PRE-FEASIBILITY STUDY REPORT
ON
THE OMBILIN COAL MINE REHABILITATION PROJECT
IN
THE REPUBLIC OF INDONESIA
(ADDITIONAL EXPLORATION)

JUNE 1980

Japan International Cooperation Agency

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PREFACE

In response to the request of the Government of the Republic of Indonesia, the Japanese Government decided to conduct a preliminary feasibility study on the Ombilin Coal Mine Development Project and entrusted the Japan International Cooperation Agency (J.I.C.A.) with the study. The J.I.C.A. sent to Indonesia a survey team headed by Mr. Kimihiko Ito from November 27, 1979 to March 31, 1980.

The team exchanged views with the officials concerned of the Government of the Republic of Indonesia and conducted a field survey in Sugar area, Ombilin Coal Mine. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

June, 1980

Keisuke Arita

Keisuke Arita
President
Japan International Cooperation Agency

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SUMMARY

The additional exploration work following the previous one completed in June, 1979 was performed during the period from November 27, 1979 to March 31, 1980. The work consisted of drilling of two holes in Sugar area, S-3 and S-4, with the total length reaching 872.1 m and the execution of geological mapping covering the whole area of Sugar of approx. 14 km^2.

The following results were obtained from the current additional exploration work.

1) Lower Tertiary formations were thinner and shallower than had been expected at both drill holes.

2) It is prominent especially at S-4, where the structural depth is around 180 m shallower than expected and Sawahlunto formation has the thickness of only 22 m.

3) A and C seams with minable thickness and proper quality occure at S-3. On the other hand, there is no occurrence of coal seam at S-4.

4) Thinning of Sawahlunto formation and the detrioration of coal seam were also found at S-5 drilled by the Indonesian side during the current exploration, where the thickness of Sawahlunto formation is 20 m and only thin coal seam occurs.

5) The above mentioned phenomena is considered to have been caused by the burried hill existed during the Tertiary sedimentation.

6) Coal at S-3 has almost the same quality as that of previously drilled holes.

7) Following are the main results obtained from the geological mapping.

a. Tertiary rocks contact with pre-Tertiary rocks through fault (temporarily named "Sugar fault").

b. It seems that Ombilin formation contacts unconformably with underlying Upper Sawah Tambang formation.

c. The large thrown fault was not confirmed in the exploration except that inferred between S-3 and S-5.

8) This report does not amend the coal reserves estimation in the southern extension as estimated in the previous exploration, for the reserves estimation for Sugar area as a whole should be made upon the completion of further exploration works planned in the near future.

CHAPTER 1. INTRODUCTION

The first exploration work was completed in June, 1979, which consisted mainly of drilling of eight holes based on "Minutes" concerning of the execution of "the survey for the rehabilitation of Ombilin coal mine" concluded on July 27, 1977, and the survey report was submitted in November, 1979. After the completion of the work, the Indonesian government requested the Japanese government to execute the additional exploration work for the support of feasibility study, terms of which are concluded in "Scope of works for the feasibility study of the Sawahlunto coal exploration."

The additional exploration work consisted of drilling of two holes with the total length of 872.1 meters and geological mapping covering the whole area of Sugar of approx. 14 km^2. The work was commenced on November 27, 1979 and completed on March 31, 1980. The location of drilling holes and the area for geological mapping are shown in Fig. 1.

In order to perform the work, two geologists (one for the whole period and the other for one month) and one drilling engineer were sent from Japan. On the Indonesian side, a project director, one geologist and six drillers, etc. took part in the survey in collaboration with the Japanese team.

The drilling work was performed mainly by the Indonesian crews with the technical assistance of the Japanese drilling engineer and it must be appreciated that they had done it successfully without serious trouble.

The summary of the survey process is shown in Fig. 2.

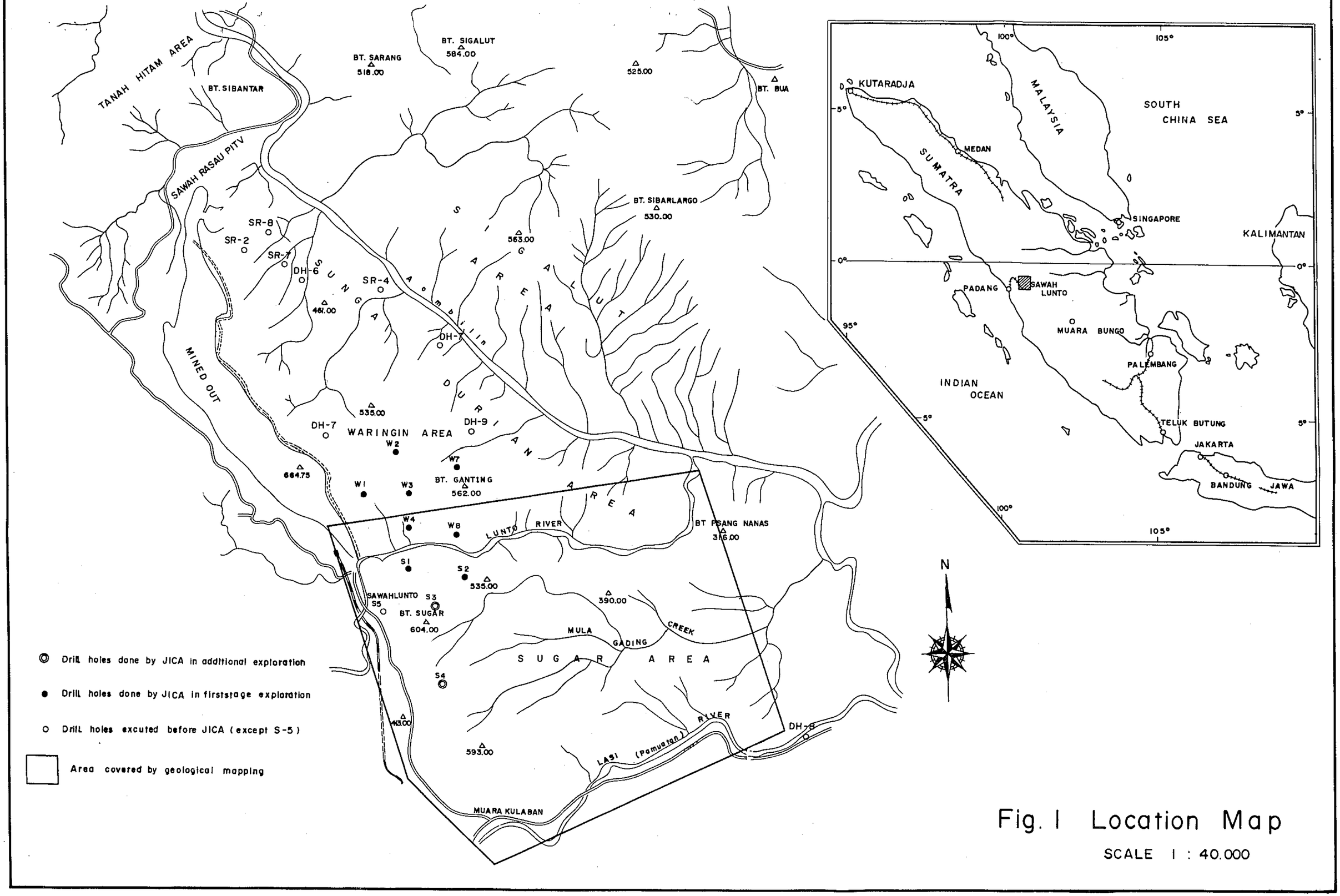


Fig. 1 Location Map

SCALE 1 : 40.000

Fig. 2 General view of exploration work

	79/11 — 12 — 80/1 — 2 — 3	Remarks
Exploration	12/6 S-3 472.8 m 2/8; 2/8 S-4 399.3 m 3/26; 2/5 2/25 Geological mapping	Total drilling holes: 2 Total drilling length: 872.5 m
JICA team member Geologist	11/27 K. ITO 3/31	Position:
Drilling Engineer	N. YOSHIDA	
Geologist	2/1 R. SAITO 2/29	
Indonesian counterpart Project-Director	12/6 HARDJONO 3/31	Directorate of Mineral Resources, Indonesia
Geologist	12/6 KADAR SOEDJONO	- do -
Driller	12/6 SUBANDI USMANDAHRO 2/14; SUHARDJA; RUWITO; WARNO; HARYADI; E. SURACHMAN	- do -
Labourer	6 men/day	

CHAPTER 2. EXPLORATION WORK

2.1 Outline of Drilling Work

The field work started on December 6, 1979. The transportation work for S-3 took longer time than had been expected because of bad road condition caused by frequent rainfalls. After the spudding of S-3 on December 29, the drilling operation proceeded smoothly and was completed at the depth of 472.8 m on February 3, 1980. The spudding of S-4 was on February 25. The operation had some trouble due to the lost circulation occured at several horizons of sandstone in lower Sawah Tambang formation and the shortage of water supply. The drilling reached to the depth of 399.3 m on March 27 and was completed. The outline of working process and main item for drilling record are shown in Fig. 3 and Table 1.

The drilling work was conducted using the same machines as was used in the previous operation (drilling machine KOKEN EP-1W and mud pump MG-15) by the same method as before (wireline coring method).

The casing program was composed of 3 stages including 6" guide pipe. 127 m/m casing pipes were set in the lower part of upper Sawah Tambang formation and 97 m/m ones in the middle part of lower Sawah Tambang formation. The interval between

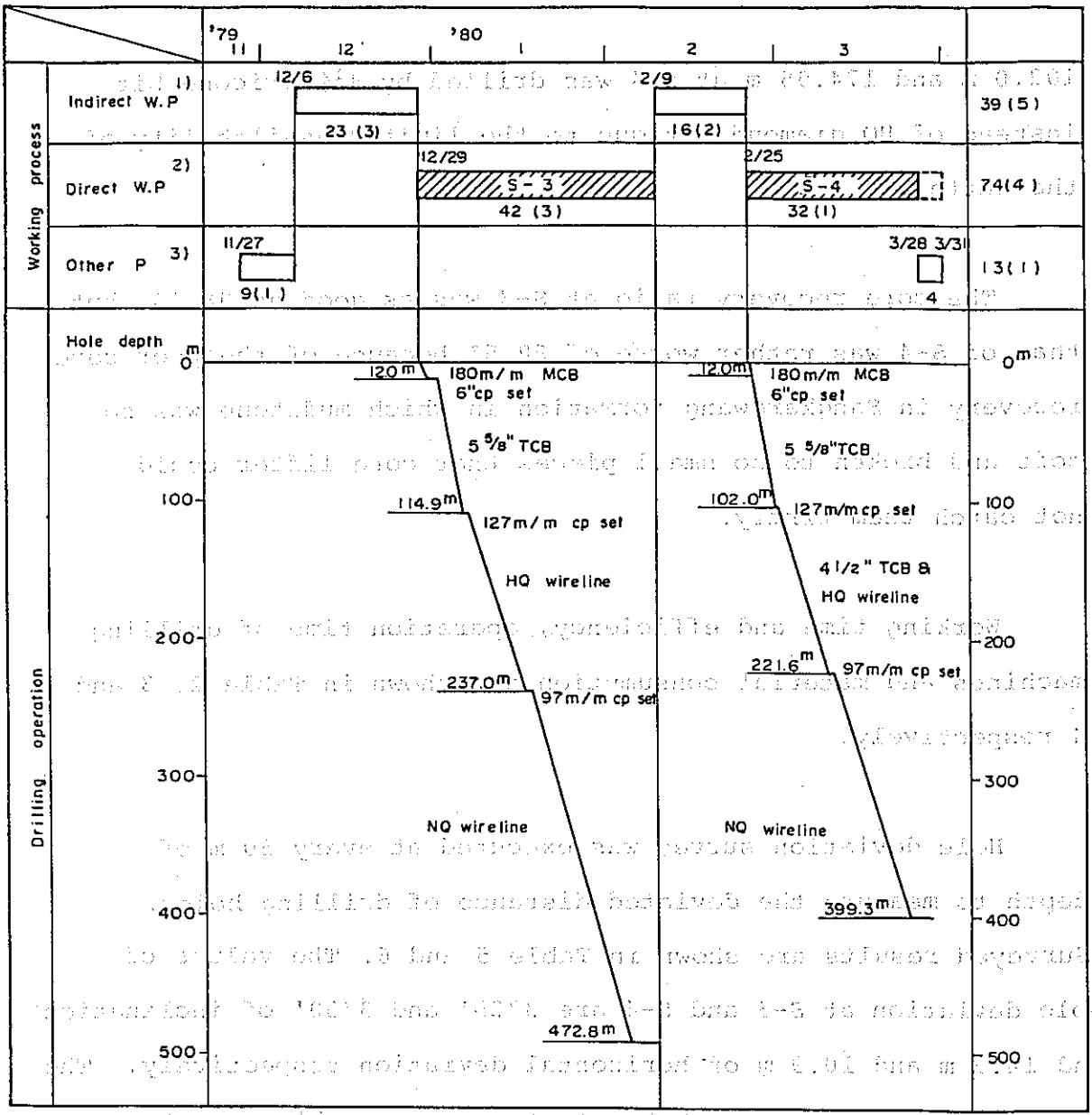
102.0 m and 174.95 m at S-4 was drilled by 4½ tricone bit instead of HQ diamond bit due to the limited availability of the latter.

The core recovery ratio at S-3 was as good as 98.1%, but that of S-4 was rather worse of 88.5% because of the poor core recovery in Sangkarewang formation in which mudstone was so soft and broken to so small pieces that core lifter could not catch them firmly.

Working time and efficiency, operation time of drilling machines and material consumption are shown in Table 2, 3 and 4 respectively.

Hole deviation survey was executed at every 50 m of depth to measure the deviated distance of drilling holes. Surveyed results are shown in Table 5 and 6. The values of hole deviation at S-3 and S-4 are 3°25' and 3°50' of inclination and 14.2 m and 10.9 m of horizontal deviation respectively. The values were not big enough to cause serious problems in terms of drilling as well as geological data study.

Fig.3 EXECUTION PROCESS OF DRILLING OPERATION



Note & Legend

1) Indirect working period; Machine disassembling, transporting & setting.

2) Direct working period; Drilling, core barrel pulling up & setting, casing setting & pulling up, mud conditioning & circulation, hole deviation survey.

3) Other period; Preparation, waiting, releasing & leaving, etc.

Commencing date
Drilling No.
Total days (No working days)
Working period by Indonesian crew

Table 1 Drilling record

		S-3	S-4
Operation	Transportation & Setting	"79 12/6 ~ 12/28	'80 2/12 ~ 2/24
	Drilling	12/29 ~ '80 2/3	2/25 ~ 3/26
	Casing pulling up & disassembling	2/4 ~ 2/11	(3/27 ~ 3/31)*
	Operating days	68	(49)
Location	Coordinate X	-20,453.744	-21,431.984
	Coordinate Y	-9,344.448	-9,300.794
	Elevation (m)	+470.14	+516.99
Final drilling depth (m)		472.80	399.30
Casing bottom	6" at (m)	12.00	12.00
	127 m/m "	114.90	102.05
	97 m/m "	237.00	221.60
Drilling bits	180 m/m MCB (m)	0 ~ 12.00	0 ~ 12.00
	$5\frac{5}{8}$ TCB (m)	12.00 ~ 114.90	12.00 ~ 102.05
	$4\frac{1}{2}$ TCB (m)		102.05 ~ 174.95
	HQ DMB (m)	114.90 ~ 237.00	174.95 ~ 221.60
	NQ DMB (m)	237.00 ~ 472.80	221.60 ~ 399.30
	Coring interval (m)	114.90 ~ 472.80	174.95 ~ 399.30
	Core recovery (%)	98.1	88.5
Major drilling difficulties & trouble			Lost circulation, shortage of water supply.

Note * Executed by Indonesian crews after Japanese team left Sawahlunto.

Table 2 Working time and efficiency

Item			Hole No. S-3	S-4	Total	Drilling rate	W-1 ∿ S-4 Total	W-1 ∿ S-4 Drilling rate
Total drilling length			472.80	399.30	872.10		4,976.75	
Total working time[1]					1,725°30'	0.51m/hr	7,403°00'	0.67m/hr
Direct working time[2]			795°00'	623°30'[4]	1,418°30'	0.61m/hr	6,024°00'	0.83m/hr
Actual drilling time[3]			525°00'	368°55'	893°55'	0.98m/hr	3,962°15'	1.26m/hr
Bit used	180m/m MCB	Drilling length (m)	12.00	12.00	24.00		122.30	
		Actual D. time (hr)	6°30'	6°30'	13°00'	1.85m/hr	64°45'	1.89m/hr
	5⅝" & 4½" TCB	Drilling length (m)	102.90	162.95	265.85		718.80	
		Actual D. time (hr)	79°25'	128°40'	208°05'	1.28m/hr	456°45'	1.57m/hr
	HQ DMB	Drilling length (m)	122.10	46.65	168.75		1,226.55	
		Actual D. time (hr)	155°35'	31°25'	187°00'	0.90m/hr	890°45'	1.38m/hr
	NQ DMB	Drilling length (m)	235.80	177.70	413.50		2,909.20	
		Actual D. time (hr)	283°30'	202°20'	485°50'	0.85m/hr	2,550°00'	1.14m/hr
Casing depth	6" (165m/m) CP		12.00	12.00	24.00		122.3	
	127m/m CP		114.90	102.05	216.95		721.55	
	97m/m CP		237.00	221.60	458.60		1,826.00	
Coring	Length (m)		357.90	224.35	582.25		4,135.75	
	Recovery (%)		98	89	95		97	

Note: 1) Total working time: Direct, indirect & trouble recovering time (indirect: refer to the previous report)
2) Direct working time: (refer to the previous report)
3) Actual drilling time: Drilling itself.
4) Exclude C.P. pulling up & transportation to storage.

Table 3 Operating time of drilling machines

	S - 3	S - 4	Total	W-1 ~ S-4 Total
Drilling machine	626°00'	467°55'	1,093°55'	5,373°50'
Drilling mud pump	569°50'	442°45'	1,012°35'	4,901°45'
Water pump	113°55'	218°35'	332°30'	753°45'
Mud mixer	87°20'	94°45'	182°05'	948°50'
Generator	358°50'	210°30'	569°20'	2,146°15'
Welder	4°55'	4°50'	9°45'	67°30'

Table 4 Material consumption

		S-3	S-4	Total	Consump. rate	W-1 ∿ S-4 Total	W-1 ∿ S-4 Consump. rate
Total drilling length		472.80	399.30	872.10		4,976.75	
Bit	180m/m MCB (pc)	1	2(1)	3(1)	8 m/pc	8(1)	15.2 m/pc
	5⅝" & 4½" TCB (pc)	2(1) 1)	7(3)	9(4)	29.5 m/pc	20(4)	35.9 m/pc
	HQ-DMB (pc)	2(1)	1	3(1)	56.3 m/pc	13(1)	94.4 m/pc
	NQ-DMB (pc)	3	4(3)	7(3)	59.1 m/pc	29(3)	100.3 m/pc
Casing pipe (desertion in hole)	165m/m & 6"φ (m)		2)			15	12 %
	127m/mφ (m)	55		55	48 %	155.5	25 %
	97mφ (m)	81		81	34 %	620.25	34 %
Mud & cement	Bentonite (kg)	2,842	4,870	7,712	8.8 kg/m	41,339	8.3 kg/m
	Ribonite (kg)	158	162	320	0.37 kg/m	2,911	0.58 kg/m
	CMC (kg)	3.8	4.7	8.5	0.01 kg/m	239.7	0.05 kg/m
	Caustic soda (kg)					79.8	0.02 kg/m
	Heavy oil (ℓ)	240	305	545	0.62 ℓ/m	5,540	1.11 ℓ/m
	Cement (kg)	320	280	600	0.69 kg/m	3,555	0.71 kg/m
Fuel & oil	Gasoline (ℓ)	320	206	526	0.60 ℓ/m	2,329	0.46 ℓ/m
	Light oil	2,065	1,385	3,450	3.96 ℓ/m	13,490	2.71 ℓ/m
	Lub. oil	50	60	110	0.13 ℓ/m	631	0.13 ℓ/m

Note 1) ( ) shows used one.

2) C.P. pulling up had not been completed during the period of JICA team's stay.

Table 5 Result of hole deviation survey (S-3)

Depth	1st Run		2nd Run		Average	
	Direction	Angle	Direction	Angle	Direction	Angle
50m	S12°E	1°30'	S16°E	1°10'	S14°E	1°20'
100	S	1°10'	S6°W	1°20'	S3°E	1°15'
150	S32°W	2°40'	S30°W	2°30'	S31°W	2°35'
200	N70°W	1°50'	N76°W	2°00'	N73°W	1°55'
250	S30°E	2°00'	S26°E	2°00'	S28°E	2°00'
300	S62°W	2°00'	S60°W	2°10'	S61°W	2°05'
350	S62°W	3°00'	S60°W	3°20'	S61°W	3°10'
400	S76°W	3°40'	S70°W	3°10'	S73°W	3°25'
450	S80°W	3°20'	S74°W	3°00'	S77°W	3°10'

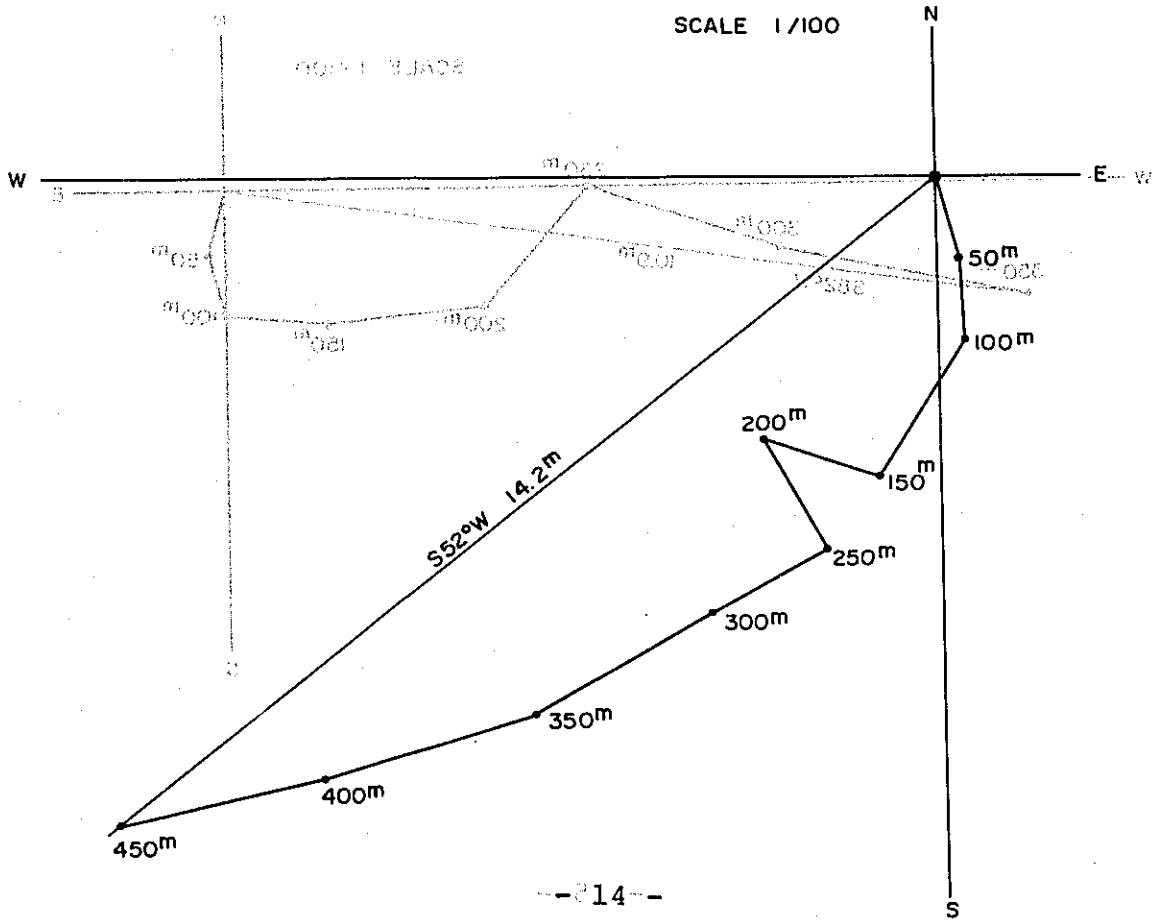
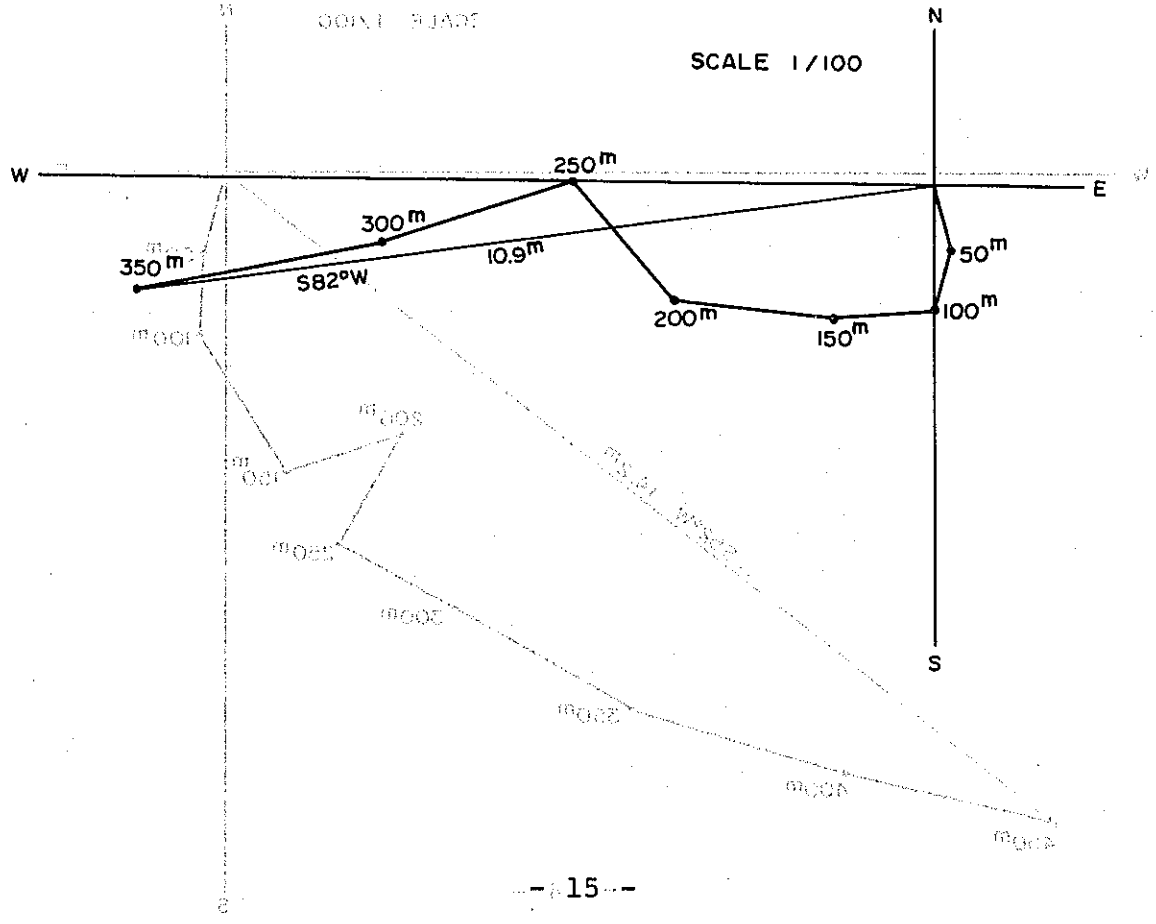


Table 6 Result of hole deviation survey (S-4)

Depth	1st Run		2nd Run		Average	
	Direction	Angle	Direction	Angle	Direction	Angle
50 m	S14°E	1°00'	S16°E	1°00'	S15°E	1°00'
100	S14°W	1°00'	S10°W	1°00'	S12°W	1°00'
150	S86°W	1°30'	S80°W	1°50'	S83°W	1°40'
200	N84°W	2°30'	N86°W	2°30'	N85°W	2°30'
250	N33°W	2°15'	N42°W	2°30'	N40°W	2°23'
300	S74°W	3°20'	S70°W	3°00'	S72°W	3°10'
350	S80°W	3°40'	S76°W	4°00'	S78°W	3°50'



2.2 Outline of Geological Mapping

The field work for geological mapping was performed from February 5 to 25, 1980. It covered the whole area of Sugar of approx. 14 km^2. Four main routes as listed below and their accompanies routes with the total length of approx. 20 km were surveyed.

Lunto River (from Swahlunto to the junction of the Ombilin River)

Trans Sumatra Highway along the Lasi (Pamuatan) River

Road between Sawahlunto and Muara Kelaban

Mula Gading creek (tributary of the Lasi River)

Each of them was surveyed by means of simple survey method using clinometer and measuring tape. The results were summarized in the route maps of 1:2,000 scale and stratigrafic section of 1:200 scale. These basic data were used for composing the geological map of 1:5,000 scale finally.

CHAPTER 3. GEOLOGY

3.1 Geology Proven from the present Exploration Drilling

3.1.1 General description

The strata from lower part of Upper Sawah Tambang formation to upper part of Sangkarewang formation were penetrated at the both drill holes, S-3 and S-4. The depth and thickness of the formations are as follows:

(meter)

		S - 3	S - 4
Height of collar		470.14	516.99
Depth (sea level)	Top of lower Sawah Tambang F.	161.35 (+308.79)	125.0 (+391.99)
	Top of Sawahlunto F.	352.35 (+117.99)	331.71 (+185.28)
	Top of Sangkarewang F.	456.00 (+14.14)	356.90 (+160.09)
Thick-ness (True)	Lower Sawah Tambang F.	191.0 (173)	206.71 (187)
	Sawahlunto F.	103.65 (97)	25.19 (22)

The rock facies of each formation at both drill holes are similar to the result of former eight holes except that of Sawahlunto formation at S-4.

