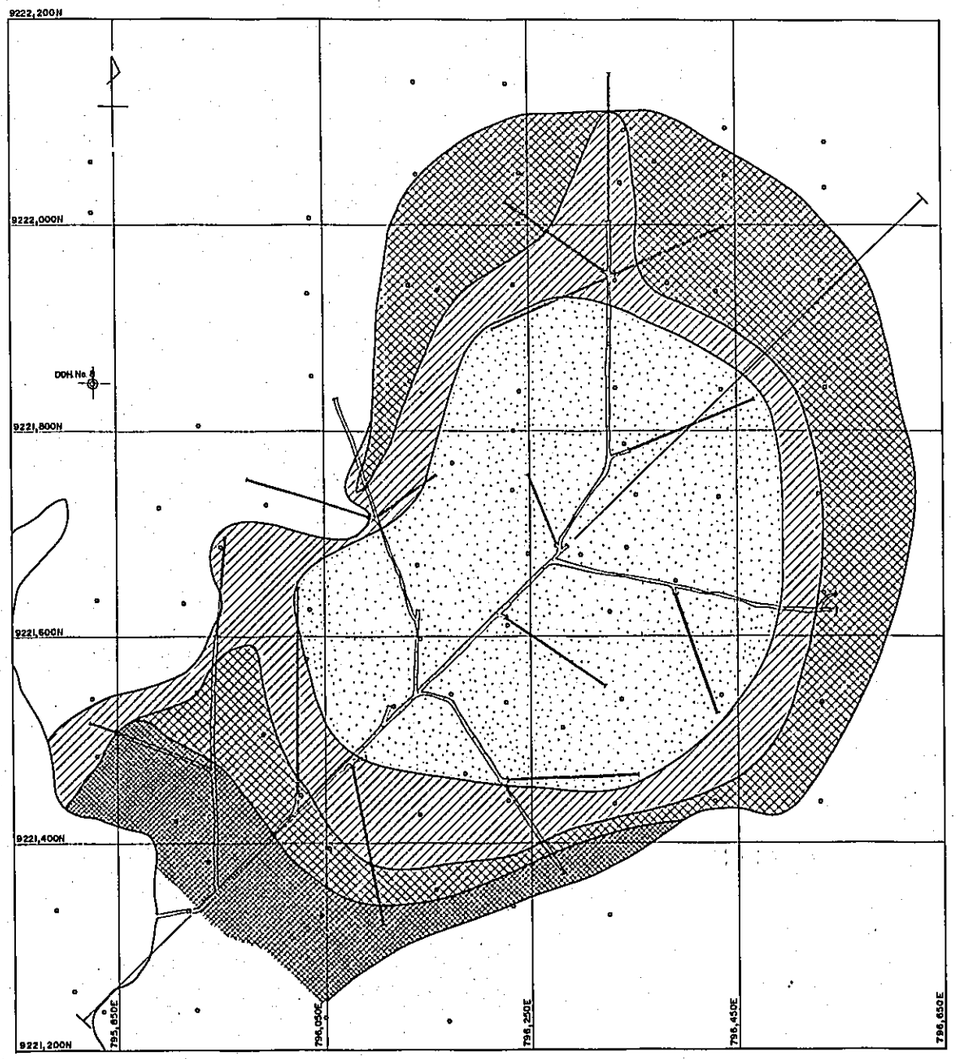


C — C'



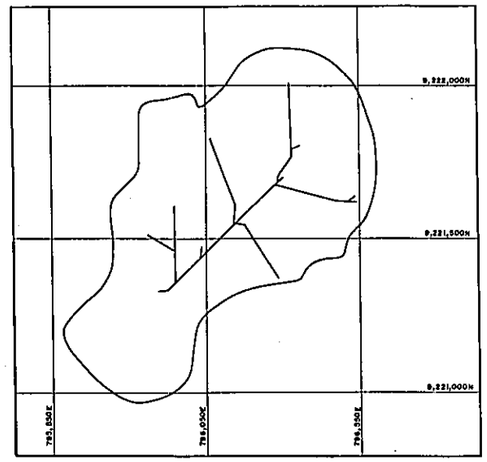


ASSAY SPECTRUM OF $Mo S_2$



INDEX MAP OF MICHIQUILLY ORE DEPOSIT

Scale 1: 10,000



LEGEND

ASSAY SPECTRUM OF Cu

- Cu ≧ 1.00%
- 1.00 Cu ≧ 0.80%
- 0.80 Cu ≧ 0.60%
- 0.60 Cu ≧ 0.40%
- 0.40 > Cu

ASSAY SPECTRUM OF MoS_2

- MoS_2 ≧ 0.06%
- 0.06 > MoS_2 ≧ 0.03%
- 0.03 > MoS_2 ≧ 0.01%
- 0.01 > MoS_2

- Tunnel
- Drill Hole
- Previous Surface Drill Hole (by ASARCO)
- Surface Drill Hole
- 60 Fault and Fissure

PLATE I

GEOLOGICAL SURVEY OF
MICHIQUILLAY PROJECT, REPUBLIC OF PERU

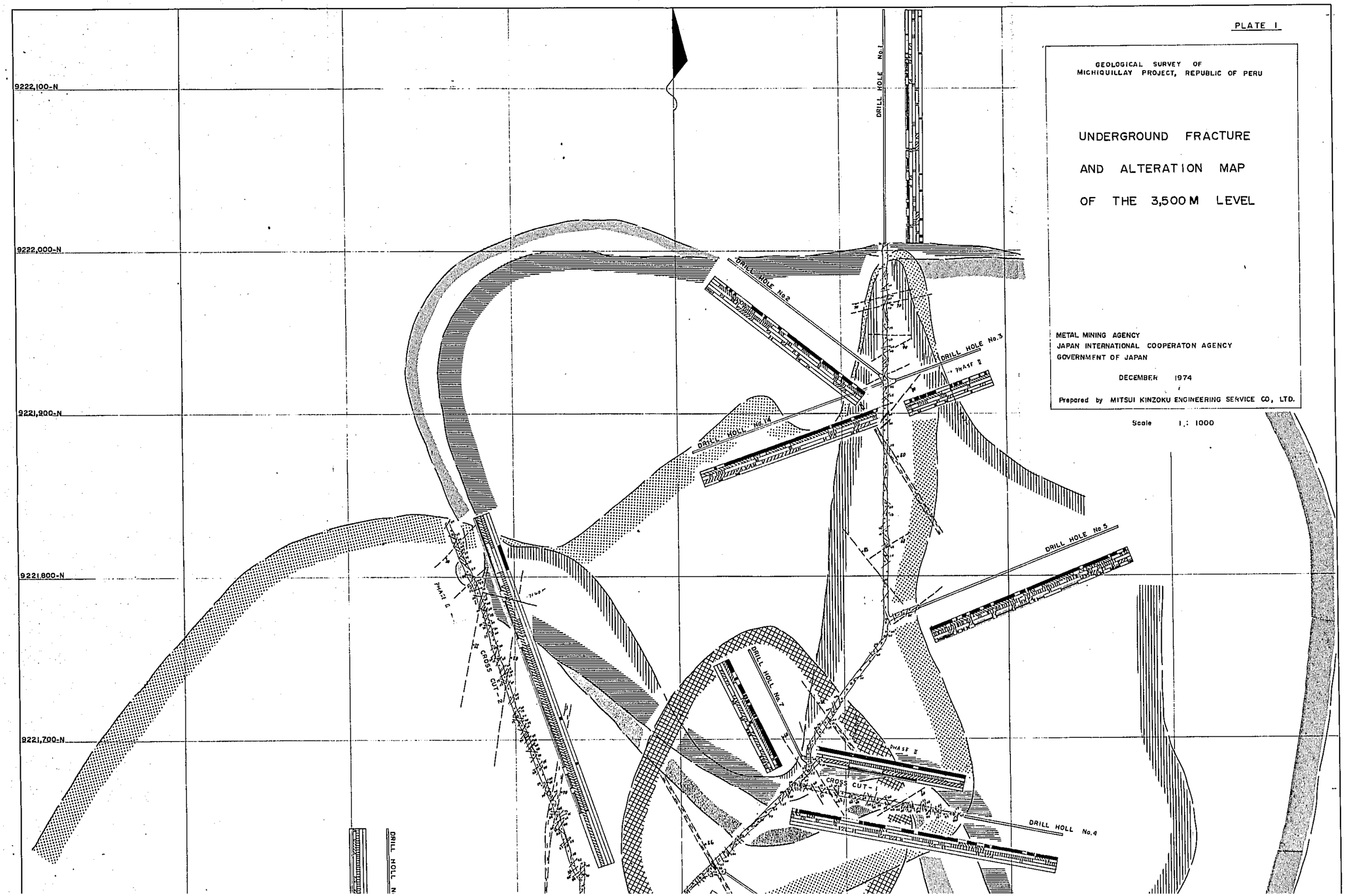
UNDERGROUND FRACTURE AND ALTERATION MAP OF THE 3,500 M LEVEL

METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATON AGENCY
GOVERNMENT OF JAPAN

DECEMBER 1974

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO, LTD.

Scale 1 : 1000



9221,700-N

9221,600-N

9221,500-N

9221,400-N

9221,300-N

795,900-E

796,000-E

796,100-E

796,200-E

796,300-E

796,400-E

796,500-E

DRILL HOLL No.8

DRILL HOLL No.7

DRILL HOLL No.4

DRILL HOLL No.6

DRILL HOLL No.10

CROSS CUT-1

CROSS CUT-3

CROSS CUT-4

PHASE II

PHASE E

△ C-34-A
3,491,840

3,490,356

LEGEND

- Quartz Monzonite Porphyry
- Fissure more than 10cm wide
- Fractures, Joints, Veins more than 1cm wide

Alteration	Intensity
Biotitization	≧ 1
Chloritization	≧ 3
Sericitization	≧ 3
Silicification	≧ 3
Argillization	≧ 3

- Biotite zone
- Chlorite zone
- Sericite zone
- Quartz zone

Lower grade part of Copper

PLATE 3 – 1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

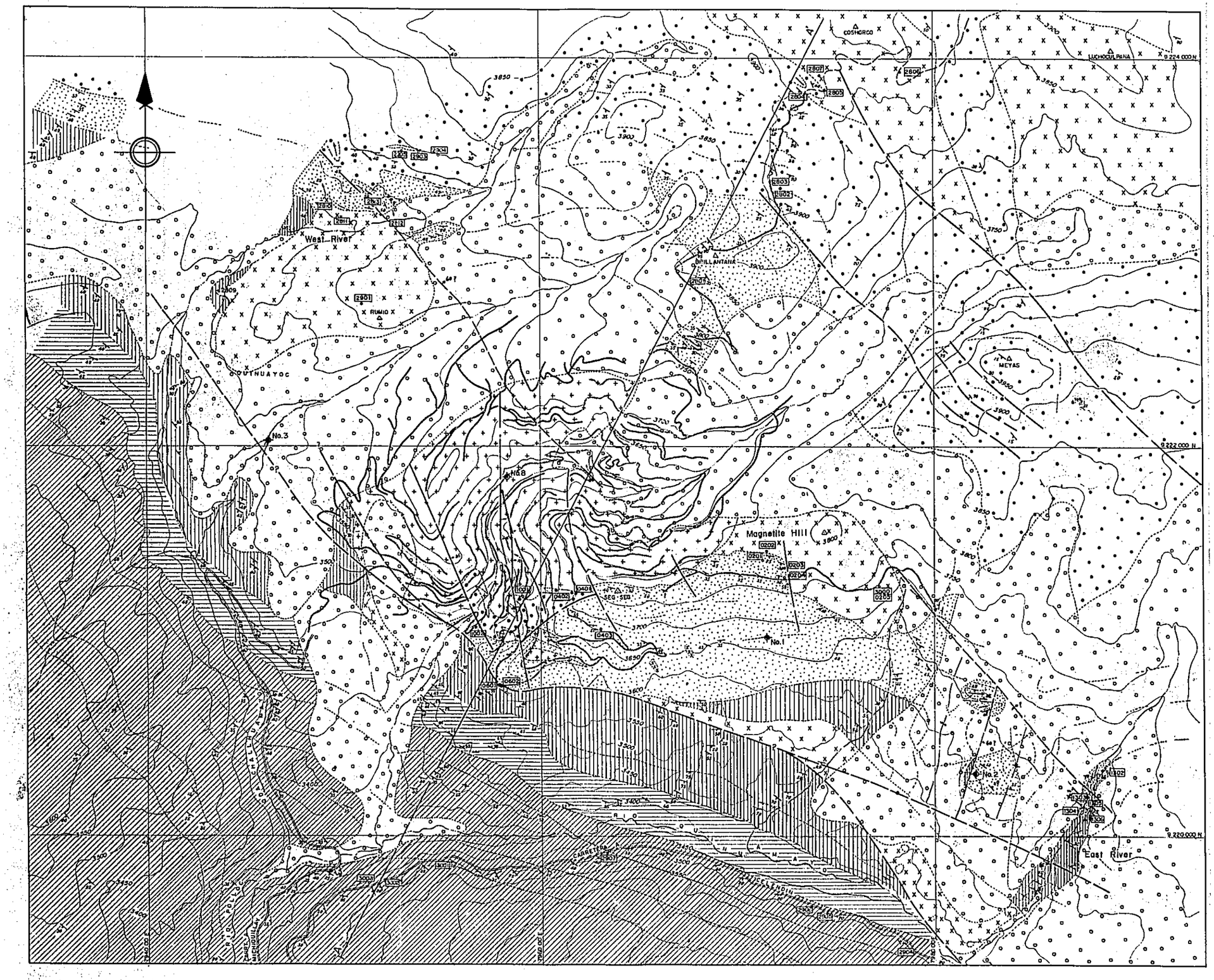
GEOLOGICAL MAP OF MICHIQUILLAY AREA

0 200 400 600 800 1000 M

Scale 1 : 10,000

Sponcereded by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD

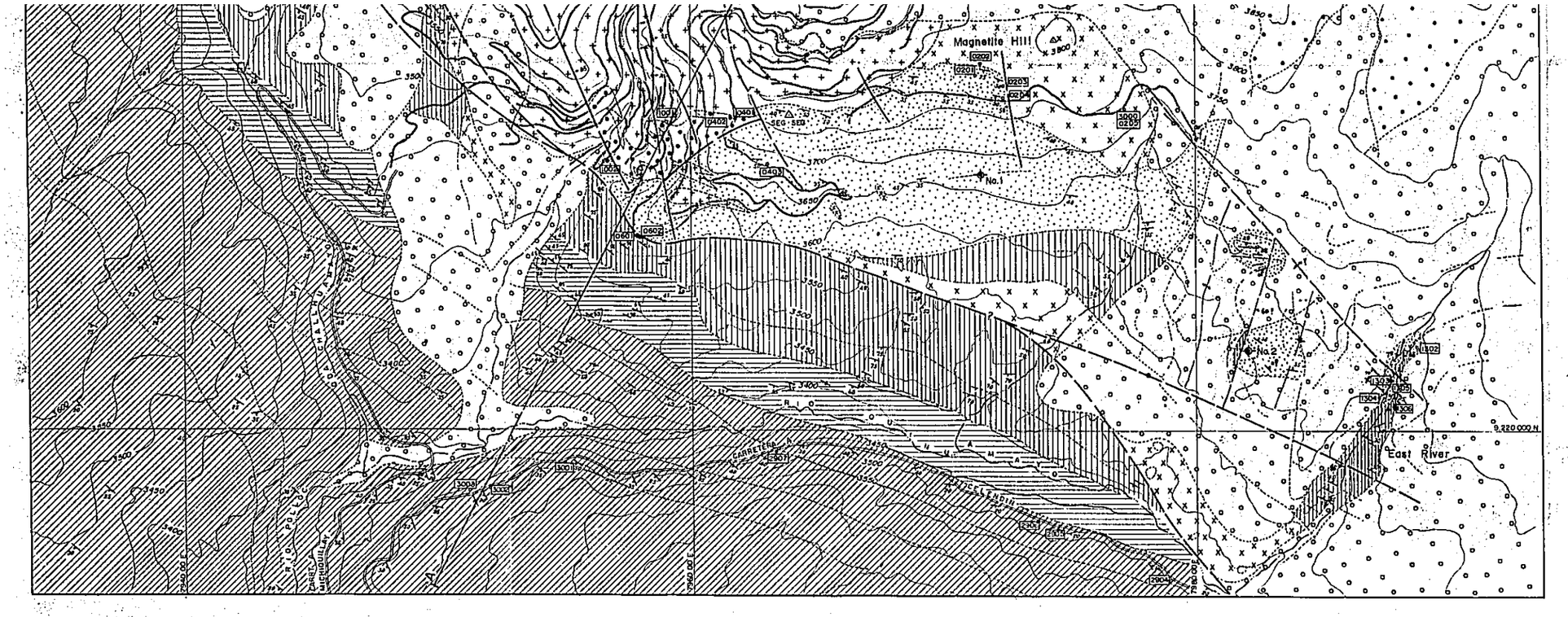


A – A' PROFILE

Legend

- Alluvial and glacial deposits
- Jumasha formation
- Pariatambo formation
- Chulec formation
- Inca formation
- Goyllarisquizga formation
- Altered quartz monzonite porphyry
- Quartz monzonite porphyry
- Bedding plane
- Fault
- Mineralized zone
- Biotite zone

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD



A - A' PROFILE

Legend

- Alluvial and glacial deposits
- Jumasha formation
- Pariatambo formation
- Chulec formation
- Inca formation
- Goyllarisquizga formation
- Altered quartz monzonite porphyry
- Quartz monzonite porphyry
- Bedding plane
- Fault
- Mineralized zone
- Biotite zone
- o 1001 Rock sample and No.
- No.1 Surface boring and No.

after J. NAKAMURA

PLATE 3 – 1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL MAP OF MICHIQUILLAY AREA

0 200 400 600 800 1000 M

Scale 1 : 10,000

Sponcereded by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

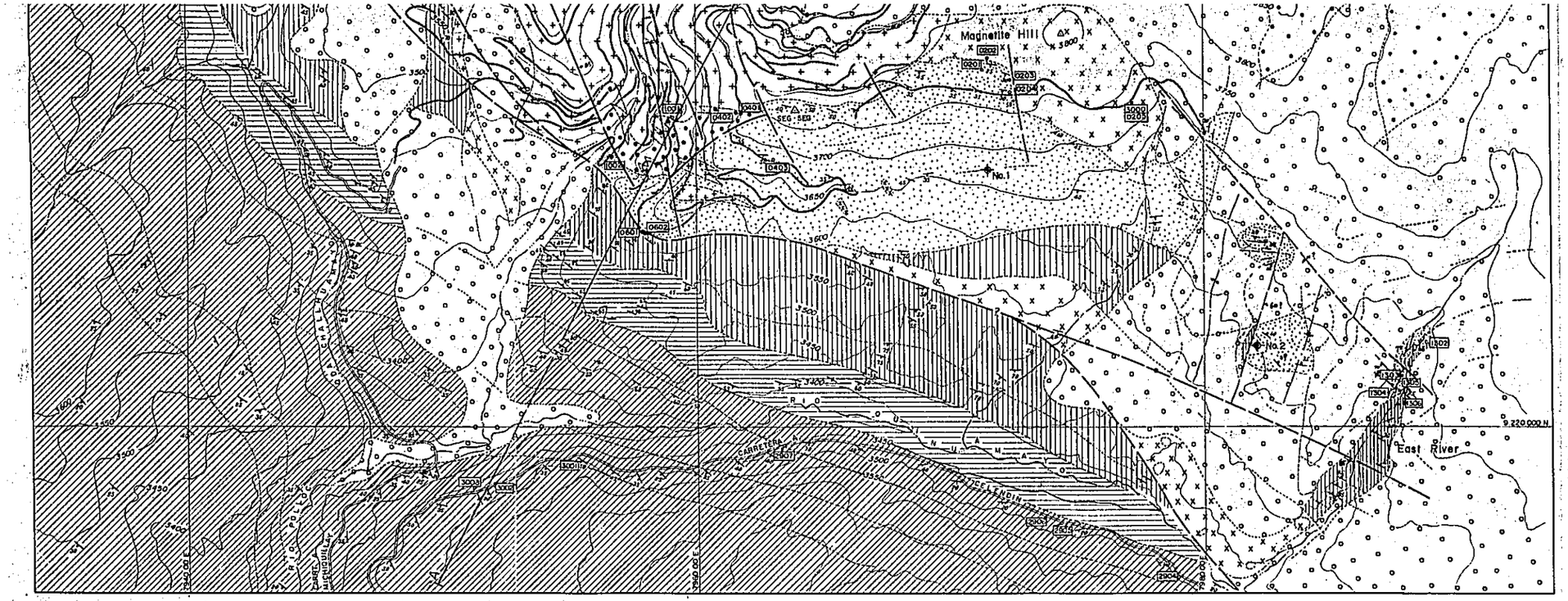
Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD

Legend

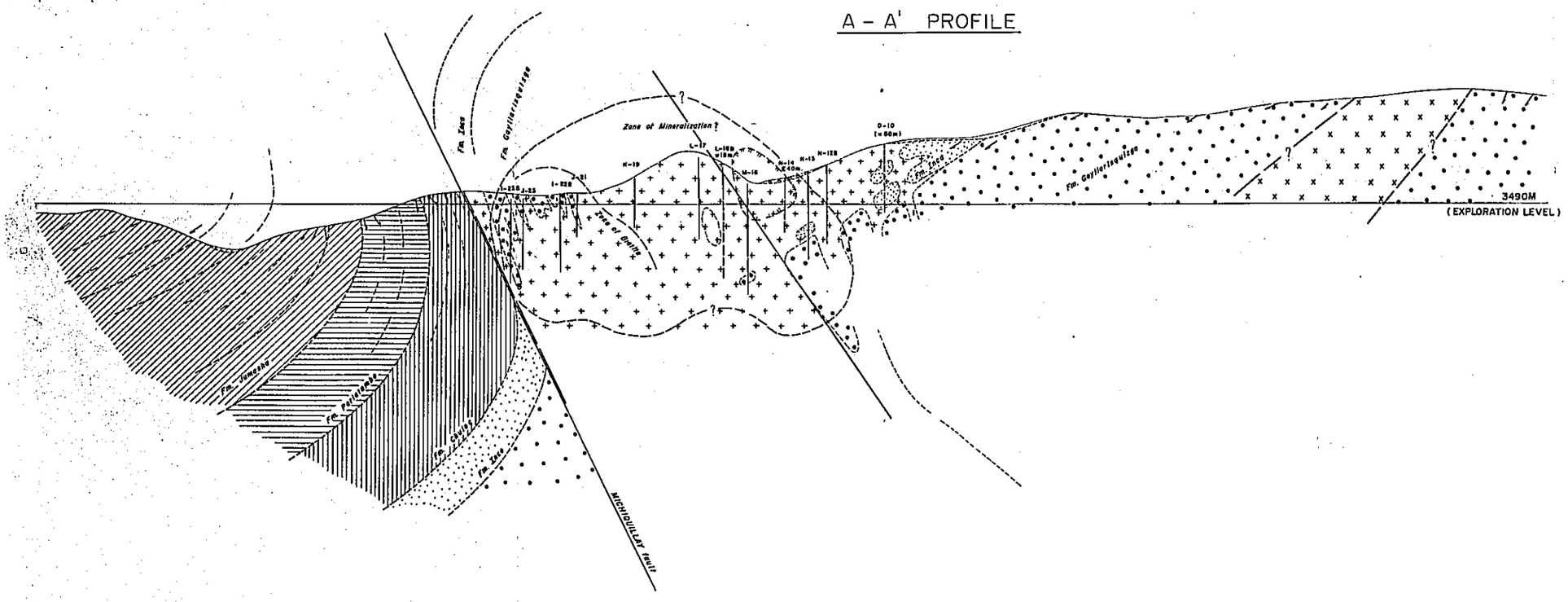
- Alluvial and glacial deposits
- Jumasha formation
- Pariatambo formation
- Chulec formation
- Inca formation
- Goyllarisquizga formation
- Altered quartz monzonite porphyry
- Quartz monzonite porphyry
- Bedding plane
- Fault
- Mineralized zone
- Biotite zone
- Rock sample and No.