The most prominent geological matter that has become clear from the current two drill holes, is "thinning" of the formations and "Shallowing" of the structural depth as compared with those expected.

Lower Sawah Tambang formation at S-3 and S-4 has the thickness of 173 m and 187 respectively, which is around 70 m thinner than that at Lunto River (250 ∿ 270 m). "Thinning" is the most prominent in Sawahlunto formation at S-4 where the formation is only 22 m thick as opposed to the usual thickness of 110 m to 130 m. Furthermore, no coal seam occurs in the formation at S-4. This phenomena is similar to that of S-5 drilled by the Indonesian side during the current exploration where the thickness of Sawahlunto formation is 20 m and only one thin coal seam occurs.

The depth of the top of Sawahlunto formation at S-3 and S-4 is 100 m to 180 m shallower than expected. A seam (or the horizon where A seam should be expected essentially) was penetrated at the depth of 84 m and 180 m above sea level at S-3 and S-4 respectively in spite of the expected of -20 m and ±0 m. With regard to the cause of the above mentioned phenomena, it is analyzed as follows:

1. There was upheaval (burried hill) of pre-Tertiary basement during the Tertiary sedimentation at the area covering the drill holes of S-4 and S-5.

2. Lower Tertiary formations were not developed enough compared to the surrounding area owing to the insufficient subsidence.

3. Raw plants for the source material of coal did not grow or were not accumulated because of slow subsidence pace.

4. The area was upheaved more than the surrounding area after Tertiary sedimentation.

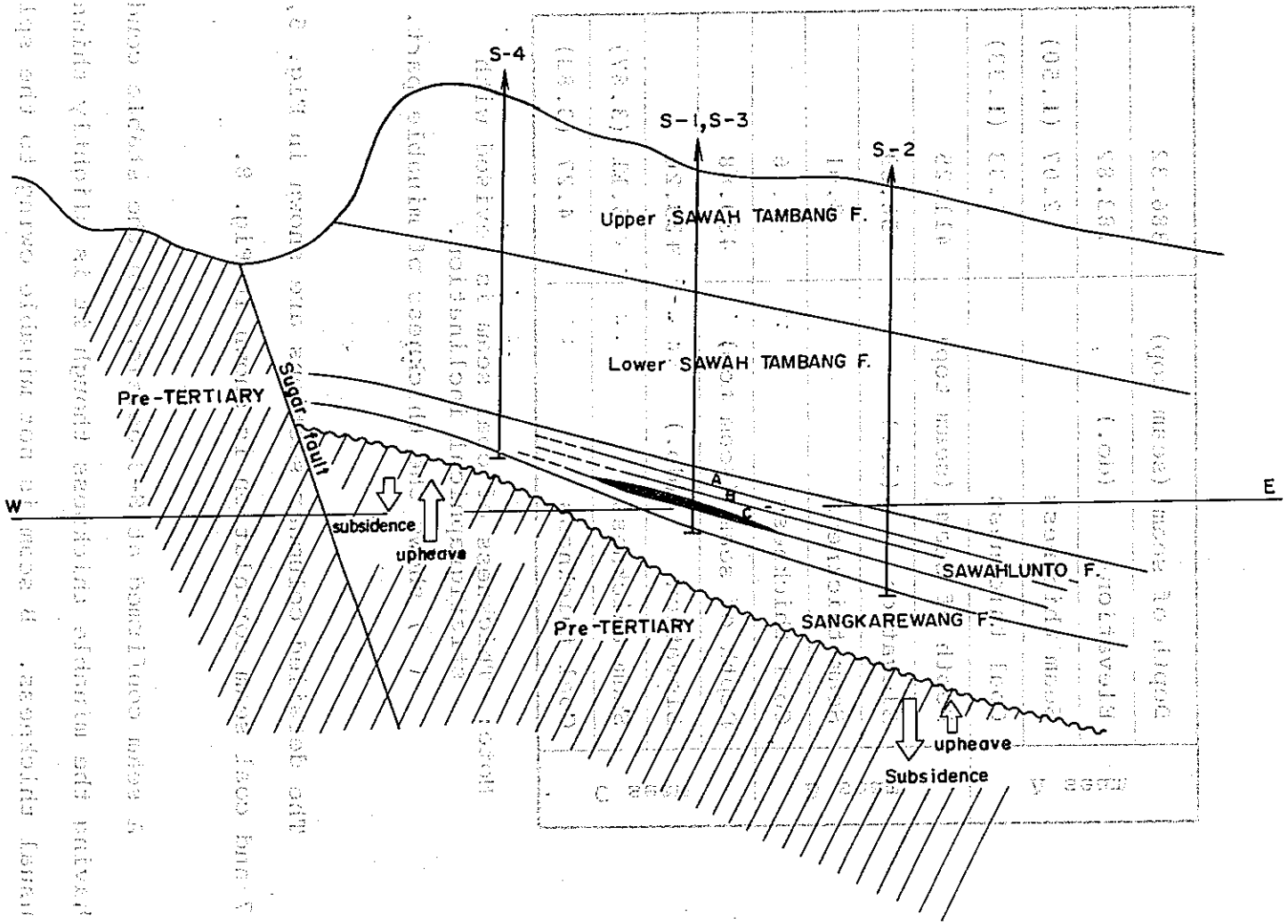
The idealized cross section is shown in Fig. 4.

However, "shallowing" at S-3 is considered to have been caused not only by above mentioned upheaval but by fault. As shown in Dwg. 2 (cross section B-B'), the bottom boundary of Upper Sawah Tambang formation at S-3 there is a supposedly discontinuity in formation boundary and coal seams between S-3 and S-5 in consideration of general dip (about 30° east) of the area. It means there must be a fault having the throw of about 130 m. This fault may correspond to the southern extension of the fault confirmed at the Lunto River (below the bridge at Air-dinging) in the current geological mapping. The throw of the fault is less than 10 meters at the Lunto River and should be getting bigger to south. However, the evidence and data concerning to this fault are so scarce that it remains to be confirmed in the future exploration.

3.1.2 Coal seam

The condition of coal seam at S-3 is as follows:

Fig.4 IDEALIZED CROSS SECTION IN SUGAR AREA



A seam	Depth of seam (seam top)	386.32
	Elevation (do.)	+83.82
	Seam thickness	2.07 (1.50)
	Coal thickness	1.33 (1.33)
B seam	Depth of seam (seam top)	411.25
	Elevation (do.)	+58.89
	Seam thickness	3.01
	Coal thickness	1.36
C seam	Depth of seam (seam top)	430.88
	Elevation (do.)	+39.26
	Seam thickness	6.11 (3.87)
	Coal thickness	4.27 (3.83)

Note: Thickness of coal seam is revised with stratigraphical inclination.
( ) shows the thickness of minable part.

The detailed columnar sections are shown in Fig. 5, 6 and 7 and coal seam correlation is shown in Fig. 8.

A seam confirmed at S-3 develops in the stable condition having the minable thickness though it is slightly thinner than usual thickness. B seam is not minable owing to the splitting. C seam was expected to be deteriorated toward south as mentioned in the previous report and the condition of C seam at S-3

Fig.5 COLUMNAR COAL SECTION FOR 6-SEAM, S-3

Scale 1 : 20

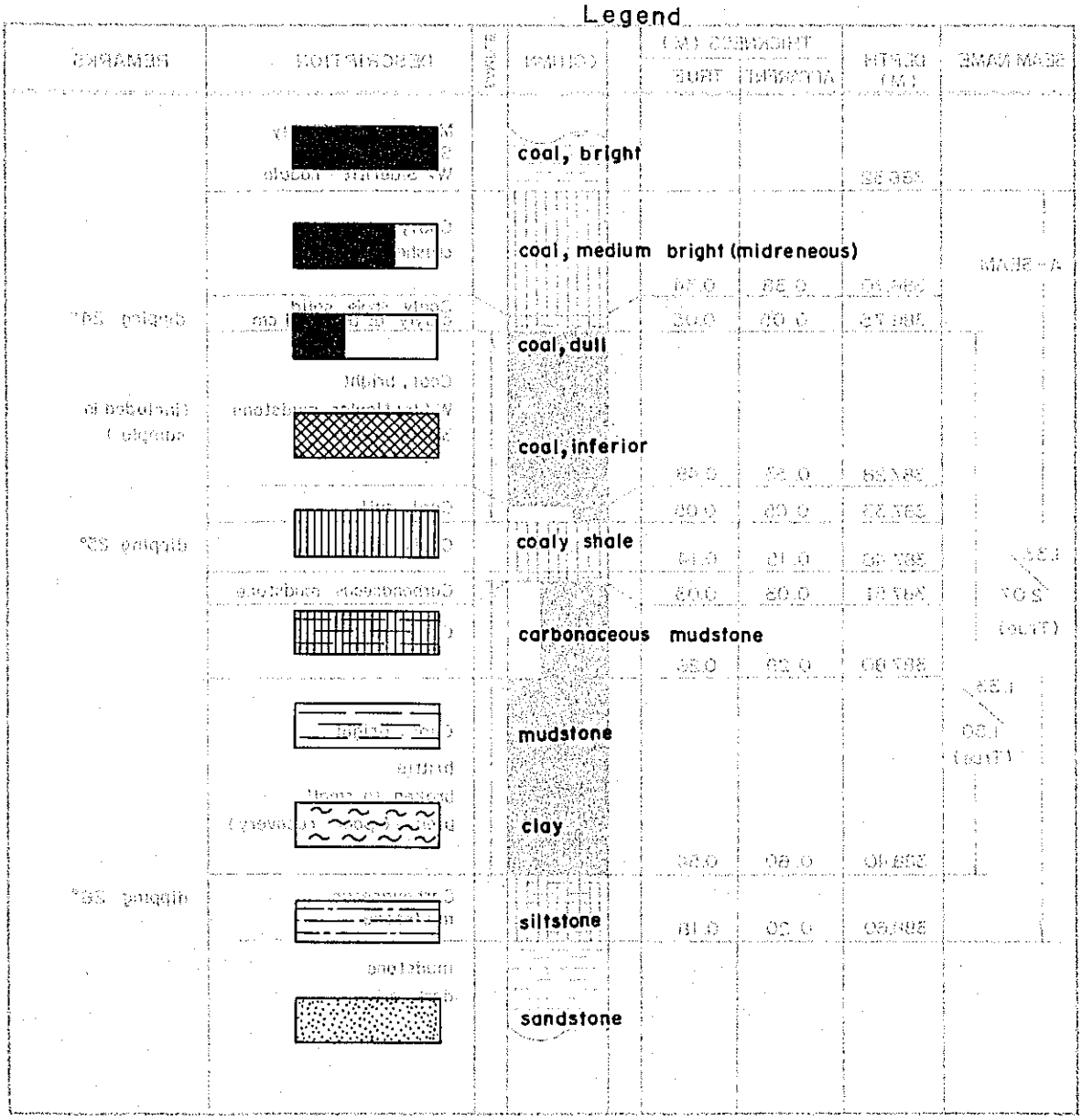


Fig.5 COLUMNAR COAL SECTION FOR A-SEAM, S-3

Scale 1 : 20

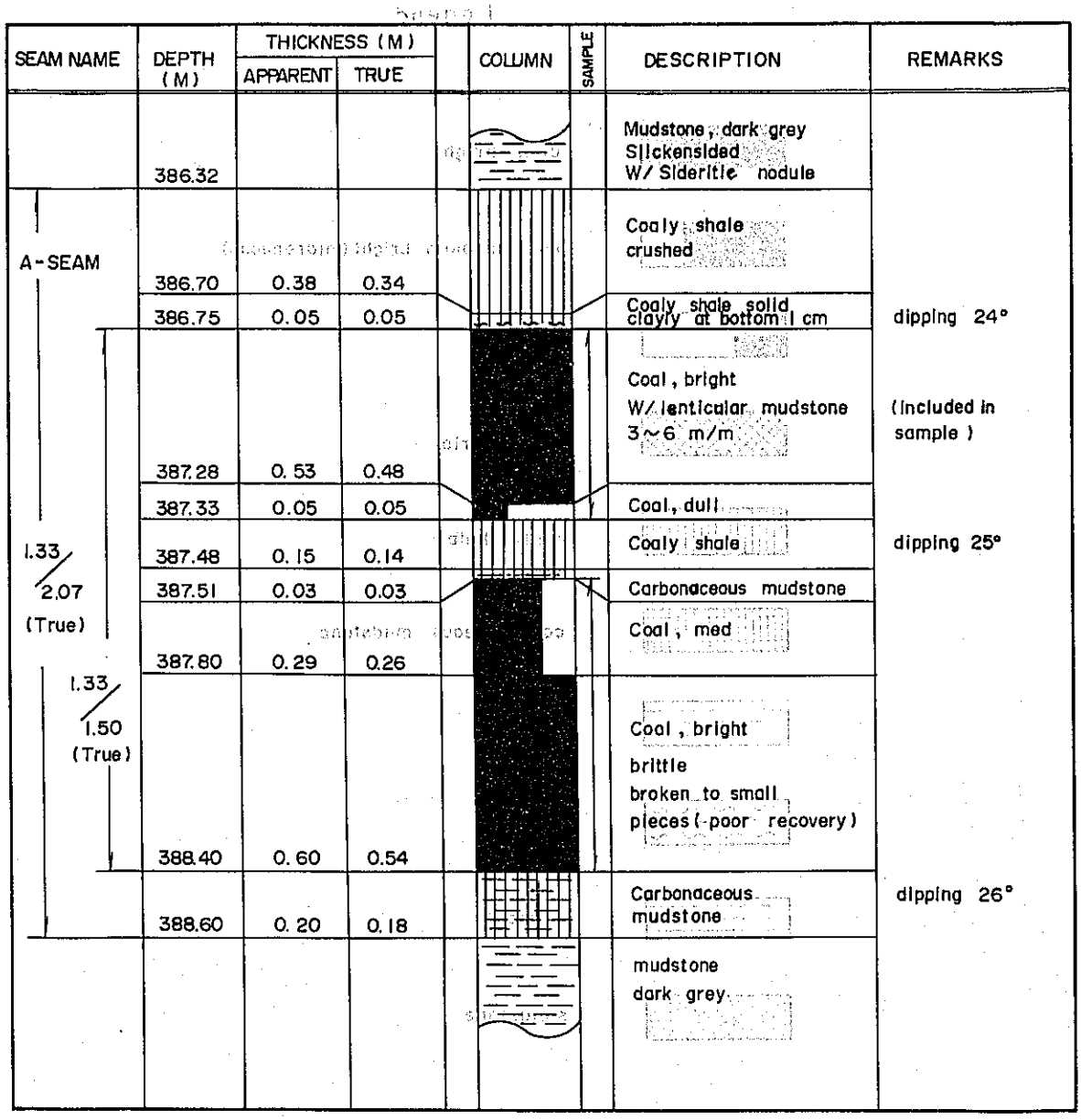


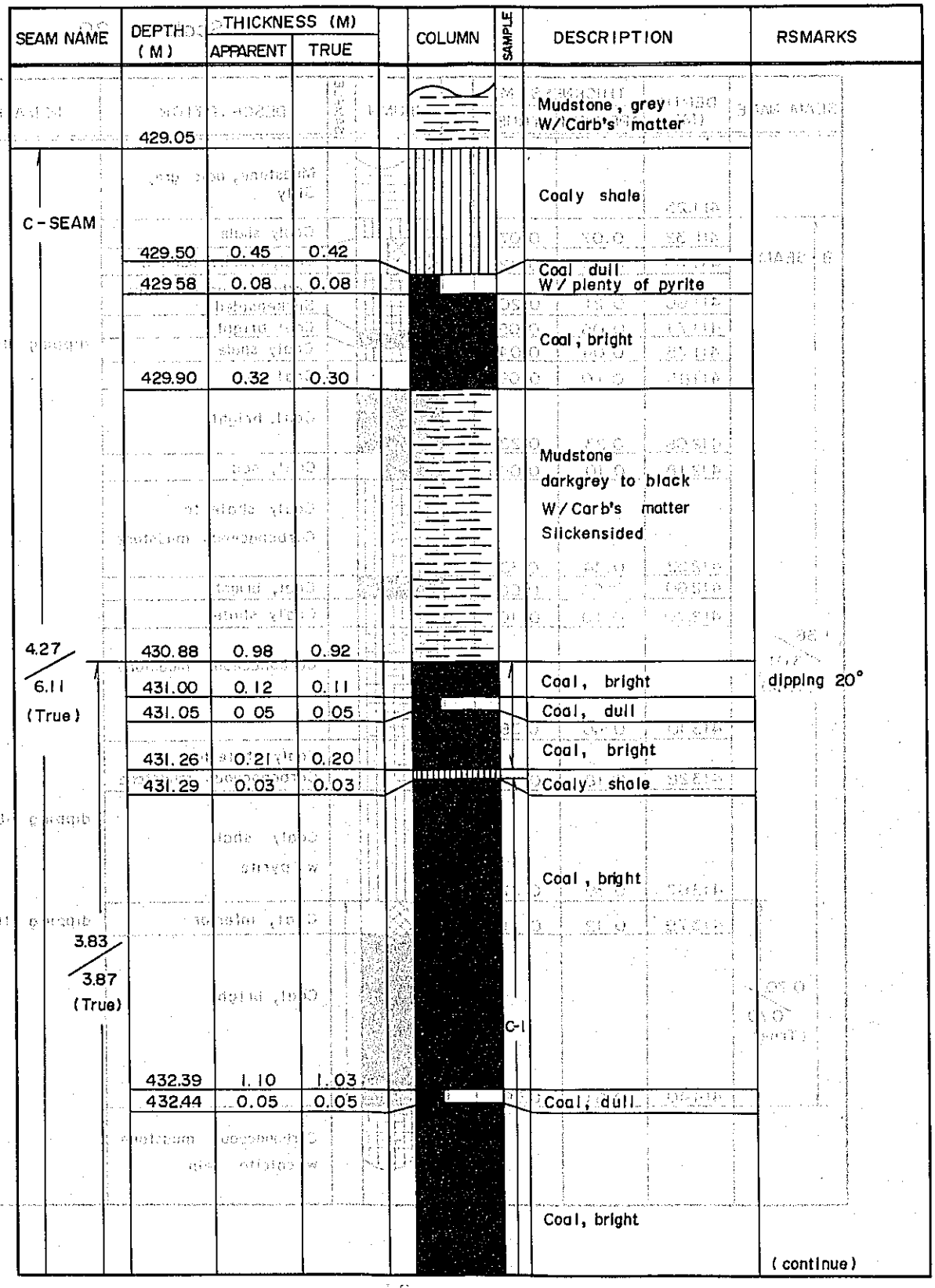
Fig. 6 COLUMNAR COAL SECTION FOR B-SEAM, S-3

Scale 1 : 20

SEAM NAME	DEPTH (M)	THICKNESS (M) APPARENT	THICKNESS (M) TRUE	COLUMN	SAMPLE	DESCRIPTION	REMARKS
	411.25					Mudstone, pale grey Silty	
B-SEAM	411.32	0.07	0.07			Coaly shale	
	411.45	0.13	0.12			Coal, inferior banded	
	411.66	0.21	0.20			Carbonaceous mudstone Slickensided	
	411.71	0.05	0.05			Coal bright	dipping 18°
	411.75	0.04	0.04			Coaly shale	
	411.85	0.10	0.095			Coal dull	
	412.08	0.23	0.22			Coal, bright	
	412.18	0.10	0.095			Coal, med	
	412.52	0.34	0.32			Coaly shale to Carbonaceous mudstone	
	412.60	0.08	0.08			Coal, bright	
	412.70	0.10	0.10			Coaly shale	
1.36 / 3.01 (True)	413.10	0.40	0.38			Carbonaceous mudstone	
	413.28	0.18	0.17			Coaly shale to Carbonaceous mudstone	
	413.67	0.39	0.37			Coaly shale w/ pyrite	dipping 18°
	413.79	0.12	0.11			Coal, inferior	dipping 16°
0.70 / 0.70 (True)	414.40	0.61	0.59			Coal, bright	
						Carbonaceous mudstone w/calcite vein	

Fig.7 COLUMNAR COAL SECTION FOR C-SEAM, S-3

Scale 1:20



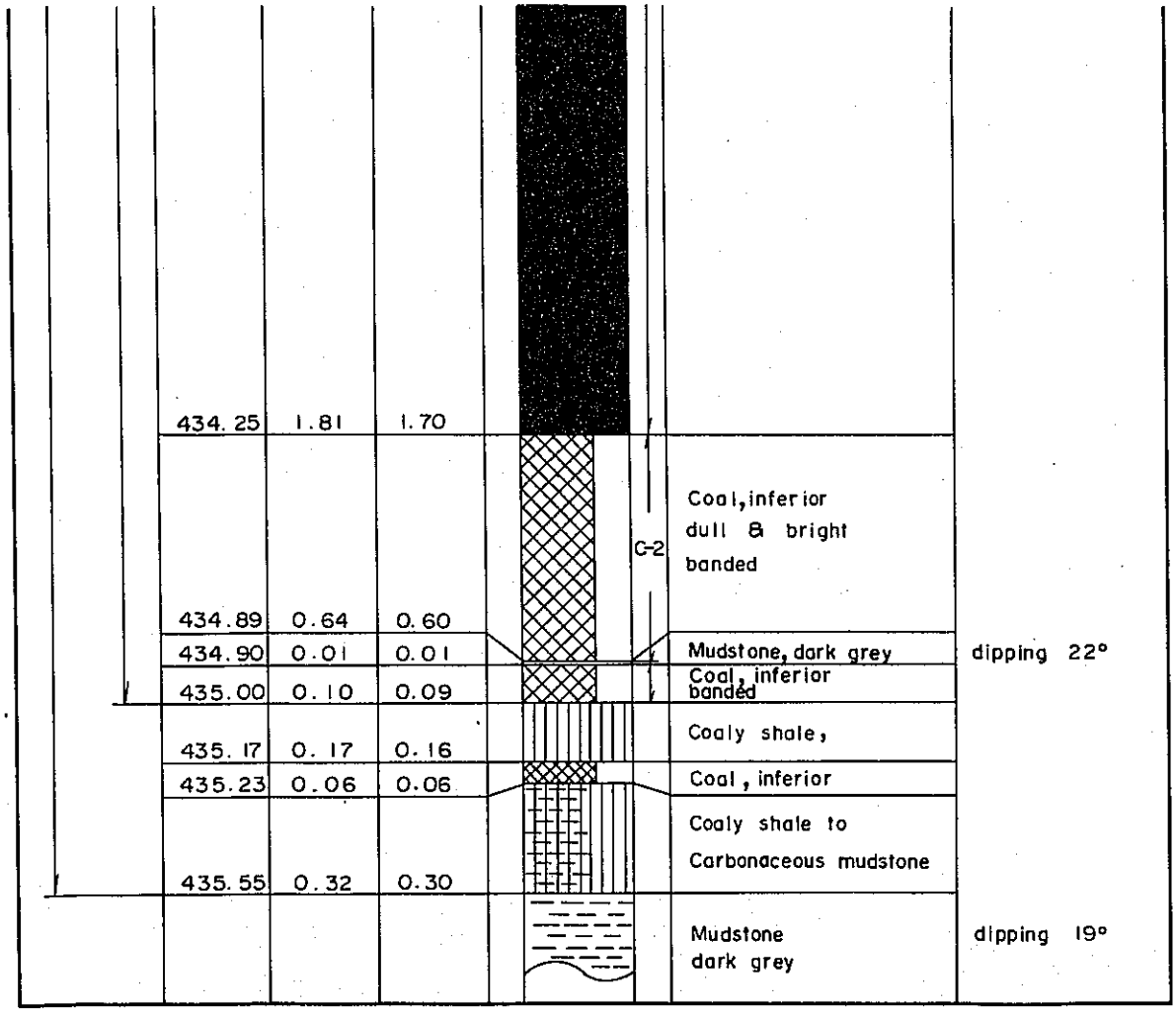
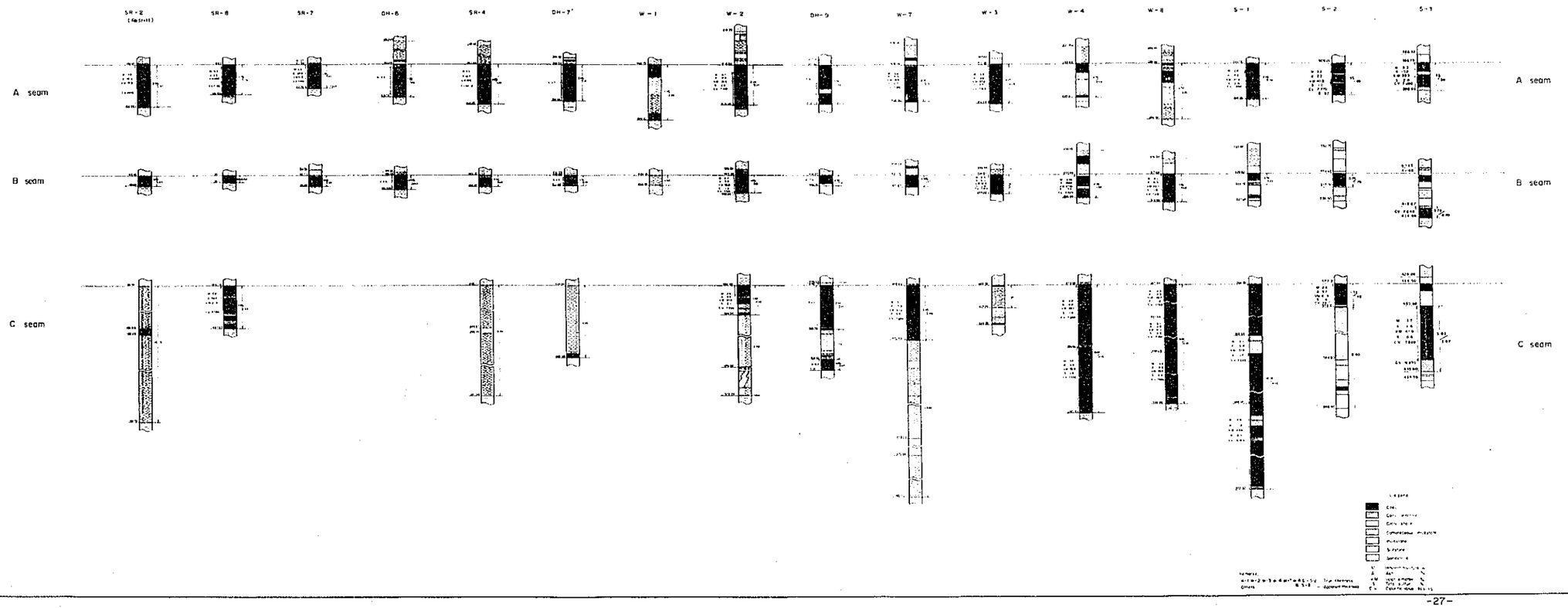

434.25
1.81
1.70
Coal, inferior
dull & bright
banded
C-2
434.89
0.64
0.60
434.90
0.01
0.01
Mudstone, dark grey
dipping 22°
435.00
0.10
0.09
Coal, inferior
banded
Coaly shale,
435.17
0.17
0.16
435.23
0.06
0.06
Coal, inferior
Coaly shale to
Carbonaceous mudstone
435.55
0.32
0.30
Mudstone
dark grey
dipping 19°

Fig-8 COAL SEAM CORRELATION



supports it though it has still minable thickness and proper quality.

The coal developing condition at S-4 is the worst among the ten drill holes since there is not occurrence of coal seam as mentioned above.

Drilling at S-5 penetrated one thin coal seam with 1.22 m of seam thickness or 0.69 m of coal thickness excluding partings. This coal seam is considered to correspond to C seam judging from its relation to the old goaf. A and B seam are thin out completely.

3.1.3 Coal quality

The results of coal analysis & testing and the petrographic analysis of coal from S-3 are shown in Table 7 and 8 respectively. The sampling position of individual coal sample shall be reffered to Fig. 5, 6 and 7.

Coal at S-3 has almost the same quality as that of former eight holes except the following differences.

1) Ash content

Coal in A seam and lower part of C seam has rather high ash content of 10.9 and 21.9% respectively. It is not clear

whether A coal in southern Sugar area has high ash content generally or the case at S-3 is an exception since there is no case exceeding 10% of ash at previous holes. On the other hand, as far as C coal is concerned it is considered that ash content becomes higher towards south in Sugar area judging from the case at S-1 and DH-8 (6.4 to 11.2% at S-1 and 22.9 to 33.4% at DH-8).

2) Sulfur content

Sulfur content of coal is considerably high, more than 2%, except in the upper part of C coal. It was expected that sulfer content of coal in Sugar area is rather high as pointed out in the report prepared last year and it was supported by the current results of analysis.

3) Ash fusion temperature

Ash fusion temperature of C coal shows 1,180°C of deformation point and 1,200°C of hemisphere point. These figures are considerably low compared with those of the former testing (the averages of C coal were 1,260°C for deformation point and 1,340°C for hemisphere point). Such a low temperature seems to be a result of the existence in considerable amount of siderite and pyrite which is supposed from high content of Fe_2O_3, CaO and SO_3 in ash (24.49, 14.35 and 9.21% respectively).