A – A' PROFILE

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD



A – A' PROFILE



Legend

- Alluvial and glacial deposits
- Jumasha formation
- Pariatambo formation
- Chulec formation
- Inca formation
- Goyllarisquizga formation
- Altered quartz monzonite porphyry
- Quartz monzonite porphyry
- Bedding plane
- Fault
- Mineralized zone
- Biotite zone
- o 1001 Rock sample and No.
- No.1 Surface boring and No.

after J. NAKAMURA

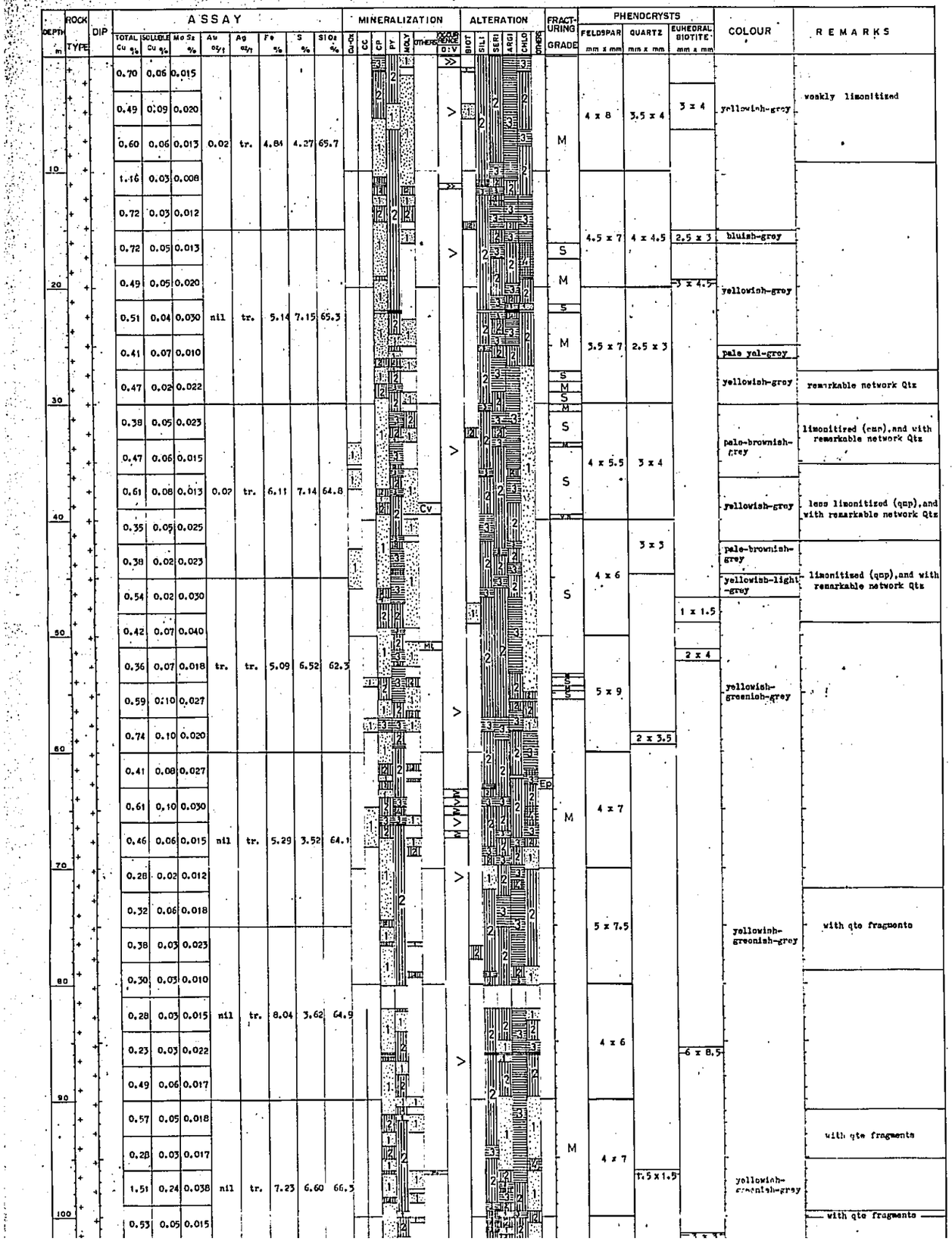


PLATE 2

SHEET 1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 1

BOTTOM DEPTH 144.38 m

COLLAR ELEVATION 3,496.27

NORTHING 9'222,005.27 EASTING 796,327.57

BEARING 0° 30' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE, CO , LTD.

Scale 1 : 200

INDEX

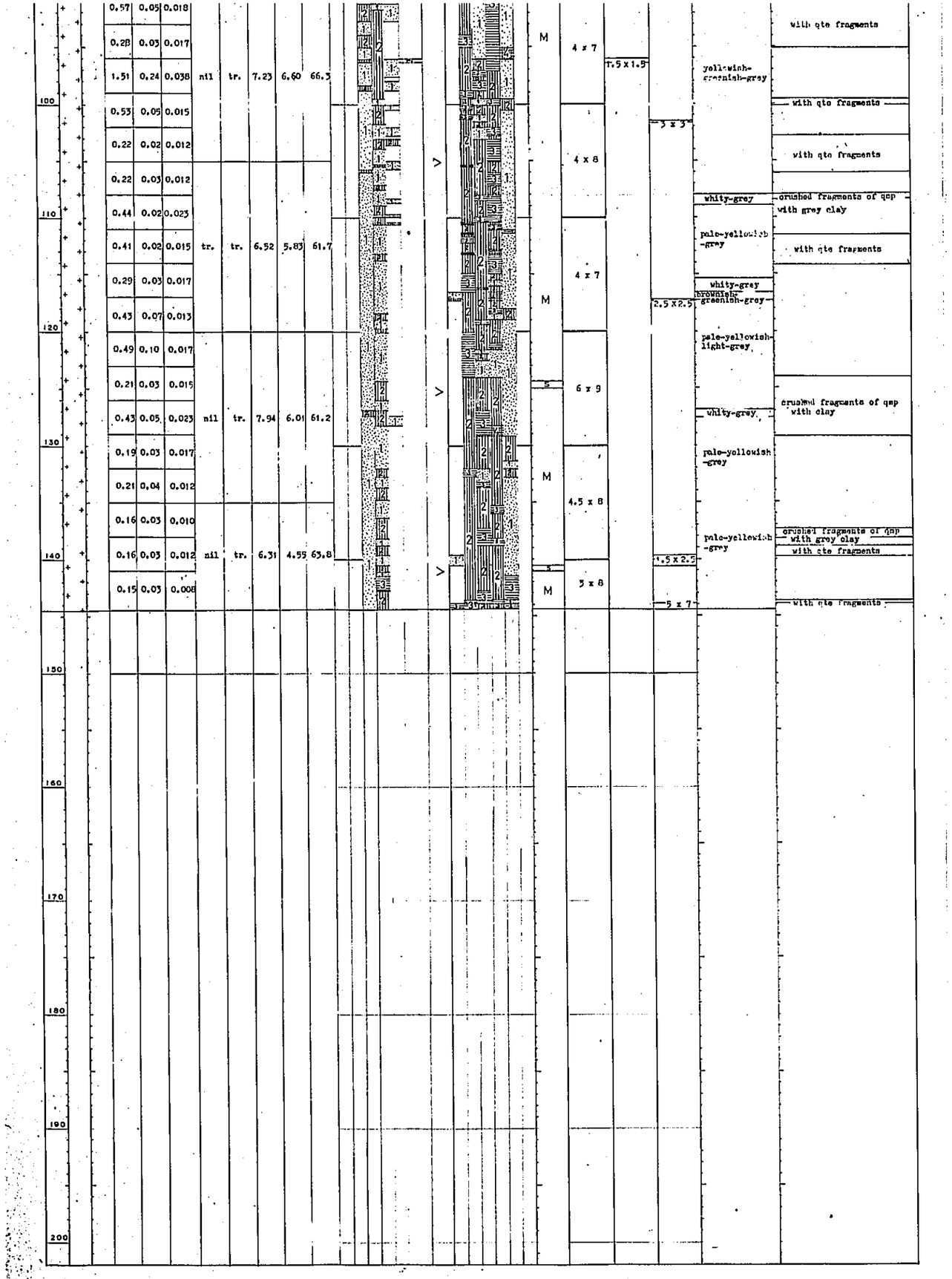
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qtz
Massive Ore (Mt, Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covelline
Bn -----Bornite

ALTERATION

BIOT-------Biotitization
SILI-------Silicification
SERI------Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration



CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite
Mt -----Magnetite
Pb -----Galena
Zn ----- Sphalerite
En ------ Enargite
OCCURENCE---Modes of Occurance of Copper Ores
D : V ------ Dissemination : Vein

SILI ------- Silicification
SERI ------- Sericitization
ARGI ------ Argillization
CHLO -------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M---- moderate
S-----strong
VS---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp-------purple
red -------red
wht -------white
yel -------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grained

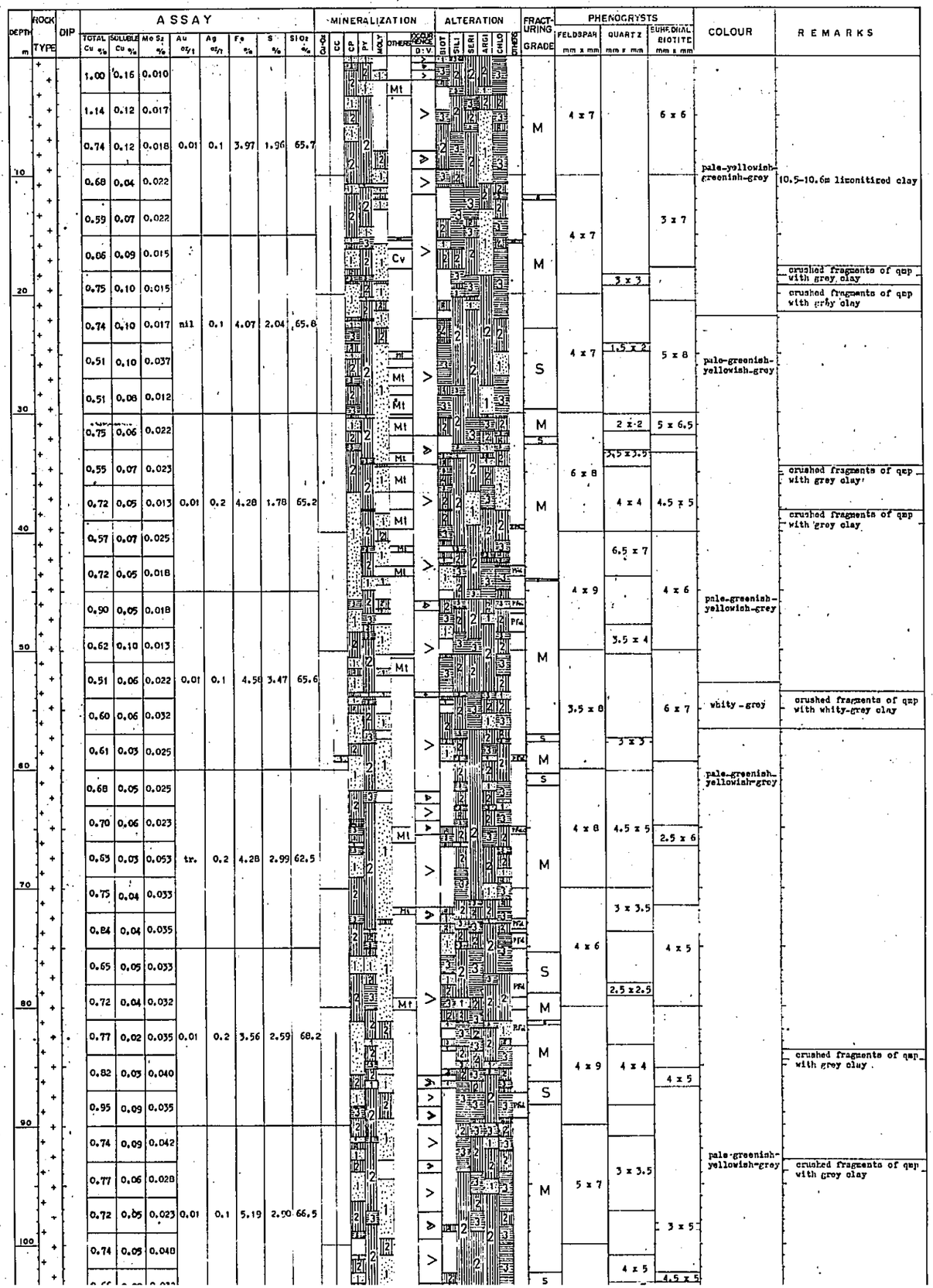


PLATE 2

SHEET 2.

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 2

BOTTOM DEPTH 116.19m

COLLAR ELEVATION 3,496.27

NORTHING 9'221'955.93 EASTING 796,321.37

BEARING 305°15' INCLINATION 0°

LOGGED BY H. Homa

Sponcered
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD.

Scale 1 : 200

INDEX

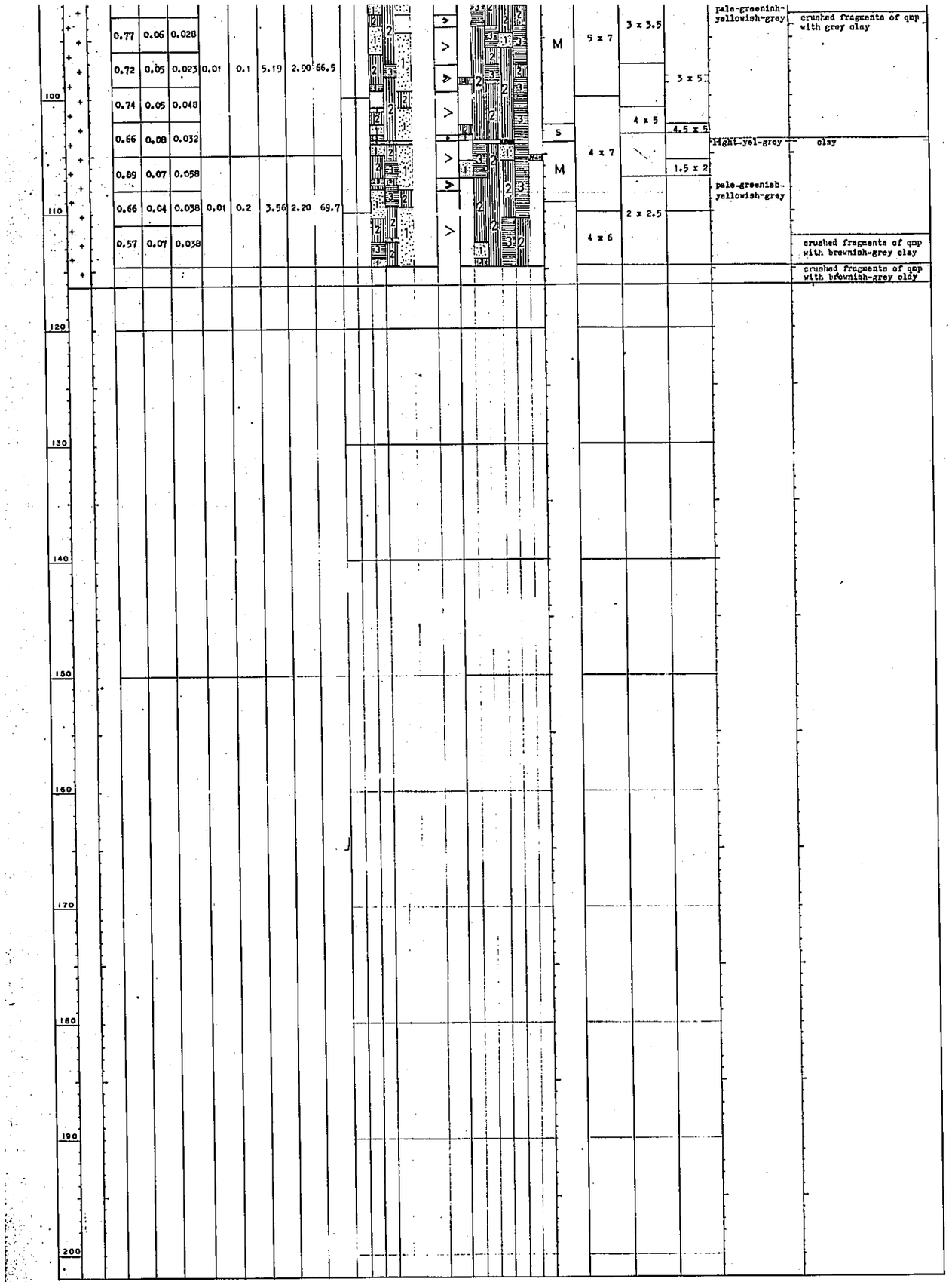
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY ------ Molybdenite
OTHERS --- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite

ALTERATION

BIOT-------Biotitization
SILI-------Silicification
SERI------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite
Mt -----Magnetite
Pb -----Galena
Zn ---- Sphalerite
En ------- Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V --------Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep ------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W----weak
M --- moderate
S ----strong
VS --- very strong

COLOUR

blk --------black
blu -------blue
brn -------brown
drk--------dark
gry -------gray
grn --------green
lgt --------light
purp-------purple
red -------red
wht -------white
yel --------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grained

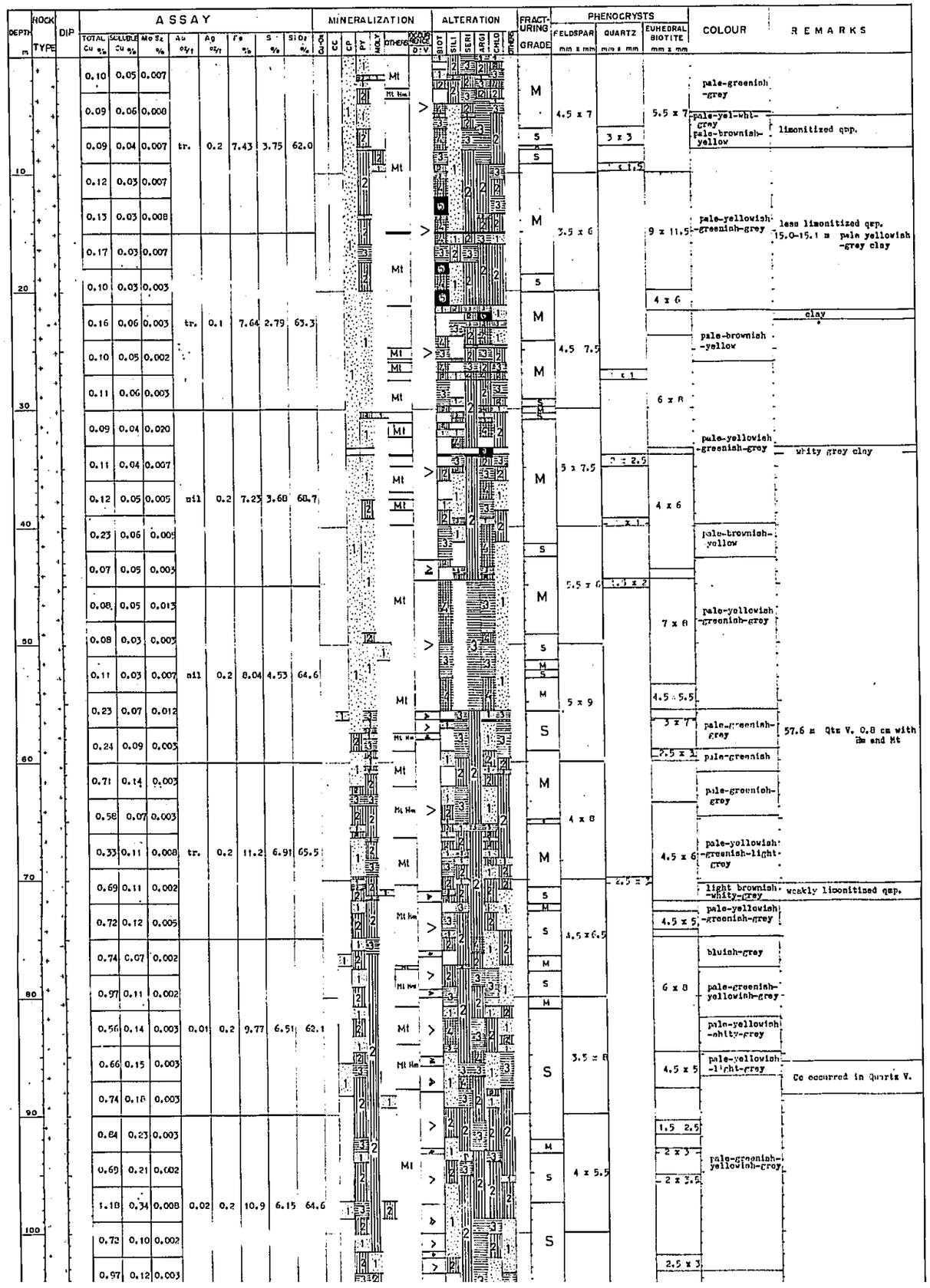


PLATE 2

SHEET 4

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 4

BOTTOM DEPTH 163.45m

COLLAR ELEVATION 3,494.00

NORTHING 9'221,670.57 EASTING 796,278.89

BEARING 101° 15' INCLINATION 0°

LOGGED BY H. Hama

Sponsered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD.

Scale 1 : 200

INDEX

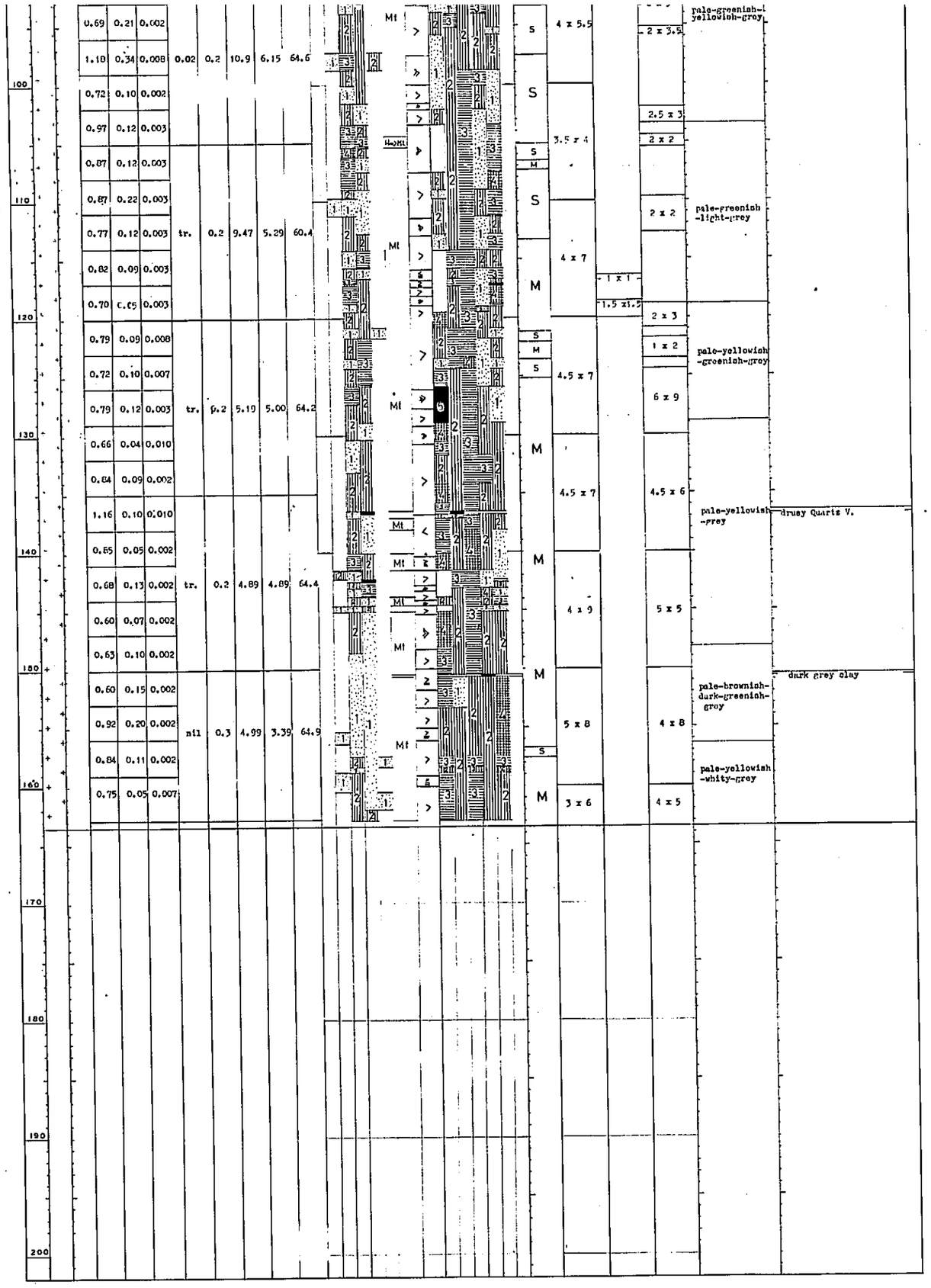
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

- Cu-Ox ----- Copper Oxides
- CC -------- Chalcocite
- CP ------- Chalcopyrite
- PY ------- Pyrite
- MOLY ------ Molybdenite
- OTHERS --- Other Ore Minerals
  - Cv -----Covelline
  - Bn -----Bornite
  - Hm-----Hematite
  - Mt -----Magnetite

ALTERATION

- BIOT-------Biotitization
- SILI-------Silicification
- SERI------Sericitization
- ARGI ------ Argillization
- CHLO-------Chloritization
- OTHERS----Other Alteration
  - Ep -------- Epidote



PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm----- Hematite
Mt -----Magnetite
Pb -----Galena
Zn ---- Sphalerite
En--------Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V-------Dissemination : Vein

SERI------ Sericitization
ARGI ------ Argillization
CHLO--------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M---- moderate
S-----strong
VS---- very strong

COLOUR

blk --------black
blu -------- blue
brn --------brown
drk --------dark
gry --------gray
grn --------green
lgt --------light
purp-------purple
red -------- red
wht -------- white
yel -------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grained

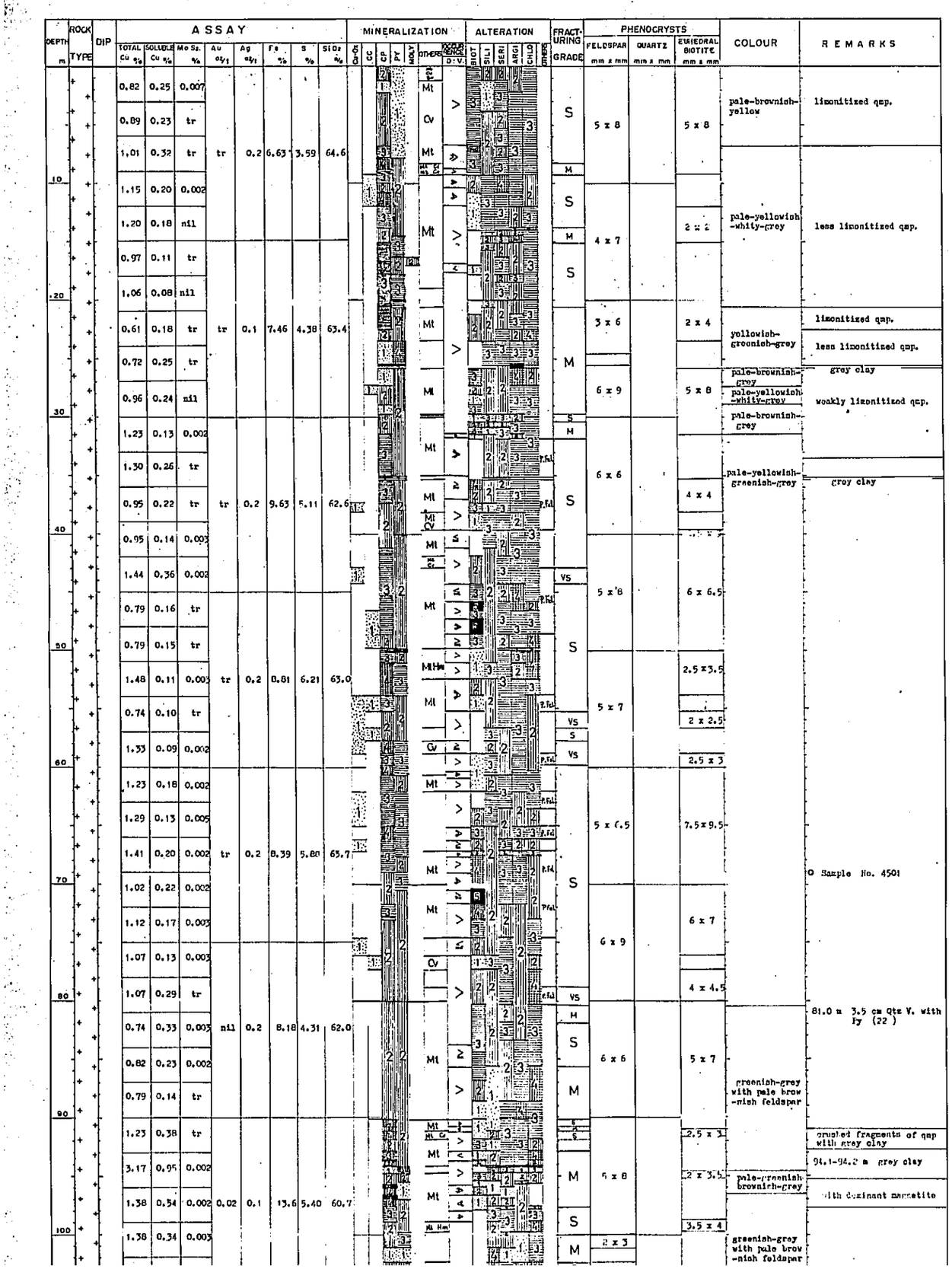


PLATE 2

SHEET 5

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 5

BOTTOM DEPTH 129.90m

COLLAR ELEVATION 3,495.51

NORTHING 9'221,781.17 EASTING 796,345.72

BEARING 67°30' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD.

Scale 1 : 200

INDEX

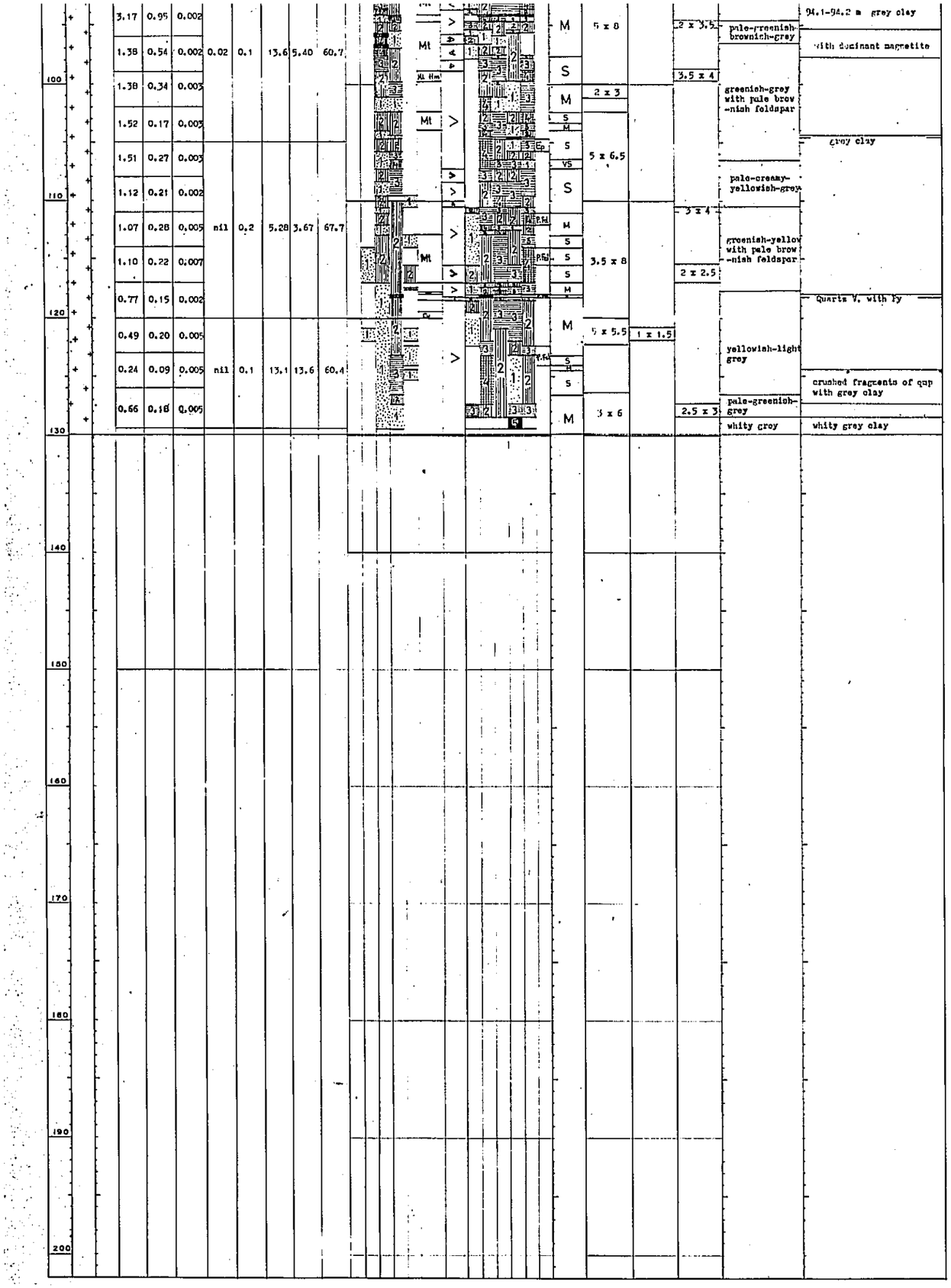
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ····· Copper Oxides
CC ····· Chalcocite
CP ····· Chalcopyrite
PY ····· Pyrite
MOLY ····· Molybdenite
OTHERS --- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite

ALTERATION

BIOT ····· Biotitization
SILI ····· Silicification
SERI ····· Sericitization
ARGI ····· Argillization
CHLO ····· Chloritization
OTHERS ---- Other Alteration



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covelline
Bn -----Bornite
Hm----- Hematite
Mt -----Magnetite
Pb -----Galena
Zn ---- Sphalerite
En-------Enargite
OCCURENCE--Modes of Occurance of Copper Ores
D : V--------Dissemination : Vein

SERI------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W- ---- weak
M- ---- moderate
S ----- strong
VS- ---- very strong

COLOUR

blk --------black
blu --------blue
brn --------brown
drk --------dark
gry --------gray
grn --------green
lgt --------light
purp -------purple
red -------- red
wht -------- white
yel -------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg --------- coarse grained

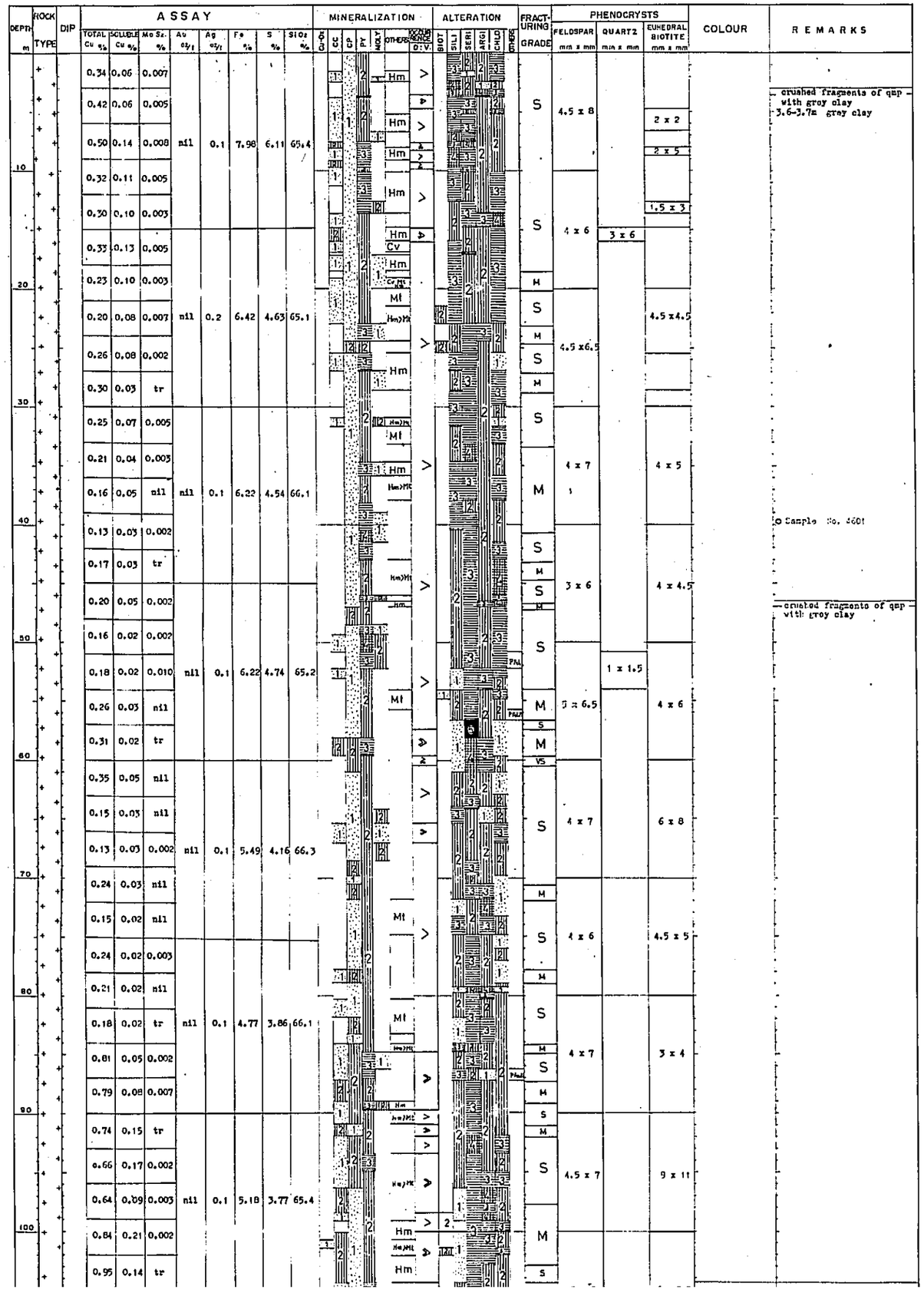


PLATE 2

SHEET 6

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 6

BOTTOM DEPTH 115.75m

COLLAR ELEVATION 3,494.48

NORTHING 9'221,617.17 EASTING 796,225.23

BEARING 124° 45' INCLINATION 0°

LOGGED BY H. Hama

Sponcarad by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO , LTD.

Scale 1 : 200

INDEX

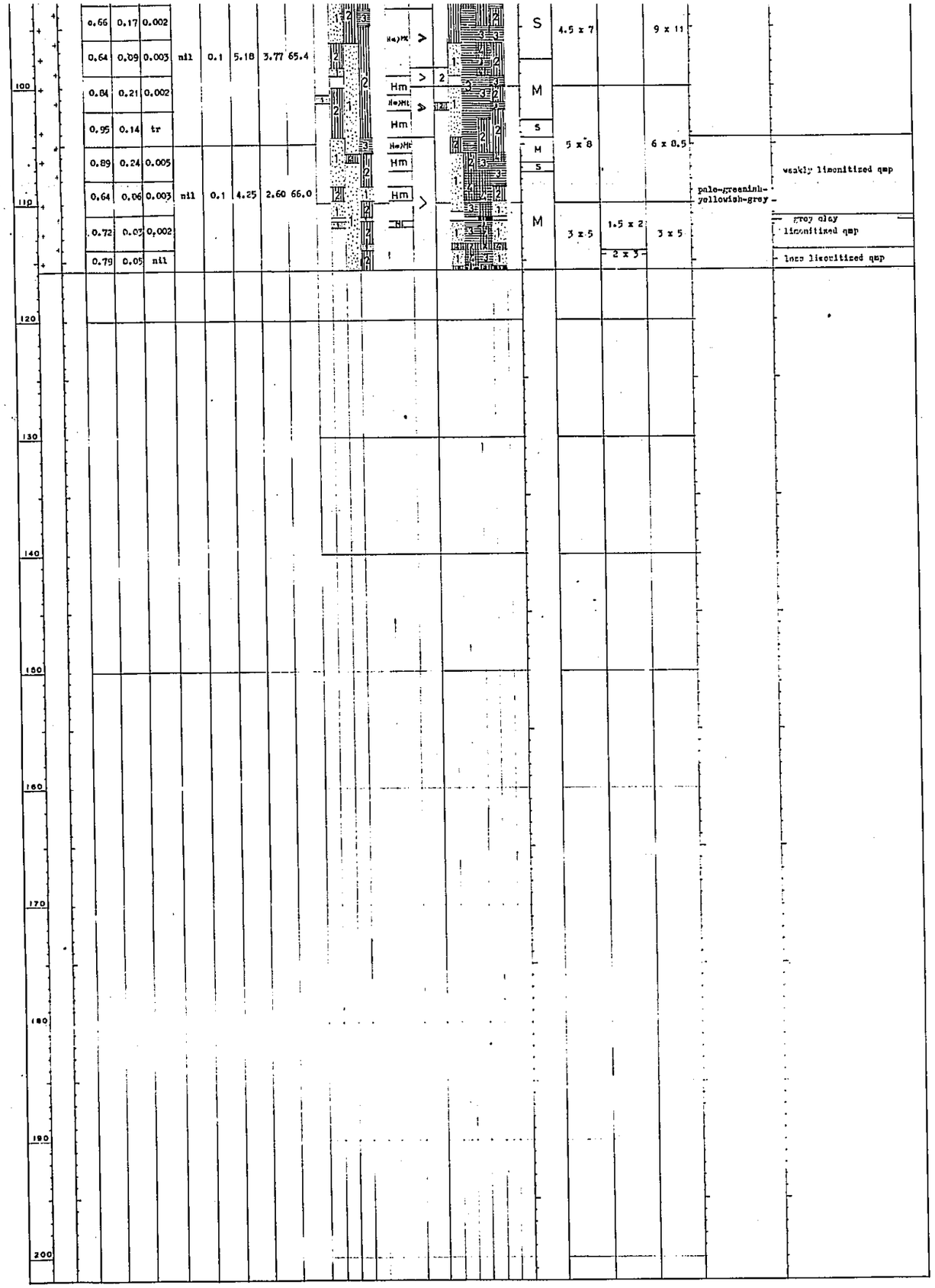
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite
Mt -----Magnetite

ALTERATION

BIOT-------Biotitization
SILI -------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En-------- Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V ---------Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO--------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------- Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W -----weak
M----- moderate
S------strong
VS----- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp-------purple
red -------red
wht -------white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg --------coarse grained

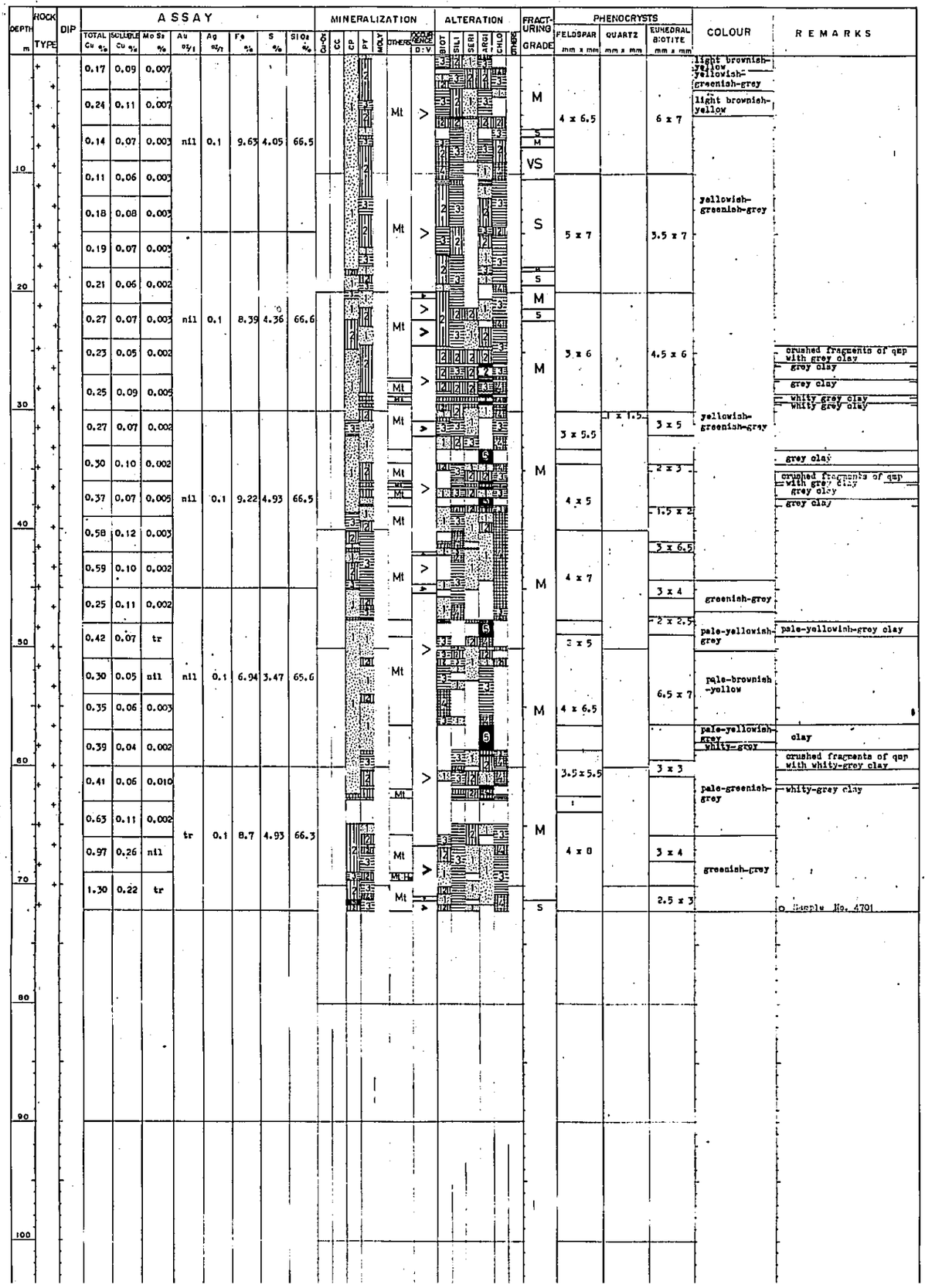


PLATE 2

SHEET 7

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 7

BOTTOM DEPTH 72.15m

COLLAR ELEVATION 3,494.95

NORTHING 9'221,690.03 EASTING 796,274.49

BEARING 337° 30' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

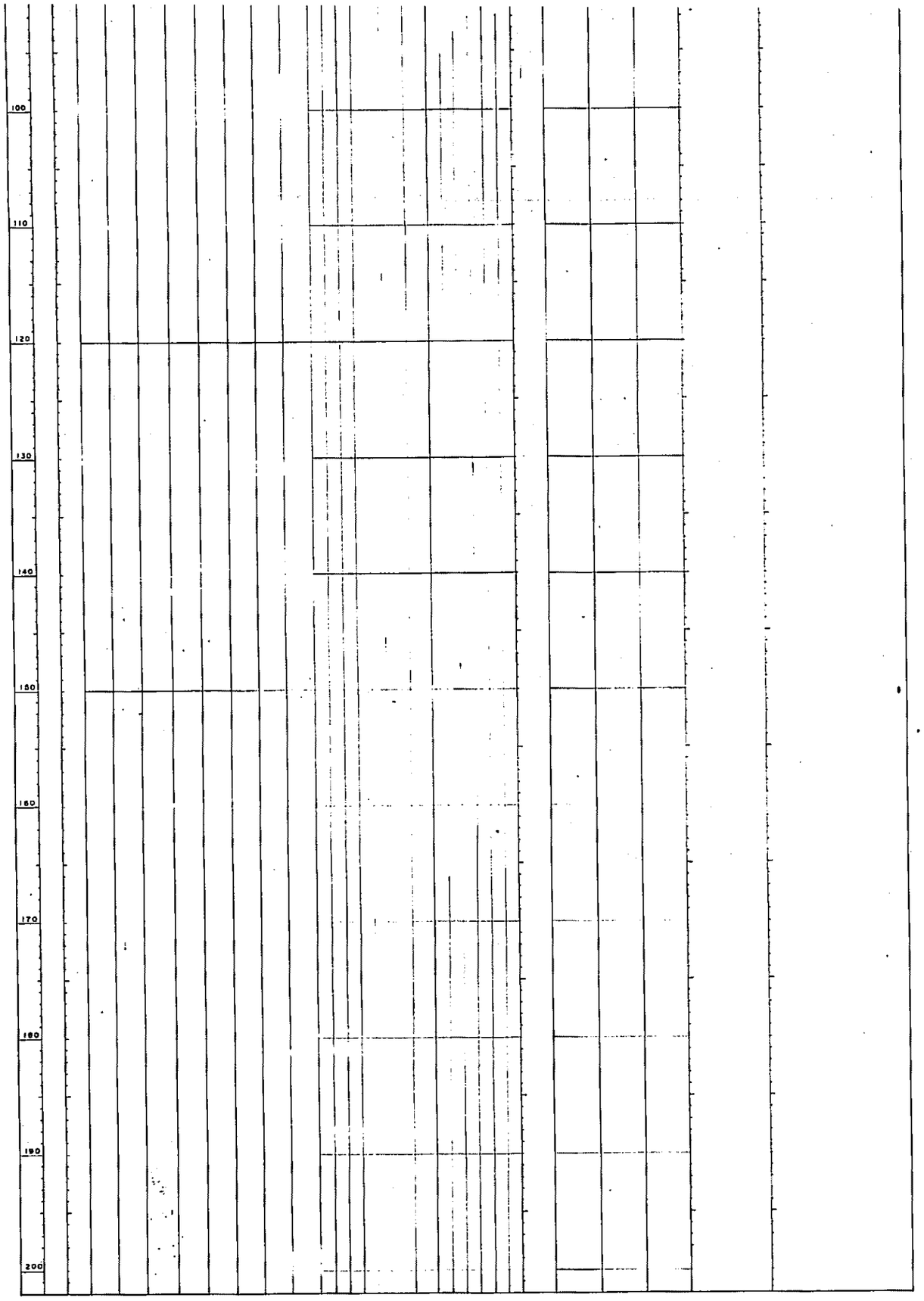
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ····· Copper Oxides
CC ····· Chalcocite
CP ····· Chalcopyrite
PY ····· Pyrite
MOLY ····· Molybdenite
OTHERS··· Other Ore Minerals
Cv ····· Covellite
Bn ····· Bornite
Hm····· Hematite