Table 7 Results of coal analysis and testing (S-3)

Coal seam		A	B	C-1	C-2
Depth		386.75∿388.40	413.67∿414.40	430.88∿434.25	434.25∿435.00
Proximate Analyses (%)	Inherant Moisture	3.3	3.2	3.7	3.6
	Ash	10.9	4.2	1.6	21.9
	Volatile Mater	39.0	42.1	41.9	32.7
	Fixed Carbone	46.8	50.5	52.8	41.8
Total Sulfur (%)		2.0	2.2	0.4	3.3
Calorific Value (kcal/kg)		7,050	7,640	7,820	5,930
C. N. S.		4	4	4	
Specific Gravity		1.36	1.31	1.28	1.52
Hardgrove Grindability Index		47	50	46	56
Ultimate Analyses (%)	C	71.8	77.3	80.7	
	H	5.1	5.5	5.8	
	N	1.9	1.7	2.0	
	O	7.9	9.1	9.5	
	Mineral Matter	11.3	4.3	1.6	
	Combustible Sulfur	2.0	2.1	0.4	
Ash fusion Point (°C)	Deformation	1,320		1,180	
	Hemisphere	1,390		1,200	
	Flow	1,420		1,210	
Fluidity Test	Softning Temp. (°C)	393		402	
	Max. Fluidity (DDPM)	13.1		5.5	
	Max. Fluidity Temp. (°C)	426		432	
	Re-Solid Temp. (°C)	456		459	
	Range (°C)	63		57	
Ash Analyses (%)	SiO_2	60.40		27.11	
	TiO_2	0.57		0.74	
	Al_2O_3	14.00		18.23	
	Fe_2O_3	12.36		24.49	
	MgO	0.41		3.50	
	CaO	1.52		14.35	
	Na_2O	0.67		1.35	
	K_2O	0.64		0.32	
	P_2O_5	0.13		0.12	
	SO_3	0.82		9.21	

Note 1) Analysed by Tokyo Coal and Mineral Research Institute.
2) Analysed on raw coal basis.

Table 8 Petrographic analysis of coal from S-3

Coal seam	A seam	B seam	Upper part of C seam (C-1)	Lower part of C seam (C-2)
Vitrinite type (Vol. %)				
V6	-	6.3	7.3	1.7
V7	86.4	83.1	84.4	57.9
V8	3.6	-	-	23.2
Maceral type (Vol. %)				
Vitrinite	90.0	89.4	91.7	82.8
Vitrinite	90.0	89.4	91.7	82.8
Pseudo-vitrinite	-	-	-	-
Exinite	3.7	3.6	4.2	2.5
Exinite	3.7	3.6	4.2	2.5
Resinite	-	-	-	-
Inertinite	1.3	1.6	2.4	1.4
Micrinite (S, C)	1.3	1.6	2.4	1.4
Semi-fusinite	-	-	-	-
Fusinite	-	-	-	-
Mineral matter	5.0	5.4	1.7	13.7
Mean maximum reflectance (%)	0.75	0.74	0.72	0.78
Reactive entity (Vol. %)	93.7	93.0	95.9	85.3
Inert entity (Vol. %)	6.3	7.0	4.1	14.7
Composition balance index	0.21	0.24	0.13	0.52
Strength Index	2.56	2.56	2.49	2.78
Calculated coke strength	0	0	0	21

Note 1) Calculated coke strength for C-2 has the error owing to high ash (more than 20 %).

2) Analyzed by Coal Mining Research Center, Japan.

Fig. 9 Photograph of fossil occured at S-3

Family Thiaridae Troschel, 1857

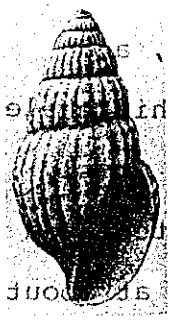
Genus Sulcospira Troschel, 1857

Sulcospira sp. indet.

Explanation of figures.

1. Reconstruction of young adult? specimen. Scale bar indicates true height.

2. Fractured surface of the drill core parallel to the fossil bearing bedding planes. Scale bar indicates true diameter of core.



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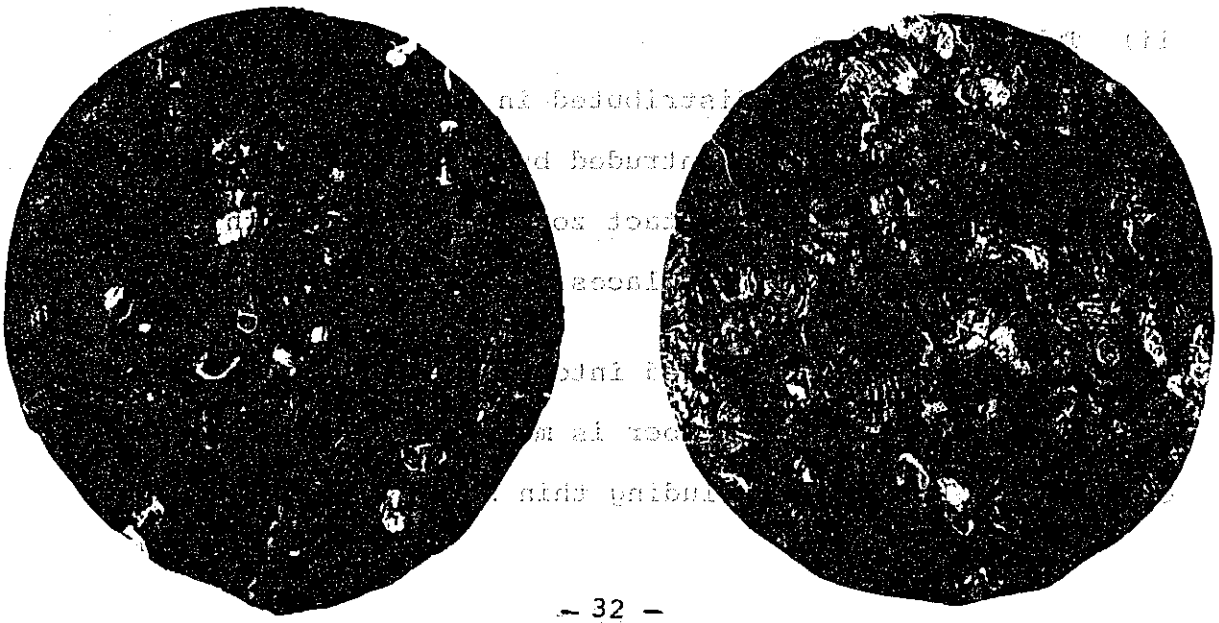


3.2 Geology Proven from the Geological Mapping

3.2.1 Stratigraphy

Stratigraphy and lithofacies in map-area are summarized in Fig. 10.

(1) Basement rocks (Pre-Tertiary)

i) Silungkang formation

This formation outcrops near the mosque in Sawahlunto within map-area and is divided into two members based on lithofacies. The upper member consists of crystalline limestone with thin shale, sandstone and conglomerate, and lower memebr consists of crystalline limestone with thin shale, sandstone and conglomerate, and lower member consists mainly of volcanic rocks (rhyolite?) interbedding thin sandstone and shale. Total thickness of the formation is estimated at about 1,500 m.

ii) Tuhur formation

This formation is distributed in the southwest of Sugar area. The formation was intruded by grano-diorite which gave the metamorphism in the contact zone and shale in this zone was changed to hornfels in places.

The formation is divided into two members based on lithofacies. The upper member is more than 450 m thick of crystalline limestone including thin shale bands. The lower

Fig 10 STRATIGRAPHIC SECTION OF SUGAR AREA

AGE	NAME OF FORMATION	THICKNESS (M)	COLUMNAR SECTION	ROCKS	CHARACTER OF ROCKS
Quaternery	Alluvial deposits	5-10		Sand, gravel, clay	
	Diluvial deposits	15-25		Sand, gravel	Gravel: Granite weathered apparently sand grains
Miocene	Ombilin Formation	120 +		Bluish and greenish grey mudstone interbedded with bentonite & tuff	Contains marine foraminifera fossils, interbedded with greenish sandstone frequently.
Oligocene	Upper Sawah Tambang Formation — Upper Member	400 +		Medium grained s.st. Mostly s.st. interbbeded with mud st. & thin coal. Mostly s.st. interbedded with mudst. and siltst. Mostly s.st. interbedded with mudst & thin coal	Coal: Veined by marcasite, including silicified wood and sideritic nodule, no economic value
	Upper Sawah Tambang Formation — Middle Member	425 ~ 0		Fine grained Sandstone	Locally changes the thickness and partly synchronized with Lower Member
	Upper Sawah Tambang Formation — Lower Member	190 ~ 520		Coarse grained Sandstone, Conglomeratic	Partly synchronized with Lower Sawah Tambang Formation
	Lower Sawah Tambang Formation	170 ~ 270		Sandstone and Mudstone in alternation	Sandstone: White & lightgrey in color. Mudstone: Greenish grey & chocolate in color.
Eocene	Sawahlunto Formation	70 ~ 130		Mudstone, containing siderite nodule, sandstone and productive coal seams	Coal seams: Productive coal seams A, (B), and C seam
Pre-Eocene (Paleocene ?)	Sangkarewang Formation	500		Mostly mudstone, chocolate in color, interbbeded with Sandstone and conglomerate	
Pre-Tertiary (Cretaceous)				Grano-diorite, Porphyrite	
Triassic	Tuhur Formation	450		Crystaline limestone	Intruded by grano-diorite
		100+		Shale and sandstone	
Permian	Silungkang Formation	1500		Crystaline limestone. Sandstone, shale and chert	

member consists of shale and sandstone having more than 100 m thickness.

iii) Igneous rocks

Grano-diorite and porphyrite occur in the southwest of Sugar area. Grano-diorite is markedly weathered and altered. Mafic mineral is changed to chlorite and epidote etc., and plagioclase is changed to clay minerals. The age of grano-diorite is thought in post-Tuhur formation and pre-Tertiary, probably Cretaceous in age.

Porphyrite in map-area is observed as dyke, which intruded into grano-diorite. This rock is also markedly weathered. Hornblende is changed to chlorite and epidote though plagioclase remains fresh. It has much carbonate minerals. It is considered that porphyrite intruded immediately after grano-diorite intrusion in Cretaceous.

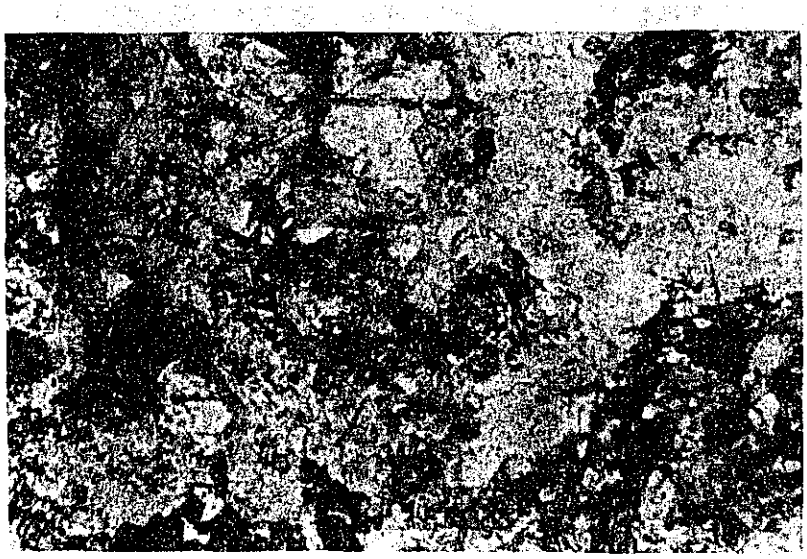
Microscopic photographs of the rocks are shown in Fig. 11 and 12.

(2) Tertiary formation

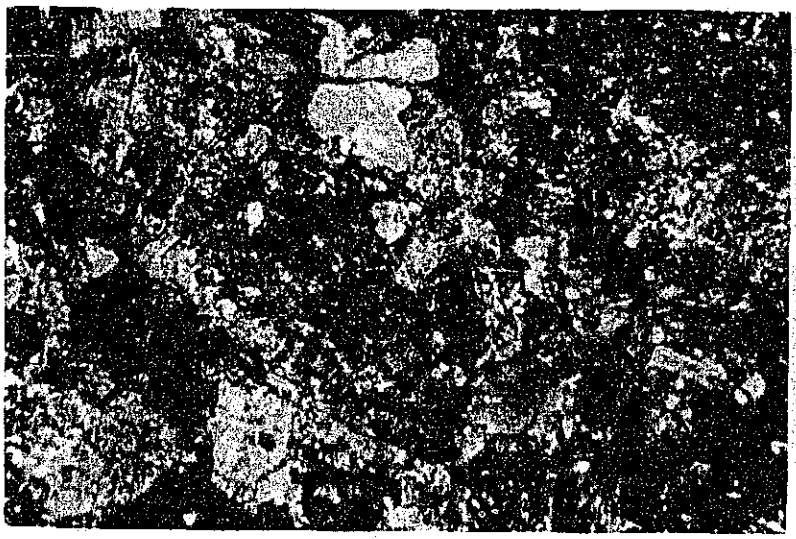
i) Sangkarewang formation

In map-area, the outcrop of this formation can be seen at the foot of the railway bridge crossing the Lunto River near the mosque where the formation is of reddish granule conglomerate and sandstone. Its total thickness is not clear

Fig. 11 Microscopic photograph of Grano-diorite



Open nicol, width; 1.88 mm



Crossed nicols

Fig. 12 Microscopic photograph of Porphyrite

Open nicol, width; 1.88 m/m

Crossed noicols

and it is estimated at between 50 and 100 m thick. The relation between Sangkarewang formation and underlying Tuhur formation is considered to be unconformity though it could not be confirmed in the current survey because the former contacts with the latter through fault.

ii) Sawahlunto formation

The outcrop of this formation can be observed along the Lunto River between the bridge near TBO office and the bridge at Airdinging. In the central and southern parts of Sugar area, the formation is not observed being hidden by weathered soil and talus. The lithofacies of the formation is expected as thick as 100 m.

iii) Lower Sawah Tambang formation

The outcrops of this formation are seen at the Lunto River and the road side (Trans Sumatra highway) along the Lasi River. The formation is distributed also at the mountain foot along the road which runs from Sawahlunto and Muara Kelaban, but it is hardly observed because of talus. The thickness of the formation is, at its maximum, 270 m at the Lunto River. Its total thickness at the southern part of Sugar is not clear because only the upper part of the formation can be observed and the lower one is missing owing to the fault. The thickness at DH-8 is approx. 250 m. The formation is characterized by greenish or reddish mudstone and coarse grained sandstone.

iv) Upper Sawah Tambang formation

The total thickness of this formation is about 600 m to 900 m and most of the mountain in map-area is composed of this formation. In the current geological survey, the formation is divided into three members respectively based on the rock facies, lower member, middle member and upper memebr.

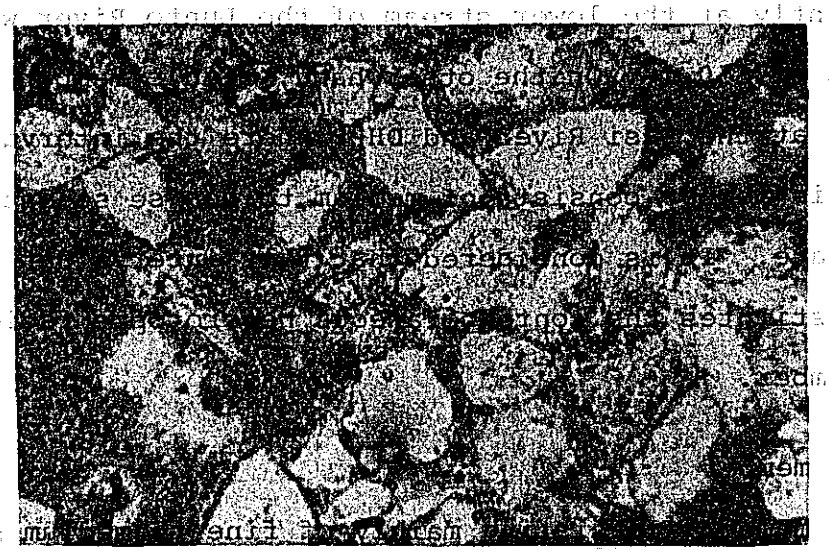
a. Lower member

This member consists of massive, thick medium to coarse sandstone with conglomerate in some parts, and forms high steep cliff surrounding the mountain.

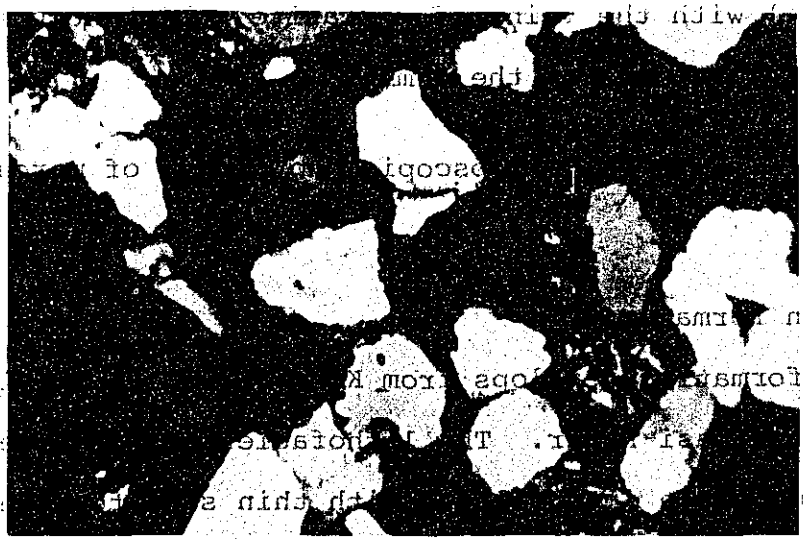
The member develops well in southern part of Sugar being about 400 m thick and gradually decrease its thickness to 190 m at the Lunto River. There is a possibility that the upper most, 60 m of underlying lower Sawah Tambang formation corresponds to the contemporaneous heterotopic facies of this memebr.

Fig. 13 shows the microscopic photograph of the typical sandstone in the member.

Fig. 13 Microscopic photograph of typical sandstone in lower member of upper Sawah Tambang formation



Open nicol, width; 1.88 m/m



Crossed nicols

Grain ; medium to coarse, well sorted
subangular to subrounded.
Quartz, feldspar, re-crystallized chert and schist, etc.
Matrix; including hematite

b. Middle member

This member consists mainly of fine sandstone and develops predominantly at the lower stream of the Lunto River with the thickness of 350 m. On the other hand, middle member does not occur at the Lasi River and DH-8 where the interval corresponding to this member consists of medium to coarse sandstone with conglomerate. It is considered that this interval at the Last River constitutes the contemporaneous heterotopic facies of middle member.

c. Upper member

This member, consisting mainly of fine to medium sandstone, partly interbeded by mudstone, is characterized by thin coal (max. 0.4 m) with the veins of marcasite, which occurs in lower and upper parts of the member.

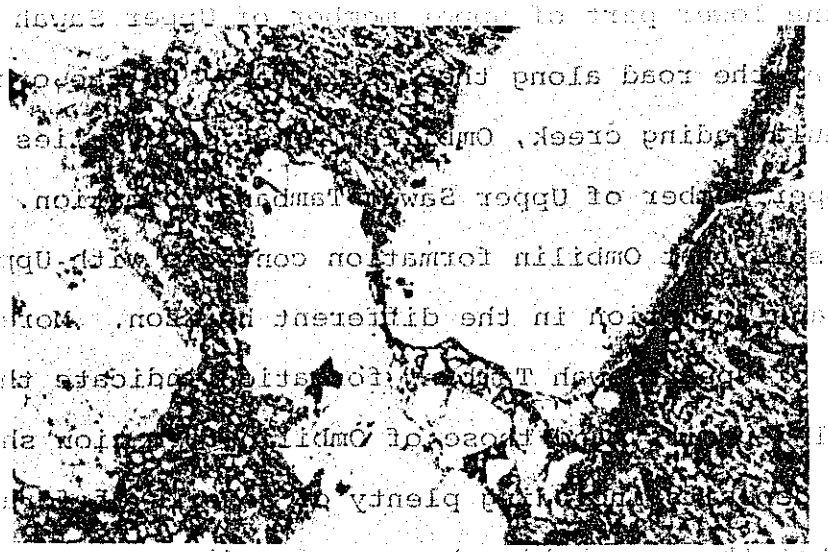
Fig. 14 shows the microscopic photograph of marcasite in coal.

v) Ombilin formation

This formation develops from Kapala Kota to the lower stream of the Lasi River. The lithofacies are composed mainly of mudstone intercalated with thin sandstone beds, which are predominant particularly near the base of the formation.

The relation between Ombilin formation and underlying Upper Sawah Tambang formation is not clear because the contact

Fig. 14 Microscopic photograph of Marcasite in coal



Reflected light, width; 0.59 m/m

area of them is covered with dilivium. However, judging from the result of mapping, it seems that Ombilin formation overlies the lower part of upper member of Upper Sawah Tambang formation at the road along the Lasi River. On the other hand, at Mula Gading creek, Ombilin formation overlies upper part of upper member of Upper Sawah Tambang formation. So, it can be said that Ombilin formation contacts with Upper Sawah Tambang formation in the different horizon. Moreover, the facies of Upper Sawah Tambang formation indicate the terrestrial deposits, and those of Ombilin formation show the marine deposits including plenty of fossils of foraminifera. It means that the remarkable changes of sedimentary environment occured between Ombilin formation and Upper Sawah Tambang formation. Based on these two facts, it is possible to assume an unconformity between both formations.

The thickness of Ombilin formation in the explored area is expected more than 120 m.

(3) Quarternary deposits

i) Diluvial deposits

Diluvial deposits occur in the west of Kapala Kota and southwest of Airdinging along the Lasi River. The deposits consist of weathered granite gravels (diameter about 5 cm) and of its clastic sand grains with the thickness of 15 to 25 m. It is considered to have been deposited and have filled the valley in diluvial epoch. It makes cliff by collapse and landslip at road cutting in above mentioned locations.

ii) Alluvial deposits

Alluvial deposits occur along the rivers, especially predominantly at the Lasi River, making alluvial plain. The deposits consits mainly of sand and gravel, partly of clay under rice field with the thickness of 5 to 10 m. It must be taken note that alluvial deposits produce placer gold at the Lasi River (nearly junction to Holban River) and the lower stream of the Lunto River.

3.2.2 Distribution of strata in main survey routes

(1) Lunto river

Along the Lunto River, the upper part of Sangkarewang, Sawahlunto, Lower Sawah Tambang and Upper Sawah Tambang formation are distributed. Especially, fine to medium sandstone of middle member of Upper Sawah Tambang formation is predominant and about 420 m thick of the member is confirmed in this route. Coal seams (A, B and C seam) in Sawahlunto formation are successively observed in this river. Several minor faults are confirmed in this area though their extension toward the southern part of Sugar area could not be traced.

(2) Mula Gading Creek

Upper Sawah Tambang formation is widely distributed in this route and is gently dipping toward east. Several thin coal seams were observed in the upper and lower part of upper member of Upper Sawah Tambang formation. Total thickness of this formation in this area is about 430 m.

(3) Lasi River

Tuhur formation, Lower Sawah Tambang, Upper Sawah Tambang and Ombilin formation are distributed in the road along the Lasi River. Especially, lower member of Upper Sawah Tambang formation predominantly develops having more than 400 m of thickness. According to the result of mapping of Sugar area, it seems that Ombilin formation contacts unconformably with Upper Sawah Tambang formation. Lower Sawah Tanbang formation contacts with Tuhur formation through large fault (temporarily named "Sugar fault") running through the southwest part of Sugar area. A few minor faults were also recognized in this route.

3.2.3 Geological structure

The geological structure of Sugar area shows a homocline in general. Average strike of the strata shows north-south to northwest-southeast direction, dipping 10° to 30° toward east. It can be said generally that the dip of horizonally lower strata is steeper than that of horizonally upper one. The average dip of lower strata is about 20° to 30° and that of upper one shows 10° to 15°.

In the western part of Sugar area, the contacted relation between the Tertiary rocks and pre-Tertiary ones has been doubtful whether unconformity or fault until this geological survey was commenced, but it was confirmed by the current survey that both rocks contact through the fault having the strike of northwest-southeast direction.

3.2.4 Conclusion

The following are the main results obtained from the current geological mapping:

a. Tertiary rocks contact with pre-Tertiary rocks through fault (temporarily named "Sugar fault")

b. Upper Sawah Tambang formation can be divided into three members based on the rock facies.

c. It seems that Ombilin formation contacts unconformably with the underlying Upper Sawah Tambang formation.

d. The columnar sections obtained from the surface survey are well correlated to those from drill holes.

e. Several faults were confirmed in the survey, but it was difficult to trace their farther extention because the succession of outcrops was rather poor. Insofar as the data of surface survey and drill holes, no large thrown fault was confirmed in the exploration except that inferred between S-3 and S-5.

CHAPTER 4. COAL RESERVES

The southern limit for the coal reserves estimation in the previous report lay in the following line.

A seam ; a line connecting the spot of 250 m south of S-2 with the outcrop found near the hospital.

C seam ; a line connecting the spot of 250 m south of S-1 with the southern termination of the goaf.

The above mentioned limit for A seam is located in 30 m north of S-3 and 120 m of S-5, and that of C seam is located in 200 m north of S-3 and 300 m of S-5.

At the current exploration, A and C seam with minable thickness and proper quality occur at S-3, and C seam is rather thicker than expected. On the other hand, no minable coal seam was found at S-4 and S-5. Furthermore, the coal seam outcroped near the hospital is considered to be not A seam but C seam according to the result of S-5.

These new facts have little effect on the previous reserves estimation because the increase of thickness of C seam compensates the decrease of that of A seam.

The coal reserves in the southern extension of the previously estimated is not calculated in this report for the reasons as follows:

a. Only several hundred thousand tons of proven reserves can be expected within the confirmed area covered by S-3.

b. S-3 is located too far from S-4 to grasp the limit of the area of coal seam deterioration.

c. Reserves estimation for Sugar area should be made after the completion of additional exploration planned in the near future.

CONCLUSION

It became clear as a result of the current exploration that coal seam developing condition in Sugar area is rather unstable. It is considered that the area having the better coal developing condition and high reserve density is limited to that around drilling holes W-4, W-8 and S-1, adding S-3. Accordingly, the conclusion in the former report, that the above mentioned area is recommended for the initial mine development in the rehabilitation program for the Ombilin Coal Mine, should not be changed in this report.

It is expected that the result obtained from the first exploration and the current one should supply the sufficient basic data for the effective feasibility study.