ALTERATION

BIOT·····Biotitization
SILI ····· Silicification
SERI ····· Sericitization
ARGI ····· Argillization
CHLO·····Chloritization
OTHERS···· Other Alteration
Ep ····· Epidote



CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm----- Hematite
Mt -----Magnetite
Pb -----Galena
Zn ----- Sphalerite
En--------Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V---------Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W -----weak
M ------ moderate
S -------strong
VS ------ very strong

COLOUR

blk --------black
blu --------blue
brn --------brown
drk --------dark
gry --------gray
grn --------green
lgt ---------light
purp--------purple
red --------red
wht --------white
yel --------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grainд

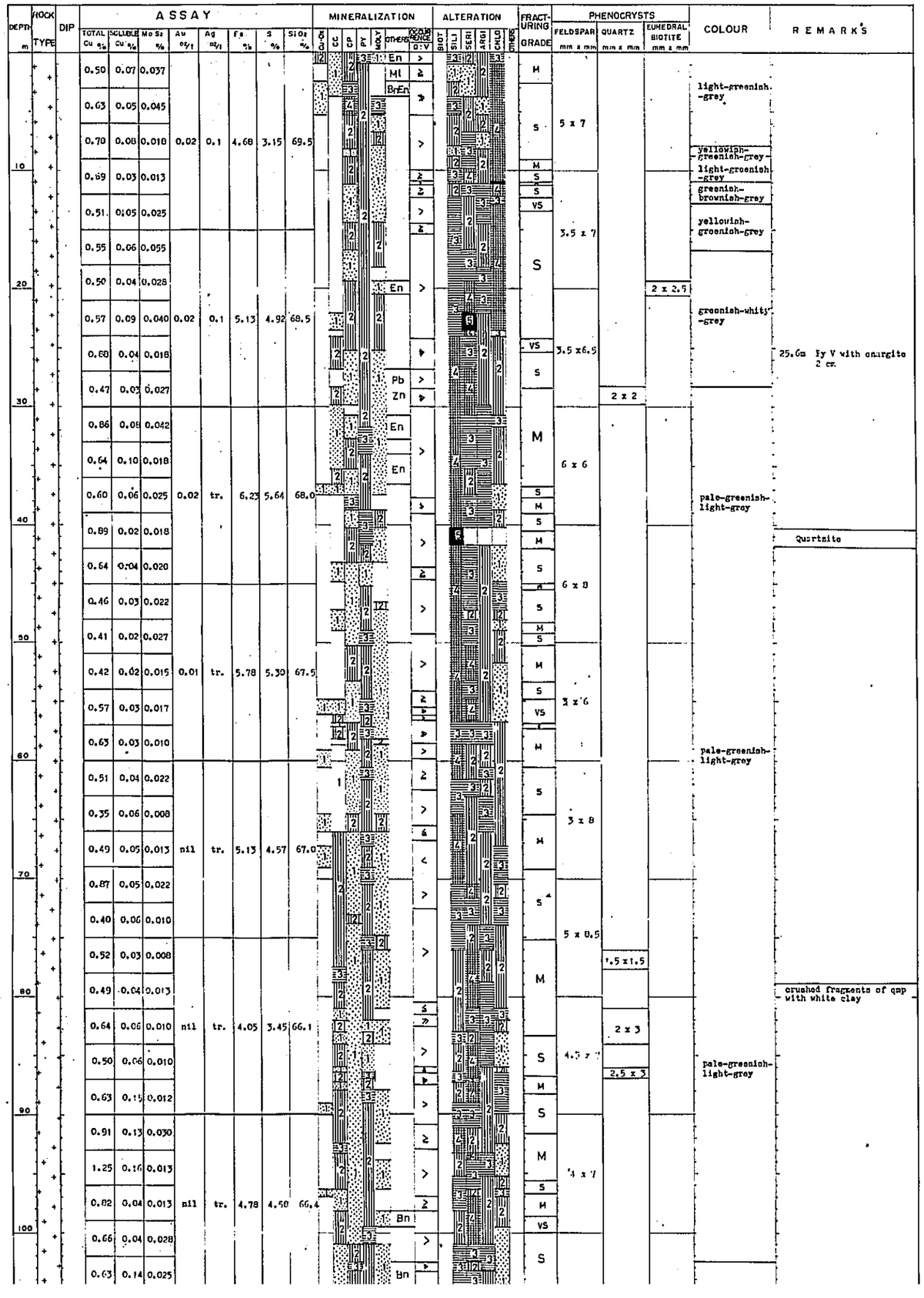


PLATE 2
SHEET 8

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 9

BOTTOM DEPTH 200.00m

COLLAR ELEVATION 3,492.65

NORTHING 9'221,447.46 EASTING 796,022.91

BEARING 0°30' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

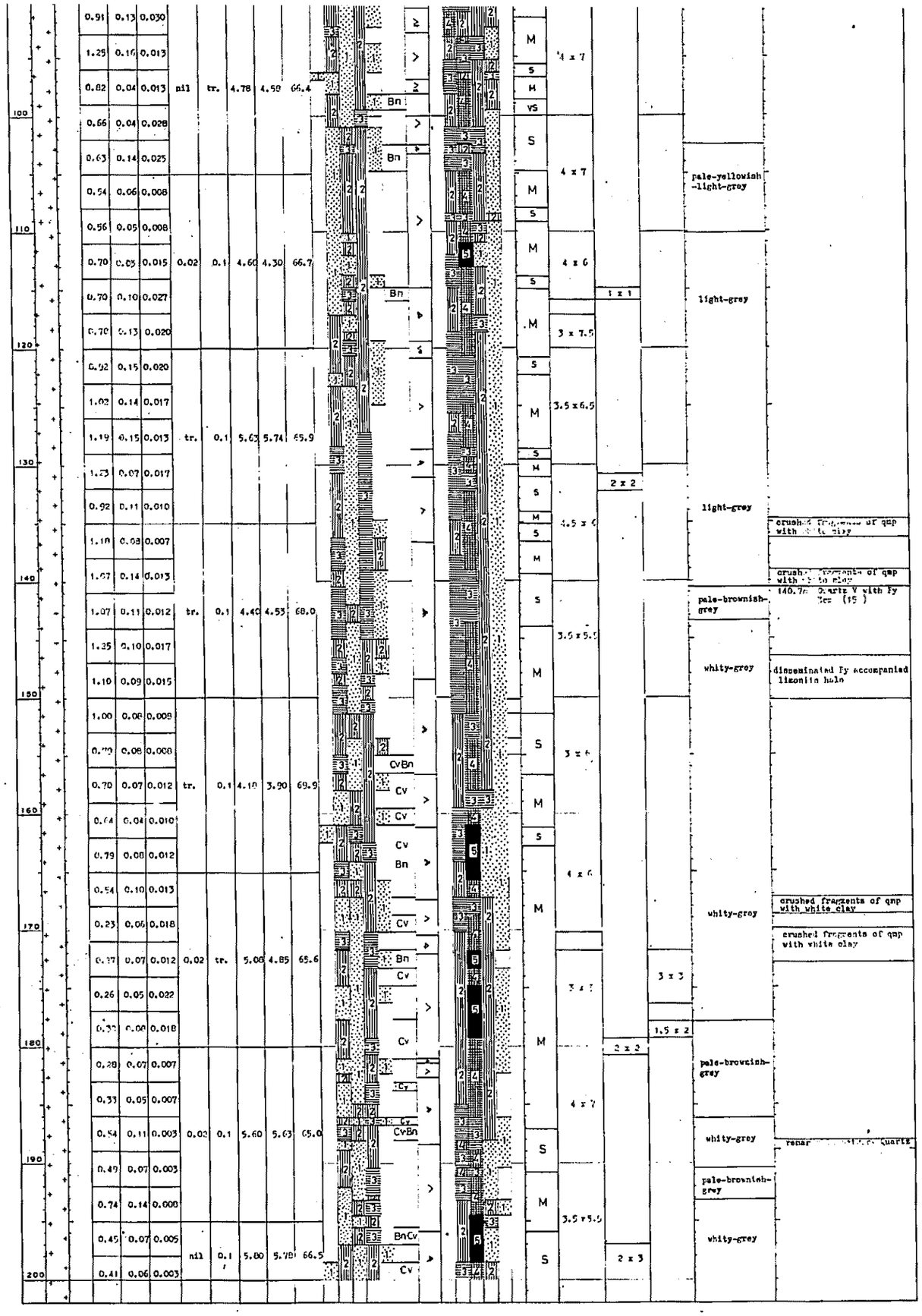
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite
Mt -----Magnetite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



0.91	0.13	0.030					
1.25	0.16	0.013					
0.82	0.04	0.013	nil	tr.	4.78	4.58	66.4
0.66	0.04	0.028					
0.63	0.14	0.025					
0.54	0.06	0.008					
0.56	0.05	0.008					
0.70	0.03	0.015	0.02	0.1	4.60	4.30	66.7
0.70	0.10	0.027					
0.70	0.13	0.020					
0.92	0.15	0.020					
1.02	0.14	0.017					
1.19	0.15	0.013	tr.	0.1	5.63	5.74	65.9
1.23	0.07	0.017					
0.92	0.11	0.010					
1.18	0.08	0.007					
1.07	0.14	0.013					
1.07	0.11	0.012	tr.	0.1	4.40	4.53	68.0
1.35	0.10	0.017					
1.10	0.09	0.015					
1.00	0.08	0.009					
0.79	0.08	0.008					
0.70	0.07	0.012	tr.	0.1	4.10	3.90	69.9
0.64	0.04	0.010					
0.79	0.08	0.012					
0.54	0.10	0.013					
0.23	0.06	0.018					
0.37	0.07	0.012	0.02	tr.	5.08	4.85	65.6
0.26	0.05	0.022					
0.32	0.08	0.018					
0.28	0.07	0.007					
0.33	0.05	0.007					
0.54	0.11	0.003	0.02	0.1	5.60	5.63	65.0
0.49	0.07	0.003					
0.74	0.14	0.008					
0.45	0.07	0.005	nil	0.1	5.80	5.78	66.5
0.41	0.06	0.003					

M
S
M
VS
S
M
S
M
S
.M
S
M
S
M
S
M
S
M
S
M
S
M
S
M
M
S
M
S

4 x 7
4 x 7
4 x 6
1 x 1
3 x 7.5
3.5 x 6.5
2 x 2
4.5 x 6
3.5 x 5.5
3 x 6
4 x 6
3 x 3
3 x 3
1.5 x 2
2 x 2
4 x 7
3.5 x 5.5
2 x 3

pale-yellowish-light-grey

light-grey

light-grey

pale-brownish-grey

whity-grey

whity-grey

pale-brownish-grey

whity-grey

pale-brownish-grey

whity-grey

crushed fragments of qmp with white clay

crushed fragments of qmp with white clay

140.7m Quartz V with Py 3cm (15)

disseminated Py accompanied limonite halo

crushed fragments of qmp with white clay

crushed fragments of qmp with white clay

repar [illegible] Quartz

CC -------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covelline
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En ------- Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V --------Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO -------Chloritization
OTHERS---- Other Alteration
Ep ------- Epidote
P - Fel ------ Pink Feldspar

INTENSITY

☐ Not Observed
1 Very Weak
2 Weak
3 Moderate
4 Strong
5 Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W----- weak
M ---- moderate
S ----- strong
VS ---- very strong

COLOUR

blk -------- black
blu -------- blue
brn -------- brown
drk -------- dark
gry -------- gray
grn -------- green
lgt -------- light
purp -------- purple
red ------- red
wht ------- white
yel ------- yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg ---------- coarse graind

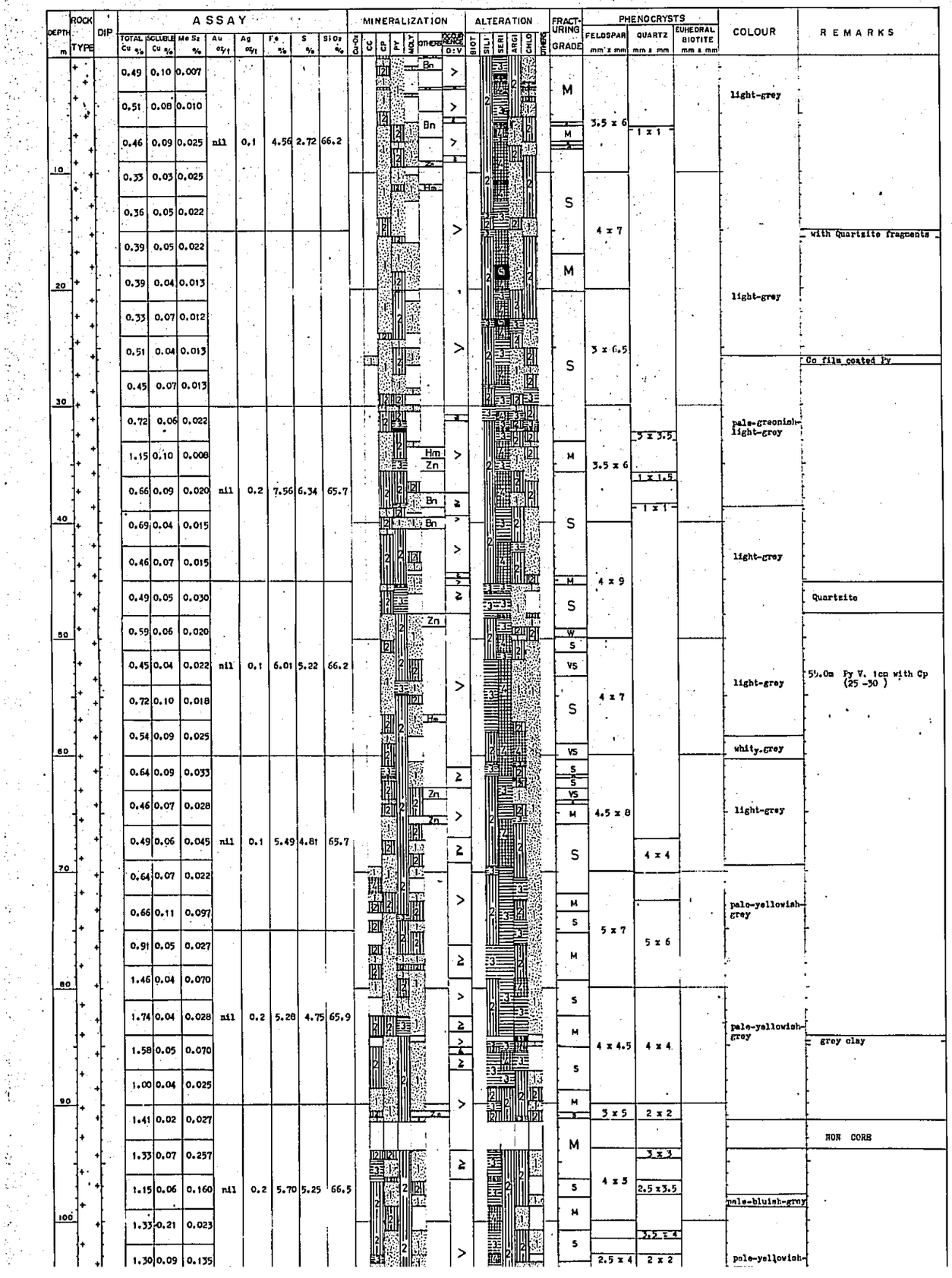


PLATE 2

SHEET 9

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 10

BOTTOM DEPTH 154.96m

COLLAR ELEVATION 3,493.28

NORTHING 9'221,472.89 EASTING 796,075.68

BEARING 169° 00' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

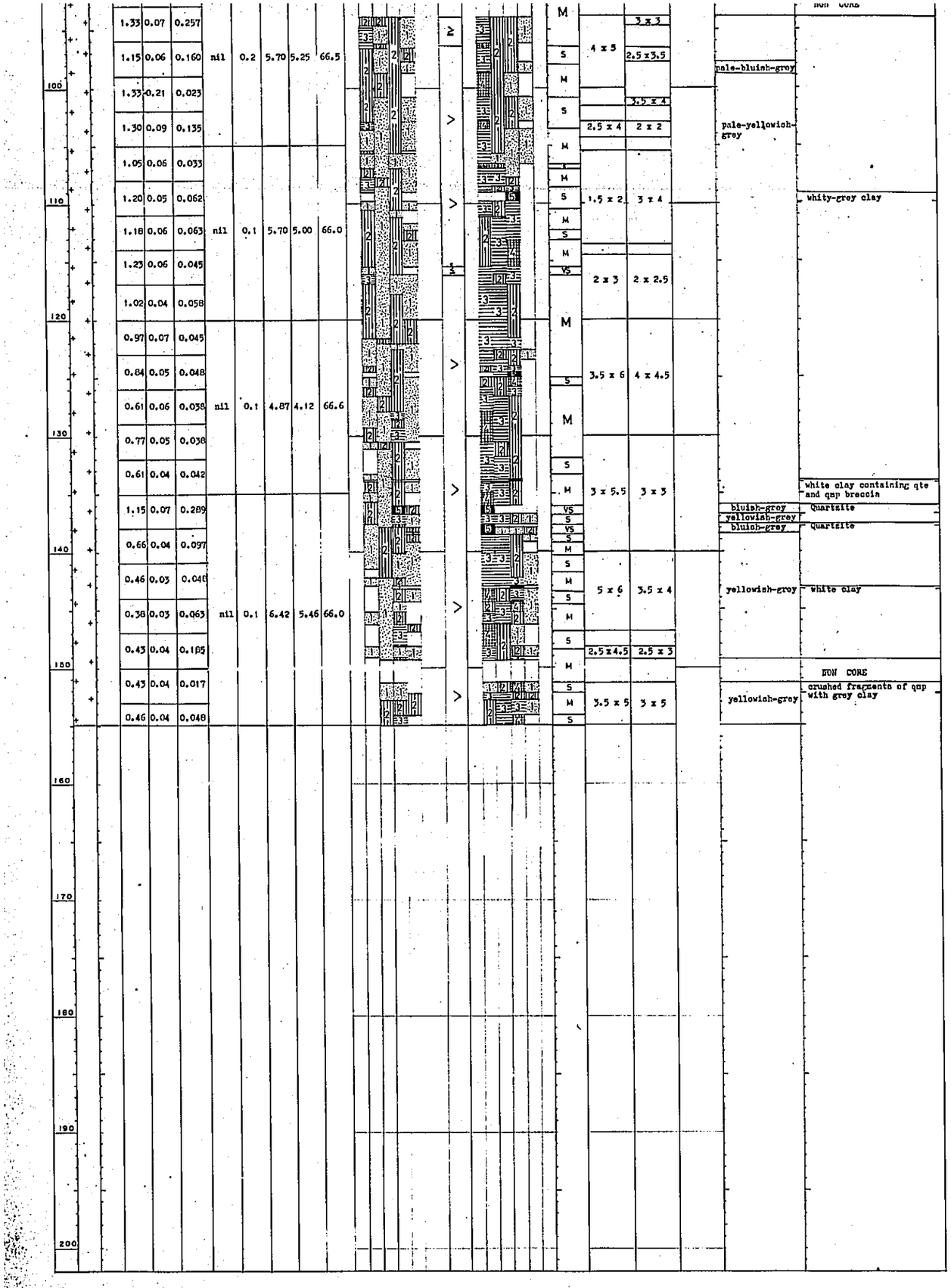
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covelline
Bn ----- Bornite
Hm ----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ----- Sphalerite
En ------ Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V ------ Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO ------ Chloritization
OTHERS---- Other Alteration
Ep -------- Epidote
P-Fel ------ Pink Feldspar

INTENSITY

- Not Observed
- 1 Very Weak
- 2 Weak
- 3 Moderate
- 4 Strong
- 5 Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----- weak
M ----- moderate
S ------ strong
VS ----- very strong

COLOUR

blk ------- black
blu ------- blue
brn ------- brown
drk ------- dark
gry ------- gray
grn ------- green
lgt -------- light
purp ------- purple
red ------- red
wht ------- white
yel ------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg --------- coarse grained

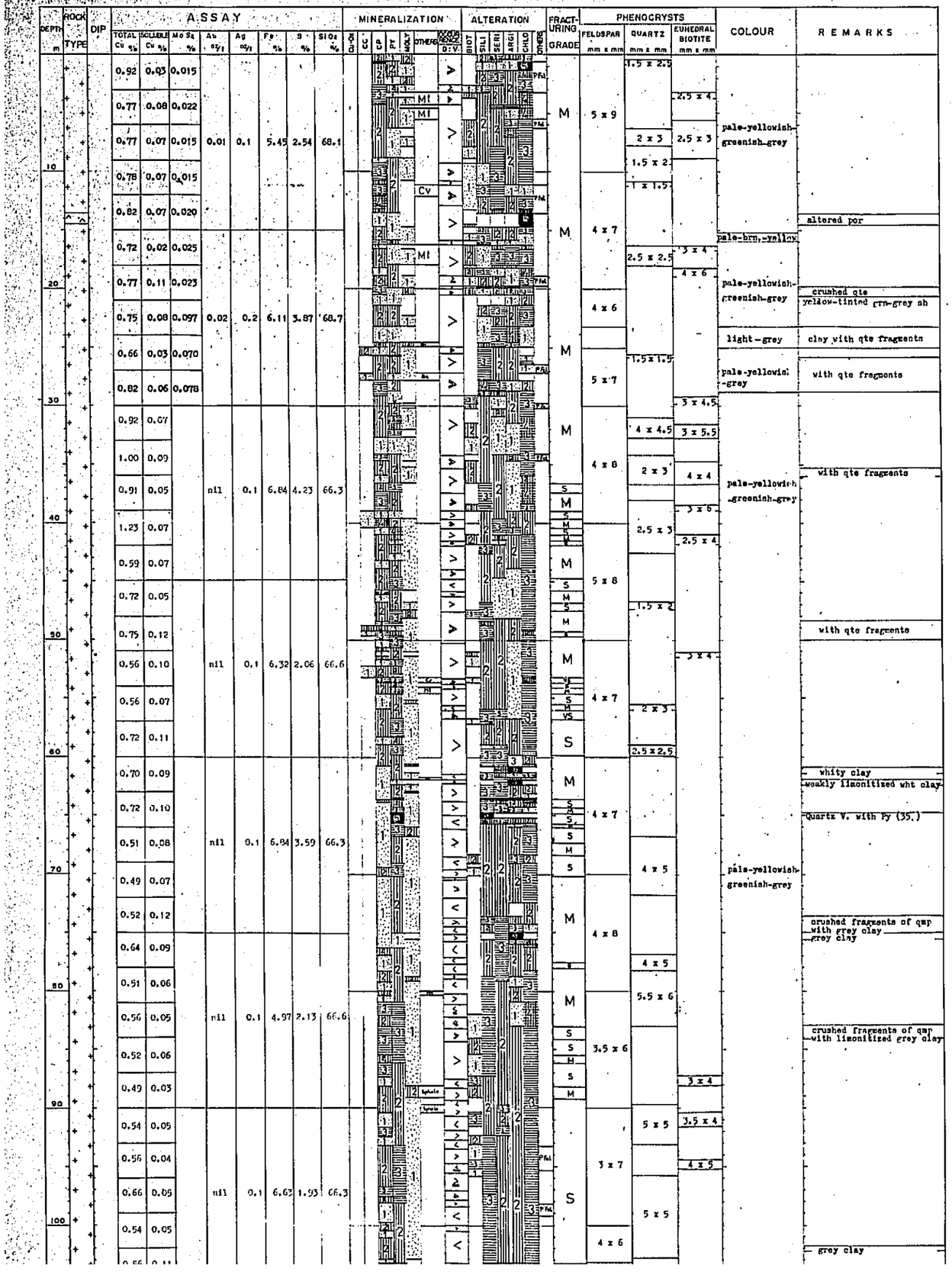


PLATE 3-1-1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 3

BOTTOM DEPTH 114.21m

COLLAR ELEVATION 3,496.26

NORTHING 9'221,952.86 EASTING 796,333.97

BEARING 65° 45' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

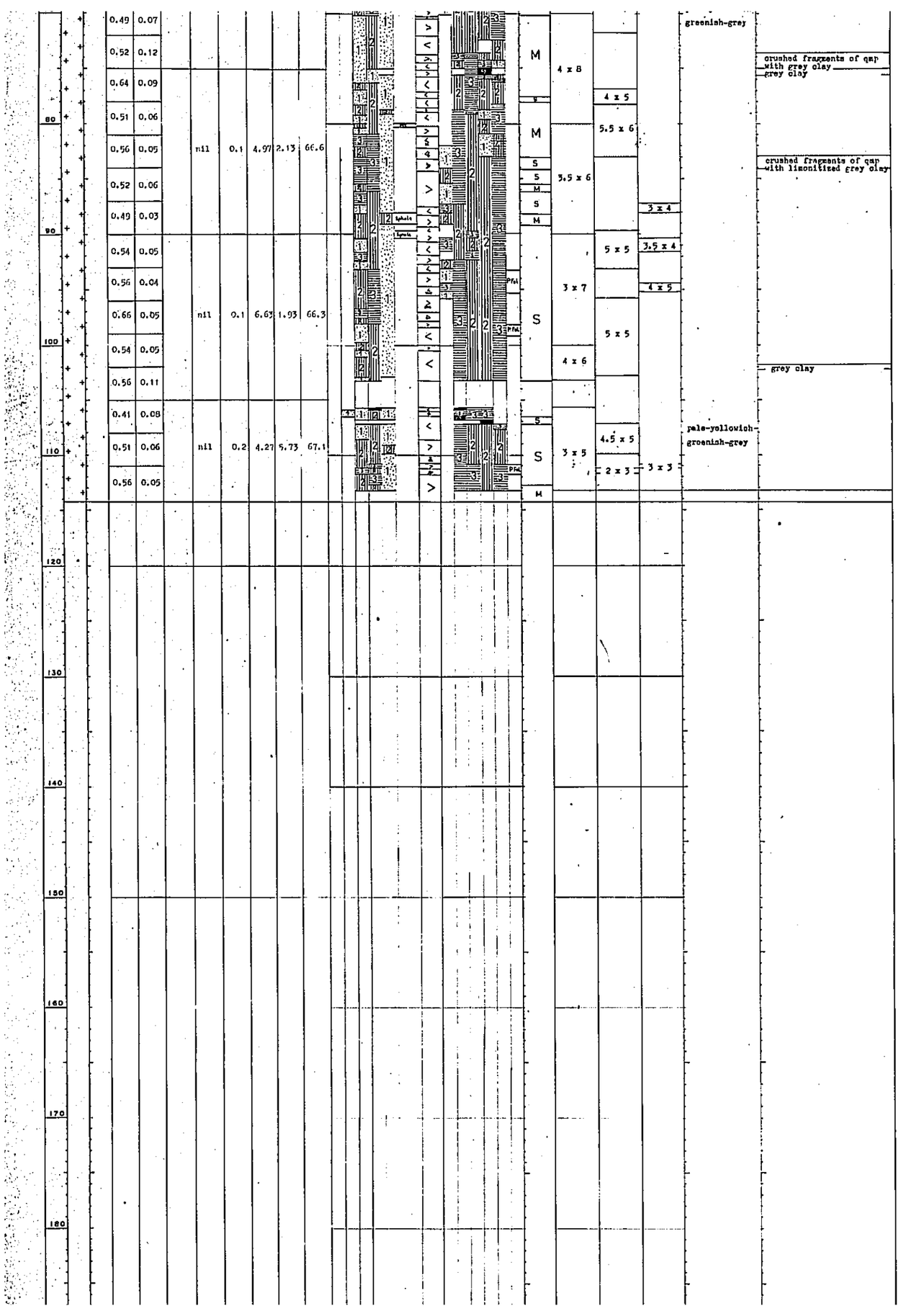
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

- Cu-Ox---- Copper Oxides
- CC ------- Chalcocite
- CP ------- Chalcopyrite
- PY ------- Pyrite
- MOLY ----- Molybdenite
- OTHERS--- Other Ore Minerals
  - Cv -----Covellite
  - Bn -----Bornite
  - Hm-----Hematite

ALTERATION

- BIOT------Biotitization
- SILI ------ Silicification
- SERI ------ Sericitization
- ARGI ------ Argillization
- CHLO------Chloritization
- OTHERS----Other Alteration
- Ep ------- Epidote



Limestone ls

Tuff tuff

Quartzite qte

Massive Ore (Mt , Py or Pb - Zn)

Gossan gos

Sheared zone

Fossils foss

MINERALIZATION

Cu-Ox----- Copper Oxides
CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ----- Sphalerite
En ------- Enargite
OCCURENCE---Modes of Occurence of Copper Ores
D : V---------Dissemination : Vein

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

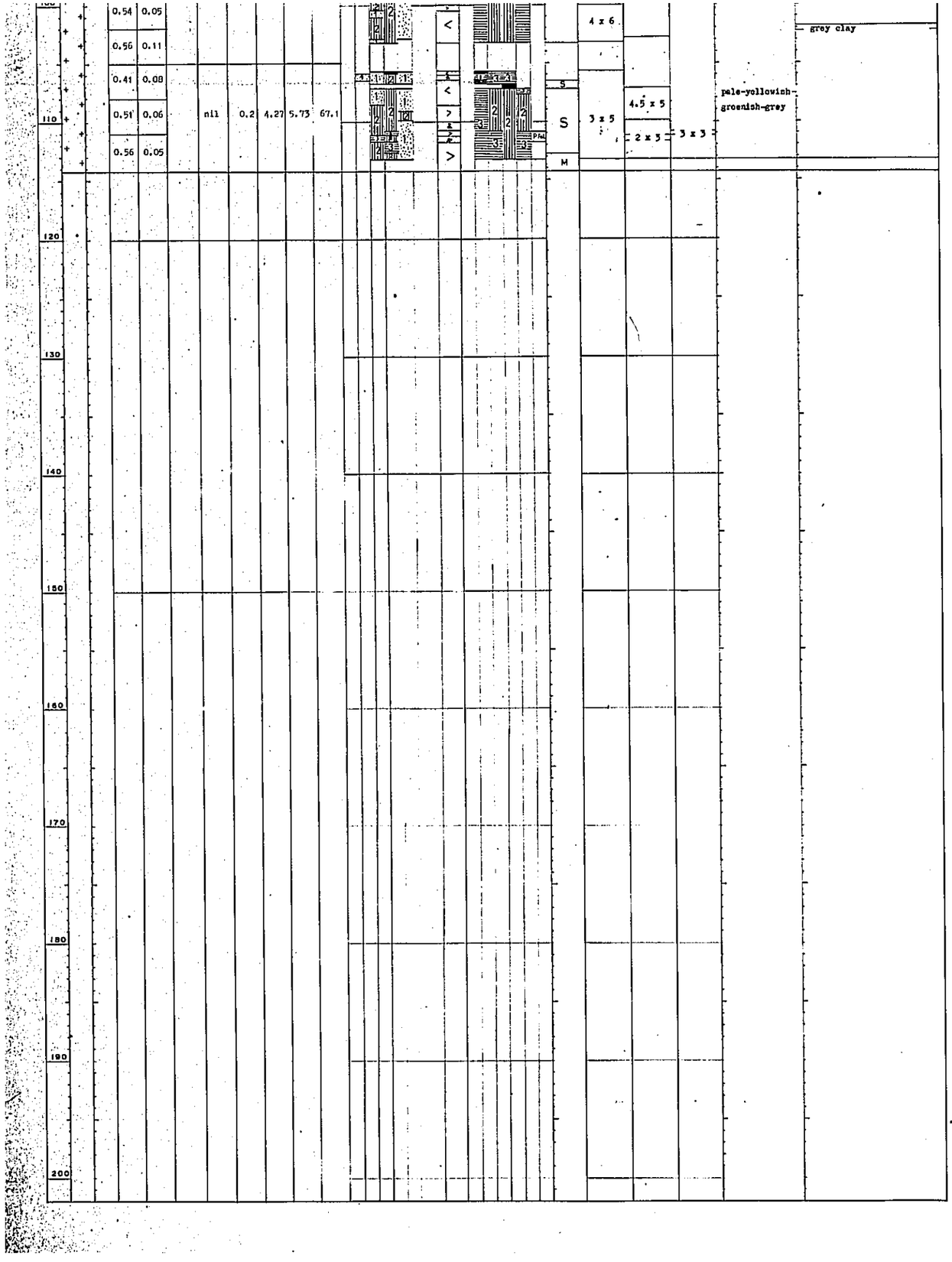
W-----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp-------purple
red ------- red
wht -------white
yel -------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grainд



Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ----- Sphalerite
En ------- Enargite
OCCURENCE···Modes of Occurence of Copper Ores
D : V·····Dissemination : Vein

OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W- ----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp -------purple
red ------- red
wht -------white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg ---------coarse grained

PLATE 3-1-2

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU.

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 11

BOTTOM DEPTH 126.52m

COLLAR ELEVATION 3,495.33

NORTHING 9'221,461.12 EASTING 796,225.91

BEARING 87° 45' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

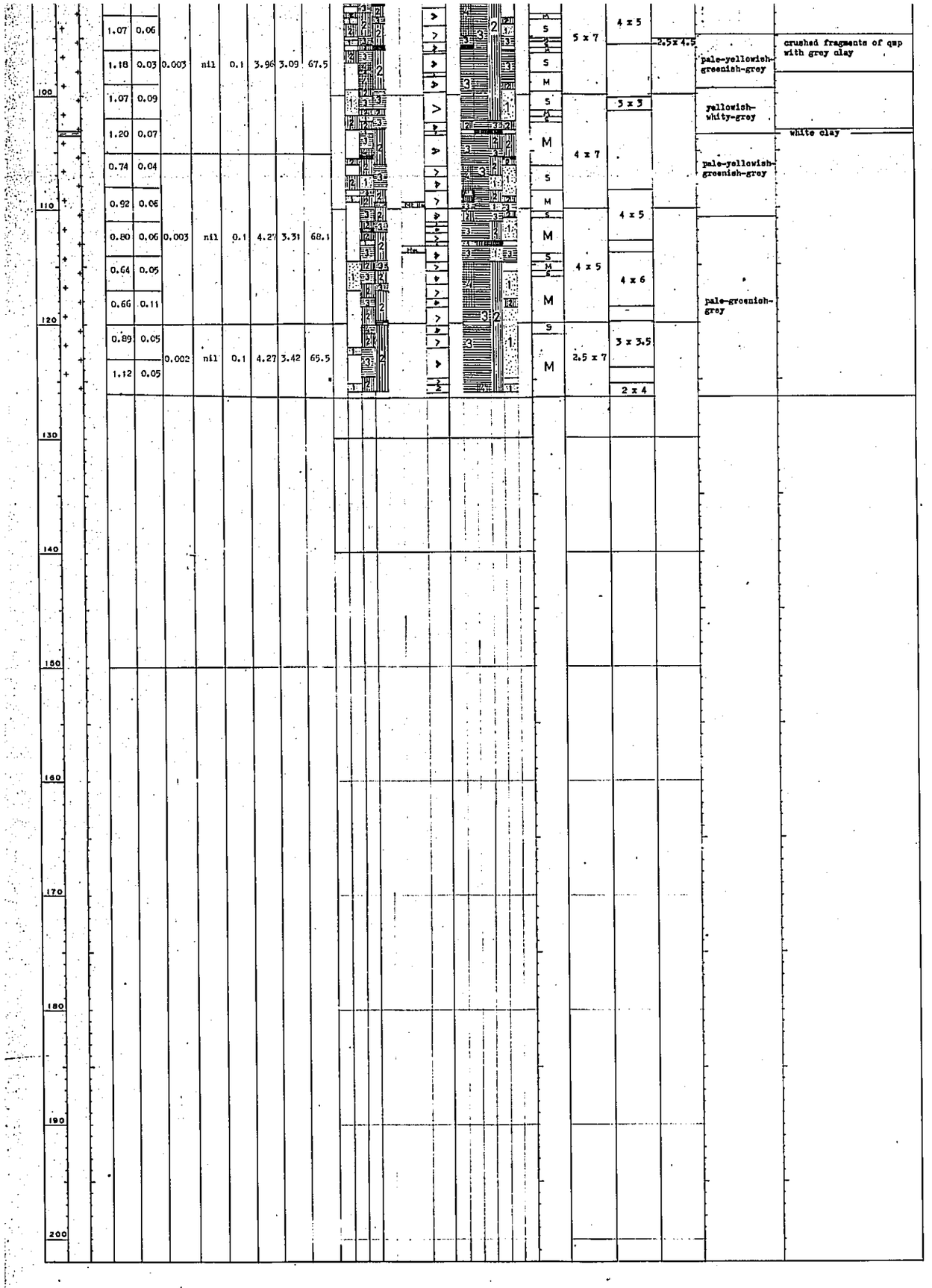
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb-Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ---------- Chalcocite
CP ---------- Chalcopyrite
PY ---------- Pyrite
MOLY ------- Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covelline
Bn -----Bornite
Hm-----Hematite

ALTERATION

BIOT-------Biotitization
SILI -------Silicification
SERI -------Sericitization
ARGI ------- Argillization
CHLO--------Chloritization
OTHERS----Other Alteration
Ep --------Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covelline
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ----- Sphalerite
En ------ Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V---------Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk --------black
blu -------- blue
brn --------brown
drk--------dark
gry --------gray
grn --------green
lgt --------light
purp -------purple
red -------- red
wht -------- white
yel -------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grained

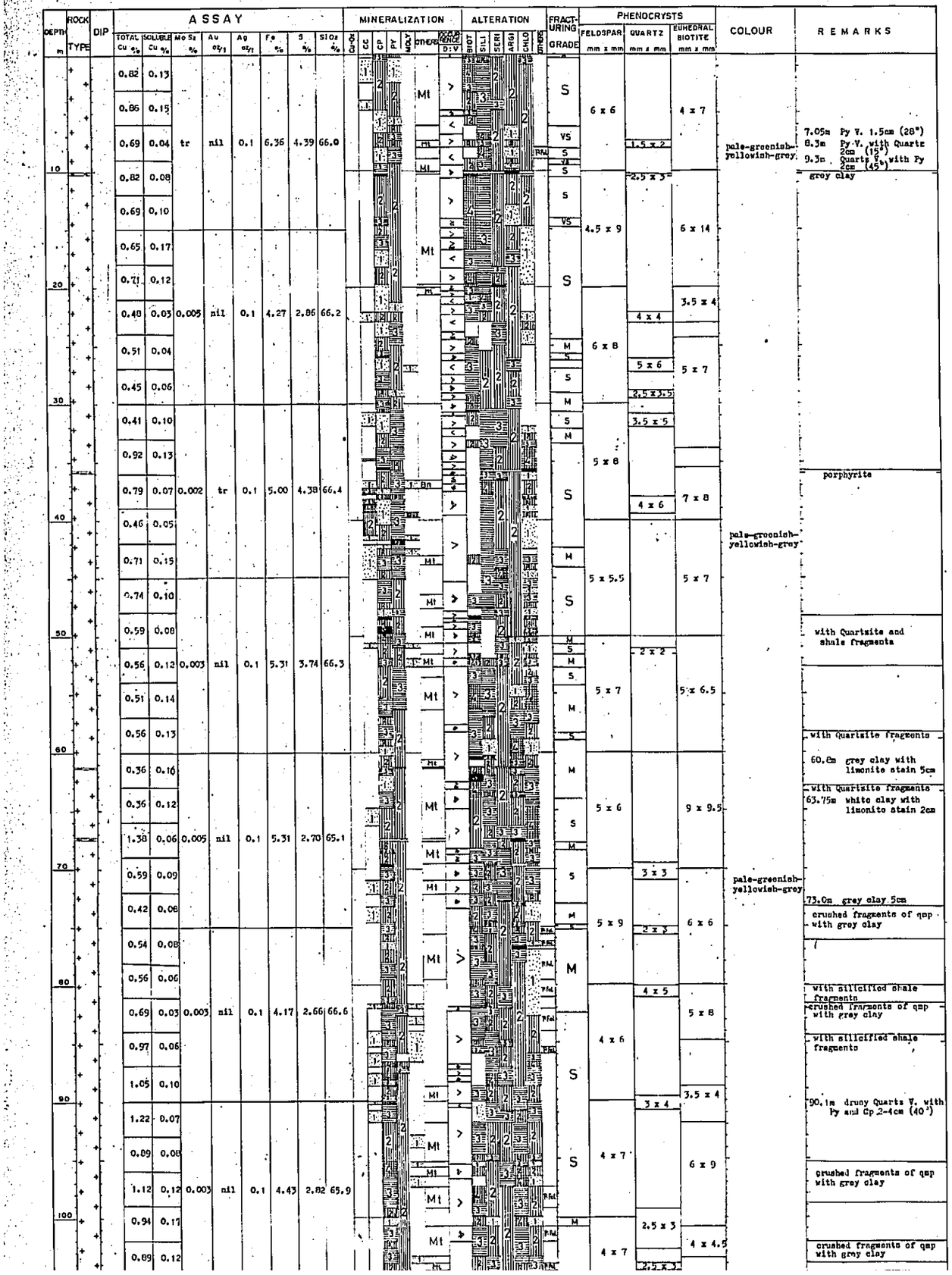


PLATE 3-1-3

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 12

BOTTOM DEPTH 121.74m

COLLAR ELEVATION 3,495.28

NORTHING 9'221,639.67 EASTING 796,388.63

BEARING 160° 45' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

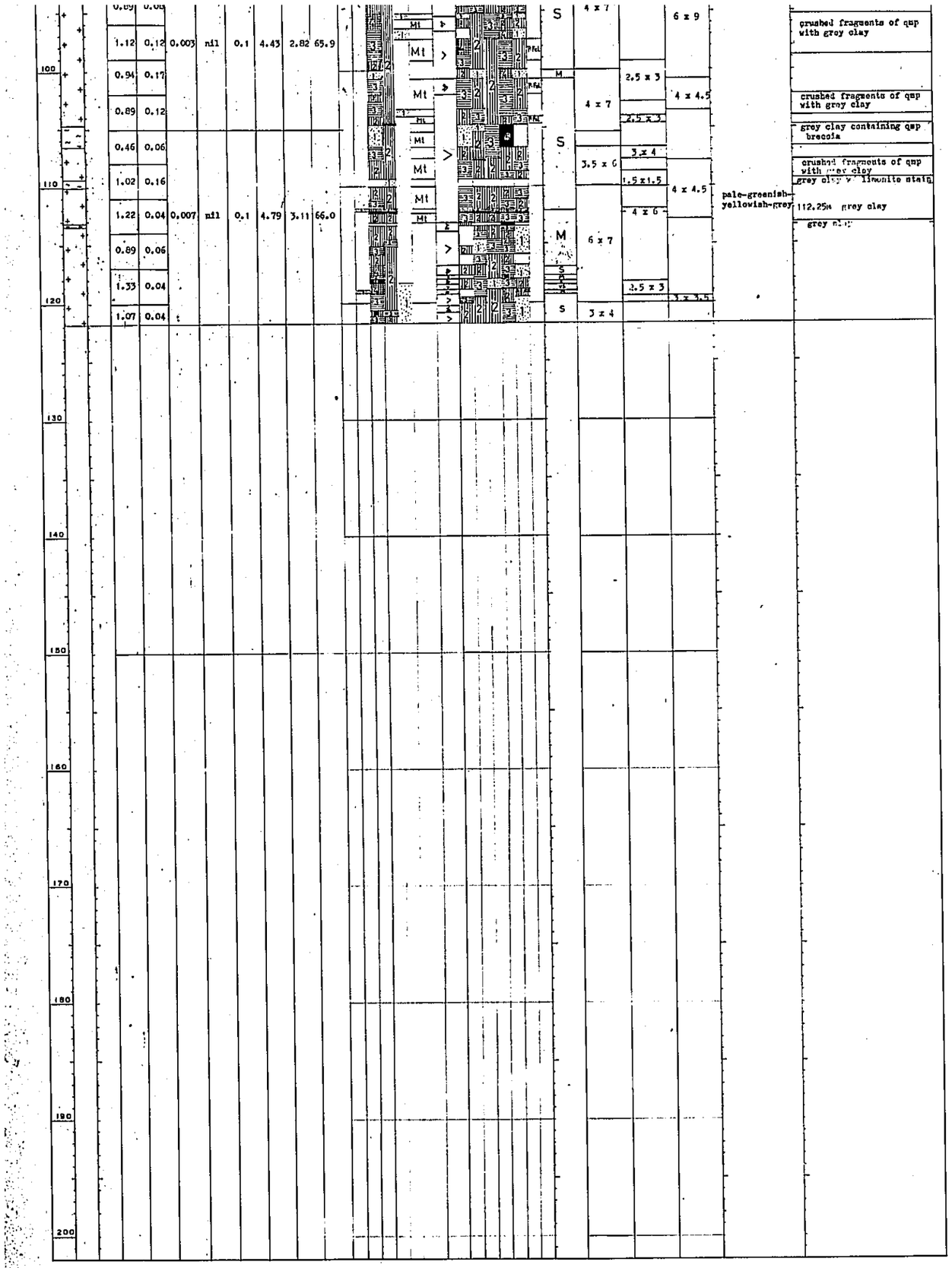
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qté
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm----- Hematite
Mt -----Magnetite
Pb -----Galena
Zn ----- Sphalerite
En.....Enargite
OCCURENCE···Modes of Occurence of Copper Ores
D : V.....Dissemination : Vein

ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep.-------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M ---- moderate
S-----strong
VS---- very strong

COLOUR

blk--------black
blu --------blue
brn --------brown
drk--------dark
gry --------gray
grn --------green
lgt---------light
purp-------purple
red -------- red
wht -------- white
yel -------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grainд

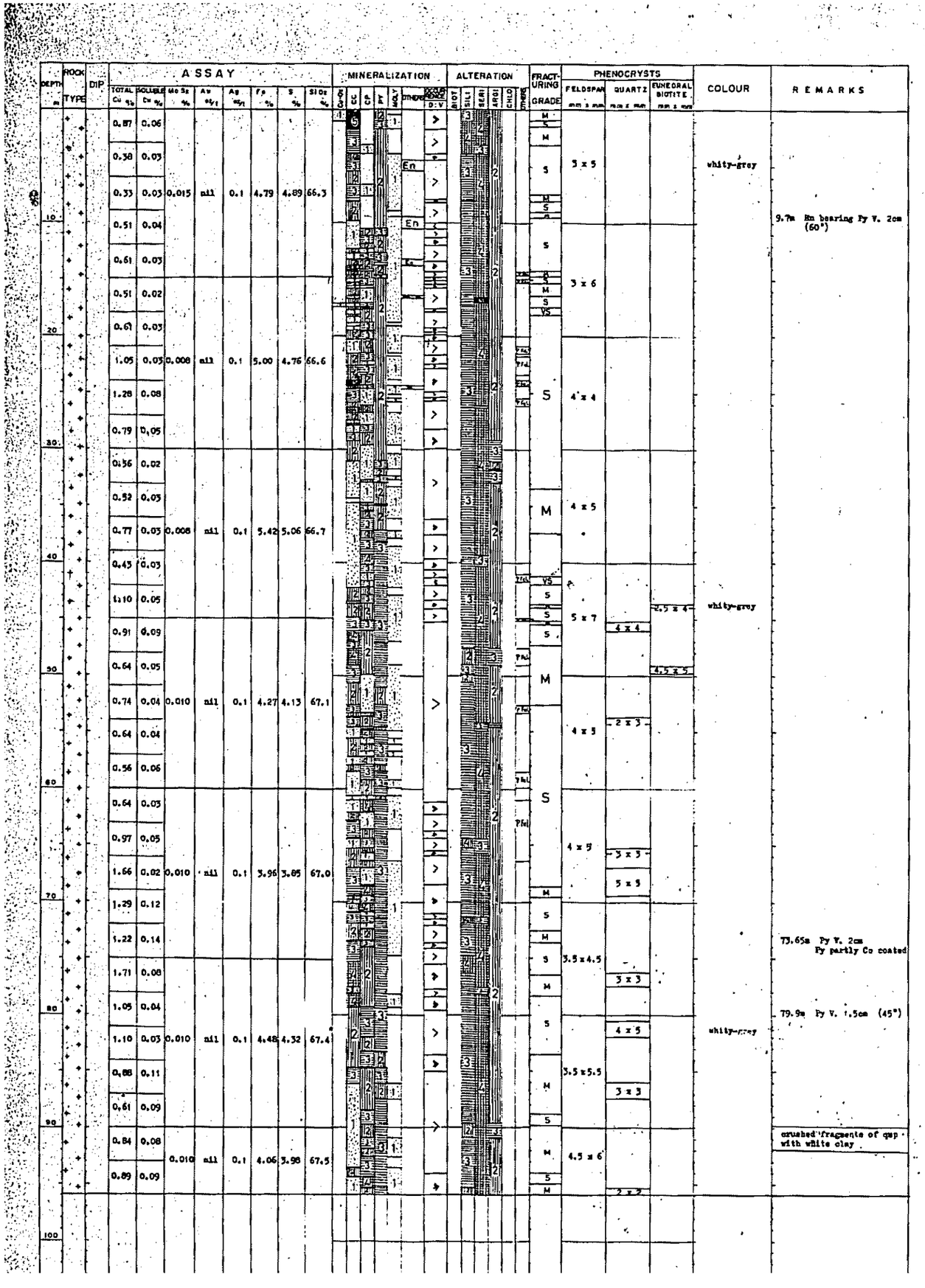


PLATE 3-1-4

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No 13

BOTTOM DEPTH 96.95m

COLLAR ELEVATION 3,494.58

NORTHING 9°221,600.62 EASTING 795,945.78

BEARING 5°15' INCLINATION 0°

LOGGED BY H. Hama

Sponcer by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE, CO., LTD.