However, the unexpected phenomena caused by the variable and unstable coal developing condition appeared sometimes during the exploration. It is recommended to execute the further exploration considering the field characteristics of this area.

ection Line

by JICA in the first stage exploration

by JICA in the additional exploration

by TBO

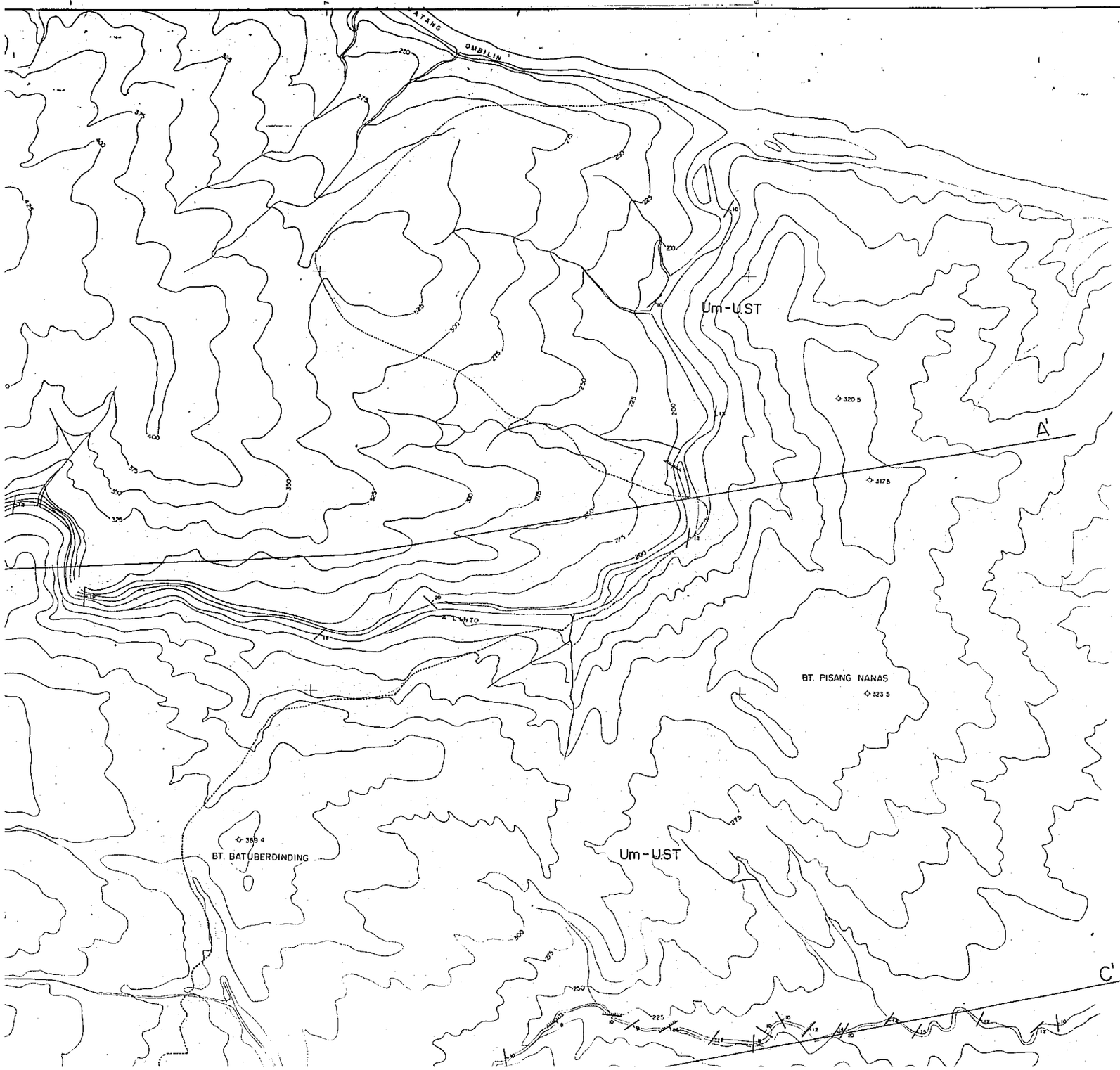
PAN INTERNATIONAL COOPERATION AGENCY

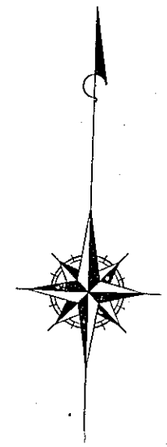
HE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
– THE ADDITIONAL EXPLORATION –

GEOLOGICAL MAP OF SUGAR AREA

No	1	Scale	1 5,000
e	April 1980	Prepared by	R. SAITO

W-1
W-3
W-7
W-4
W-8
BT. GANTING
Δ 569.6
BT. PAAL
Δ 546.9
Lm-U.ST
Mm - U.ST
Lobangtembox
Tangalgunung
Airdingin
A
B
B'
S-1
S-2
S-3
S-5
CAMP SITE
SK
SL
SG
Lm-U.ST
Lm-U.ST
Mm-U.ST
BT. BATUBERDINDING
369.4
19 000
20 000

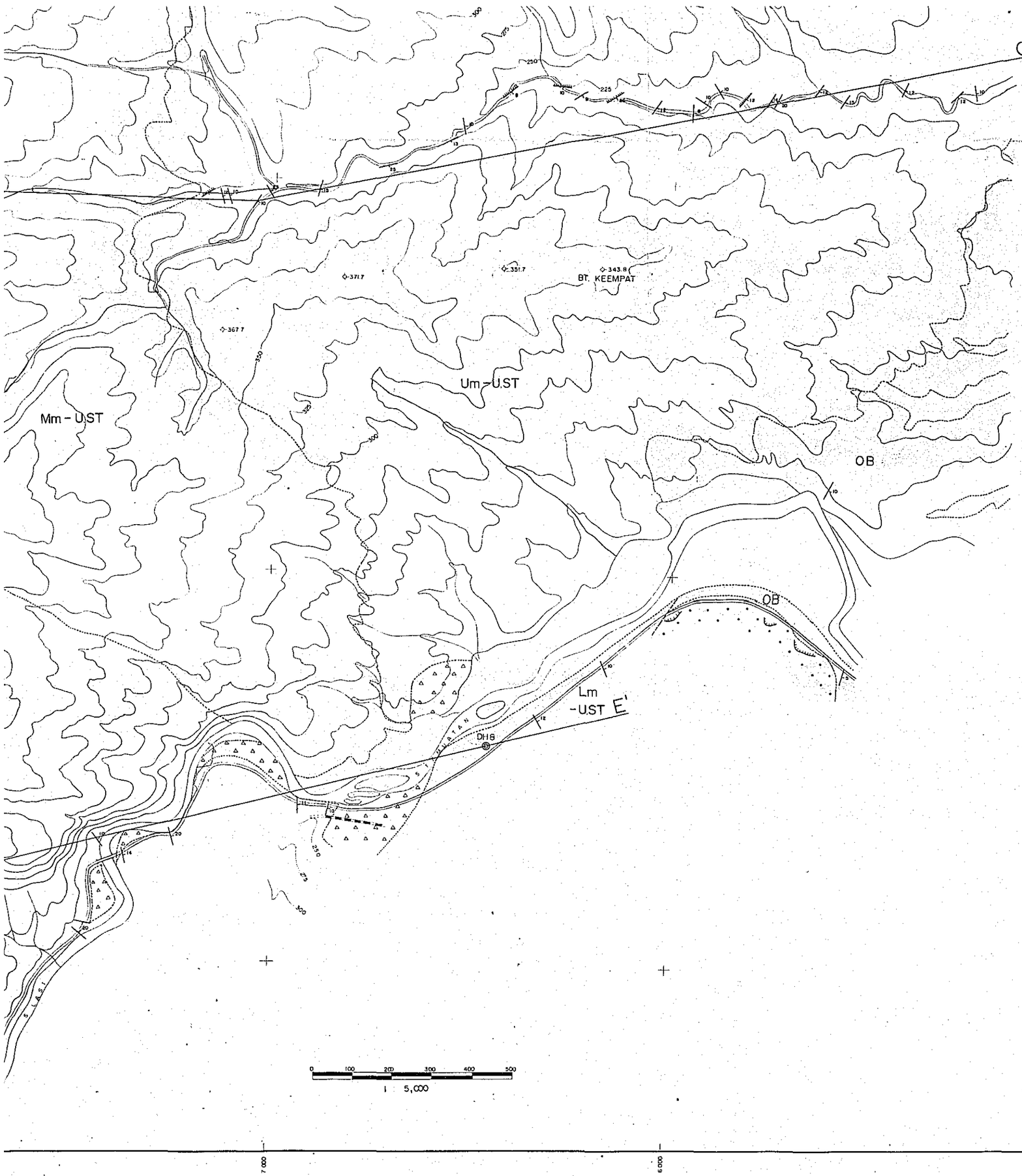




LEGEND

		Talus Deposits
		Alluvial Deposits
		Deluvial Deposits
Miocene	OB	Ombilin Formation

B
SG
C
D
D'
TH
LST
Lm-UST
Mm-UST
Lm.-U.ST
S-4
Pondokkopu
Kundoboruk
Bukitsugku
BT AIRDINGIN
BT BATUTERDORONG
BT AIRTIRIS
Belimbing
Ambatjang
Sungkai
Kelapaoli
Lansono
Simpangtiga
Air dingin
MUARA KELABAN
SUNGAI LABAN
SUNGAI LASI
3717
3677
4816
472.3
21 000
22 000
23 000
10 000
9 000
8 000
7 000
0 100 200



Miocene
- OB — Ombilin Formation
- Um-UST — Upper Member: sandstone medium & fine grained, mudstone, siltstone, coal
- Mm-UST — Middle Member: sandstone fine grained
- Lm-UST — Lower Member: sandstone coarse grained, conglomeratic

Oligocene
- Upper Sawah Tambang Formation
- L.ST — Lower Sawah Tambang Formation

Eocene
- SL — Sawahlunto Formation

Pre-Eocene (Paleocene)
- SK — Sangkarewang Formation

Pre-Tertiary
- Porphyrite
- Grano-diorite

- TH — Tuhur Formation (limestone, sandstone & mudstone)
- SG — Silunkang Formation (limestone, juarzite etc.)

- Strike & Dip
- Strike & Dip of Coal Seam
- Anticline
- Syncline
- Fault
- A —— A' Geological Cross Section Line
- Drill Holes done by JICA in the first stage exploration
- Drill Holes done by JICA in the additional exploration
- Drill Hole done by TBO

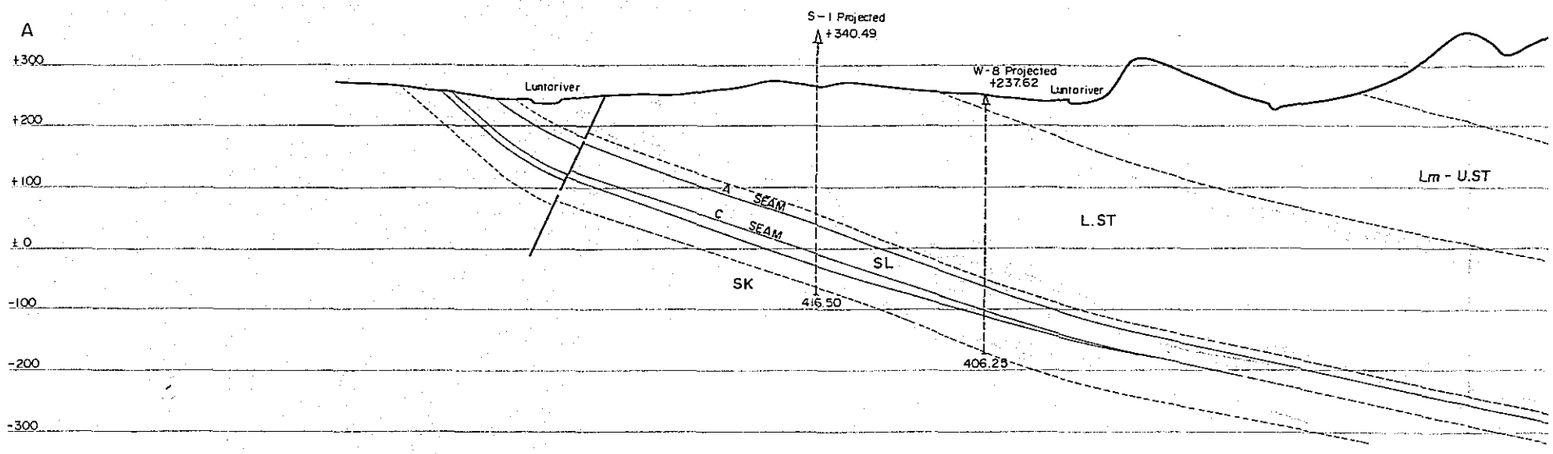
JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
– THE ADDITIONAL EXPLORATION –

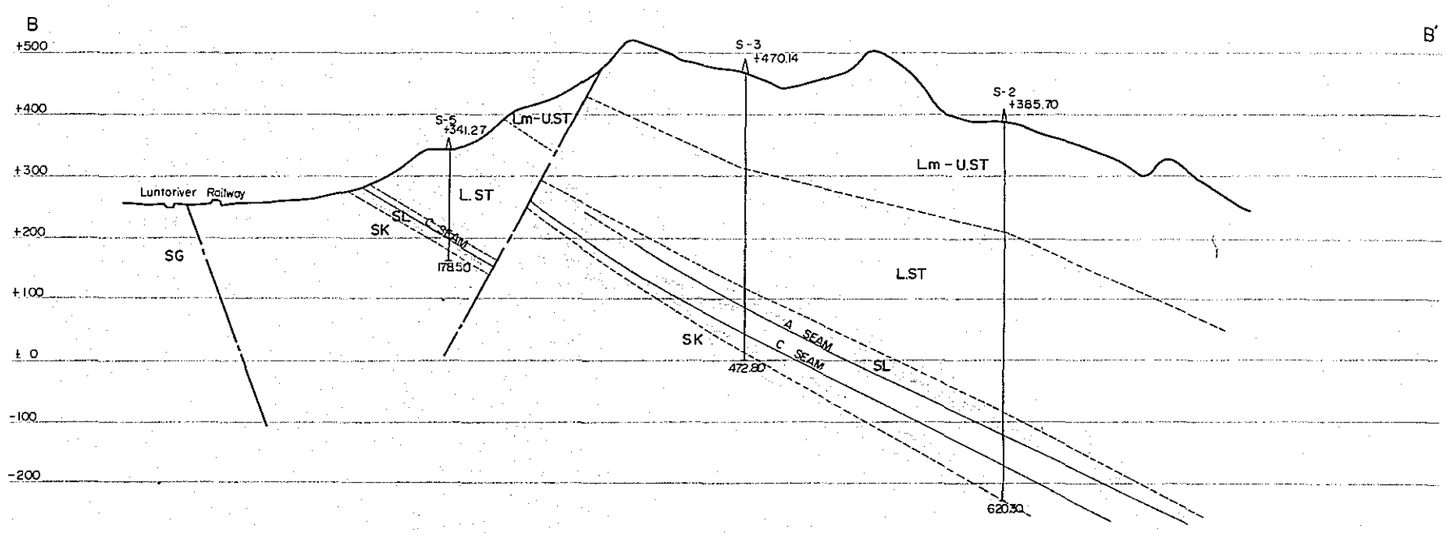
GEOLOGICAL MAP OF SUGAR AREA

Dwg. NO	1	Scale	1 : 5.000
Date	April, 1980	Prepared by	R. SAITO

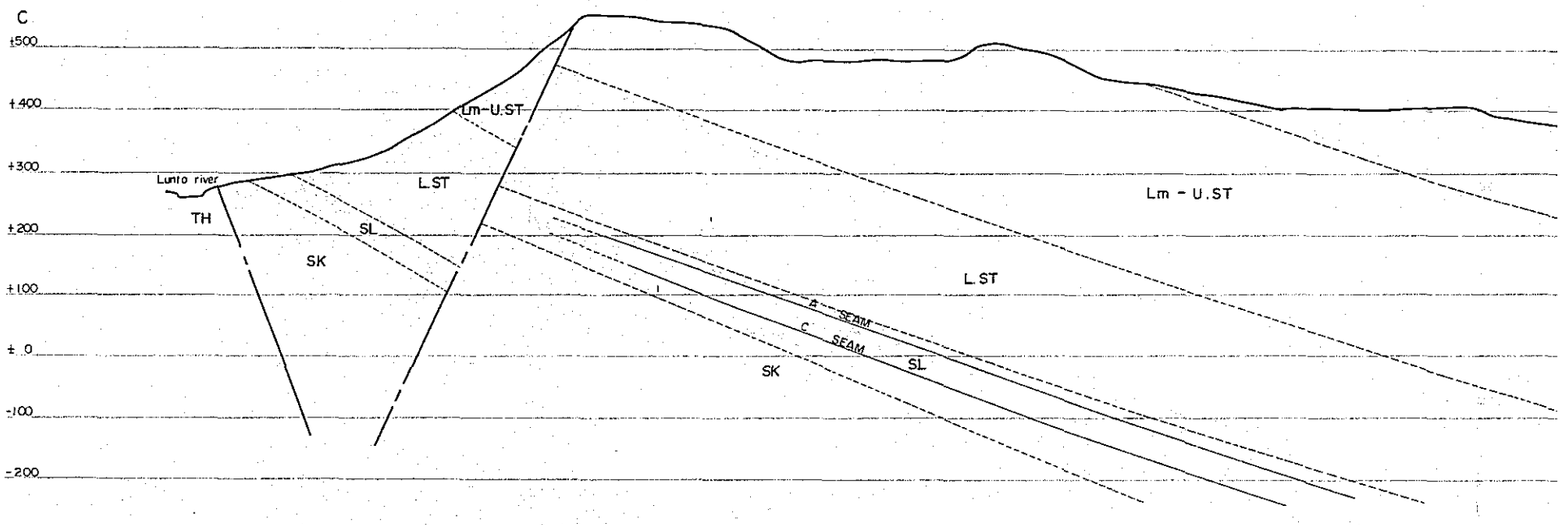
A


S-1 Projected
+340.49
W-8 Projected
+237.62
Luntoriver
Luntoriver
+300
+200
+100
± 0
-100
-200
-300
Lm - U.ST
L.ST
A SEAM
C SEAM
SL
SK
416.50
406.25

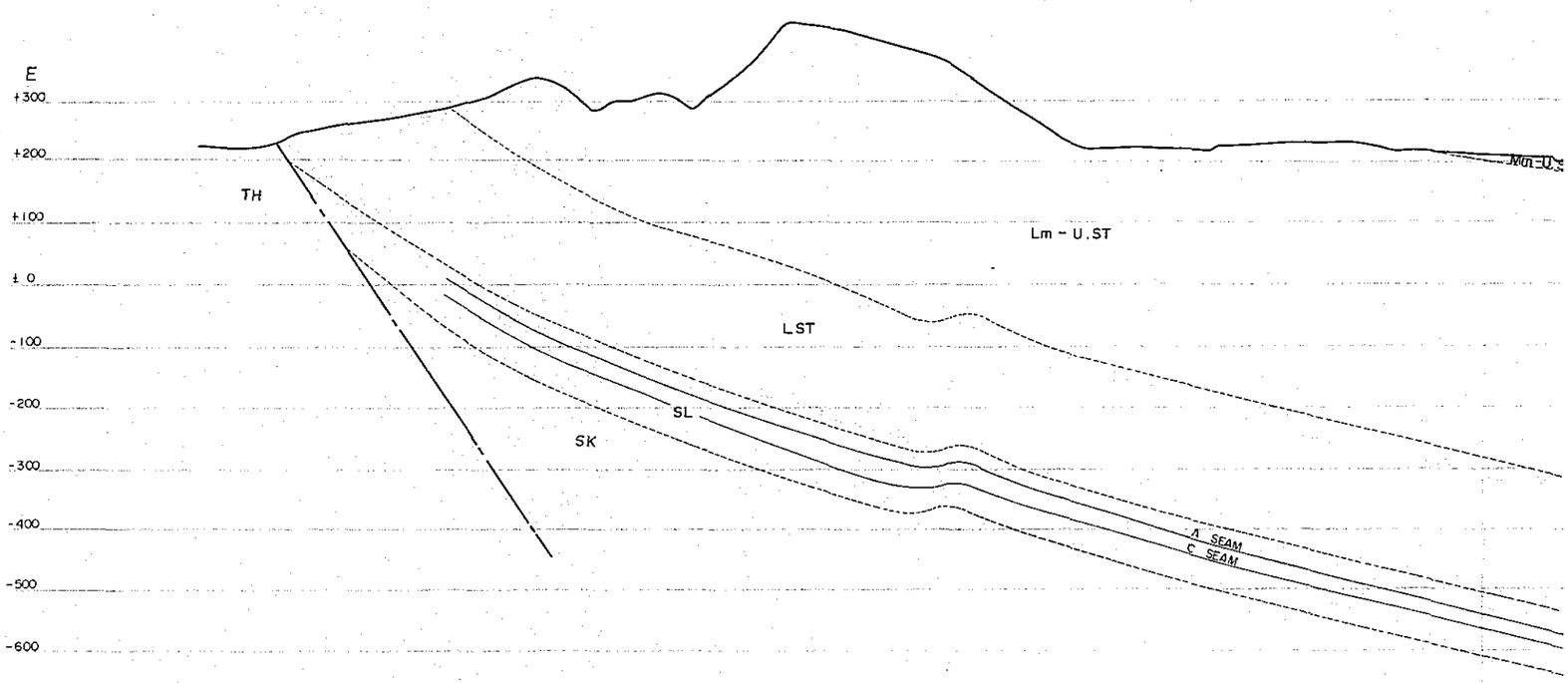
B


B'
S-3
+470.14
S-2
+385.70
S-5
+341.27
Lm-U.ST
Lm - U.ST
Luntoriver Railway
L.ST
SK
SL
C SEAM
SG
178.50
L.ST
A SEAM
C SEAM
SL
SK
472.80
620.30
+500
+400
+300
+200
+100
± 0
-100
-200

C


Lm-U.ST
Lm - U.ST
Lunto river
L.ST
TH
SL
SK
L.ST
A SEAM
C SEAM
SL
SK
+500
+400
+300
±200
+100
± 0
-100
-200

E


TH
Lm - U.ST
L.ST
SL
SK
A SEAM
C SEAM
+300
+200
+100
± 0
-100
-200
-300
-400
-500
-600

Mm - U.ST

Lm - U.ST

B'

D

S-4
+516.99

Mm - U.ST

L.ST

SL

SK

Lm - U.ST

L.ST

399.30

SK

SL

A SEAM

C SEAM

- U.ST

Mm - U.ST

Um - U.ST

DH-8
+209.31

Mm - U.ST

Um - U.ST

A SEAM

C SEAM

662.30

E'

+200

+100

± 0

-100

-200

-300

-400

-500

-600

Um-UST

Mm-UST

Lm-UST

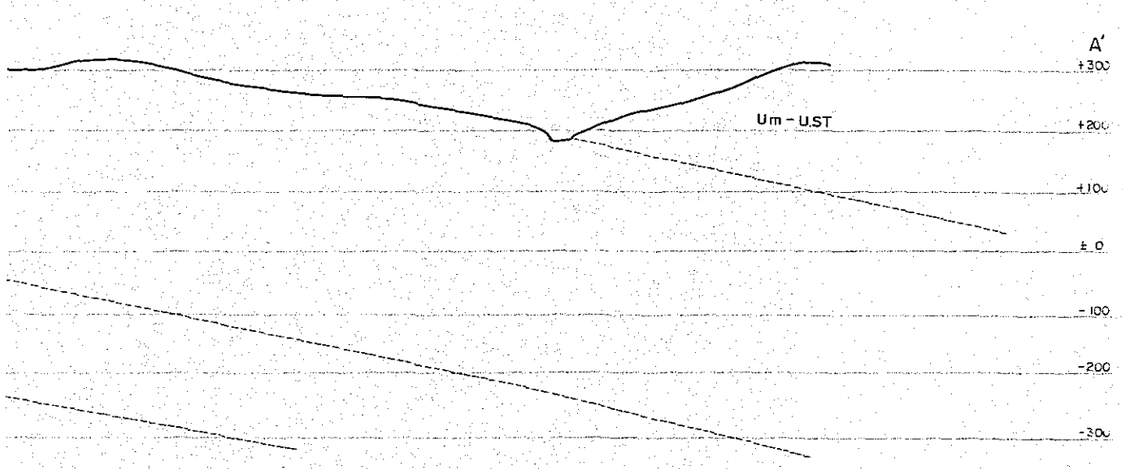
L.ST

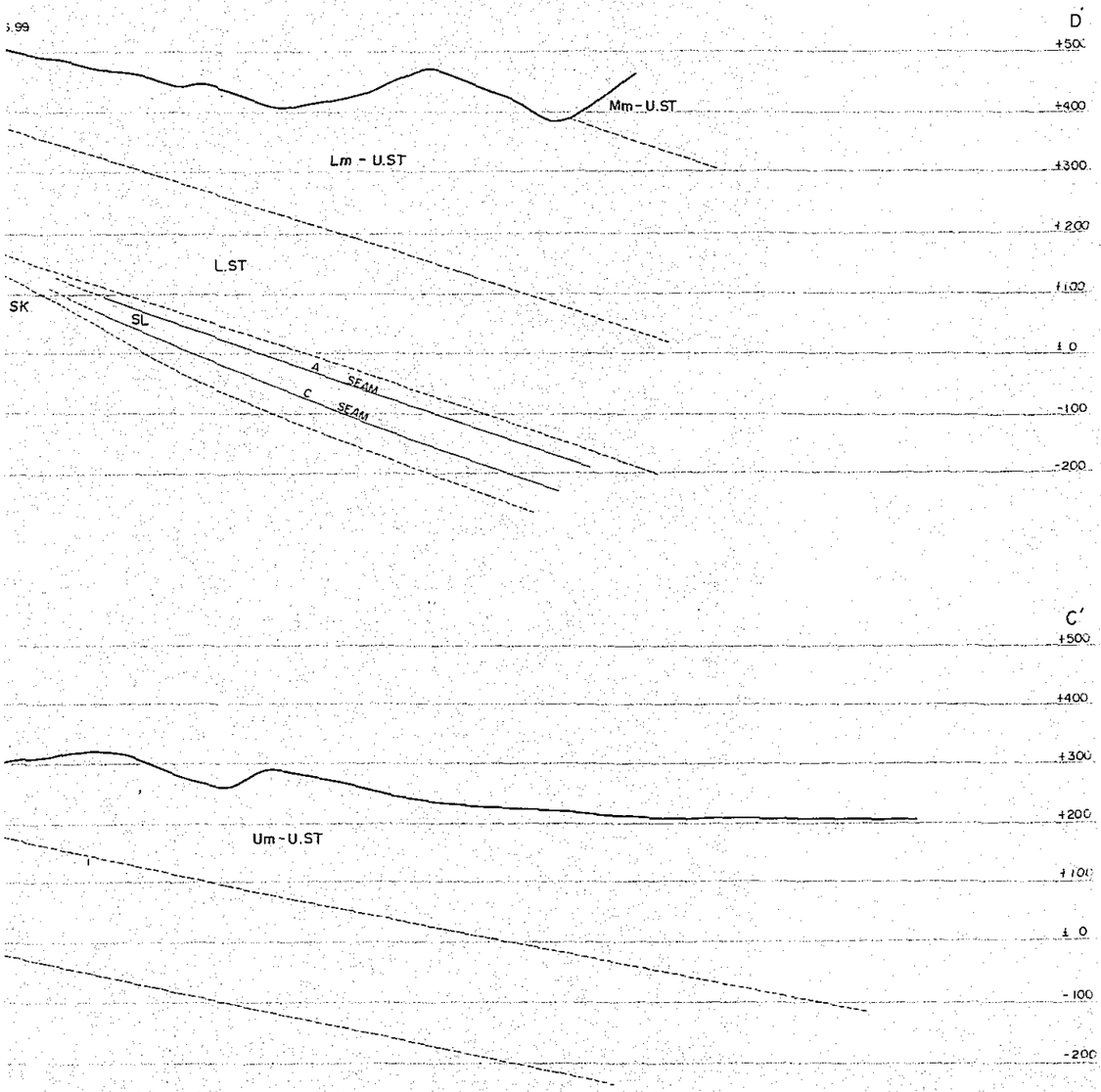
SL

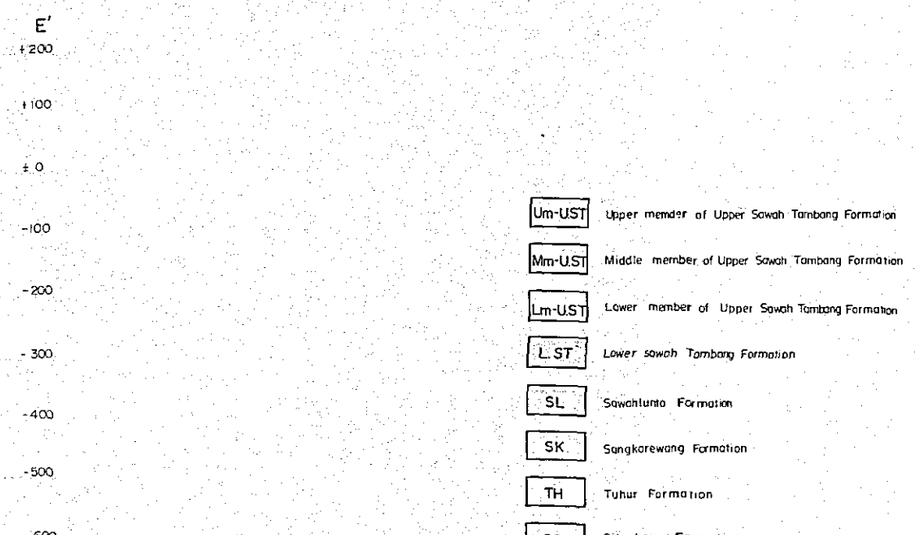
SK

TH

SG







Um-U.ST	Upper member of Upper Sawah Tambang Formation
Mm-U.ST	Middle member of Upper Sawah Tambang Formation
Lm-U.ST	Lower member of Upper Sawah Tambang Formation
L.ST	*Lower sawah Tambang Formation*
SL	Sawahlunto Formation
SK	Sangkarewang Formation
TH	Tuhur Formation
SG	*Silungkang Formation*

JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
THE ADDITIONAL EXPLORATION

Geological Cross Sections

Dwg No	2	Scale	1 : 5,000
Date	April, 1980	Prepared by	K. ITO, R. SAITO

BORE HOLE LOG

HOLE NO	S-3
AREA	SUGAR
DATE DRILLED	29th Dec. '79 - 31th March 1980
TOTAL DEPTH	472.80 m
RL COLLAR	+ 467.121 m
COORDINATE	X = +15,808.402 ; Y=-20,252.83a
DRILLER	N.YOSHIDA
LOGGED BY	K.ITO , K SOEDJONO
ASS DRILLER	
DRILL MACHINE	KOKEN EP-1 Scale 1:100

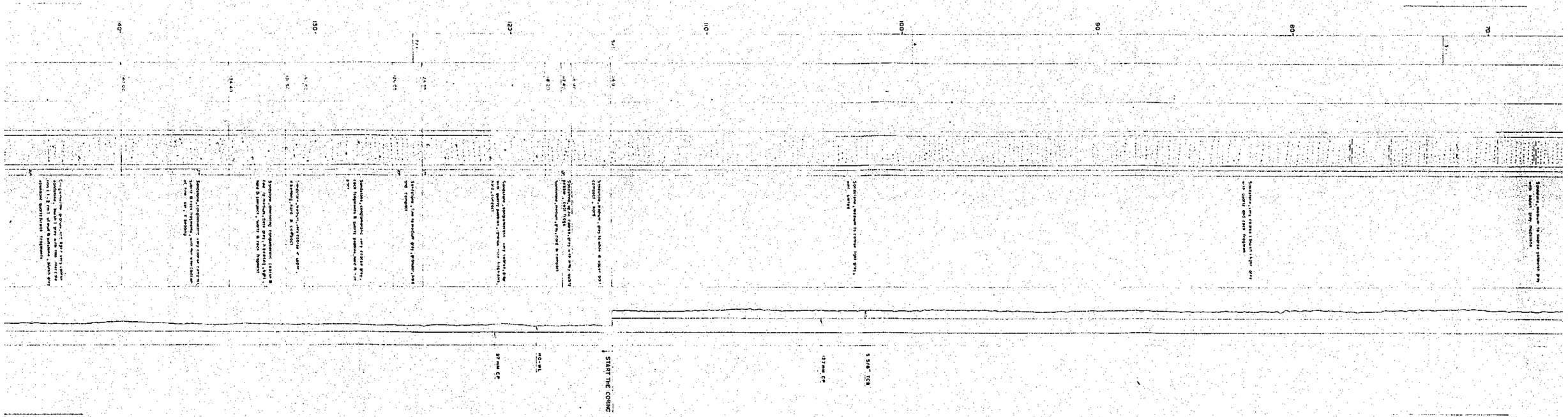
JAPAN INTERNATIONAL COOPERATION AGENCY

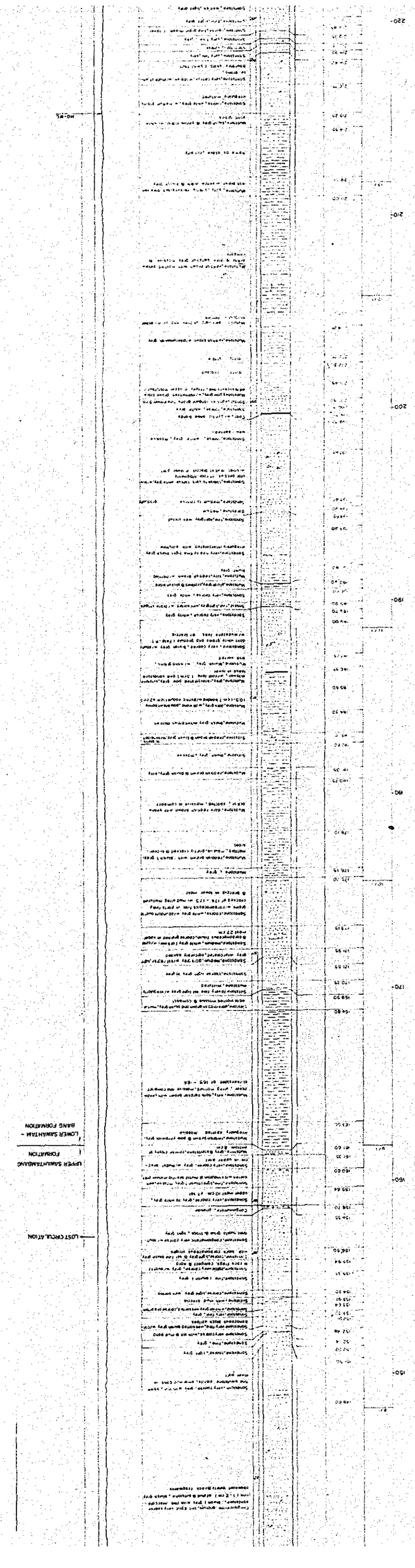
THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE
— THE ADDITIONAL EXPLORATION —

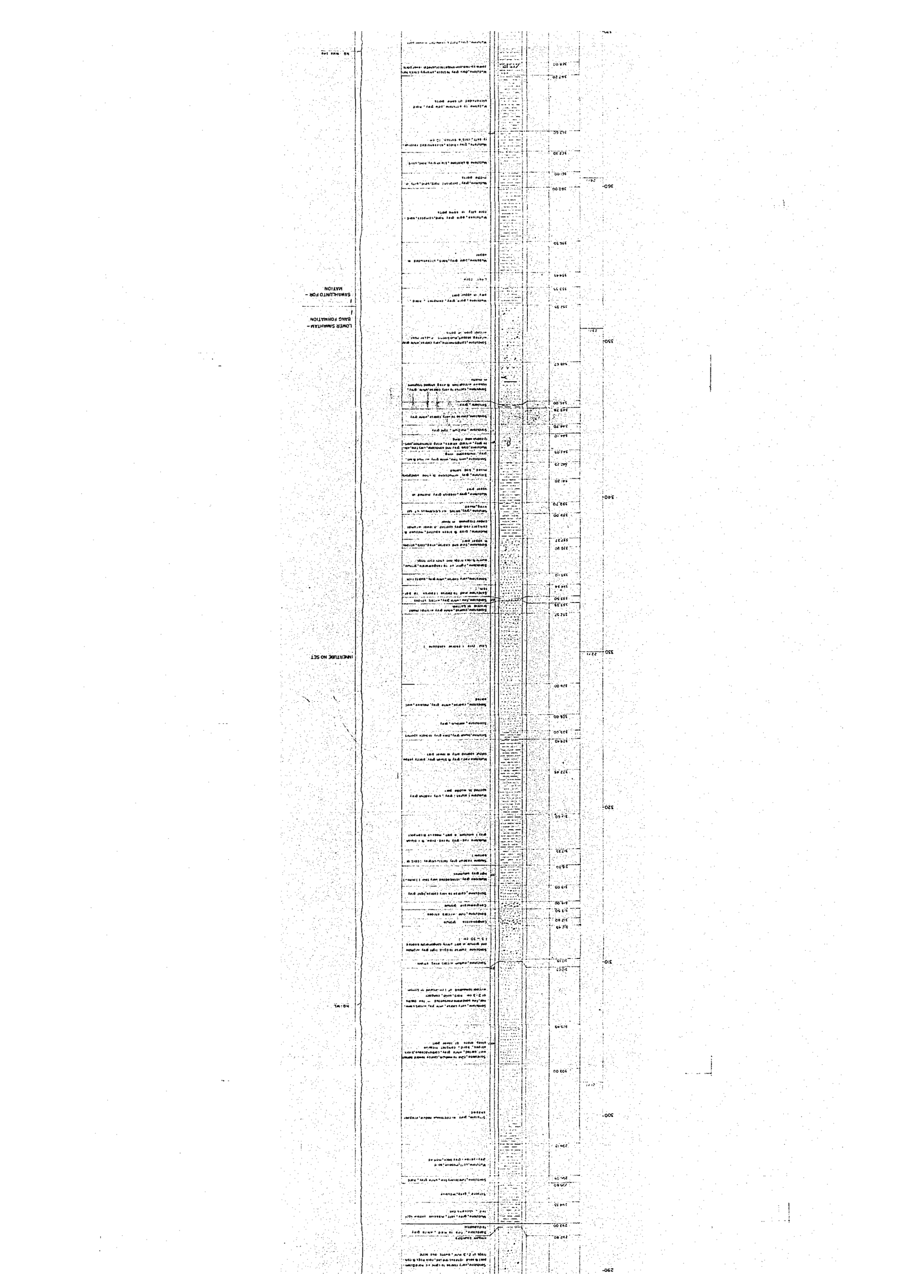
Bore Hole Log

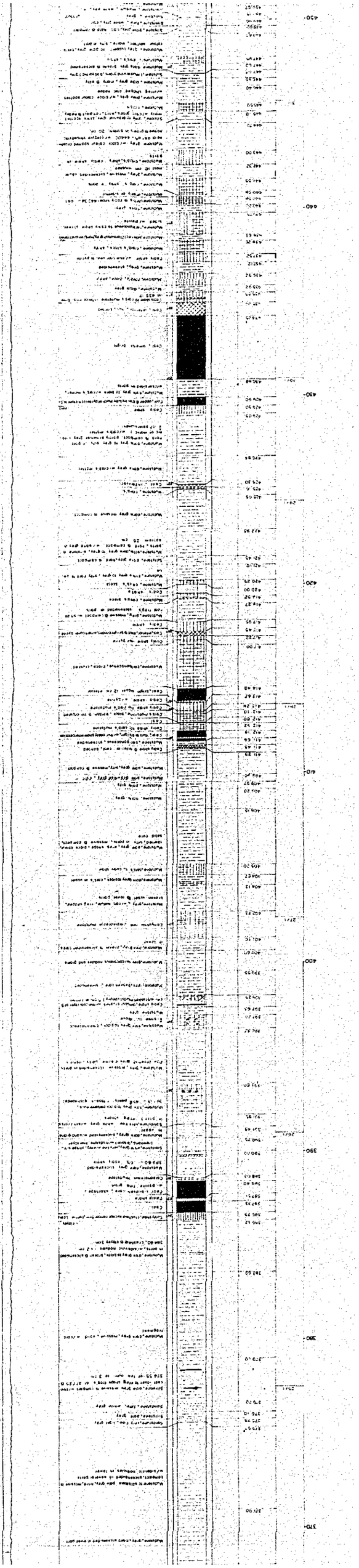
	3a	Scale	1 : 100
Date		Prepared by	K.Ito, K.SOEDJONO

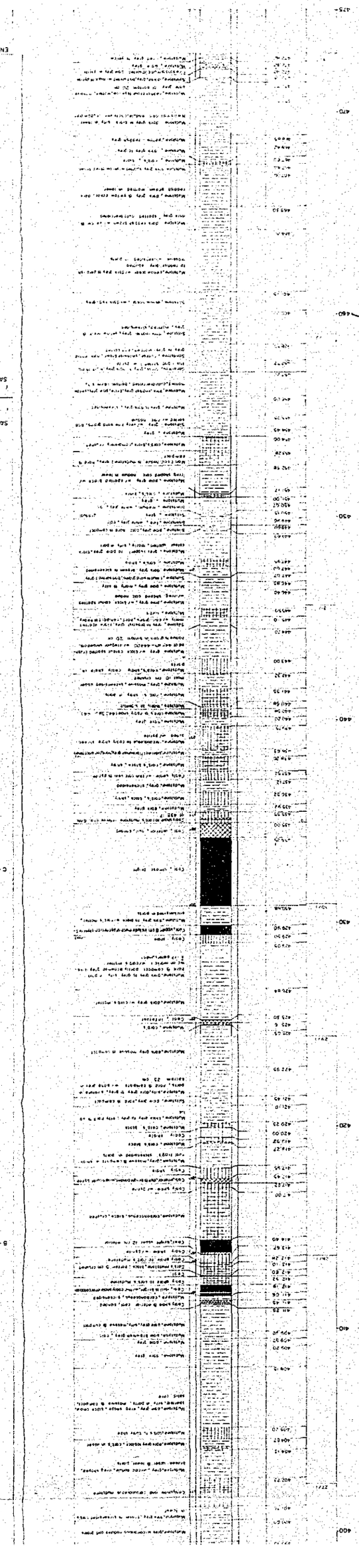
DATE & SHIFT	DEPTH	APPARENT THICKNESS	STRAT COLUMN	LOSS %	ROCK DESCRIPTION	100m/M	REMARK
	0				Sand, loose to very dense, semi-wet, angular to fine yellowish brown with sandstone boulder in upper part		
		2m					140 mM MCB
							6" CP
	10						
		50m					
							5 5/8" TCB
					Sandstone, medium, light to dark yellowish brown, well sorted		127 mM CP
							97 mM CP
	20						
	30				Sandstone, coarse, greenish grey, quartzitic, well sorted		
	40						
		2					
	50				Sandstone, conglomeratic, medium to coarse, greyish light grey with bluish grey mudstone		
	60				Sandstone, very crushed, brownish grey		
					Sandstone, medium to coarse yellowish grey with bluish grey mudstone		




LOWER SAWAHTAM – BANG FORMATION
UPPER SAWAHTAMBANG FORMATION
LOST CIRCULATION
210-
200-
190-
180-
170-
160-
150-
90-


LOWER SAMHTAM - BANG FORMATION
SAMHALUNTO FOR - MATION
INNERTUBE NO SET
NO - WE
NO WWE INE


C – SEAM
B – SEAM
A – SEAM
450
440
430
420
410
400
390
380
370


SAMAHLUNTO FOR-
MATION
SANKARE WAND FOR-
MATION
C — SEAM
B — SEAM
END OF HOLE
400
410
420
430
440
450
460
470
475

BORE HOLE LOG

HOLE NO.	S-4
AREA	SUGAR
DATE DRILLED	25Th. Feburary – 26Th. March 1980
TOTAL DEPTH	399.30m
EL. COLLAR	511.551 m
COORDINATE	X = + 15849.842 , Y = – 21214.222
DRILLER	N. YOSHIDA
LOGGED BY	K. ITO, K. SOEDJONO
DRILL MACHINE	KOKEN, EP-1W

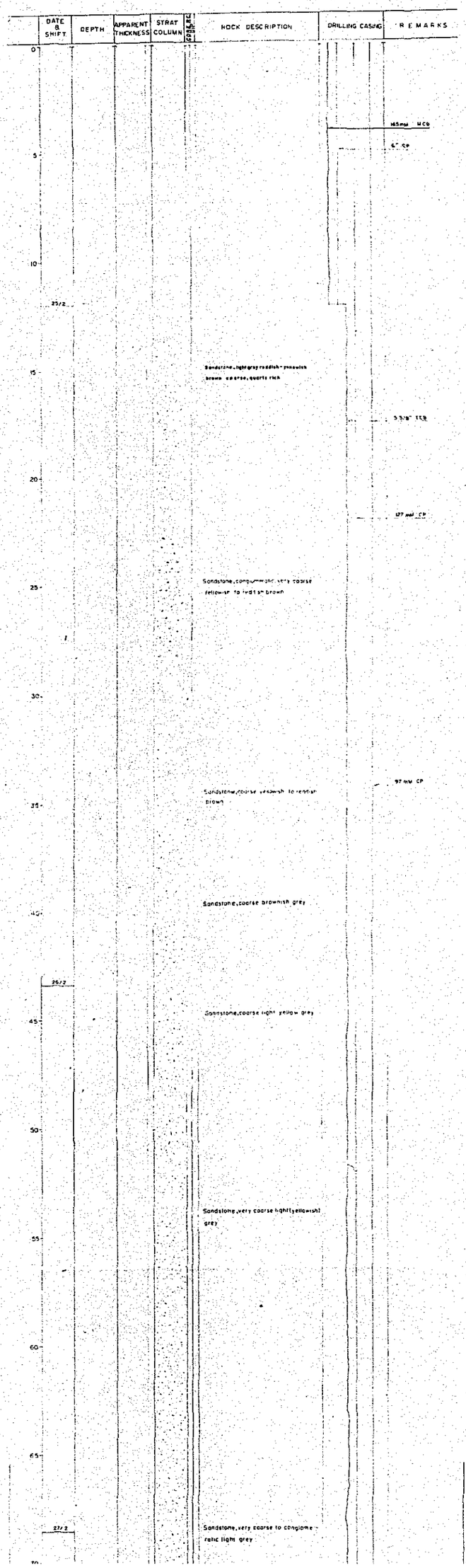
Scale 1:100

JAPAN INTERNATIONAL COOPERATION AGENCY

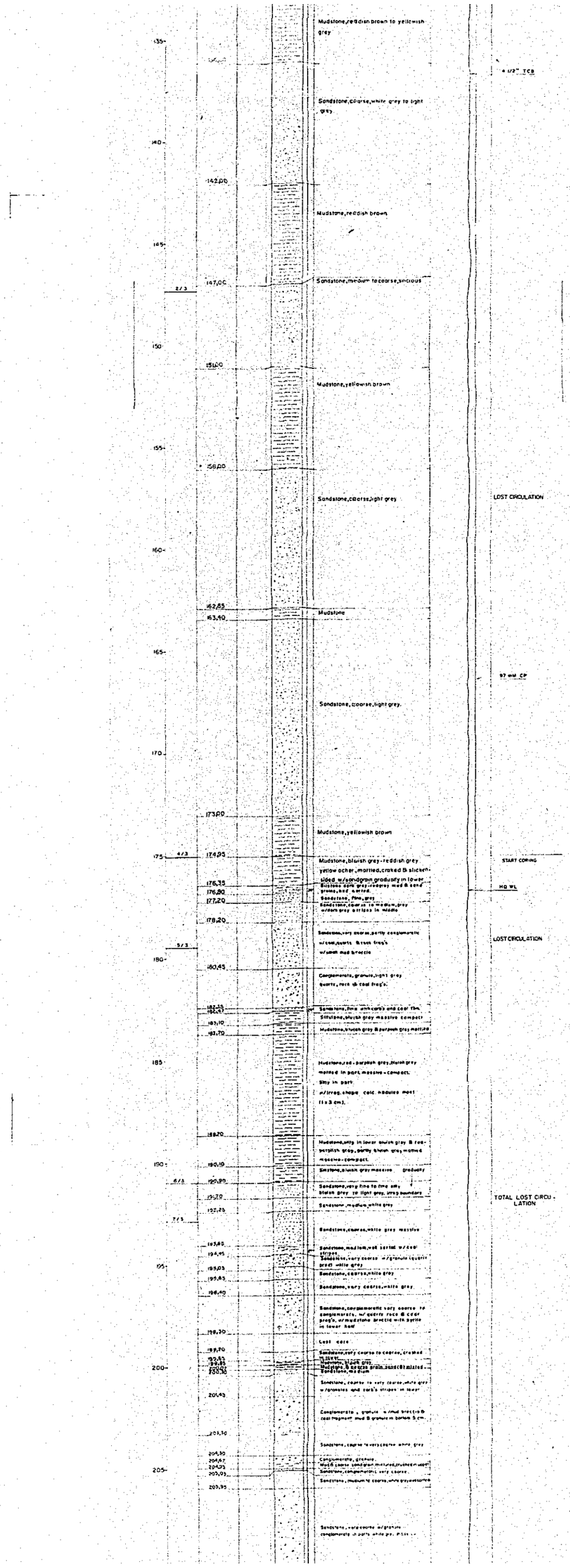
THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE – THE ADDITIONAL EXPLORATION –

Bore Hole Log

	3b	Scale	1 : 100
Date		Prepared by	K.Ito, K.SOEDJONO




65-
70-
75-
80-
85-
90-
95-
100-
105-
110-
115-
120-
125-
130-
135-
27/2
28/2
29/2
Sandstone,very coarse to conglomeratic
light grey
Sandstone,very coarse to conglomeratic
rotic light grey
Sandstone,very coarse,lightbluish)
grey,w/ bluish grey mudstone grain
(w/thin mudstone layer)
Sandstone,conglomeratic very coarse
light grey
Sandstone,coarse to very coarse
light(yellowish) grey.
Sandstone,coarse to very coarse to very coarse light grey
Sandstone,coarse light yellowish grey
4 VS' TCB
Mudstone,purplish to reddish brown
bluish grey,m Lithol,massive
Sandstone,coarse
Mudstone,reddish brown to yellowish
grey
Mudstone,reddish brown
UPPER SAMAKTAM -
LOWER SAMAKTAM -
BANG FORMATION
BANG FORMATION
HOBIL


135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
142,00
147,00
151,00
156,00
162,85
163,40
173,80
174,95
176,35
176,80
177,20
178,20
180,45
183,10
183,70
188,70
190,19
190,80
192,79
193,25
193,85
194,45
195,03
195,85
196,40
198,30
199,70
200,43
201,43
204,30
204,67
205,03
205,95
2/3
4/3
5/3
6/3
7/3
Mudstone,reddish brown to yellowish grey
Sandstone,coarse,white grey to light grey
Mudstone,reddish brown
Sandstone,medium to coarse,siliceous
Mudstone,yellowish brown
Sandstone,coarse,light grey
Mudstone
Mudstone,yellowish brown
Mudstone,bluish grey-reddish grey
yellow ocher,mottled,cracked & slickensided w/sandgrain gradually in lower
Siltstone,sandy grey-reddish grey mud & sand grains,bad sorted.
Sandstone, fine, grey
Sandstone,coarse to medium,grey w/dark grey stripes in middle
Sandstone,very coarse,partly conglomeratic w/coal,quartz & rock frag's
w/small mud breccia
Conglomerate, granule,light grey
quartz, rare ch coal frag's.
Siltstone,bluish grey massive compact
Mudstone,bluish grey & purplish grey mottled
Mudstone,red-purplish grey,bluish grey
mottled in part,massive-compact.
Silty in part
w/irreg.shape calc. nodules most
(1 x 3 cm).
Mudstone,silty in lower bluish grey & red-purplish grey,partly bluish grey mottled
massive-compact.
Siltstone,bluish grey massive gradually
Sandstone,very fine to fine silty
bluish grey to light grey, irreg boundary
Sandstone,medium,white grey
Sandstone,coarse,white grey massive
Sandstone,medium,well sorted w/coal stripes
Sandstone,very coarse w/granule (quartz pred) white grey
Sandstone,coarse,white grey
Sandstone,very coarse,white grey
Sandstone,conglomeratic very coarse to conglomeratic, w/quartz rock & coal frag's, w/mudstone breccia with pyrite in lower half
Lost core
Sandstone,very coarse to coarse, crushed in layer
Mudstone, bluish grey
Mudstone & coarse grain sand(s) silstone
Sandstone,medium
Sandstone, coarse to very coarse,white grey w/granules and coal's stripes in layer
Conglomerate , granule w/mud breccia & coal fragment mud & granule in bottom 5 cm.
Sandstone, coarse to very coarse white grey
Conglomerate, granule
Mud & coarse sandgrain mixture,crushed in layer
Sandstone,conglomeratic, very coarse.
Sandstone, medium to coarse,white grey,massive
Sandstone, very coarse w/granule conglomerate in parts white gr. Pebb
4 1/2" TCB
START CORING
HQ WL
LOST CIRCULATION
97 mm CP
LOST CIRCULATION
TOTAL LOST CIRCULATION

LOST CIRCULATION

LOST CIRCULATION

NO - WL

LOST CIRCULATION

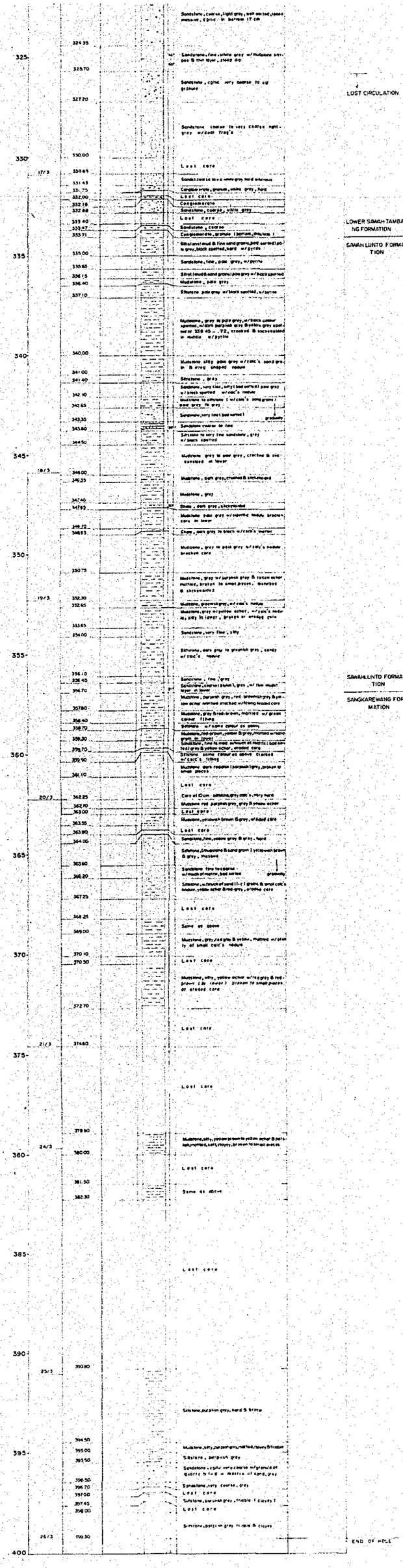
LOST CIRCULATION

LOWER SAWAH TAMBANG FORMATION

SAWAH LUNTO FORMATION

SAWAHLUNTO FORMATION

SANGKAREWANG FORMATION


Sandstone, coarse, light grey, well sorted, loose
Sandstone, cgnc - in between 17 cm
324.35
325
325.70
Sandstone, cgnc very coarse to cg
gritstone
LOST CIRCULATION
327.20
Sandstone coarse to very coarse light -
grey w/coal frag's
330
330.00
Lost core
17/3
330.65
Sandstone coarse white grey hard siliceous
331.45
331.75
Conglomerate, granule, white grey, hard
332.00
Lost core
332.18
Conglomerate
332.88
Sandstone, coarse, white grey
333.40
Lost core
333.67
Sandstone, coarse
333.71
Conglomerate, granule (quartz) pebble
LOWER SAWAH TAMBA-
NG FORMATION
Siltstone/mud & fine sand grains, poor sorted pale
grey, black spotted, hard w/pyrite
SAWAH LUNTO FORMA-
TION
335
335.00
Sandstone, fine, pale grey, w/pyrite
335.65
336.15
Silst/mud & sand grains, pale grey w/black spotted
336.40
Mudstone, pale grey
337.10
Siltstone pale grey w/black spotted, w/pyrite
Mudstone, grey to pale grey, w/black pebble
spotted, w/dark purplish grey & pebble grey spot-
ted at 338.45 - .72, crossbd & sackcssbd
in middle w/pyrite
340
340.00
Mudstone silty pale grey w/calc's sand grey
in & irreg shaped nodule
341.00
341.40
Siltstone, grey
Sandstone, very fine, silty (bad sorted) pale grey
w/black spotted w/calc's nodule
342.10
Mudstone to siltstone (w/calc's sand grains)
pale grey to grey
342.65
Sandstone, very fine (bad sorted)
gradually
343.35
Sandstone coarse to fine
343.80
Siltstone to very fine sandstone, grey
w/black spotted
344.50
345
Mudstone grey to pale grey, crushed & pie-
cessed at lower
18/3
346.00
346.23
Mudstone, dark grey, crushed & sackcssed
Mudstone, grey
347.60
347.93
Shale, dark grey, sackcssed
Mudstone pale grey w/calcritic nodule, brecciated
core in lower
348.70
348.85
Shale, dark grey to black w/calc's matter
Mudstone, grey to pale grey w/calc's nodule
350
brecciated core
350.75
Mudstone, grey w/purplish grey & yellow ochre
mottled, broken to small pieces, disturbed
& sackcssbd
352.30
19/3
352.65
Mudstone, greenish grey, w/calc's nodule
Mudstone, grey w/yellow ochre, w/calc's nodu-
le, silty in lower, broken or crushed core
353.65
354.00
Sandstone, very fine, silty
Siltstone, dark grey to greenish grey, sandy
w/calc's nodule
355
356.10
Sandstone, fine, grey
SAWAHLUNTO FORMA-
TION
356.40
Sandstone, coarse (blue), grey, w/ thin mudst
layer at lower
356.70
Mudstone, purplish grey, red-brownish-grey & yel-
low ochre mottled cracked w/strong leaded core
357.80
Mudstone, grey & red-brown, mottled w/green
SANGKAREWANG FOR-
MATION
colour filling
358.40
Siltstone w/same colour as above
358.70
Mudstone, red-brown, yellow & grey, mottled w/sand
grain in lower
359.30
Sandstone, fine to med w/much of matrix (bad sort
ed) grey & yellow ochre, crushed core
359.70
360
Siltstone same colour as above (caved
359.90
w/calc's filling)
Mudstone dark reddish (purplish) grey, broken to
small pieces
361.10
Lost core
362.25
20/3
Core of 10cm sandstone, grey calc's, very hard
362.70
Mudstone red purplish grey, grey & yellow ochre
363.00
Lost core
Mudstone, yellowish brown & grey, w/faded core
363.35
363.80
Lost core
Sandstone, fine, yellow grey & grey, hard
364.00
Siltstone/mudstone & sand grains (yellowish brown
& grey, massive
365
365.60
Sandstone fine to coarse
w/much of matrix, bad sorted
gradually
366.20
Siltstone, w/much of sand (1-2 grains) & small calc's
nodule, yellow ochre & red-grey, crushed core
367.25
Lost core
368.25
Same as above
369.00
Mudstone, grey, (reddish grey & yellow, mottled w/plen
ty of small calc's nodule
370
370.10
Lost core
370.50
Mudstone, silty, yellow ochre w/(reddish grey & red-
brown (by caved?) broken to small pieces
of graded core
372.70
Lost core
21/3
374.60
375
Lost core
378.90
Mudstone, silty, yellow brown to yellow ochre & purp-
lish-mottled, soft, clayey, broken to small pieces
24/3
380.00
360
Lost core
381.50
Same as above
382.30
385
Lost core
390
390.80
25/3
Siltstone, purplish grey, hard & brittle
394.50
Mudstone, silty, purplish grey, mottled, clayey & friable
395.00
395
Siltstone, purplish grey
395.50
Sandstone, cgnc very coarse w/granule of
quartz & fine matrix of sand, grey
396.50
396.70
Sandstone, very coarse, grey
397.00
Lost core
397.45
Siltstone, purplish grey, friable (clayey?)
398.00
Lost core
Siltstone, purplish grey friable & clayey
26/3
399.50
END OF HOLE
400

BORE HOLE LOG

HOLE NO.	S – 5
AREA	SUGAR
DATE DRILLED	24th JAN – 19th MAR '80
TOTAL DEPTH	178.50 m
RL COLLAR	+ 340.328 m
COORDINATE	X = + 15346.418 ; Y = – 20252.838
DRILLER	AMAN, RADJINGUN, YULKIYAR
LOGGED BY	K. ITO , K. SOEDJONO
ASS. DILLER	
DRILL MACHINE	LY. 38