Scale 1 : 200

INDEX

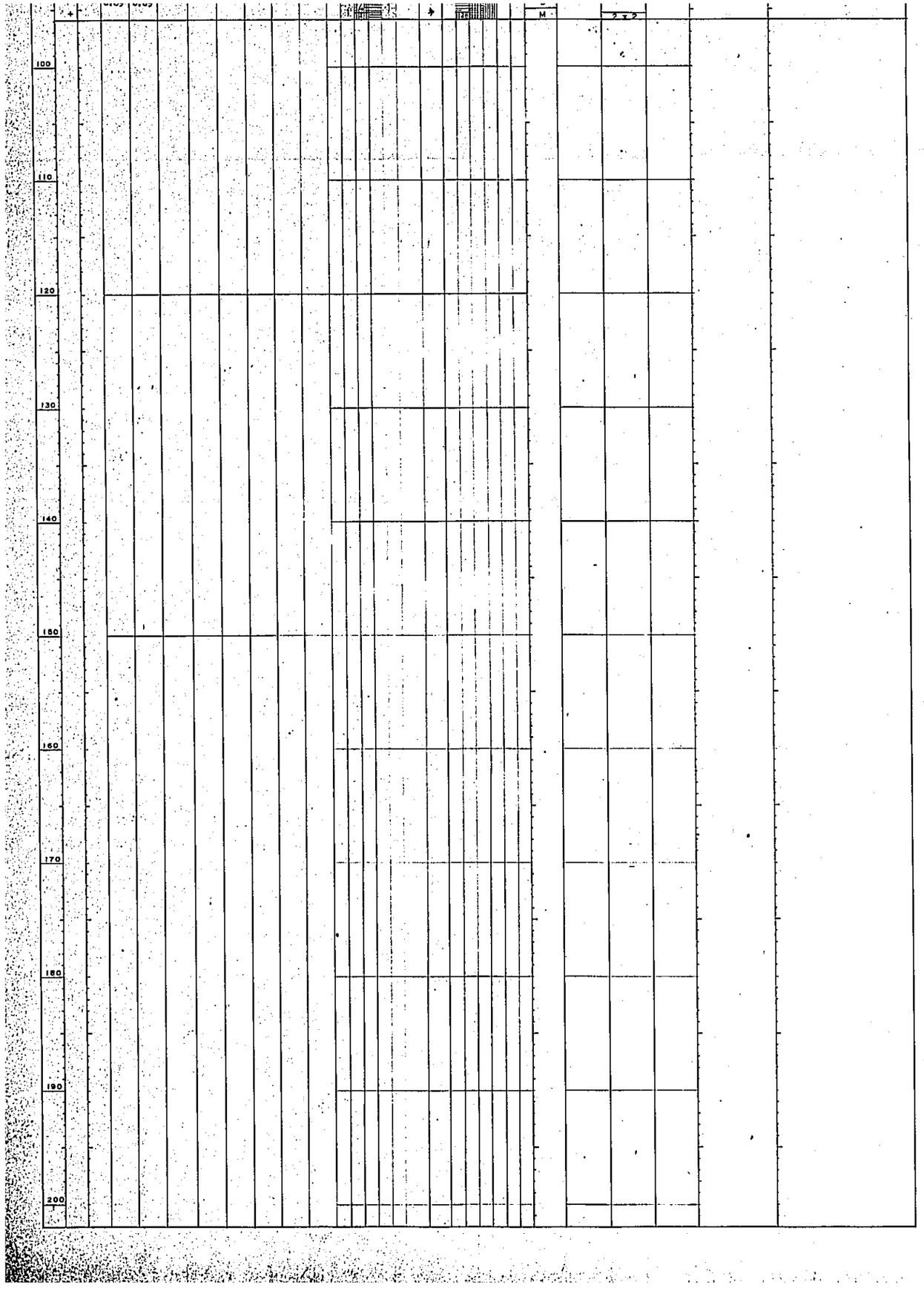
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb-Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

- Cu-Ox ----- Copper Oxides
- CC ----- Chalcocite
- CP ----- Chalcopyrite
- PY ----- Pyrite
- MOLY ----- Molybdenite
- OTHERS --- Other Ore Minerals
  - Cv ----- Covellite
  - Bn ----- Bornite

ALTERATION

- BIOT ----- Biotitization
- SILI ----- Silicification
- SERI ----- Sericitization
- ARGI ----- Argillization
- CHLO ----- Chloritization
- OTHERS ---- Other Alteration



PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En-------- Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V -------- Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W---------weak
M --------- moderate
S ---------strong
VS--------- very strong

COLOUR

blk-------black
blu -------blue
brn -------brown
drk-------dark
gry -------gray
grn -------green
lgt--------light
purp-------purple
red ------- red
wht ------- white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg---------coarse grained

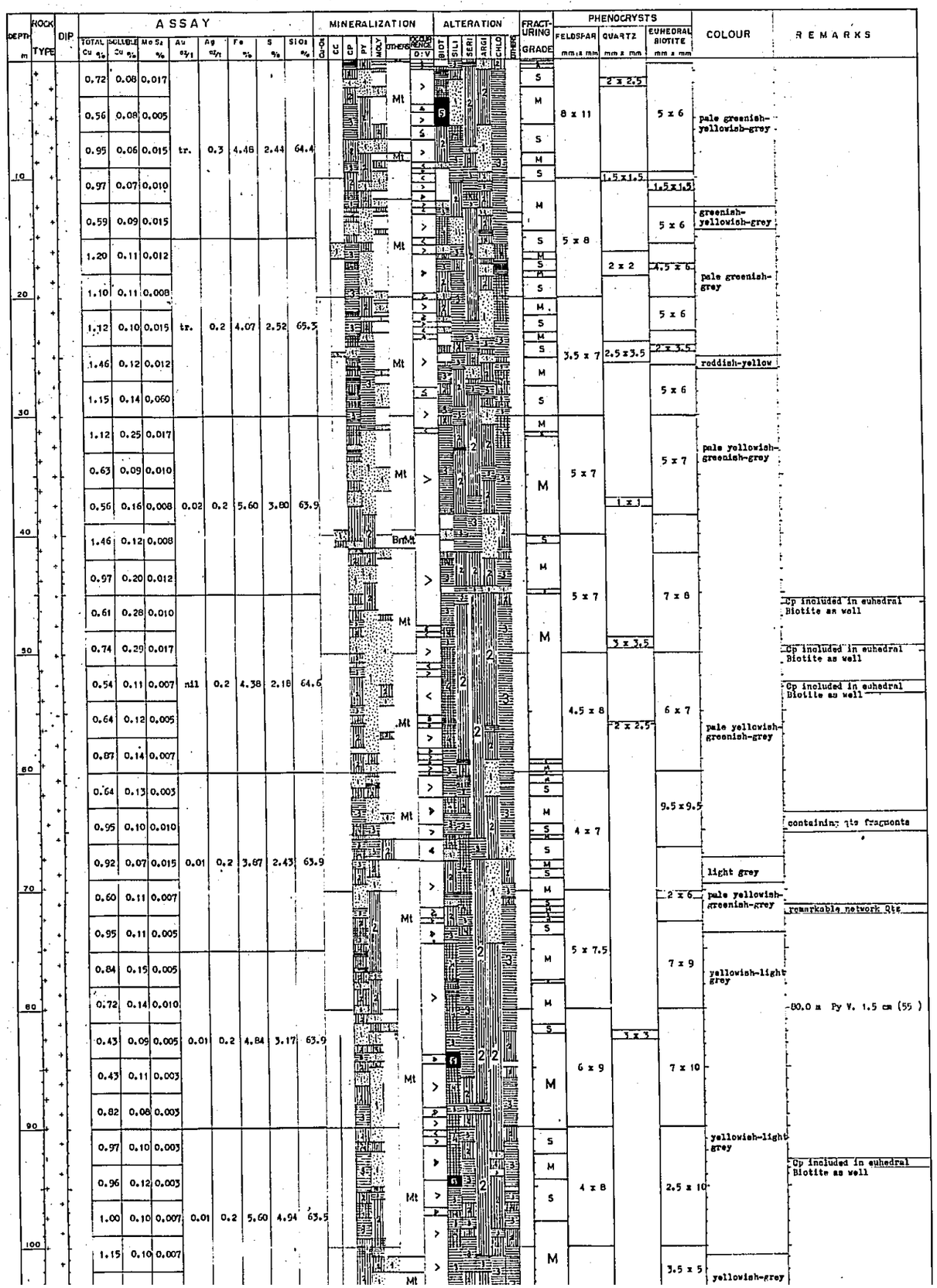


PLATE 2

SHEET 10

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 14

BOTTOM DEPTH 123.20m

COLLAR ELEVATION 3,496.46

NORTHING 9'221,949.56 EASTING 796,325.24

BEARING 245° 30' INCLINATION 0°

LOGGED BY H. Homa

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 . 200

INDEX

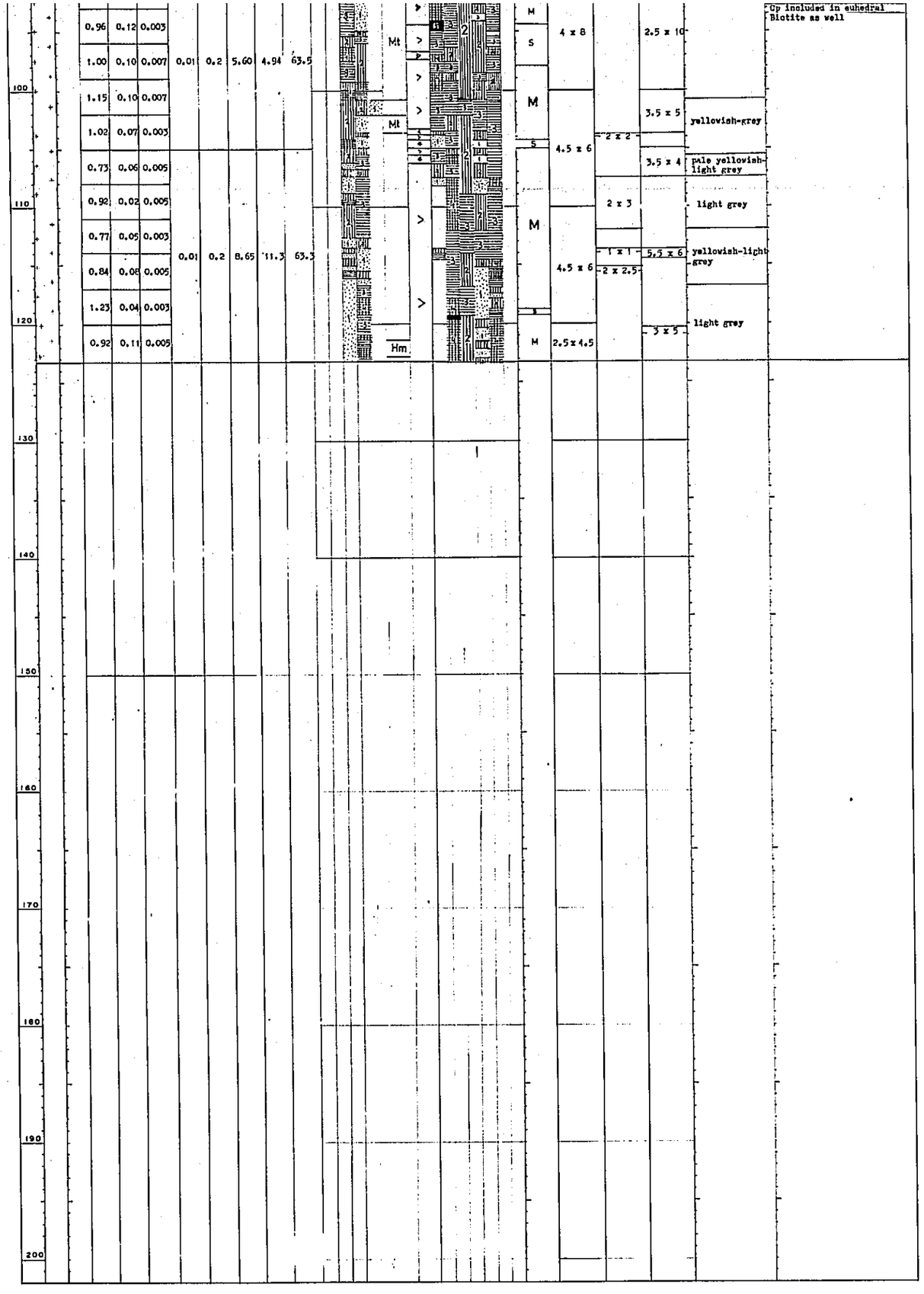
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ..... Copper Oxides
CC ..... Chalcocite
CP ..... Chalcopyrite
PY ..... Pyrite
MOLY ..... Molybdenite
OTHERS ... Other Ore Minerals
Cv ..... Covellite
Bn ..... Bornite
Hm ..... Hematite

ALTERATION

BIOT ..... Biotitization
SILI ..... Silicification
SERI ..... Sericitization
ARGI ..... Argillization
CHLO ..... Chloritization
OTHERS .... Other Alteration
Ep ..... Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covelline
Bn ----- Bornite
Hm ----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En ------- Enargite
OCCURENCE:--Modes of Occurence of Copper Ores
D : V --------Dissemination : Veln

SERI ------ Sericitization
ARGI ------ Argillization
CHLO -------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp -------purple
red -------- red
wht -------- white
yel -------- yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg --------coarse grained

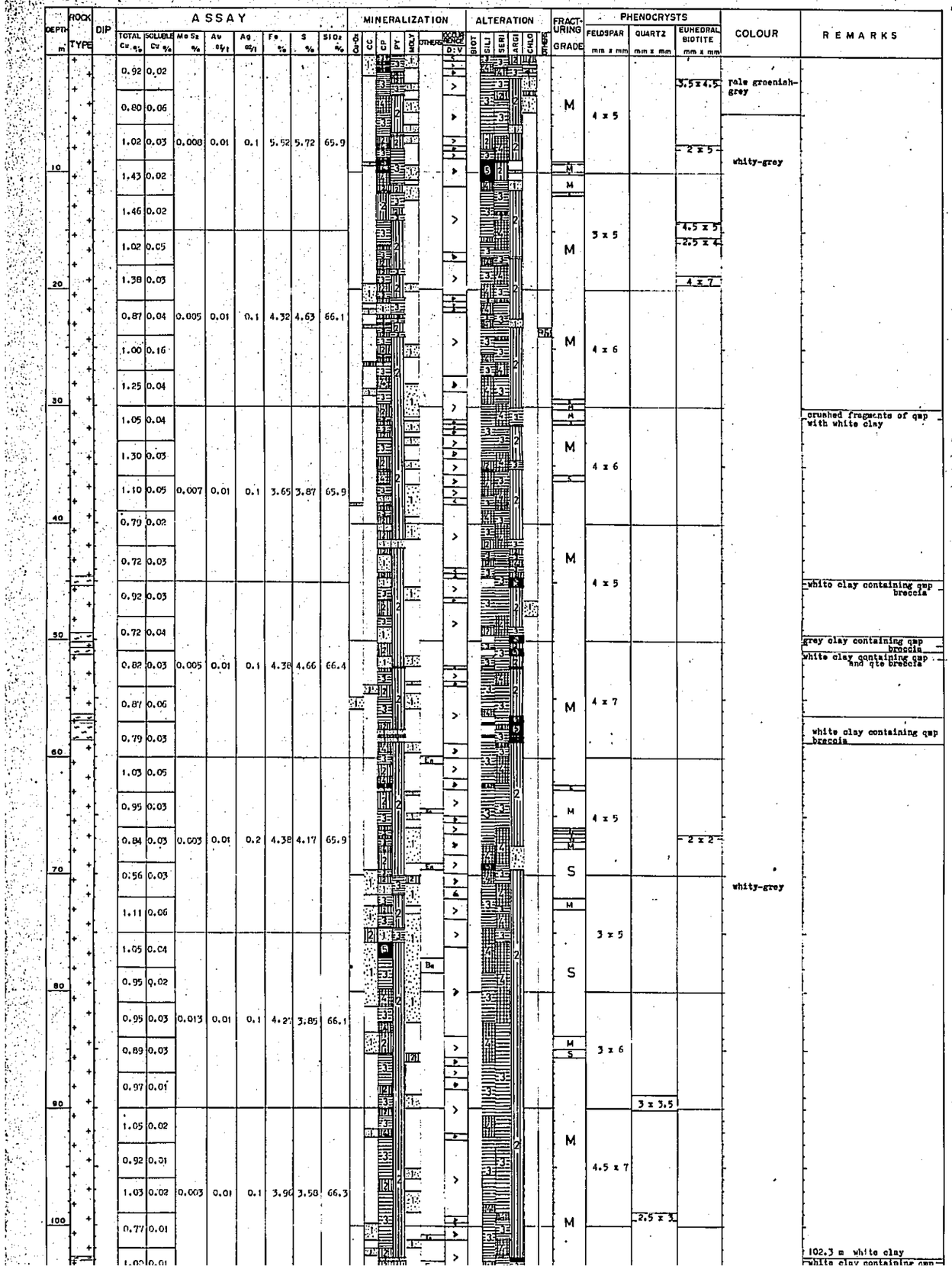


PLATE 3-1-5

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF . PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 15

BOTTOM DEPTH 121.95m

COLLAR ELEVATION 3,495.01

NORTHING 9'221,715.95 EASTING 796,092.40

BEARING 287°15' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE, CO., LTD.

Scale 1 : 200

INDEX

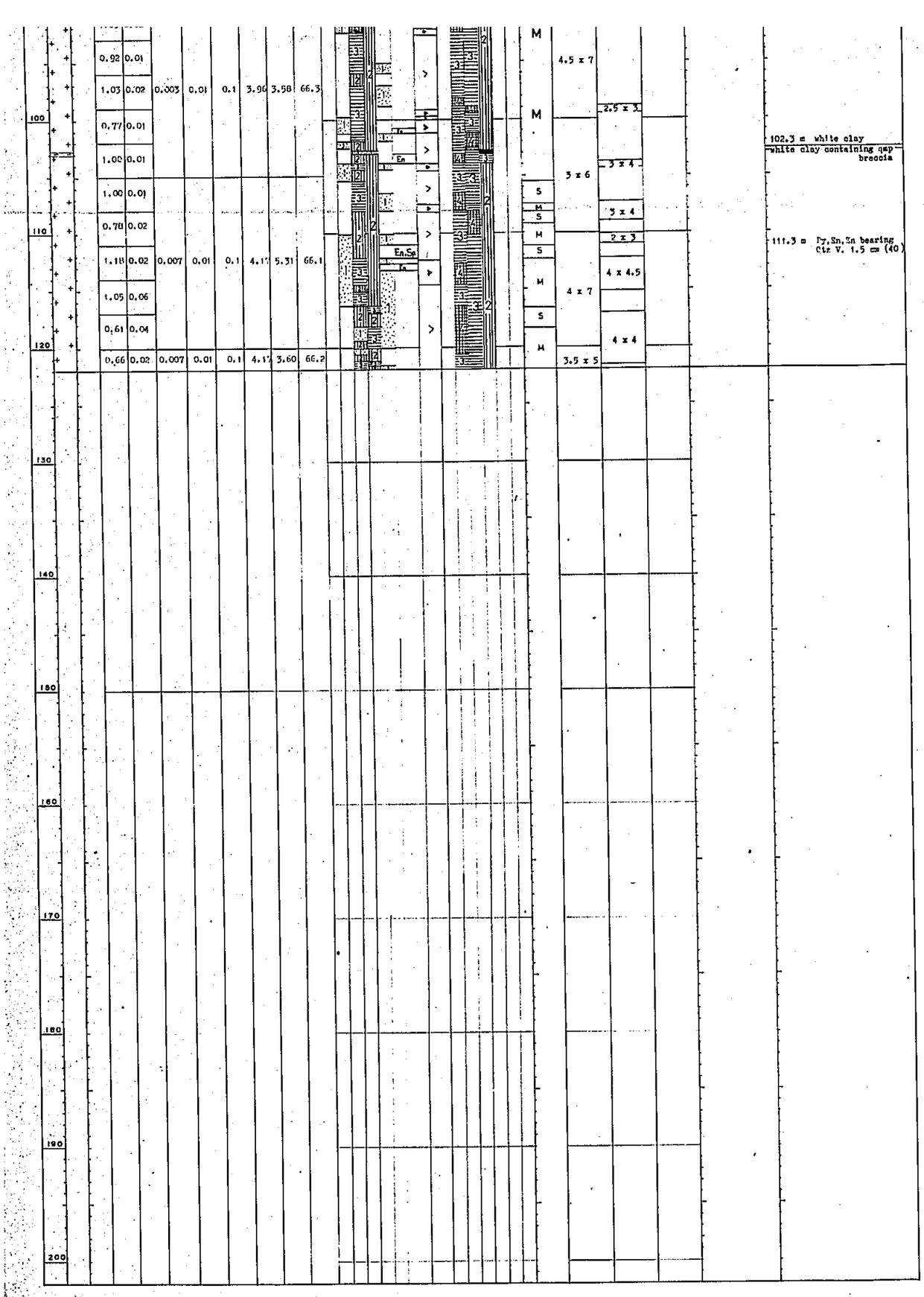
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
CC -------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm-----Hematite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLQ-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ----- Sphalerite
En------ Enargite
OCCURENCE---Modes of Occurence of Copper Ores
D : V --------Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO -------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENCITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W---------weak
M--------- moderate
S---------strong
VS--------very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp-------purple
red ------- red
whi -------white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg ---------coarse grained