Scale 1:100

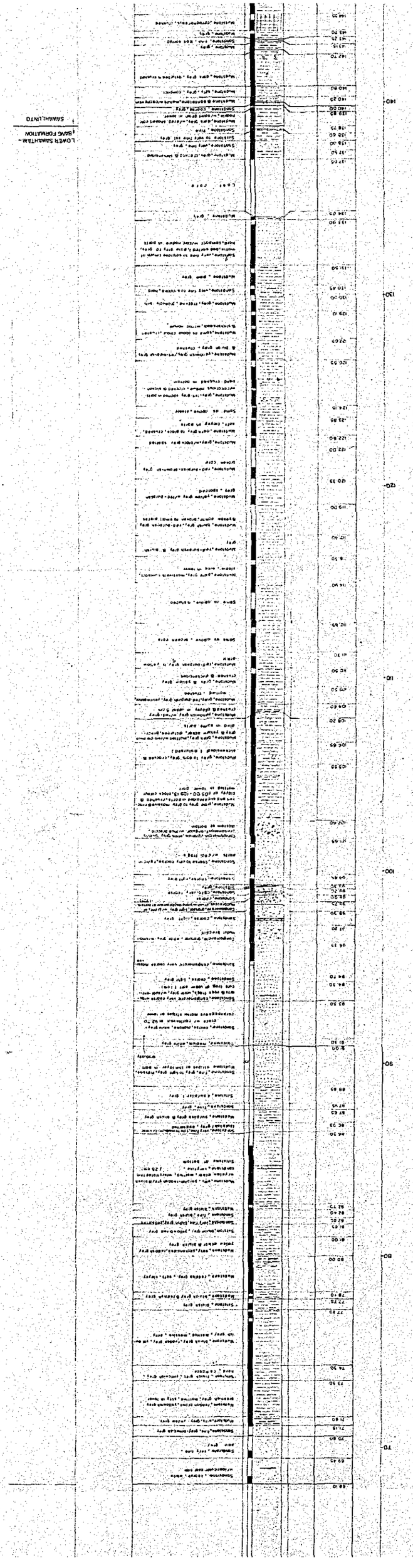
JAPAN INTERNATIONAL COOPERATION AGENCY

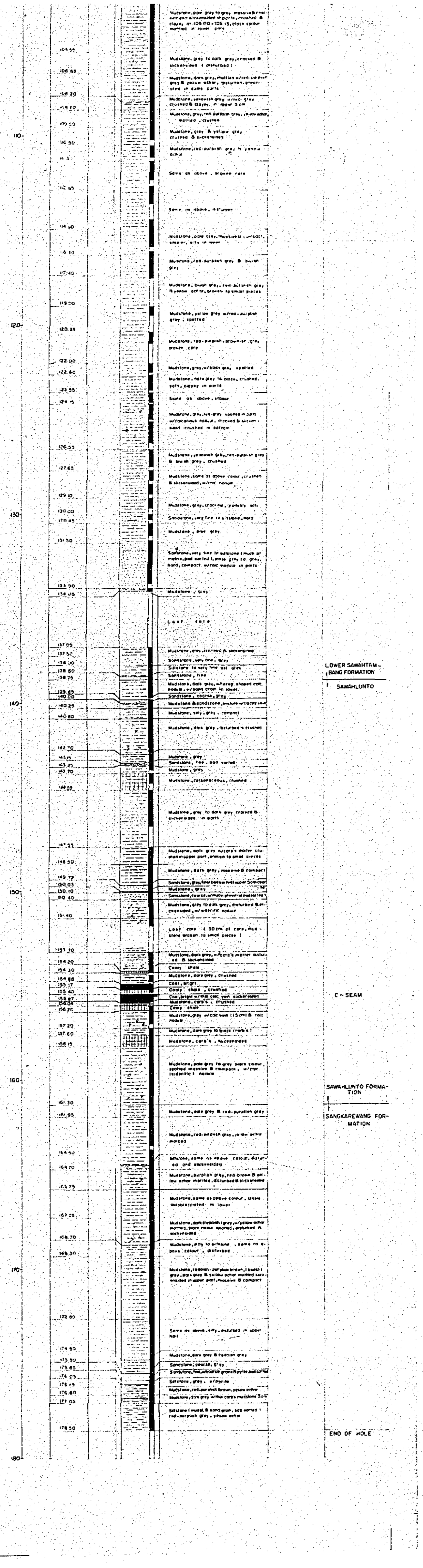
(THE SURVEY FOR THE REHABILITATION OF DIMBULIK COAL MINE — THE ADDITIONAL EXPLORATION —)

Bore Hole Log

	3 c	Scale	1 : 100
Date		Prepared by	K. Ito, K. SOEDJONO

DATE & SHIFT	DEPTH	APPARENT THICKNESS	STRAT COLUMN	CORE REC.	ROCK DESCRIPTION	DRILLING CASING	REMARKS
	0						
	0.60				Soil, yellowish brown		Non core (slime)
	1.05				Mudstone, partly sandy, greenish grey, soft, weathered		
					Siltstone, pale yellowish grey, weathered		
	3.10						
					Siltstone to very fine sandstone, pale brownish grey		Non core (slime)
	7.50						
	8.00				Mudstone, grey to yellowish grey		
					Mudstone, pale grey, yellowish grey & partly red - grey, massive		
	9.30						
10	9.70				Mudstone, bluish grey & dark greenish grey		
					Mudstone, bluish grey, silty in lower, massive		
	12.25				Sandstone, very fine, bluish grey to pale brown grey, soft, bedded, much of matrix)		
	13.30				Sandstone, fine, pale greenish grey		
	14.25				Sandstone, coarse, silty		
	15.25				Sandstone, fine, silty bottom 5cm coarse		
	16.20				Mudstone, silty, grey to greenish grey		
	19.25						
20					Sandstone, very fine, silty, pale bluish grey, bedded, w/much of mud matrix)		
	22.40						
					Pale yellow to brown		
	25.30						
					Sandstone, coarse, white grey to reddish brown (oxidized)		
	28.40						
30					Sandstone, fine to coarse pale (bleached) grey		Non core (slime)
	31.45						
	31.85				Siltstone, pale grey		
					Mudstone, pale yellowish grey, pale grey & purplish grey, massive		
	32.80						
	33.15				Siltstone, pale grey		
					Sandstone, very fine, pale bluish grey to white grey w/ purplish grey stripes / carb's material in-		
	34.50						
					Sandstone, fine to very fine, pale grey		Non core (slime)
	37.40						
40					Sandstone, medium, pale brownish grey, to pale grey, (lower)		
	43.40						
	44.40				Mudstone, pale grey		
	45.40				Mudstone, grey & purplish grey mottled		
					Mudstone, purplish-reddish grey, yellowish-grey mottled, w/ irreg shaped smaller reddish massive		
	46.65						
					Mudstone, dark bluish grey		
	48.15				Sandstone, fine and coarse (bed sorted), bluish grey		
	48.95				Sandstone, fine, scattered w/ coarse grain		
	49.20				Sandstone, very coarse (angular quartz grains) bluish grey		
	49.95				Coarse w/much of mud matrix		
50					Siltstone, (olivish) grey, w/mottled dark greish, upper 20cm muddy @ bottom 30 cm of (as)		
	51.35				Sandstone, pale grey, fine, w/ slightly carb's streaks		
	52.15						
					Sandstone, medium, pale grey		
	53.00				Sandstone, coarse, white grey, massive w/ black carb's stripes in parts		
	54.70						
60					Sandstone, fine to medium, pale grey to brownish grey, well sorted		Non core (slime)


LOWER SAMANTHA-
SAMAHLUNTO
SAMAHLUNTO FORMATION
140
130
120
110
100
90
80
70


LOWER SAWAHTAMBANG FORMATION
SAWAHLUNTO
C-SEAM
SAWAHLUNTO FORMATION
SANGKAREWANG FORMATION
END OF HOLE
110
120
130
140
150
160
170
180
Lost core

JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE) — THE ADDITIONAL EXPLORATION —

Columnar Section

Route	Lunto River		
Dwg. No.	3d	Scale	1 : 200
Date	April, 1980	Prepared by	R. Saito

FORMATION NAME		LOCALITY NUMBER	THICKNESS (True)	COLUMN	ROCK DESCRIPTION	REMARKS (Strike & Dip of strata)
UPPER SAWAH FORMATION	UPPER MEMBER		+ 85		sandstone, fine grained and mudstone including thin coal	
	MIDDLE MEMBER		420		sandstone, medium to fine grained.	
	LOWER MEMBER	ⓒ-②	60		sandstone, coarse grained	
			130		sandstone, coarse to medium grained, intercalated thin mudstone (0.05~0.10m)	
	LOWER		1.3		mudstone, gray	
			0.6		mudstone, lenticular	
		Ⓑ	3.7		sandstone, coarse and medium grained	
			2.0		mudstone, chocolatic	
			0.5		sandstone, fine grained	
			1.0		mudstone, gray	
			1.0		mudstone, chocolatic	
			0.8		sandstone, medium grained	
			1.2		mudstone, gray	
			5.0		sandstone, coarse grained	
			2.0		mudstone, gray	
			0.5		sandstone, fine grained	
			1.6		sandstone, coarse grained	
			0.7		mudstone, gray	
			5.0		sandstone, coarse grained	
			2.4		mudstone	
			3.5		sandstone, coarse grained	
			3.0		mudstone, gray	
			4.0		sandstone, medium and coarse grained	
			2.4		mudstone, greenish and chocolatic	

LOWER SAWAH TAMBANG FORMATION

	5.0		sandstone, coarse grained	
	2.4		mudstone	
	3.5		sandstone, coarse grained	
	3.0		mudstone, gray	
	4.9		sandstone, medium and coarse grained	
	2.4		mudstone, greenish and chocolatic	
	4.3		sandstone, coarse grained	
	3.0		mudstone, greenish and chocolatic.	
	1.0		mudstone, light gray	
Ⓐ	7.0		sandstone, coarse grained	
	3.0		mudstone, gray	
	3.0		mudstone, chocolatic	
	2.0		mudstone, light gray	
	2.0		sandstone, medium grained, platy	NS, E 45°
	6.0		sandstone, coarse grained	
	6.0		mudstone, greenish and chocolatic	
	6.3		sandstone, coarse grained	
	2.0		sandstone, fine grained, greenish	
	3.0		mudstone, greenish - chocolatic	
	0.7		sandstone, fine grained	
	0.7		sandstone, medium grained	
	0.2		mudstone + sandstone	
	4.0		sandstone, coarse grained	
	5.0		mudstone	
	1.0		sandstone, fine grained, gray	
	0.2		sandstone, fine grained	
	1.0		mudstone, light gray	
	29 ~ 30		mudstone, chocolatic	
	0.4		coaly shale	
	2.5		mudstone, gray	
	3.0		mudstone, chocolatic	
	2.0		mudstone, greenish	
	0.6		sandstone, medium grained, brown	
	3.0		mudstone, chocolatic	
	7.0		mudstone, greenish gray	
	0.5		sandstone & mudstone in alternation	
	0.5		sandstone, fine grained	N10E, SE30
	4.0		sandstone, coarse grained, brown	
	0.3		sandstone, fine grained, laminated	
	5.0		sandstone, coarse grained	
	1.3		sandstone, coarse grained	N10W, NE 42
	3.0		mudstone, chocolatic	
	6.0		mudstone, chocolatic	
	1.2		sandstone, medium grained with siceritic nodule	
	3.3		mudstone, chocolatic	
	0.3		sandstone, medium grained	

	sandstone, coarse grained		
5.0			
1.3	sandstone, coarse grained	N20W, NE 42	
	mudstone, chocolatic		
3.0			
	mudstone, chocolatic		
6.0			
1.2	sandstone, medium grained with sideritic nodule		
	mudstone, chocolatic		
3.3			
0.3	sandstone, medium grained		
	mudstone chocolatic		
5.0			
1.0	mudstone, silty, gray		
	sandstone, fine grained, greenish-gray		
2.0			
0.5	mudstone, greenish-gray		
1.3	sandstone, fine grained, greenish-gray		
0.5	sandstone, very fine grained, greenish-gray		
	mudstone, greenish-gray		
3.6			
1.6	sandstone, medium, greenish and mudstone, gray in alternation		
	sandstone, medium grained, partly laminated		
2.4			
	sandstone, fine grained, greenish-gray		
2.0			
2.0	mudstone		
	mudstone, greenish-chocolatic		
4.0			
6.0	mudstone, greenish-gray		
		N5°E, 34°E	
	sandstone, coarse grained F.	Fault (N20°W, SW 68°)	
6.0			
5.0+	mudstone		
	sandstone, coarse grained		
8.0			
	sandstone, fine grained, light gray, loose		
2.5			
	sandstone, coarse grained		
4.0			
	unknown	Fault (N40°W, NE 80°)	
0.5	sandstone, fine grained, gray		
0.3	sandstone, medium grained		
	sandstone and mudstone in alternation		
3.0			
	sandstone, medium grained		
10.0			
0.5	mudstone, gray		
0.4	sandstone, fine grained		
	mudstone, gray		
7.0			
0.5	sandstone, fine grained		
1.5	mudstone, chocolate with greenish gray irregular mixture		
0.9	sandstone, fine grained, greenish gray		
1.0	mudstone, gray		
0.7	sandstone, light gray		
0.2	mudstone		
0.3	sandstone, fine grained		
		N10W, NE 32	
	sandstone, medium grained		
11.0			
	mudstone (?)		
5.0			
	mudstone		
2.2			
	mudstone light gray		
4.2			
	mudstone light gray with sideritic nodule.		
2.0			
	mudstone, gray, including sandstone		
4.5			
0.3	sandstone, medium grained, white		
	mudstone, gray		
3.0			
	unknown		
0.4	coal	N10°W, NE 32°	
0.12	coaly shale		
0.03	sandstone fine grained		
	coal		
0.84			
	mudstone, gray		
1.0			
	sandstone, fine grained		
1.15			
0.75	coals shale and mudstone		
0.35	mudstone		
	sandstone, fine grained		
2.0			
	sandstone, fine grained with coaly matter		
0.65			
0.3	sandstone, fine grained		
1.0	coaly shale	N25W, NE 24	
	unknown		
2.0			
0.9	sandstone, fine grained		
0.3	mudstone, dark gray		
0.7	coaly shale		
0.1	mudstone		
0.7	coaly shale		
	mudstone, gray with sideritic nodule		
0.7			
0.6	sideritic nodule		
	mudstone, gray		
2.3			
	coaly shale		
1.2			
0.7	mudstone gray		
	mudstone gray with sideritic nodule		
4.0			

SAWAHLUNTO

SAWAHLUNTO FORMATION

6.0	mudstone, greenish - gray	
	sandstone, coarse grained	N5, 34 E
6.0		Fault (N12°W, 54-68°)
5.0+	mudstone	
	sandstone, coarse grained	
8.0		
	sandstone, fine grained, light gray, loose	
2.5		
	sandstone, coarse grained	
4.0		
	unknown	Fault (N-S/W, NE30)
0.5	sandstone, fine grained, gray	
0.3	sandstone, medium grained	
	sandstone and mudstone in alternation	
3.0		
	sandstone, medium grained	
10.0		
0.5	mudstone, gray	
0.4	sandstone, fine grained	
7.0	mudstone, gray	
0.5	sandstone, fine grained	
1.5	mudstone, concrete with greenish gray irregular mixture	
0.9	sandstone, fine grained greenish gray	
1.0	mudstone, gray	
0.7	sandstone, light gray	
0.2	mudstone	
0.3	sandstone, fine grained	
		N15W, NE32
	sandstone, medium grained	
11.0		
	mudstone (?)	
6.0		
	mudstone	
2.2		
	mudstone light gray	
4.2		
	mudstone Light gray with siderite nodule	
2.0		
	mudstone, gray, including sandstone	
4.5		
0.3	sandstone, medium grained, white	
	mudstone, gray	
3.0		
	unknown	
0.5	coal	N10°W, NE32
0.17	coaly shale	
0.03	sandstone fine grained	
	coal	
0.64		
1.0	mudstone, gray	
	sandstone, fine grained	
1.15		
0.75	coaly shale and mudstone	
0.35	mudstone	
	sandstone, fine grained	
2.0	sandstone, fine grained with coaly matter	
0.65		
0.3	sandstone, fine grained	
1.0	coaly shale	N25W, NE24
	unknown	
2.0		
0.9	sandstone, fine grained	
0.3	mudstone, dark gray	
0.7	coaly shale	
0.1	mudstone	
0.7	coaly shale	
0.7	mudstone gray with siderite nodule	
0.6	siderite nodule	
2.3	mudstone, gray	
1.2	coaly shale	
0.7	mudstone gray	
	mudstone gray with siderite nodule	
4.0		
	mudstone gray	
3.2		
0.5	siderite nodule	
	mudstone, gray with siderite nodule.	
2.0		
0.15	mudstone, gray	
0.19	coal	
0.5	inferior coal	
0.2	coaly shale	
1.0	coal	
0.15	inferior coal	
0.50	coaly shale	
1.0	coal	
0.12	inferior coal	
0.4	coaly shale	
0.6	mudstone	
1.3	coaly shale	
1.1	mudstone gray	
0.4	coaly shale	
0.4	mudstone, gray	
0.3	coaly shale	
0.4	coal	
0.25	coaly shale and coal	
	coal	
6.0		
0.4	coaly shale	
0.3	inferior coal	
0.1	coal	
0.7	coaly shale	
0.2	inferior coal	
1.6	coaly shale and mudstone alternation	
1.5	mudstone, gray	
0.5	siderite nodule	
0.4	coaly shale	
0.2	mudstone	
	mudstone with siderite nodule	
3.0		
	sandstone, fine grained	
3.0		
1.0	mudstone gray	
	mudstone, gray with siderite nodule	
3.0		
	unknown	
	mudstone, greenish gray and gray	
20+		

JAPAN INTERNATIONAL COOPERATION AGENCY

(THESURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE) —THE ADDITIONAL EXPLORATION—

Columnar Section

Route	Mulo Gading Creek		
Dwg No	3 e	Scale	
Date	April. 1980	Prepared by	R. SAITO

FORMATION NAME		LOCALITY NUMBER	THICKNESS (True)	COLUMN	ROCK DESCRIPTION	REMARKS (strike & dip of strata)
OMBILIN FORMATION					mudstone intercalted with thin coarse sandstone	
UPPER SAWAH TAMBANG FORMATION	UPPER MEMBER		+100		sandstone, medium to coarse grained.	
			100		Sandstone, fine grained, intercalated silt-stone and thin coal eams.	
			1		Sandstone, fine grained intercalated with very fine sand stone and silt stone bands.	
			120		Sandstone fine grained, intercalated with sandy siltstone and thin coal seams.	
	MIDDLE MEMBER		60		Sandstone, fine grained	

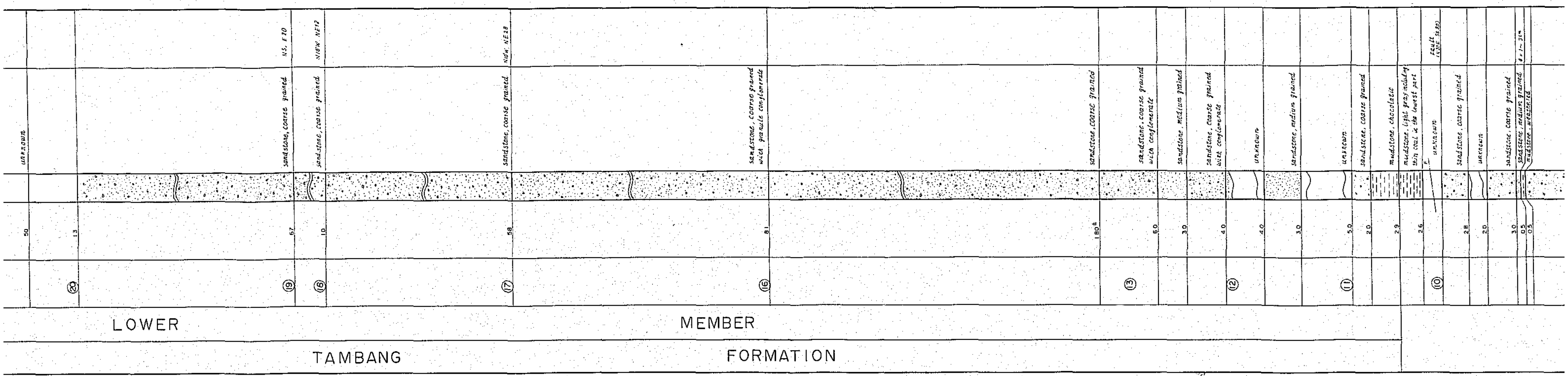
JAPAN INTERNATIONAL COOPERATION AGENCY

THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE I — THE ADDITIONAL EXPLORATION

Columnar Section

Route	Lasi River		
Dwg No	3f	Scale	1 : 200
Date	April, 1980	Prepared by	R. Saito

FORMATION NAME	LOCALITY NUMBER	THICKNESS (True)	COLUMN	ROCK DESCRIPTION	REMARKS (Strike & Dip of strata)
OMBILIN FORMATION					
		40 ~ 50		mudstone, light gray, loose	
UPPER SAWAH MEMBER		0.7		sandstone, medium grained	
		0.3		conglomerate	
		0.5		mudstone	
		0.5		mudstone, chocolatic	
		0.4		mudstone, weathered	
		2.0		mudstone, light gray	
		1.0		mudstone, light gray	
		0.6		sandstone, medium grained	
		2.0		mudstone Light gray	
		1.0		mudstone, light gray	
		0.4		mudstone and sandstone in alternation	
		1.0+		sandstone, medium grained, brown	
		5.0		unknown	
		3.0		siltstone, light gray	
		0.32		mudstone, light gray	
		2.0		mudstone, light gray, hard	
		3.5		sandstone, fine grained	
		0.78		mudstone	
		0.90		sandstone, fine grained	
		0.63		sandstone fine grained	
		7.0		mudstone, dark gray	
		3.0		unknown	
		2.5		sandstone, fine grained	
		3.0		mudstone	
		1.0		sandstone medium alternation with mudstone	
		0.4		mudstone light gray	
		2.0		sandstone fine grained, massive	
		2.9		mudstone, light gray	
		0.28		coal (0.13*), mudstone (0.05*)	
		3.0		mudstone, light gray	
		2.0		sandstone, fine grained, massive	
		1.0		silt stone	
		0.5		mudstone	
		0.7		sandstone, fine grained	
		1.3		mudstone and sandstone in alternation	
		1.3		mudstone, brown	
		0.5		coaly sazle	
		1.0		mudstone with nodule	
		1.3		tuff sandstone including carbonaceous matter	
		1.0		mudstone, dark gray	
		0.88		sandstone, medium, brown	
		0.46		conglomerate (ϕ = 0.5 ~ 10cm)	
		0.63		mudstone, dark gray	
	DH-8	12		unknown	
		34		unknown	
MIDDLE MEMBER		50		unknown	

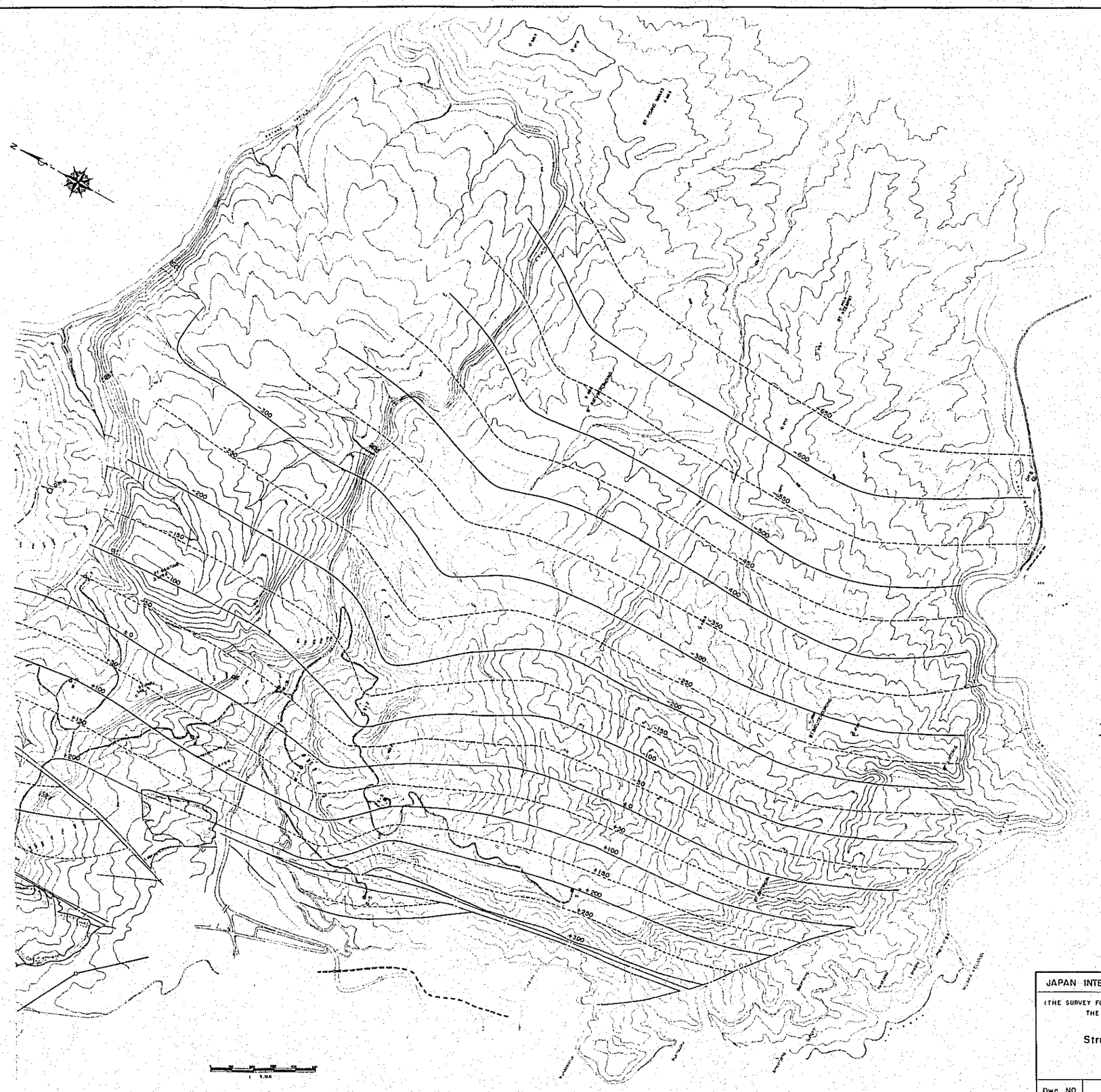

LOWER MEMBER
TAMBANG FORMATION
unknown
sandstone, coarse grained
sandstone, coarse grained with granule conglomerate
sandstone, coarse grained with conglomerate
sandstone, medium grained
mudstone, chocolatic

LOWER SAWAH FORMATION — TAMBANG

	2.9		mudstone, light gray including thin coal in the lowest part	
	2.6		F unknown	Fault (N10E 56SE)
(10)			sandstone, coarse grained	
	2.8		unknown	
	2.0		sandstone, coarse grained	
	3.0		sandstone, medium grained	ϕ = 1~ 3cm
	0.5		mudstone, weathered	
	0.5		sandstone, coarse grained	
	6.0		conglomerate	
	1.0		mudstone, light gray	
	0.4		mudstone, greenish gray mixed with chocolate	
	2.4		sandstone, medium grained	
	0.5		mudstone, chocolatic	
	0.5		sandstone medium grained greenish gray	
	0.9		mudstone, chocolatic	
	3.0		sandstone, coarse grained	
	2.4		sandstone, medium grained, loose	
	0.2		sandstone, medium-grained, banded	
	1.0		sandstone, medium grained, loose	
	0.5		mudstone, greenish gray	
	1.0		sandstone, medium grained	
	1.0		sandstone, medium grained, brown, cross-bedded	
	1.7		sandstone, coarse grained, chocolatic	
	1.0		sandstone, medium grained	
	0.5		conglomerate	ϕ = 1~ 5cm
	2.0		sandstone, coarse grained	
	2.6		mudstone, greenish gray	
	0.5		sandstone, medium grained, greenish gray	
	1.8		sandstone, medium grained, brown	
	1.9		sandstone, coarse grained, brown	
	1.0		sandstone, coarse grained, including coal parts	
	1.0		conglomerate	ϕ = 1.5 cm
	0.4		sandstone, conglomeratic	
	0.5		mudstone, greenish green	
	2.5		sandstone, fine grained	
	0.5		sandstone, medium grained, brown	
	1.0		sandstone, medium grained, greenish gray	
	1.5		sandstone, medium grained	N20°W, NE35
	0.5		sandstone, medium grained	
	2.5		mudstone, gray	
	2.0		mudstone, chocolatic	
	5.0		sandstone, medium grained greenish gray	
	0.2		sandstone, fine grained, greenish gray	
	0.2		sandstone, greenish gray	
	2.0		sandstone, medium grained, brown	
	3.0		sandstone, medium, brown, loose	
	0.3		sandstone, medium grained including coal patch	
	2.0		mudstone, greenish gray	
	4.0		sandstone, medium greenish gray	
	0.65		sandstone, medium grained loose.	
	6.0		sandstone, medium grained brown	
(9)	2.0		unknown	
(8)	12.0		sandstone, medium grained brown	
	2.0		mudstone, greenish gray	
	4.0		sandstone, fine, greenish gray	
	1.0		mudstone, greenish gray	
	0.5		sandstone, medium grained greenish gray	
	3.0		F mudstone	Fault (N7°W, 34°E)
	1.3		sandstone fine grained greenish green	
	1.2		mudstone, greenish gray	
	0.7		mudstone, chocolate mixed with greenish gray	
	3.0		mudstone, greenish gray	
(7)	6.0		mudstone, greenish gray	
	0.35		sandstone, medium grained alternate with mudstone, brown	N14°W, NE 23
	1.0		sandstone medium grained brown, banded	
	1.2		sandstone medium grained banded	
	3.0		conglomerate	
	0.5		mudstone, brown	
	0.6		sandstone medium, greenish gray	
	1.3		mudstone, greenish gray	
	1.3		mudstone, brown	
	0.5		F(?)	
(21)	5.0		unknown	
	2.0		sandstone, medium, brown	N28°W, NE10
	0.45		mudstone, gray	
	3.7		sandstone, medium grained, brown	
	6.5		mudstone, weathered	
	1.0		sandstone, medium grained	
	0.5		mudstone, weathered	
	1.0		sandstone, conglomeratic	
	2.0		mudstone	

LOWER SAWAH TAMBANG FORMATION

	30		mudstone, chocolatic	
	24		sandstone, coarse grained	
	0.2		sandstone, medium grained, loose	
	1.0		sandstone, medium grained banded	
	0.5		sandstone, medium grained, loose	
	1.0		mudstone, greenish gray	
	1.0		sandstone, medium grained	
	1.7		sandstone, medium grained, brown, cross-bedded	
	1.0		sandstone, coarse grained, calcitic	
	0.5		sandstone, medium grained	
	2.0		conglomerate	φ = 1 ~ 2cm
	2.6		sandstone, coarse grained	
	0.5		mudstone, greenish gray	
	1.8		sandstone, medium grained, greenish gray	
	1.9		sandstone, medium grained, brown	
	1.0		sandstone, coarse grained, brown	
	1.0		sandstone, coarse grained, including coal patch	
	0.4		conglomerate	φ = 1.5 cm
	0.5		sandstone, conglomeratic	
	2.5		mudstone, greenish green	
	0.5		sandstone, fine grained	
	1.0		sandstone, medium grained, brown	
	1.5		sandstone, medium grained, greenish gray	
	0.5		sandstone, medium grained	N20°W, NE°5
	2.5		sandstone, medium grained	
	2.0		mudstone, gray	
	5.0		mudstone, chocolatic	
	0.2		sandstone, medium grained, greenish gray	
	0.2		sandstone, fine grained, greenish gray	
	2.0		sandstone, greenish gray	
	3.0		sandstone, medium grained, brown	
	0.5		sandstone, medium brown, loose	
	2.0		sandstone, medium grained including coal patch	
	4.0		mudstone, greenish gray	
	0.65		sandstone, medium greenish gray	
	6.0		sandstone, medium grained, loose	
⑨	2.0		sandstone, medium grained, brown	
⑧	12.0		UNKNOWN	
	2.0		sandstone, medium grained, brown	
	4.0		mudstone, greenish gray	
	1.0		sandstone, fine, greenish gray	
	0.5		mudstone, greenish gray	
	3.0		sandstone, medium grained, greenish gray	
	3.0		F mudstone	fault (N75°W, 70°)
	1.3		sandstone, fine grained, greenish green	
	1.2		mudstone, greenish gray	
	0.7		mudstone, chocolate mixed with greenish gray	
	3.0			
⑦	6.0		mudstone, greenish gray	
	0.35		mudstone, greenish gray	
	1.0		sandstone, medium grained, alternate with medium red bed	N32°W, NE 28
	1.2		sandstone, medium grained, brown, banded	
	3.0		sandstone, medium grained, banded	
	0.5		conglomeratic	
	0.6		mudstone, brown	
	1.3		sandstone, medium, greenish gray	
	1.3		mudstone, greenish gray	
	0.5		mudstone, brown	
			F(?)	
㉑	5.0		Unknown	
	2.0		sandstone, medium, brown	N15°W, NE10
	0.45		mudstone, gray	
	3.7		sandstone, medium grained, brown	
	6.5		mudstone, weathered	
	1.0		sandstone, medium grained	
	0.5		mudstone, weathered	
	1.0		sandstone, conglomeratic	
	2.0		mudstone	
	1.0		sandstone, coarse grained	
	0.5		sandstone, medium grained	
	5.0		mudstone, weathered	
㉒	20+		sandstone, medium grained	
			unknown (fracture zone)	
㉓	15 ~ 20			
			mudstone	

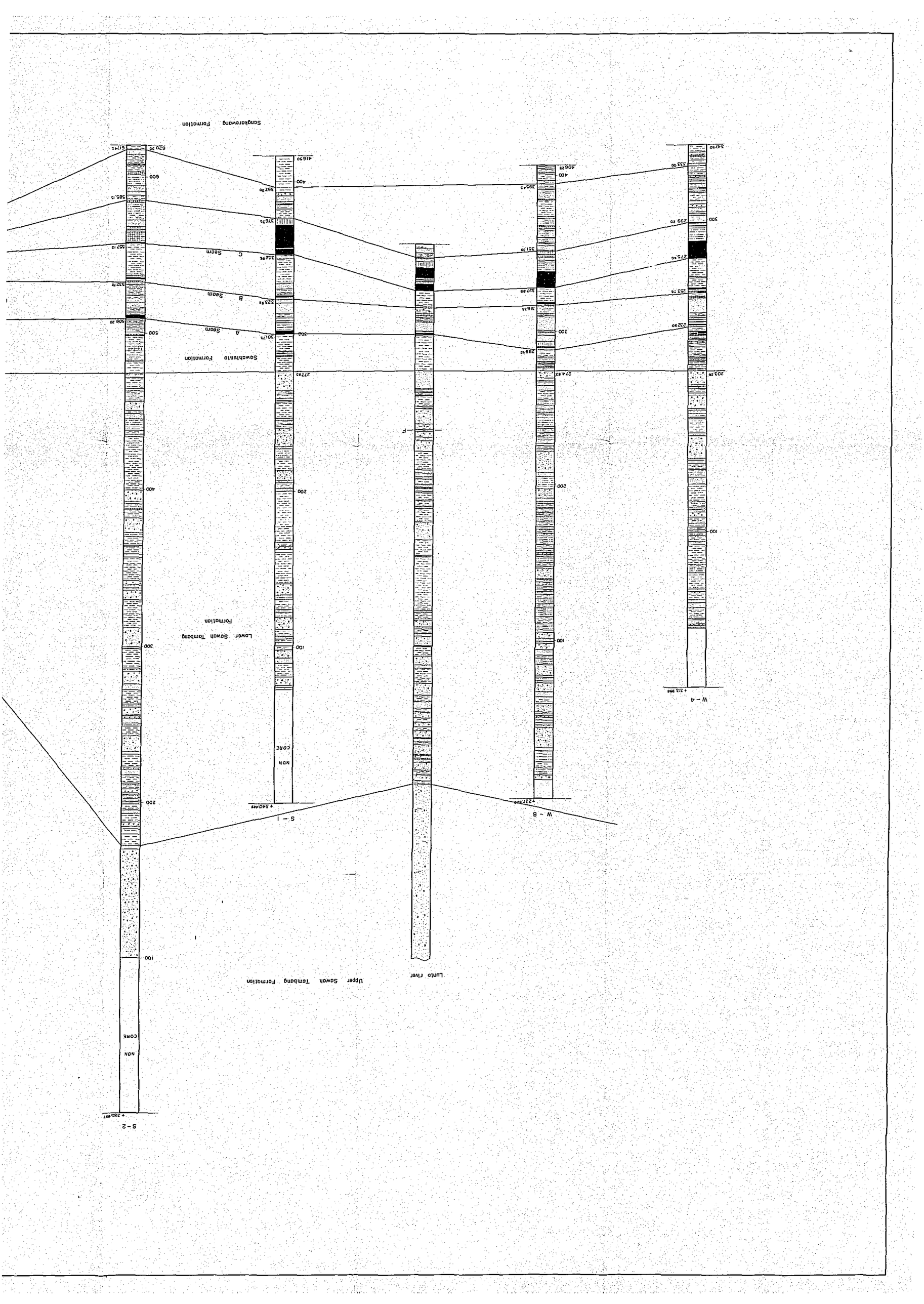


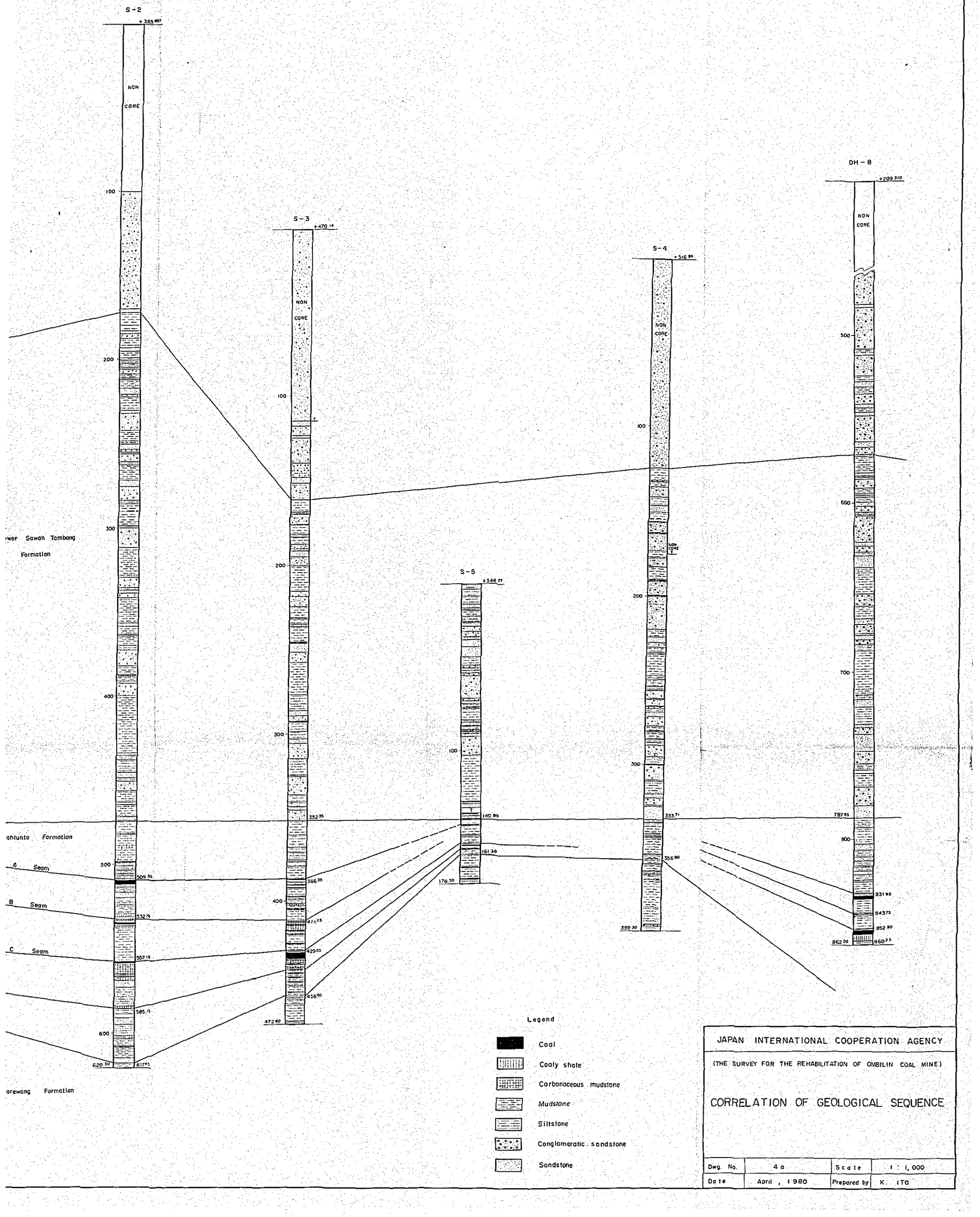
JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
THE ADDITIONAL EXPLORATION

Structure Contour Map
A Seam

Dwg NO	5 a	Scale	1 : 10,000
Date	April, 1980	Prepared by	K. Ito


Sangkarewang Formation
Sawahlunto Formation
A Seam
B Seam
C Seam
Lower Sawah Tambang Formation
Upper Sawah Tambang Formation
Lunto river
NON CORE
S - 1
S - 2
W - 8
W - 4

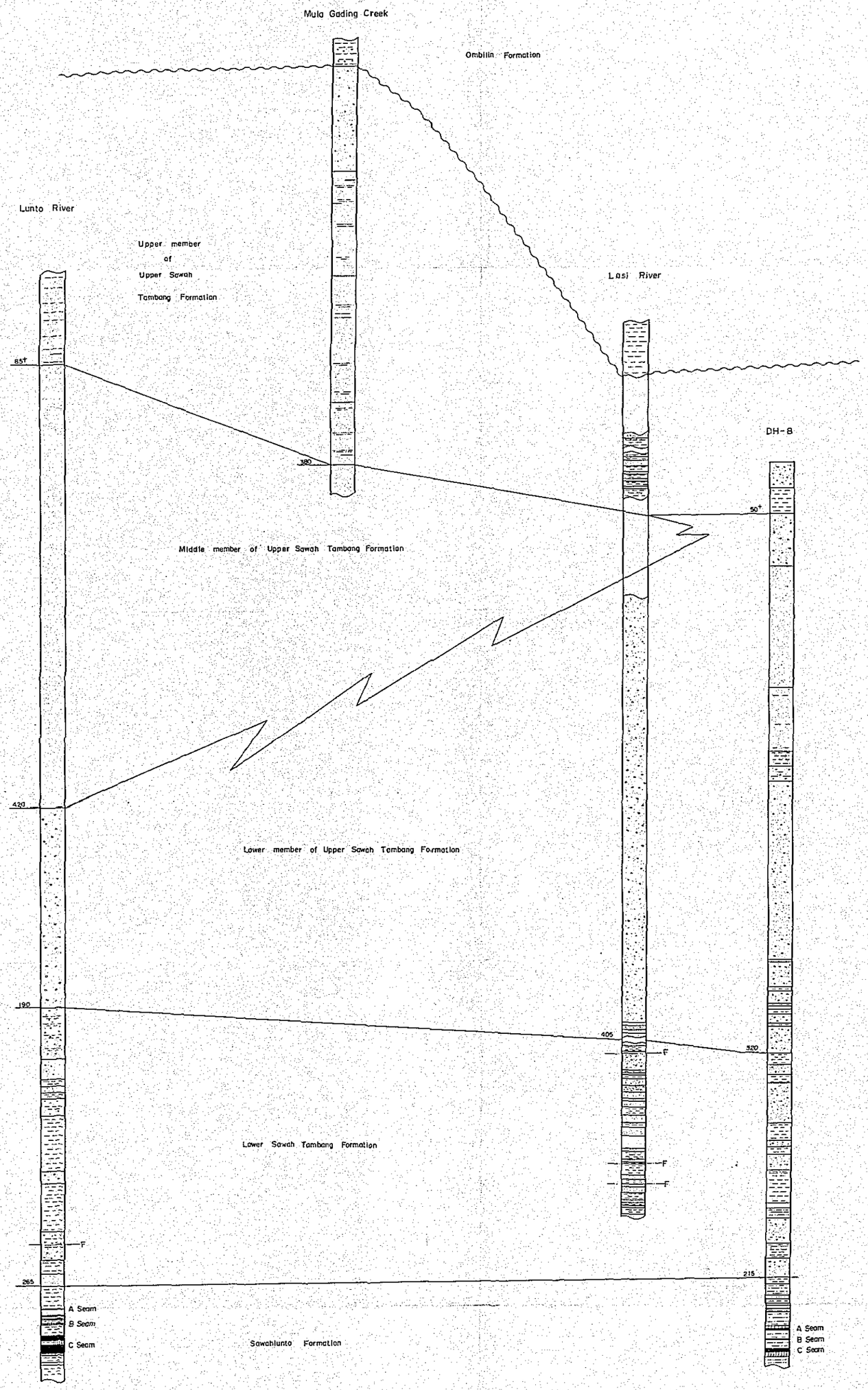


JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)

CORRELATION OF GEOLOGICAL SEQUENCE

Dwg. No.	4 a	Scale	1 : 1,000
Date	April , 1980	Prepared by	K. ITO



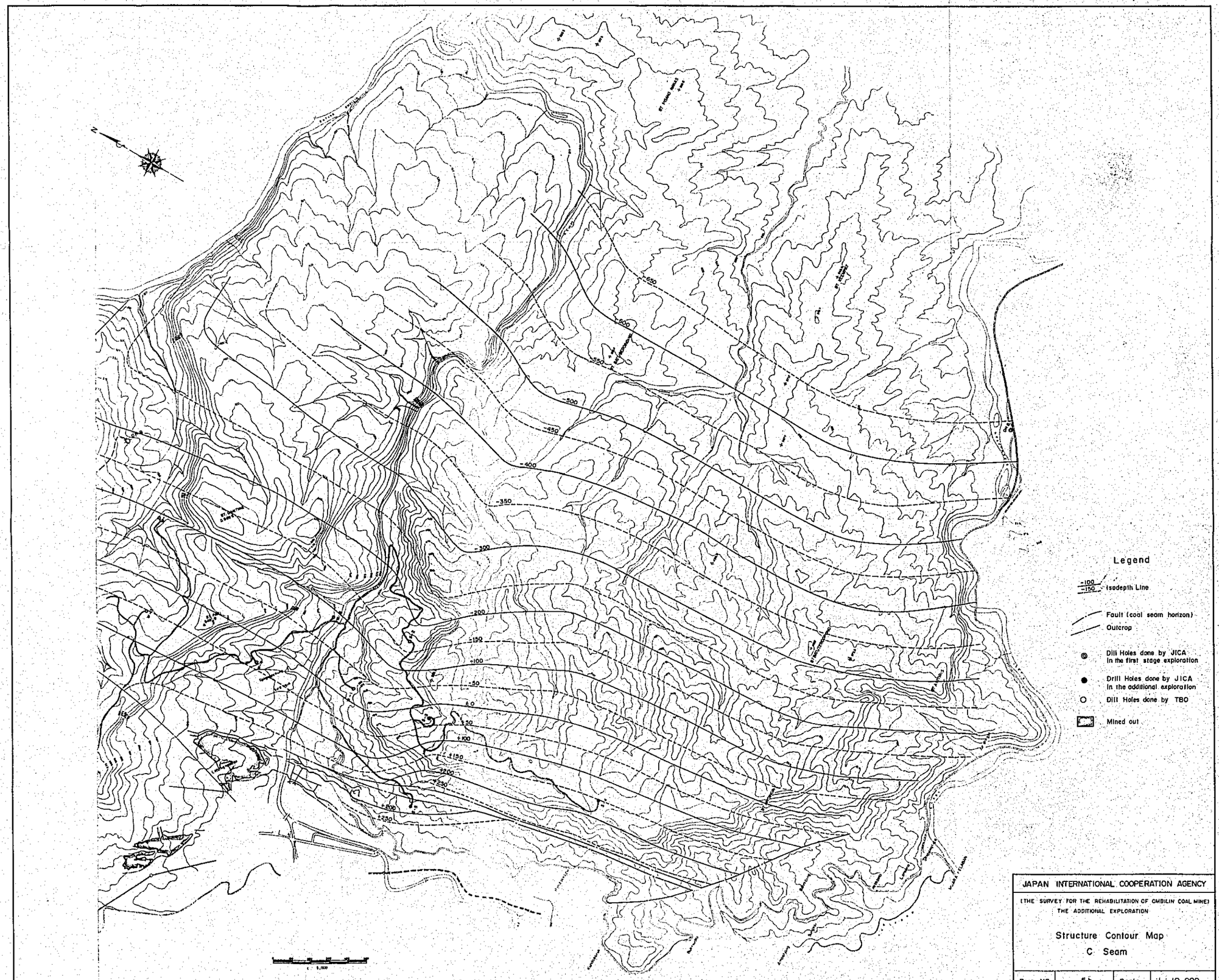
JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
— THE ADDITIONAL EXPORATION —

THE CORRELATION OF GEOLOGICAL SEQUENCE

(Lunto River, Mula Gading Creek, Lasi River)

Dwg. No.	4 b	Scale	1 : 2 000
Date	April 1980	Prepared by	R. Saito

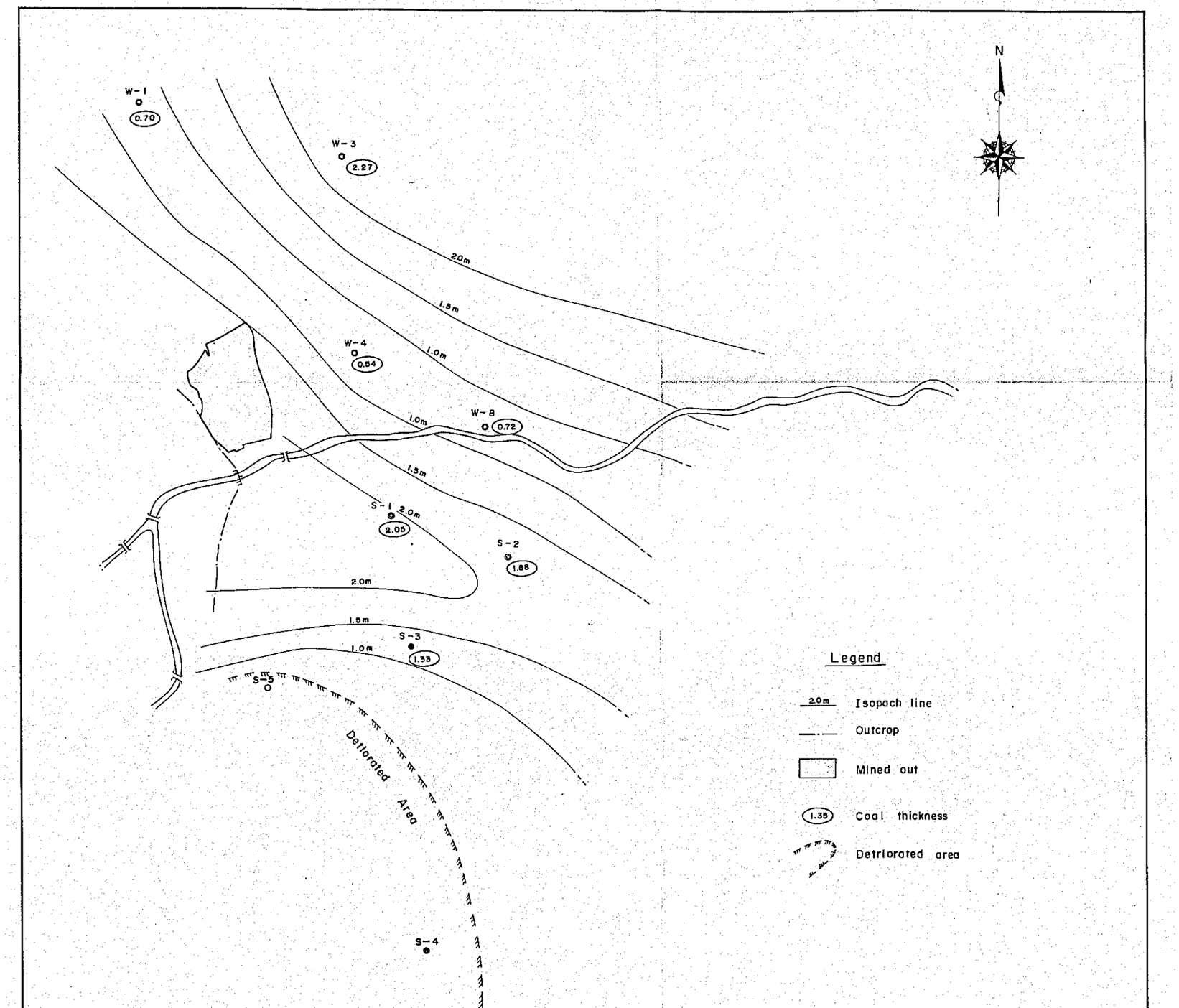


JAPAN INTERNATIONAL COOPERATION AGENCY

THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE
THE ADDITIONAL EXPLORATION

Structure Contour Map
C Seam

Dwg NO	5b	Scale	1 : 10,000
Date	April, 1980	Prepared by	K. Ito

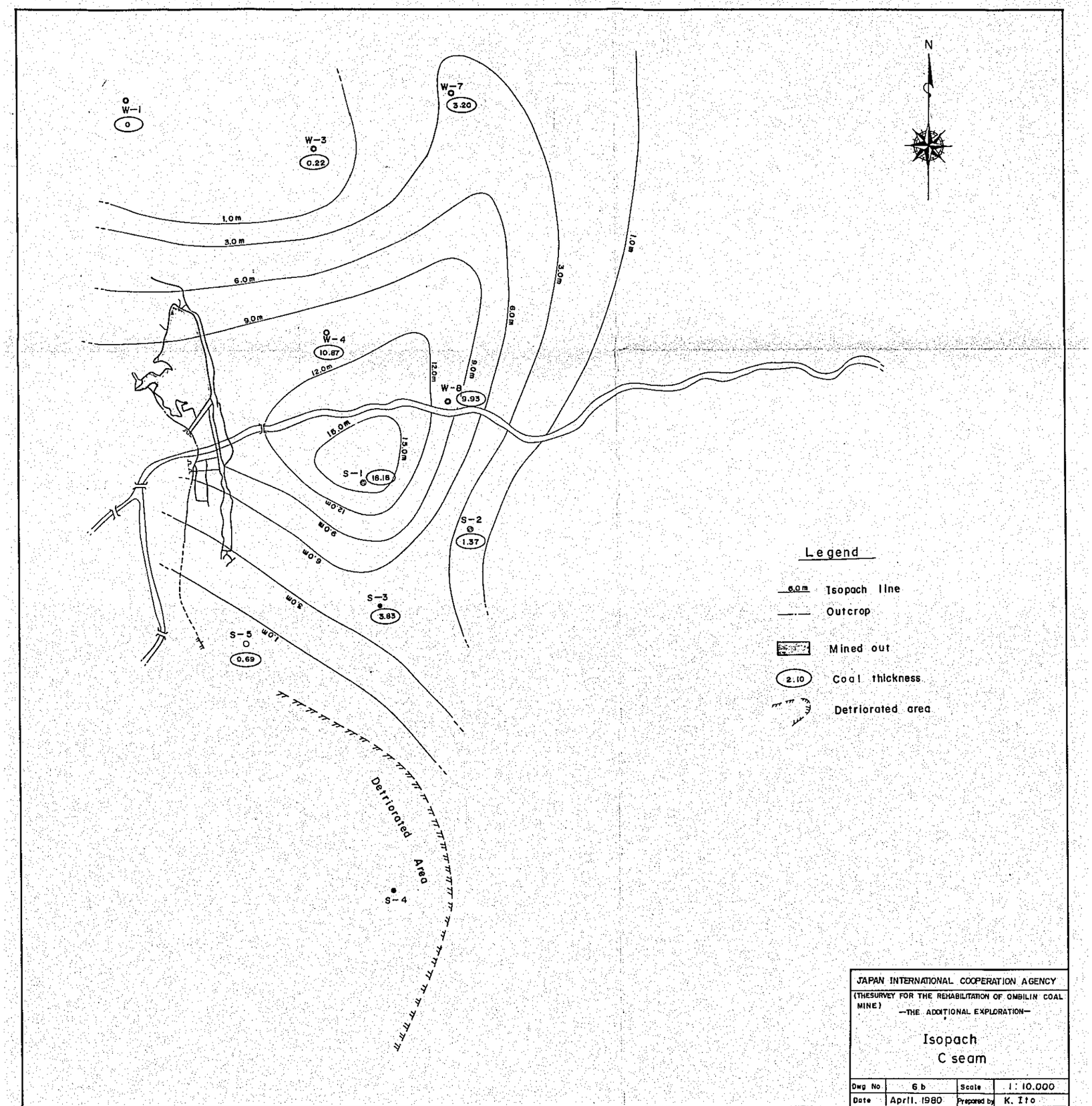


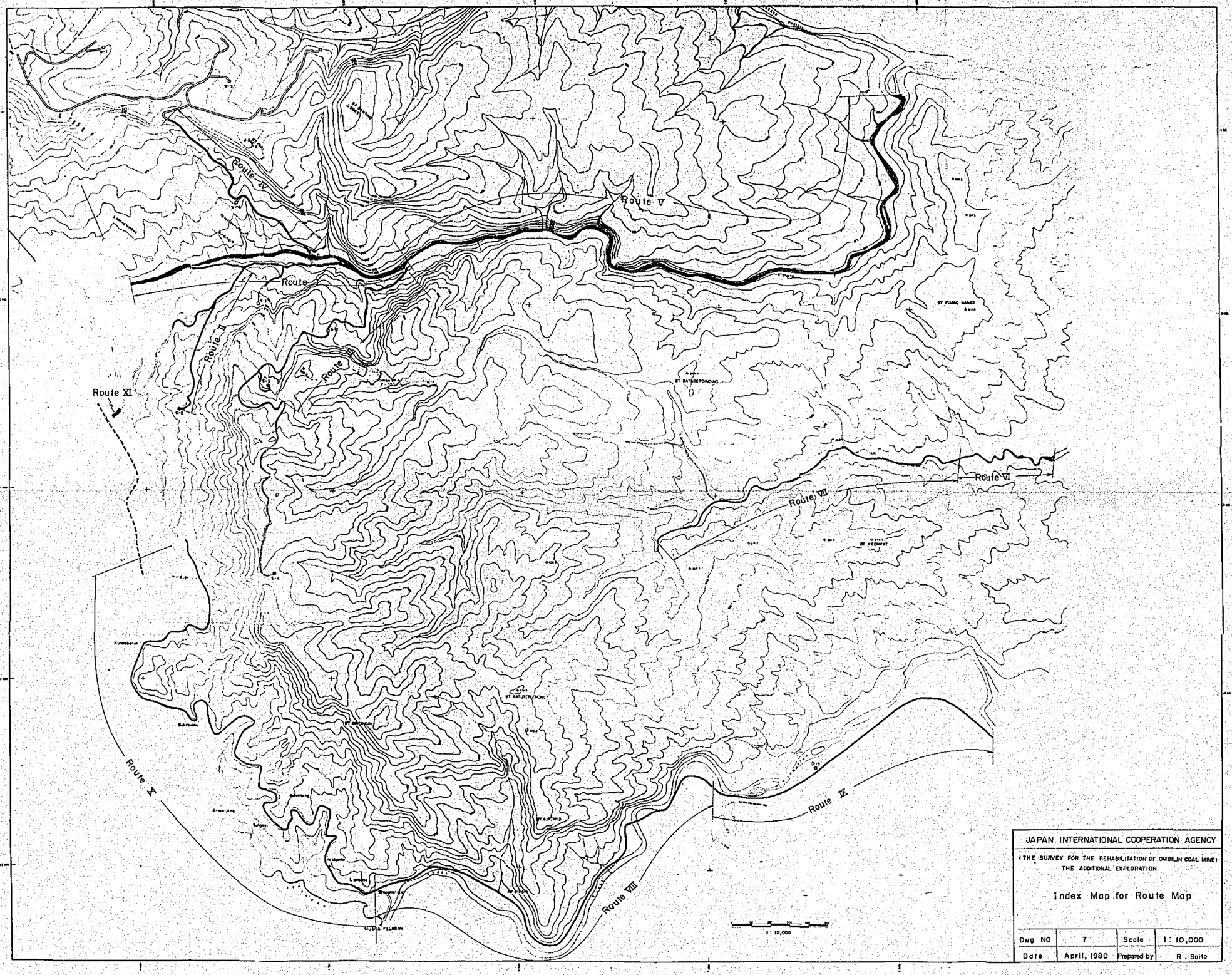
JAPAN INTERNATIONAL COOPERATION AGENCY

(THESURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE) —THE ADDITIONAL EXPLORATION—

Isopach
A seam

Dwg No	6 a	Scale	1 : 10.000
Date	April. 1980	Prepared by	R. SAITO


N
W-1
0
W-3
0.22
W-7
3.20
W-4
10.87
W-8
9.93
S-1
16.16
S-2
1.37
S-3
3.83
S-5
0.69
S-4
1.0m
3.0m
6.0m
9.0m
12.0m
15.0m
Detriorated Area
Legend
6.0m Isopach line
Outcrop
Mined out
2.10 Coal thickness
Detriorated area
JAPAN INTERNATIONAL COOPERATION AGENCY
(THESURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
—THE ADDITIONAL EXPLORATION—
Isopach
C seam
Dwg No 6 b
Scale 1 : 10,000
Date April. 1980
Prepared by K. Ito