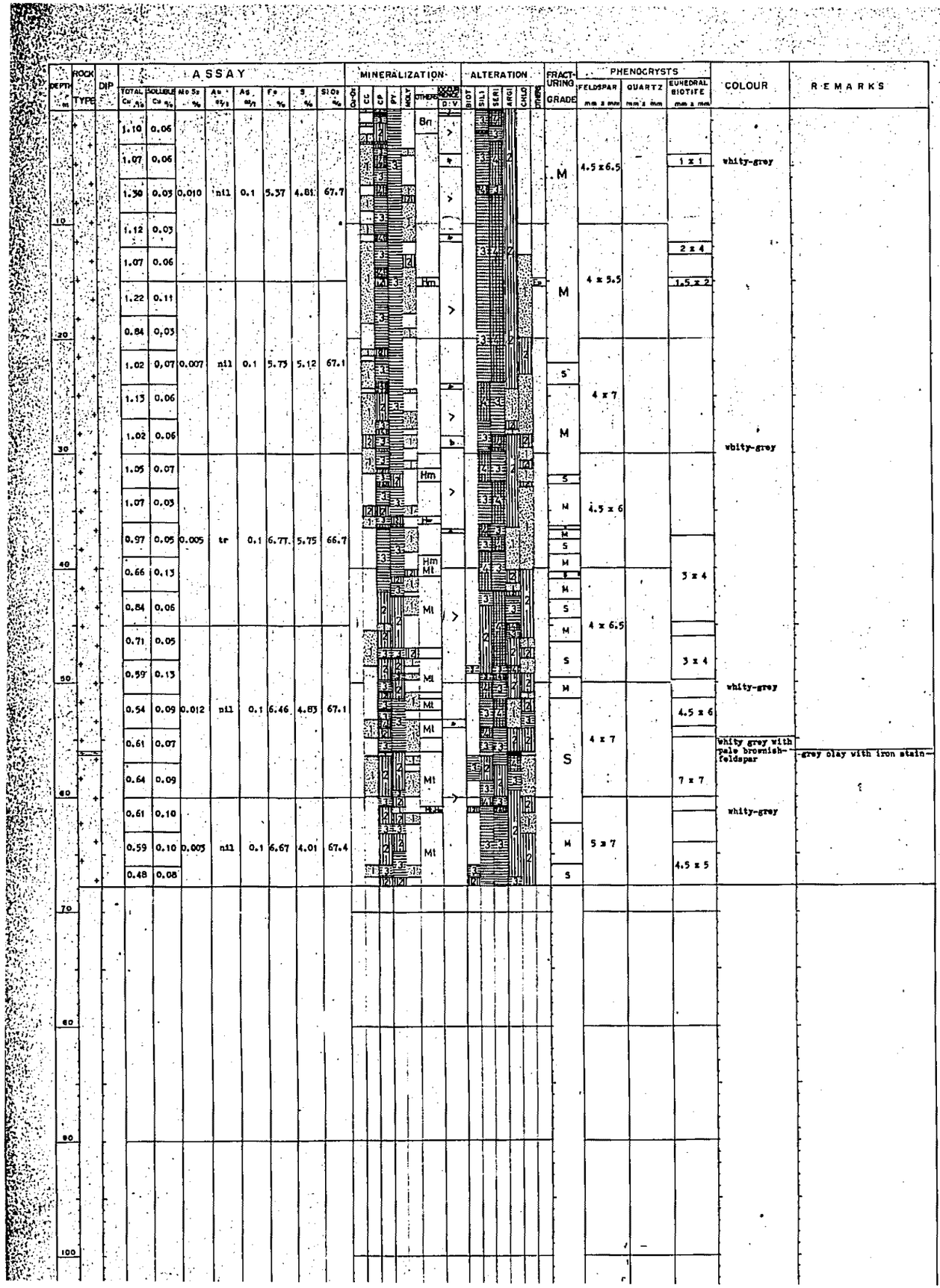


PLATE 3-1-6

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No 16

BOTTOM DEPTH 67,67m

COLLAR ELEVATION 3,494,77

NORTHING 9'221'716.96 EASTING 796,102.03

BEARING 52°15' INCLINATION 0°

LOGGED BY H. Homa

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

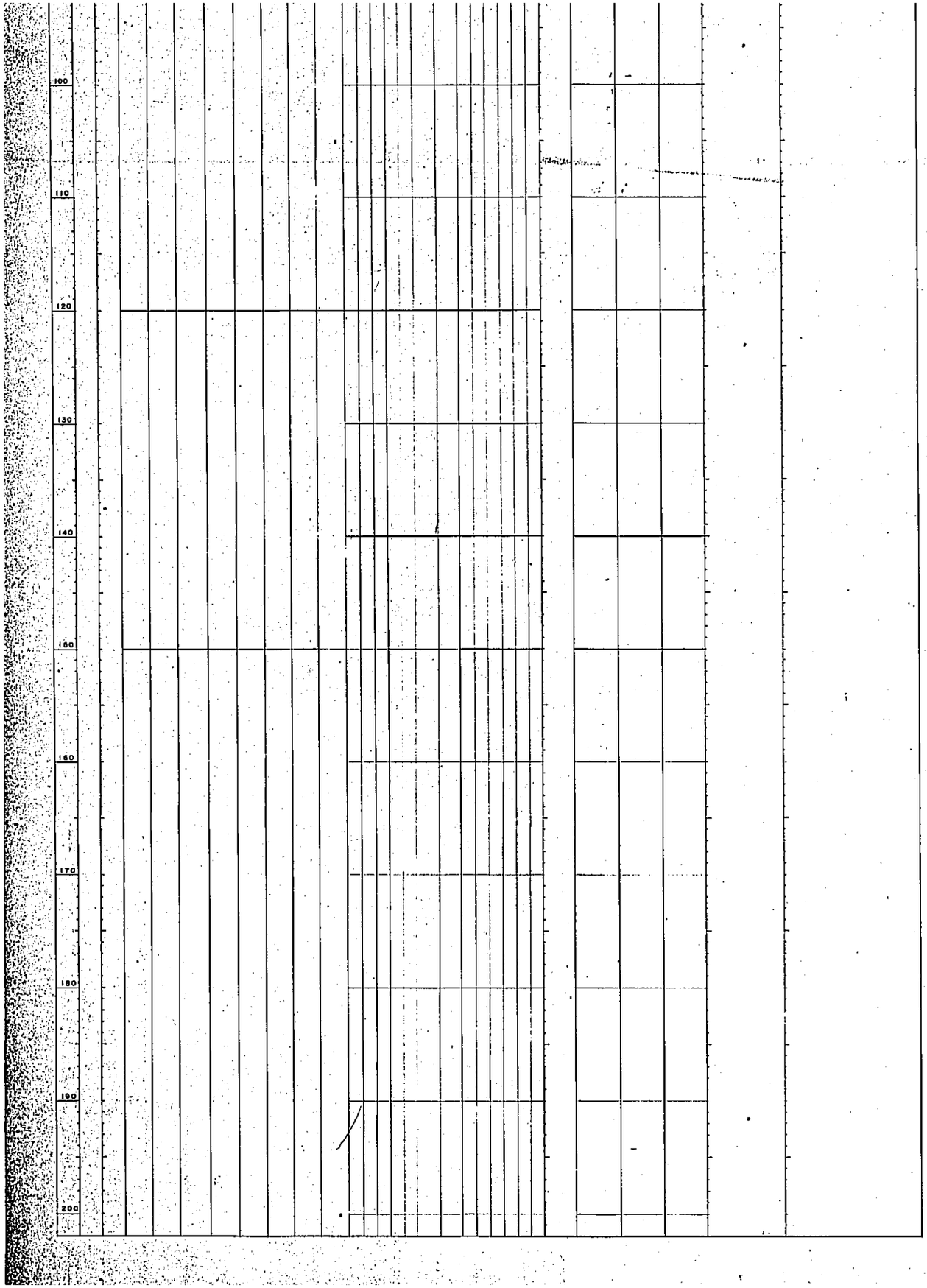
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS --- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite
Hm ----- Hematite

ALTERATION

BIOT ------- Biotitization
SILI ------- Silicification
SERI ------- Sericitization
ARGI ------ Argillization
CHLO ------- Chloritization
OTHERS ---- Other Alteration
Ep ------- Epidote



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
Hm----- Hematite
Mt ----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En------- Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V--------Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS---Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENCITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W---------weak
M--------- moderate
S---------strong
VS---------very strong

COLOUR

blk-------black
blu-------blue
brn-------brown
drk-------dark
gry-------gray
grn-------green
lgt--------light
purp-------purple
red ------- red
wht-------white
yel-------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg --------coarse grained

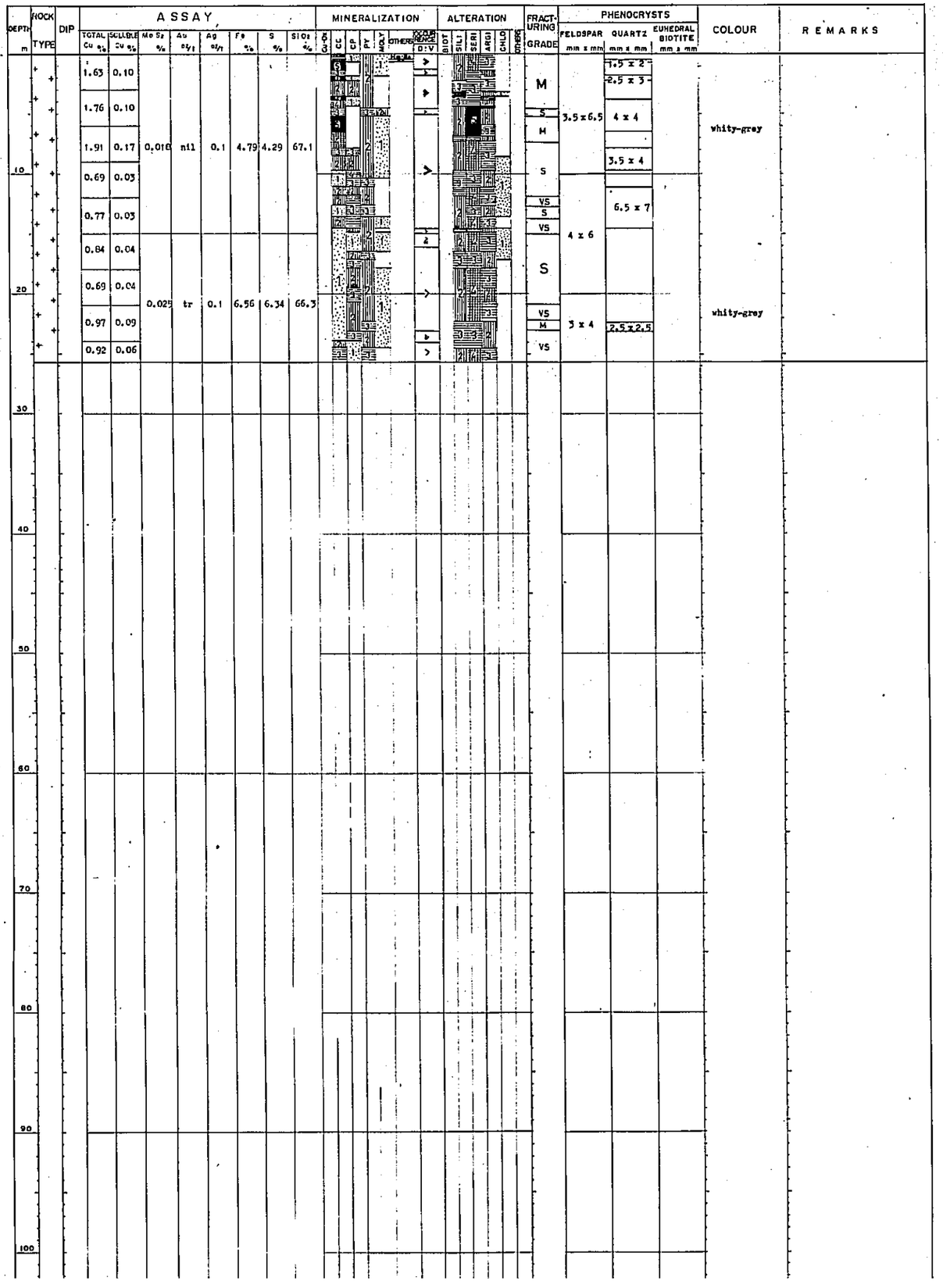


PLATE 3-1-7

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF UNDERGROUND DRILL HOLE

No. 17

BOTTOM DEPTH 25.70m

COLLAR ELEVATION 3,493.21

NORTHING 9'221,507.36 EASTING 795,847.73

BEARING 289°30' INCLINATION 0°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE, CO , LTO.

Scale 1 : 200

INDEX

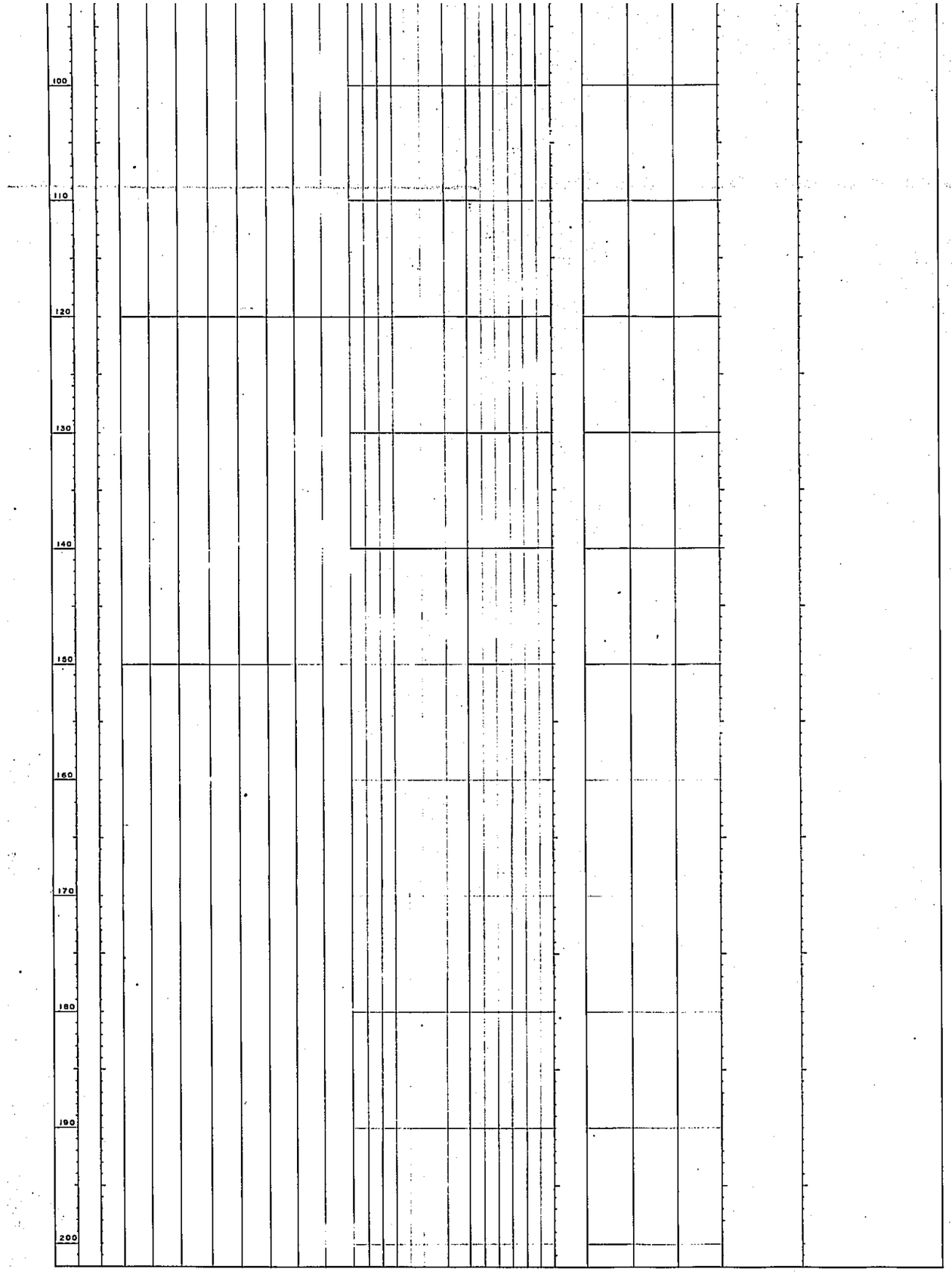
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
CC -------- Chalcocite
CP -------- Chalcopyrite
PY -------- Pyrite
MOLY ------ Molybdenite
OTHERS --- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ----- Covelline
Bn ----- Bornite
Hm----- Hematite
Mt----- Magnetite
Pb ----- Galena
Zn ---- Sphalerite
En ------ Enargite
OCCURENCE--Modes of Occurence of Copper Ores
D : V---------Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- 1 Very Weak
- 2 Weak
- 3 Moderate
- 4 Strong
- 5 Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp -------purple
red ------- red
wht ------- white
yel -------- yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg --------- coarse grained

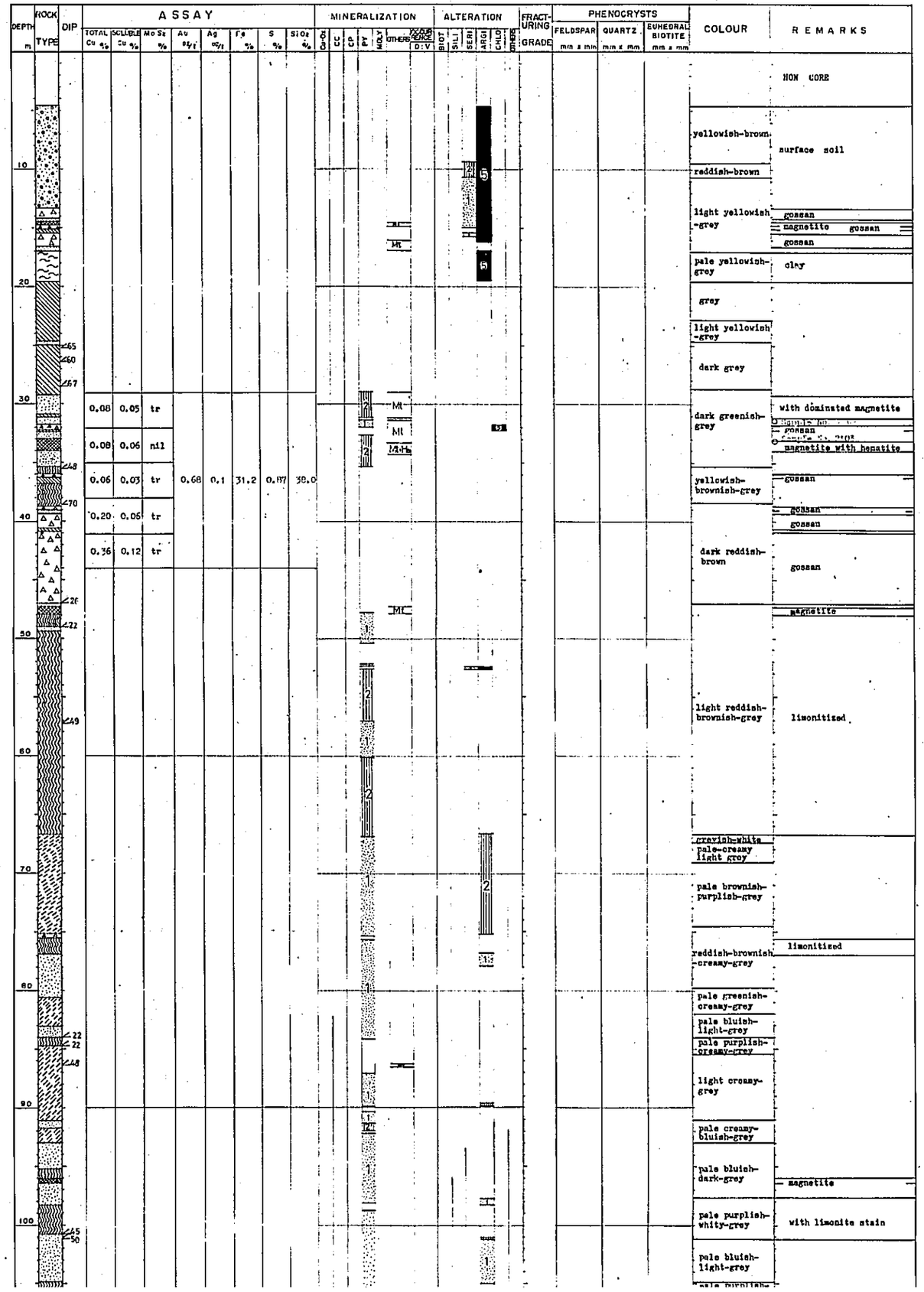


PLATE 5

SHEET 1

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF SURFACE DRILL HOLE

No. 1

BOTTOM DEPTH 200.00m

COLLAR ELEVATION 3,657.77

NORTHING 9'221,024.89 EASTING 797,142.15

BEARING 0° INCLINATION -90°

DATE LOGGED from Nov. 23 to Dec. 1, 73

LOGGED BY H. Hamo

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO, LTD.

Scale 1 : 200

INDEX

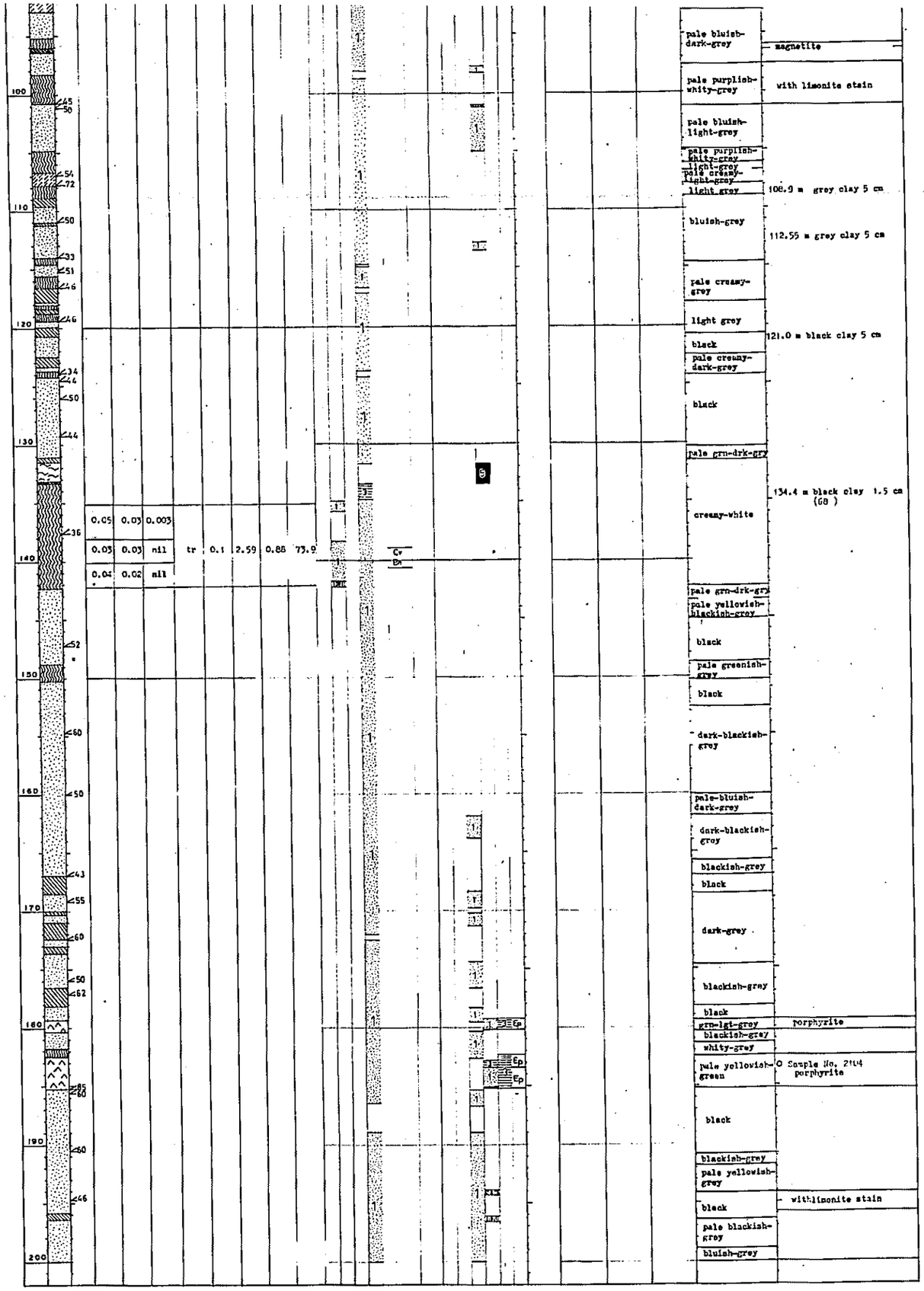
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt, Py or Pb-Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ------- Chalcocite
CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS --- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite
Mt ----- Magnetite