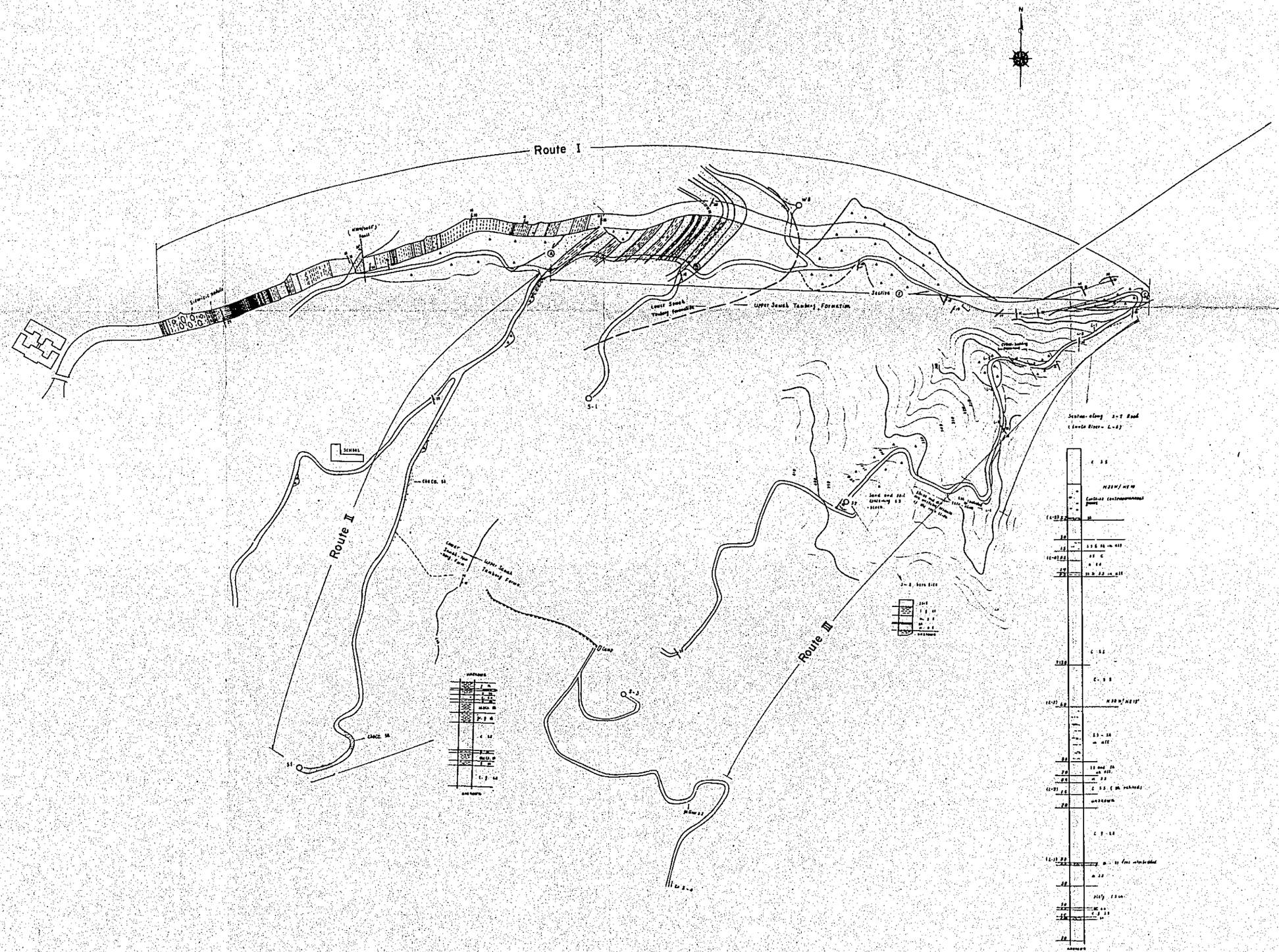


JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
THE ADDITIONAL EXPLORATION

Index Map for Route Map

Dwg NO	7	Scale	1 : 10,000
Date	April, 1980	Prepared by	R . Saito



JAPAN INTERNATIONAL COOPERATION AGENCY

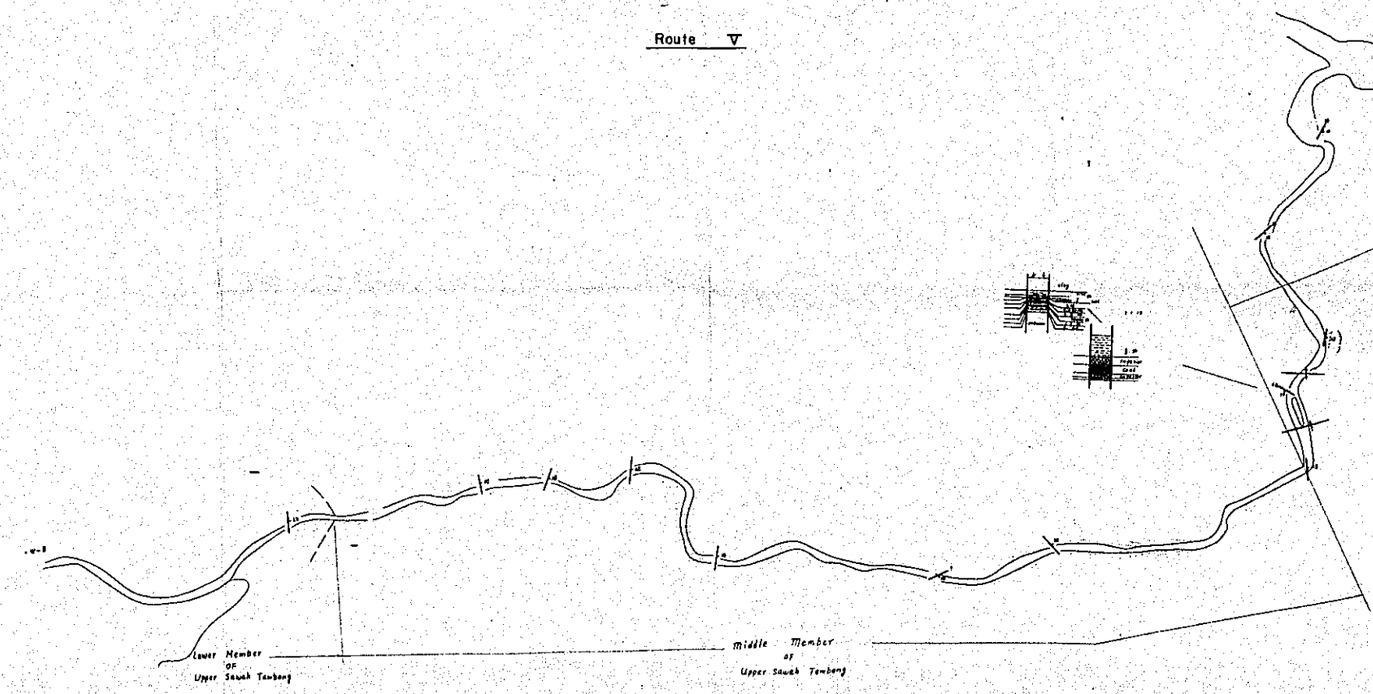
(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
– THE ADDITIONAL EXPLORATION –

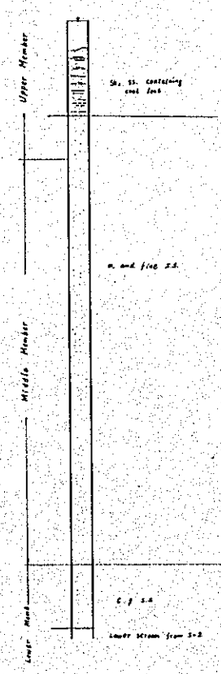
ROUTE MAP

– Upper Stream of the Lunto River –
(Route I, II, III)

Dwg No.	B-8	Scale	1 : 2,000
Date	April, 1980	Prepared by	R. Saito, K. Ito

Route V



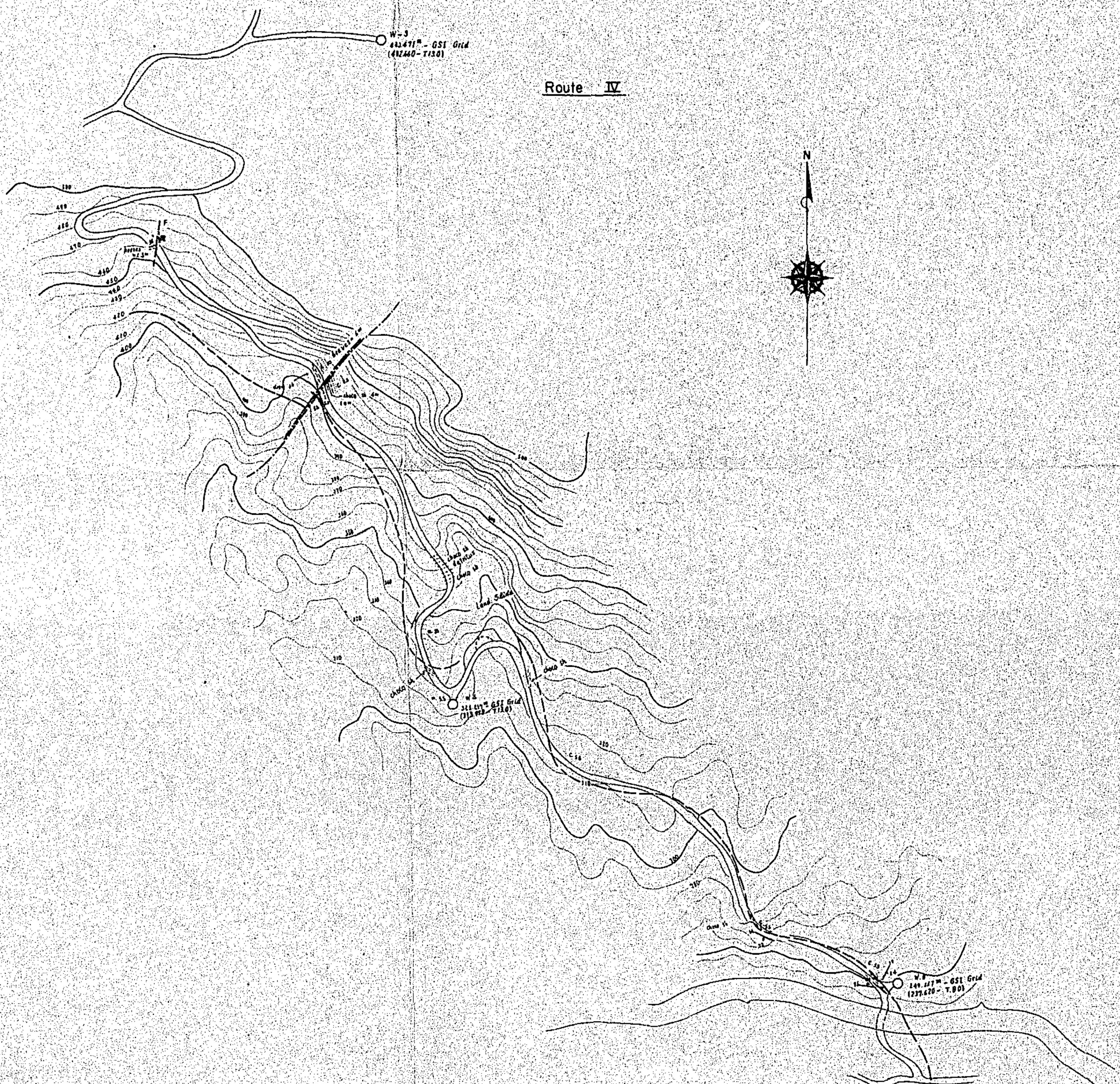


JAPAN INTERNATIONAL COOPERATION AGENCY

THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE
— THE ADDITIONAL EXPLORATION —

ROUTE MAP
— Lower Stream of the Lunto River —
(Route V)

Dwg No	8 b	Scale	1 : 5 000
Date	April 1980	Prepared by	R. Saito, K. Ito

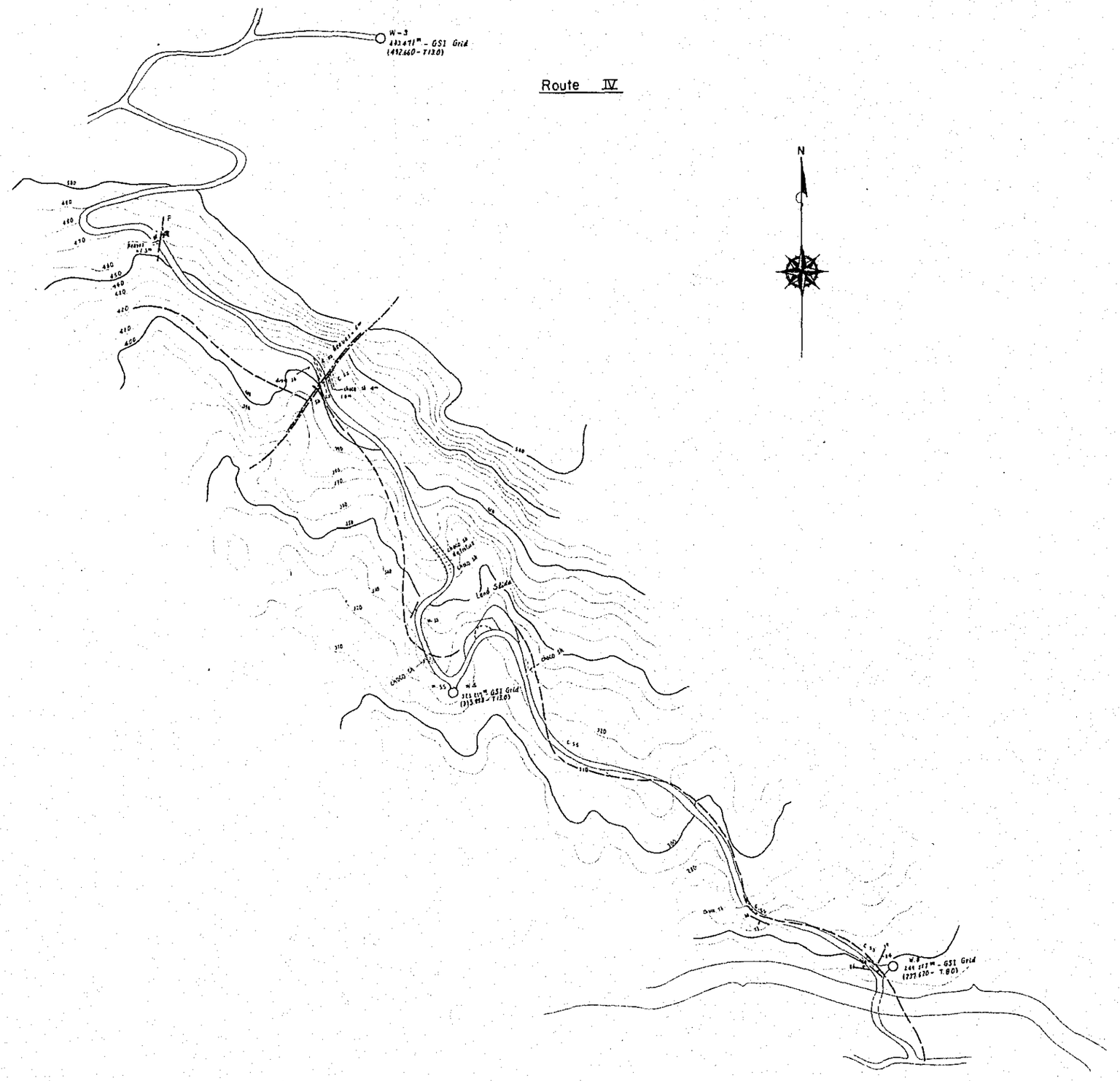


JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
— THE ADDITIONAL EXPLORATION —

ROUTE MAP
— W8 to W3 —
(Route IV)

Dwg No	8 c	Scale	1 : 2 000
Date	April 1980	Prepared by	R. Saito, K. Ito



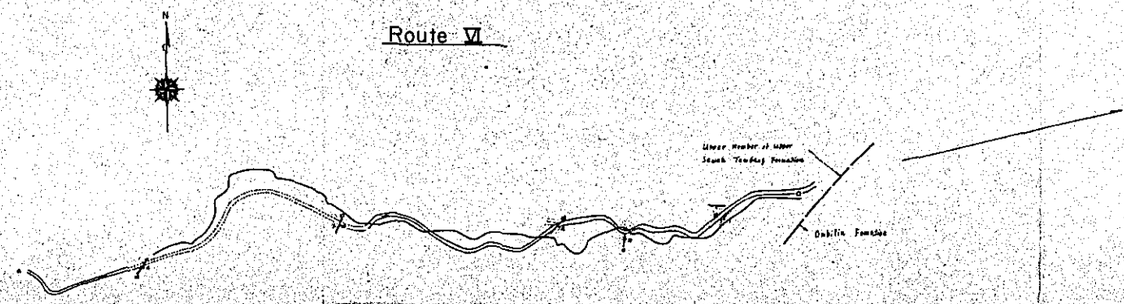
JAPAN INTERNATIONAL COOPERATION AGENCY

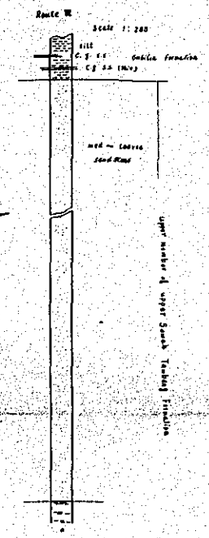
(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
— THE ADDITIONAL EXPLORATION —

ROUTE MAP
— W8 to W3 —
(Route IV)

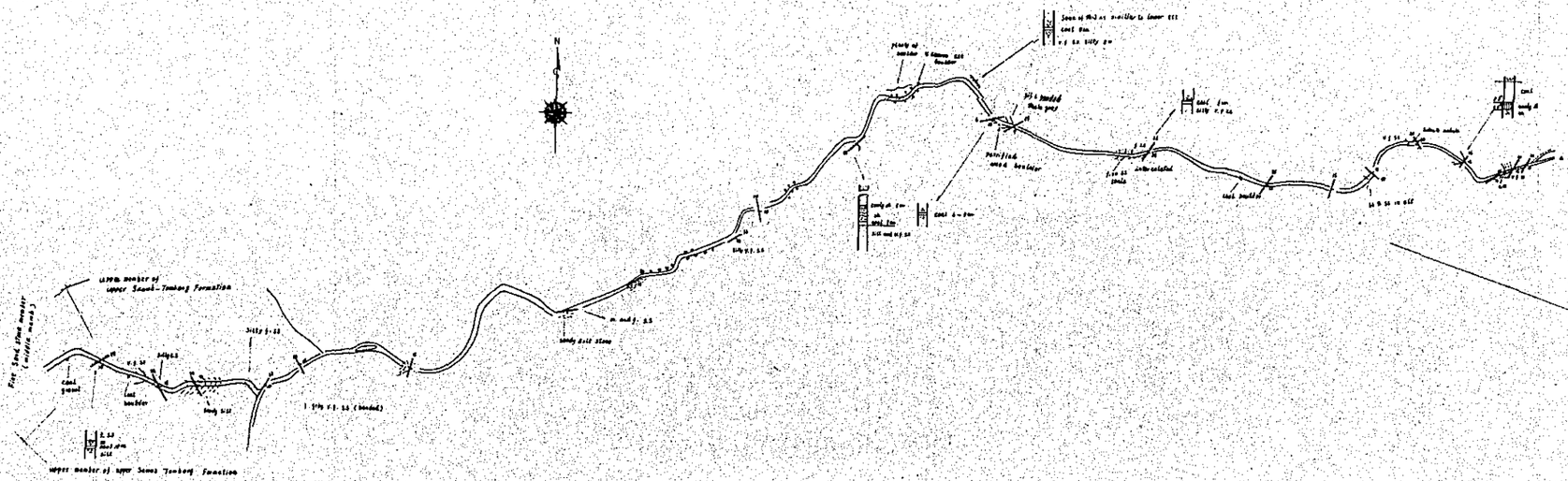
Dwg No	8 c	Scale	1 : 2 000
Date	April 1980	Prepared by	R. Saito, K. Ito

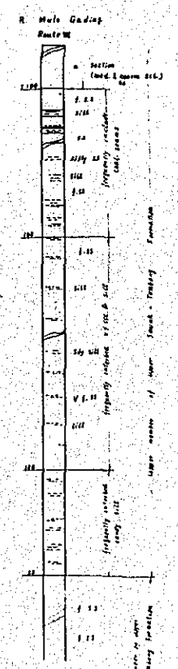
Route Ⅵ





Route Ⅶ





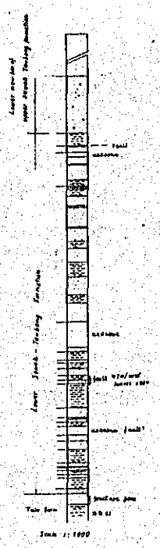
JAPAN INTERNATIONAL COOPERATION AGENCY

(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
- THE ADDITIONAL EXPLORATION -

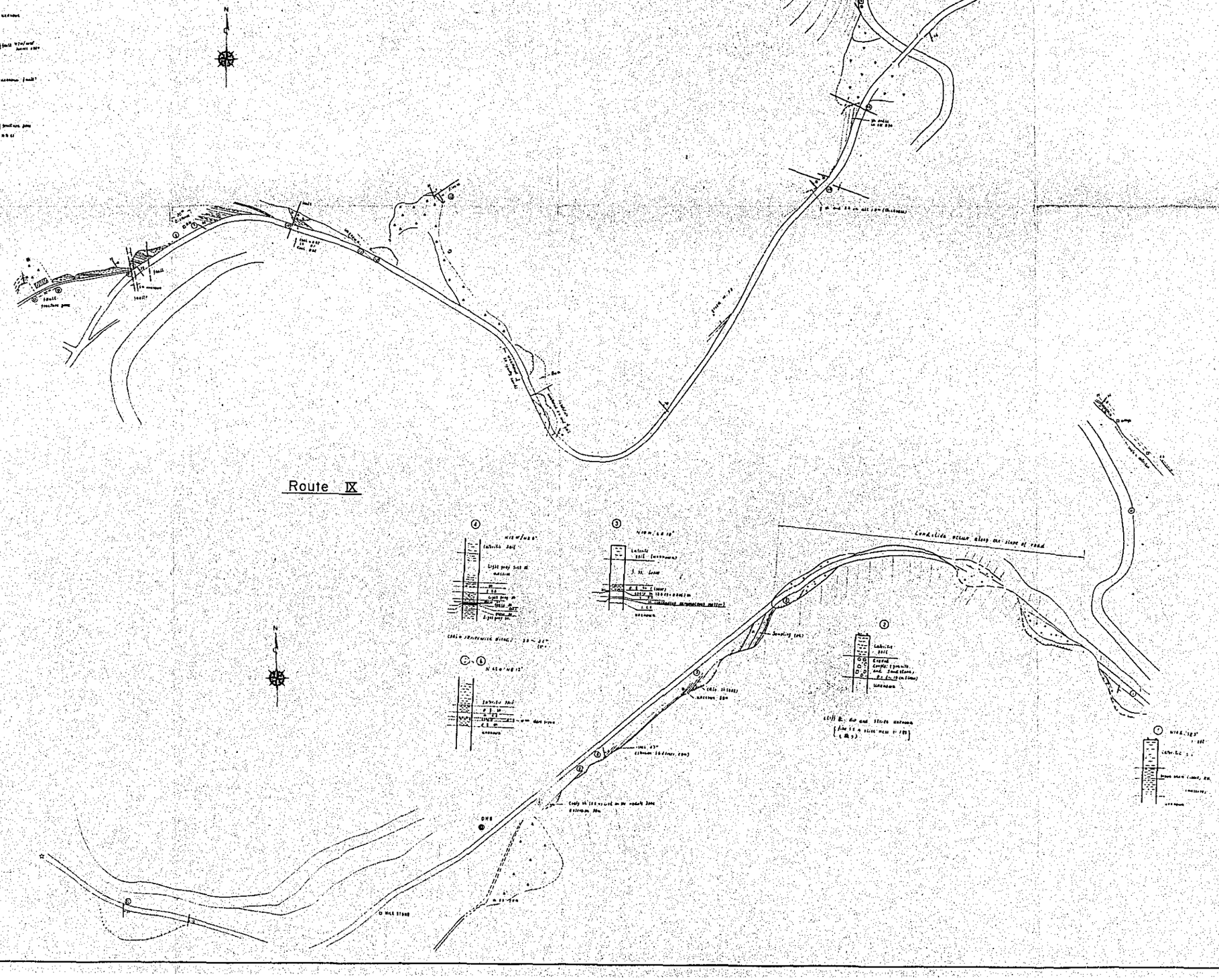
ROUTE MAP

— Mula Gading Creek —
(Route Ⅵ, Ⅶ)

Dwg. No.	Ed	Scale	1 : 2,000
Date	April, 1980	Prepared by	R. Saito , K. Ito



Route VIII



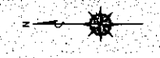
Route IX

JAPAN INTERNATIONAL COOPERATION AGENCY

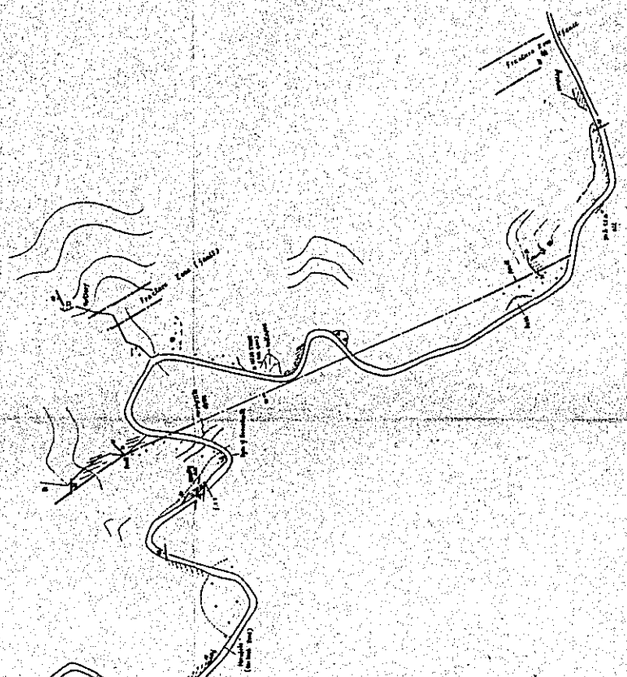
(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE)
~ THE ADDITIONAL EXPLORATION ~

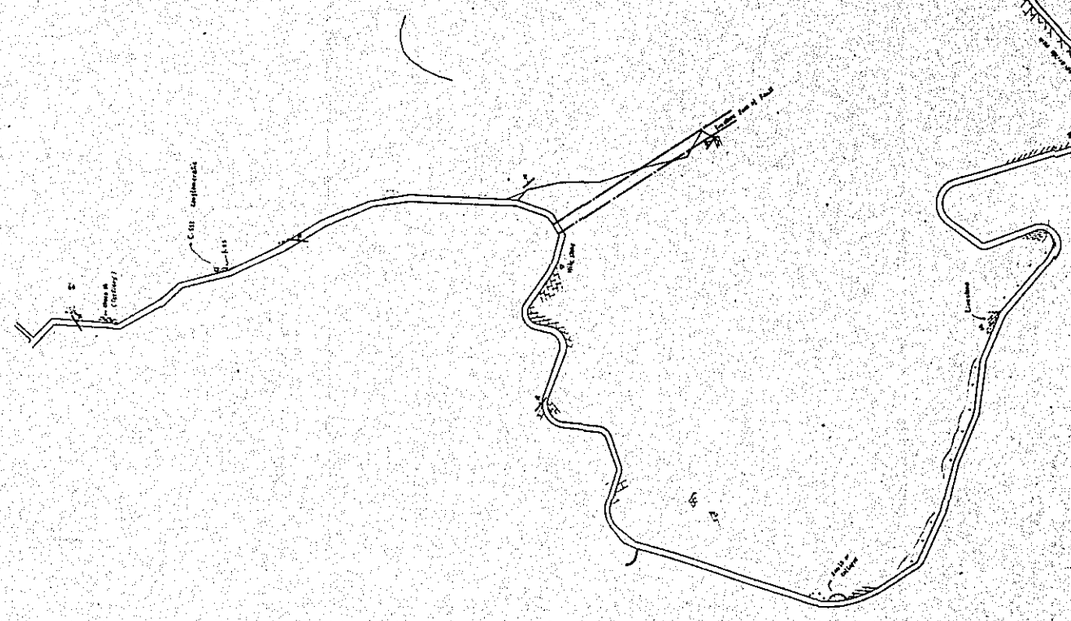
ROUTE MAP
~ Losi River ~
(Route VIII, IX)

Dwg No.	8-e	Scale	1 : 2,000
Date	April, 1980	Prepared by	R. Saito, K. Ito



Route X





JAPAN INTERNATIONAL COOPERATION AGENCY			
(THE SURVEY FOR THE REHABILITATION OF OMBILIN COAL MINE) — THE ADDITIONAL EXPLORATION —			
ROUTE MAP — Road between Sawahlunto and Muara Kelaban — (Route X)			
Dwg No.	8 f	Scale	1 : 2,000
Date	April, 1980	Prepared by	H. Saito , K. Ito

JICA

PRE-FEASIBILITY STUDY REPORT

ON

THE OMBILIN COAL MINE REHABILITATION PROJECT

IN

THE REPUBLIC OF INDONESIA

(ADDITIONAL EXPLORATION)

JUNE • 80

JICA