ALTERATION

BIOT-------Biotitization
SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep ------- Epidote
P-Fel------ Pink Feldspar



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv ------ Covellite
Bn ------ Bornite
Hm------ Hematite
Mt------ Magnetite
Pb ------ Galena
Zn ------ Sphalerite
En-------Enargite
OCCURENCE--- Modes of Occurence of Copper Ores
D : V -------- Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------- Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W-----weak
M----- moderate
S -----strong
VS---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt -------light
purp-------purple
red ------- red
wht -------white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg --------- coarse grained

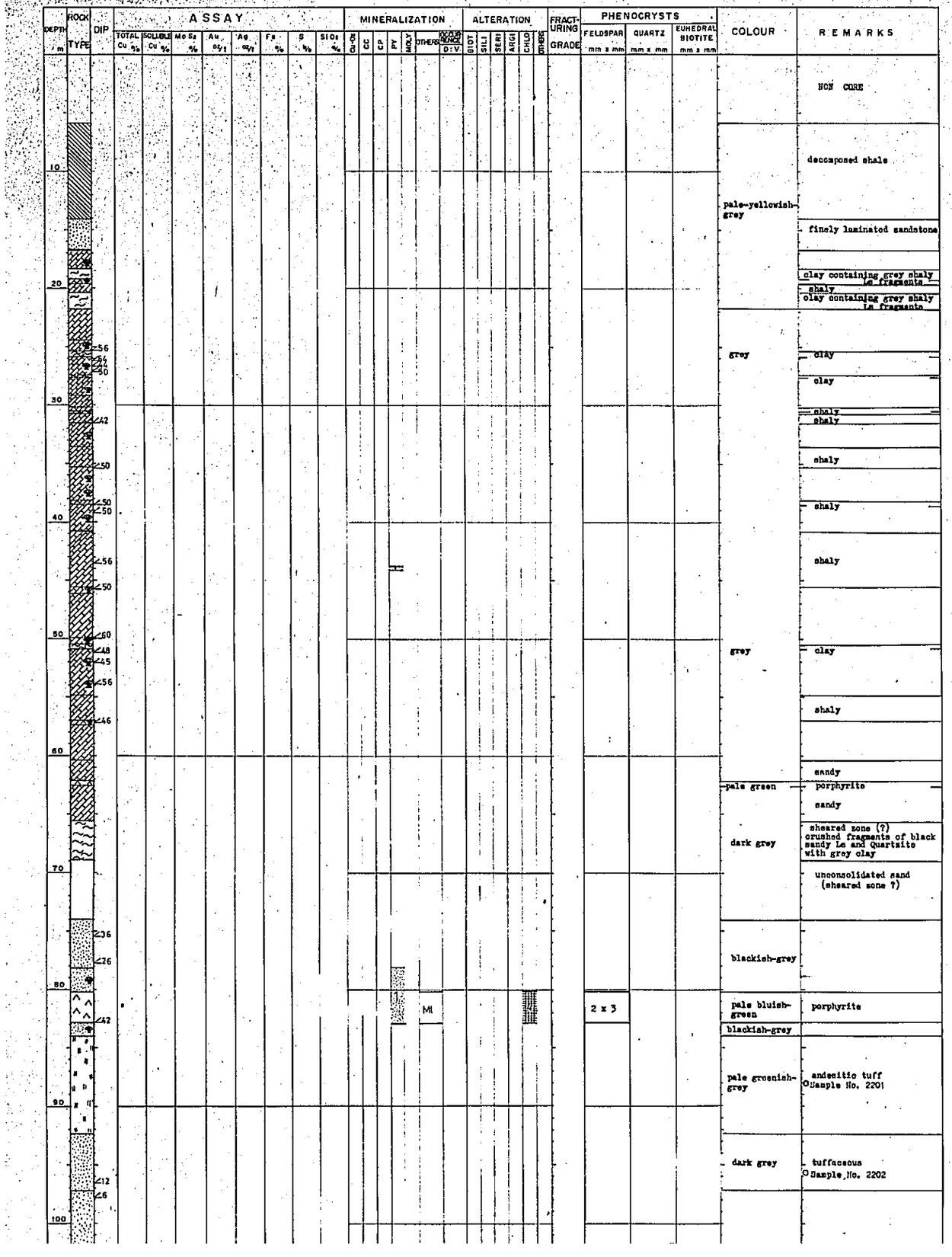


PLATE 5
SHEET 2

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA, REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF SURFACE DRILL HOLE

No. 2

BOTTOM DEPTH 150.55m

COLLAR ELEVATION 3,592.64

NORTHING 9'220,322.08 EASTING 798,208.05

BEARING 0° INCLINATION -90°

DATE LOGGED from Dec. 16 to Dec. 22, 73

LOGGED BY H. Homa

Sponcerd by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO, LTD.

Scale 1 : 200

INDEX

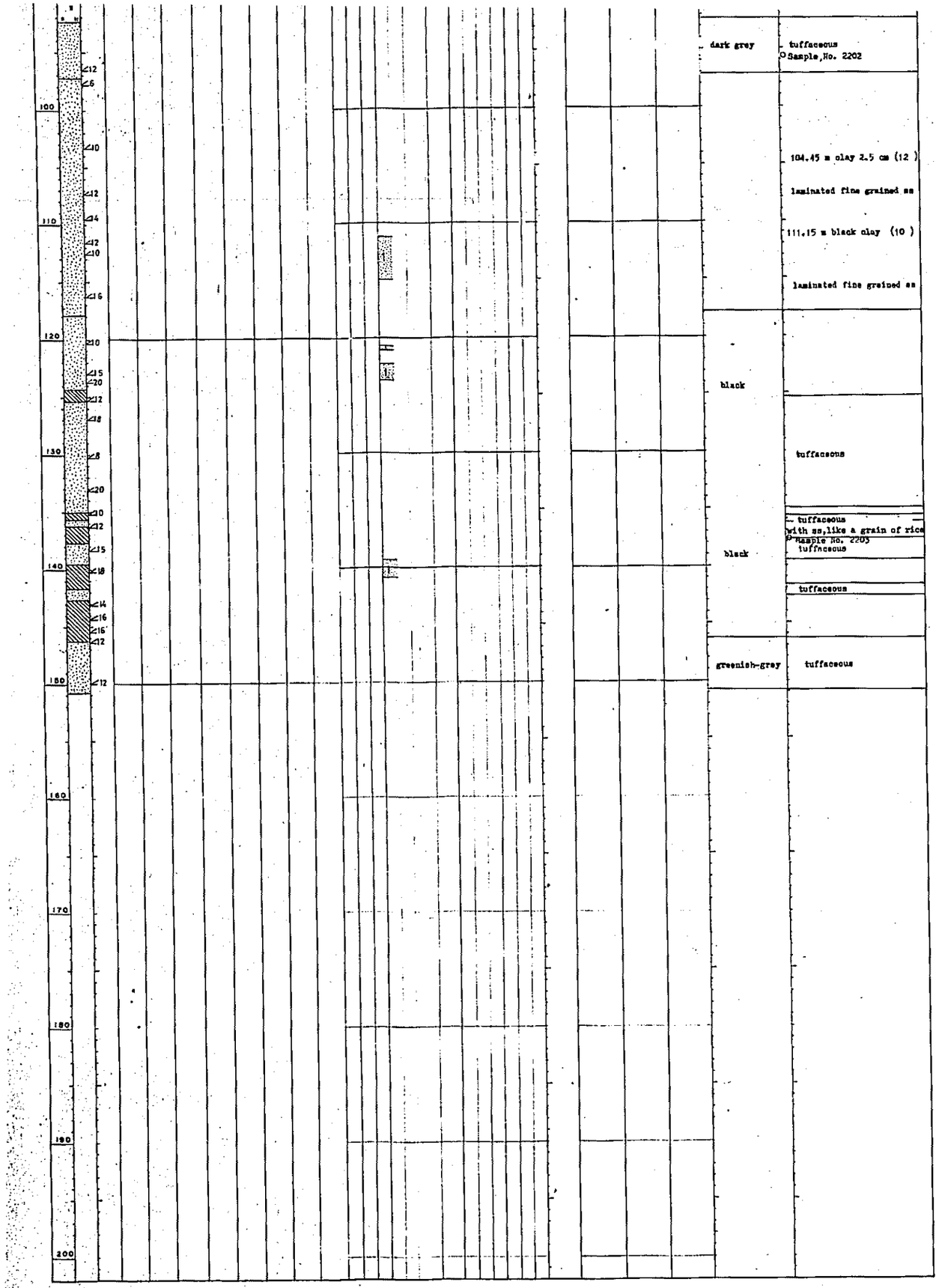
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt, Py or Pb-Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ..... Copper Oxides
CC ..... Chalcocite
CP ..... Chalcopyrite
PY ..... Pyrite
MOLY ..... Molybdenite
OTHERS --- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite

ALTERATION

BIOT ..... Biotitization
SILI ..... Silicification
SERI ..... Sericitization
ARGI ..... Argillization
CHLO ..... Chloritization
OTHERS ---- Other Alteration



CP ------- Chalcopyrite
PY ------- Pyrite
MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covelline
Bn -----Bornite
Hm-----Hematite
Mt -----Magnetite
Pb -----Galena
Zn ----- Sphalerite
En ------ Enargite
OCCURENCE---Modes of Occurence of Copper Ores
D : V ------- Dissemination : Vein

SILI ------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

Not Observed
Very Weak
Weak
Moderate
Strong
Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M---- moderate
S-----strong
VS---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt --------light
purp-------purple
red -------red
wht -------white
yel -------yellow

GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg ---------coarse grained

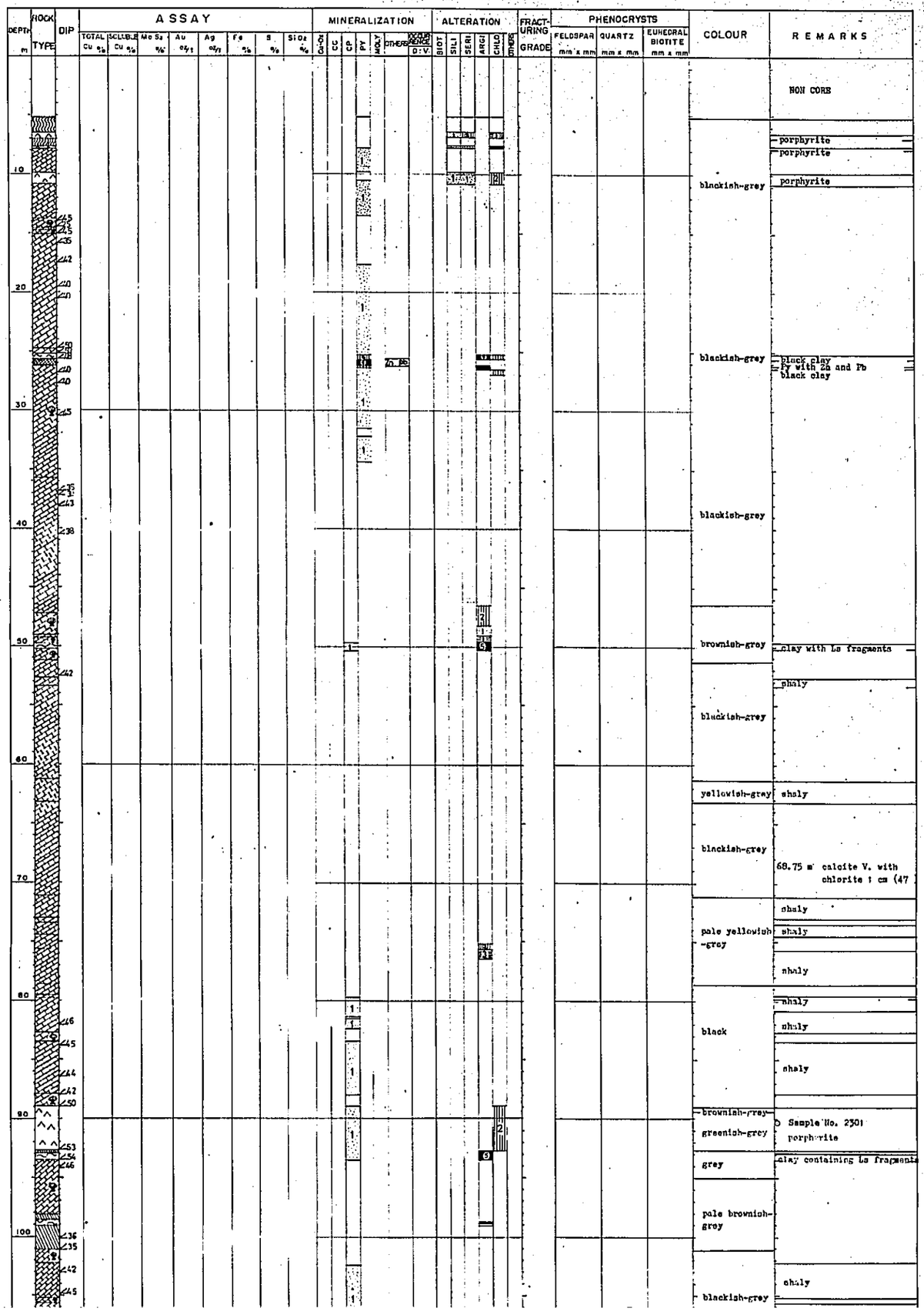


PLATE 3-1-8

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF SURFACE DRILL HOLE

No. 3

BOTTOM DEPTH 201.50m

COLLAR ELEVATION 3,493.91

NORTHING 9'222,029.25 EASTING 794,622.36

BEARING 0° INCLINATION -90°

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

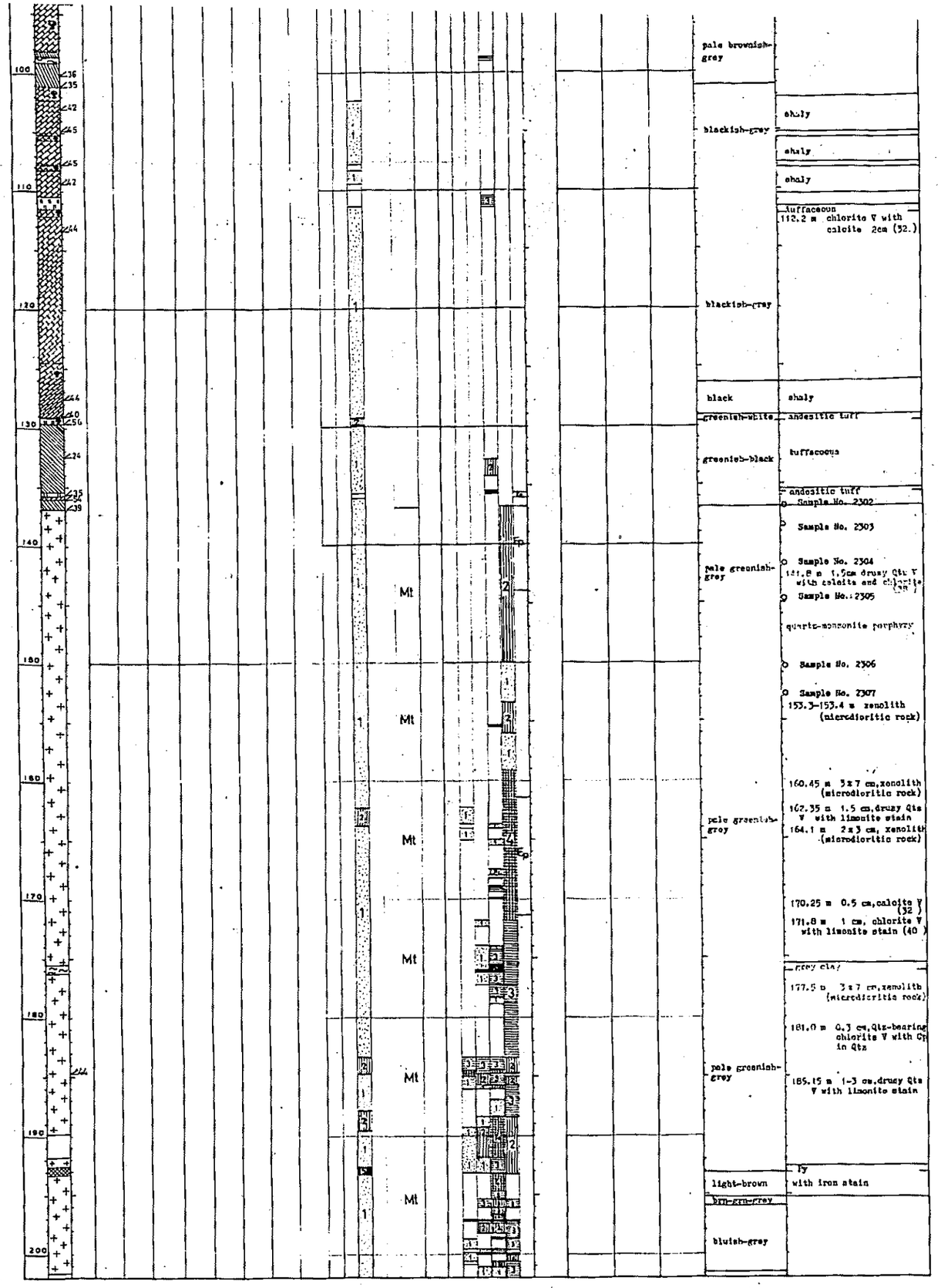
ROCK TYPE	ABBREVIATION
Soil	soil
Porphyrite	por
Quartz Monzonite Porphyry	qmp
Shale	sh
Siltstone	slt
Sandstone	ss
Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb-Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu-Ox ----- Copper Oxides
CC ----- Chalcocite
CP ----- Chalcopyrite
PY ----- Pyrite
MOLY ----- Molybdenite
OTHERS --- Other Ore Minerals
Cv ----- Covellite
Bn ----- Bornite
Hm ----- Hematite
Mt ----- Magnetite
Pb ----- Galena

ALTERATION

BIOT ----- Biotitization
SILI ----- Silicification
SERI ----- Sericitization
ARGI ----- Argillization
CHLO ----- Chloritization
OTHERS --- Other Alteration
Ep ----- Epidote
P-Fel ----- Pink Feldspar



MOLY ------ Molybdenite
OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn -----Bornite
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Mt ----- Magnetite
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OCCURENCE--Modes of Occurance of Copper Ores
D : V -------Dissemination : Vein

ARGI ------ Argillization
CHLO-------Chloritization
OTHERS----Other Alteration
Ep ------ Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
- Very Weak
- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

W ----weak
M ---- moderate
S -----strong
VS ---- very strong

COLOUR

blk -------black
blu -------blue
brn -------brown
drk -------dark
gry -------gray
grn -------green
lgt -------light
purp-------purple
red -------red
wht -------white
yel -------yellow

GRANULARITY

fng -------- fine grained
mdg -------- medium grained
csg ---------coarse grained

PLATE 3-1-9

GEOLOGICAL SURVEY OF
MICHIQUILLAY AREA , REPUBLIC OF PERU

GEOLOGICAL AND ASSAY LOG OF SURFACE DRILL HOLE

No. 8

BOTTOM DEPTH 154.23m

COLLAR ELEVATION 3,527.16

NORTHING 9'221,845.46 EASTING 795,827.91

BEARING 0° INCLINATION - 90°

LOGGED BY H. Hama

Sponcered by
METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

Prepared by MITSUI KINZOKU ENGINEERING SERVICE. CO , LTD.

Scale 1 : 200

INDEX

ROCK TYPE	ABBREVIATION
Soil	soil
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Quartz Monzonite Porphyry	qmp
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Siltstone	slt
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Limestone	ls
Tuff	tuff
Quartzite	qte
Massive Ore (Mt , Py or Pb - Zn)	
Gossan	gos
Sheared zone	
Fossils	foss

MINERALIZATION

Cu - Ox ----- Copper Oxides
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SILI-------- Silicification
SERI ------ Sericitization
ARGI ------ Argillization
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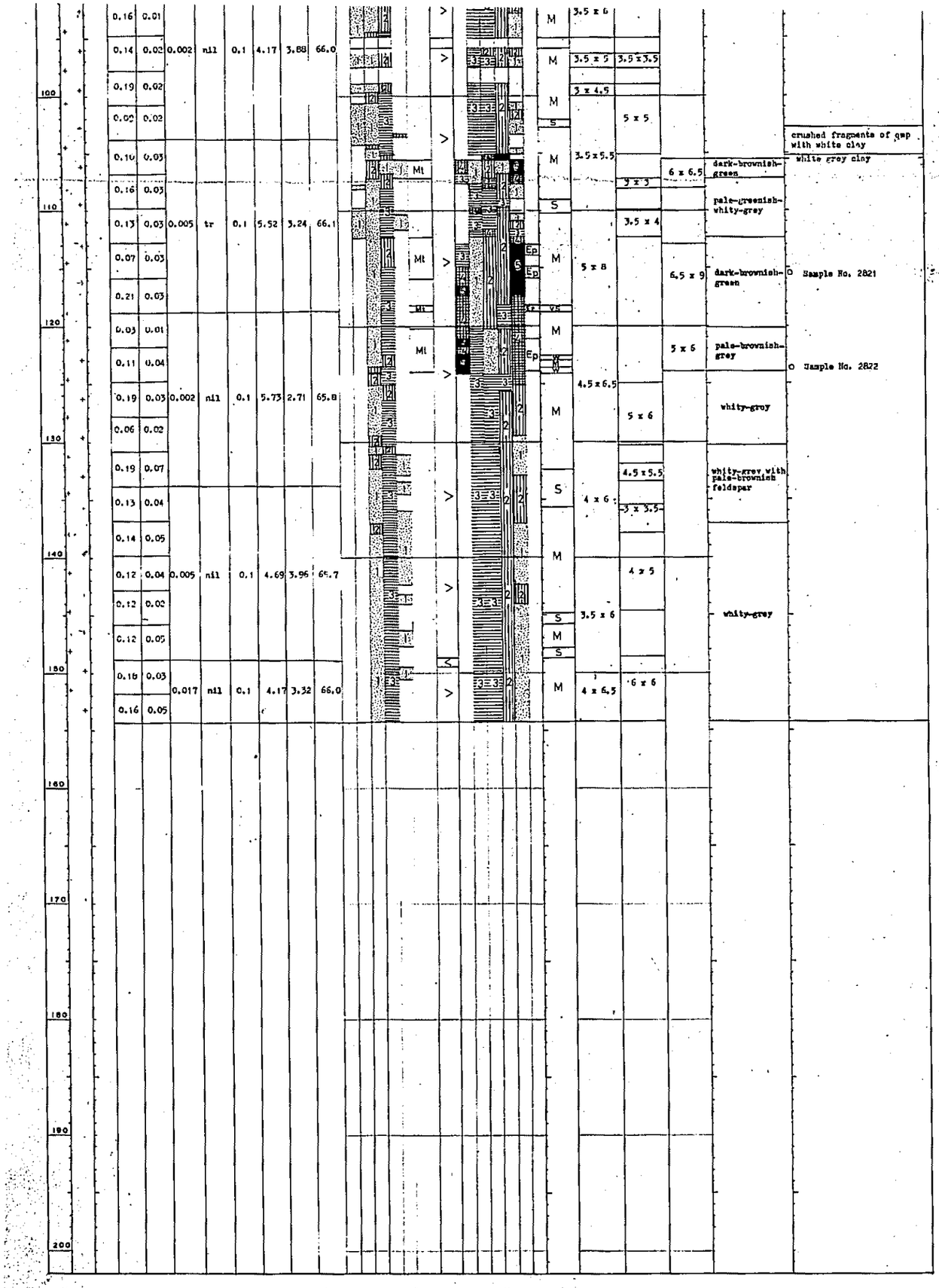
Ep -------- Epidote



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OTHERS--- Other Ore Minerals
Cv -----Covellite
Bn ----- Bornite
Hm----- Hematite
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OCCURENCE--Modes of Occurence of Copper Ores
D : V-------Dissemination : Vein

SERI ------ Sericitization
ARGI ------ Argillization
CHLO -------Chloritization
OTHERS----Other Alteration
Ep -------- Epidote
P-Fel------ Pink Feldspar

INTENSITY

- Not Observed
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- Weak
- Moderate
- Strong
- Very Strong

* Intensity based on the comparison with "STANDARD SAMPLES"

FRACTURING GRADE

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GRANULARITY

fng ------- fine grained
mdg -------- medium grained
csg ---------coarse grained