

三畳紀花崗岩

オルドビス紀  
石灰岩層

シルル～デボニアン紀

頁岩-砂岩-砂質頁岩互層

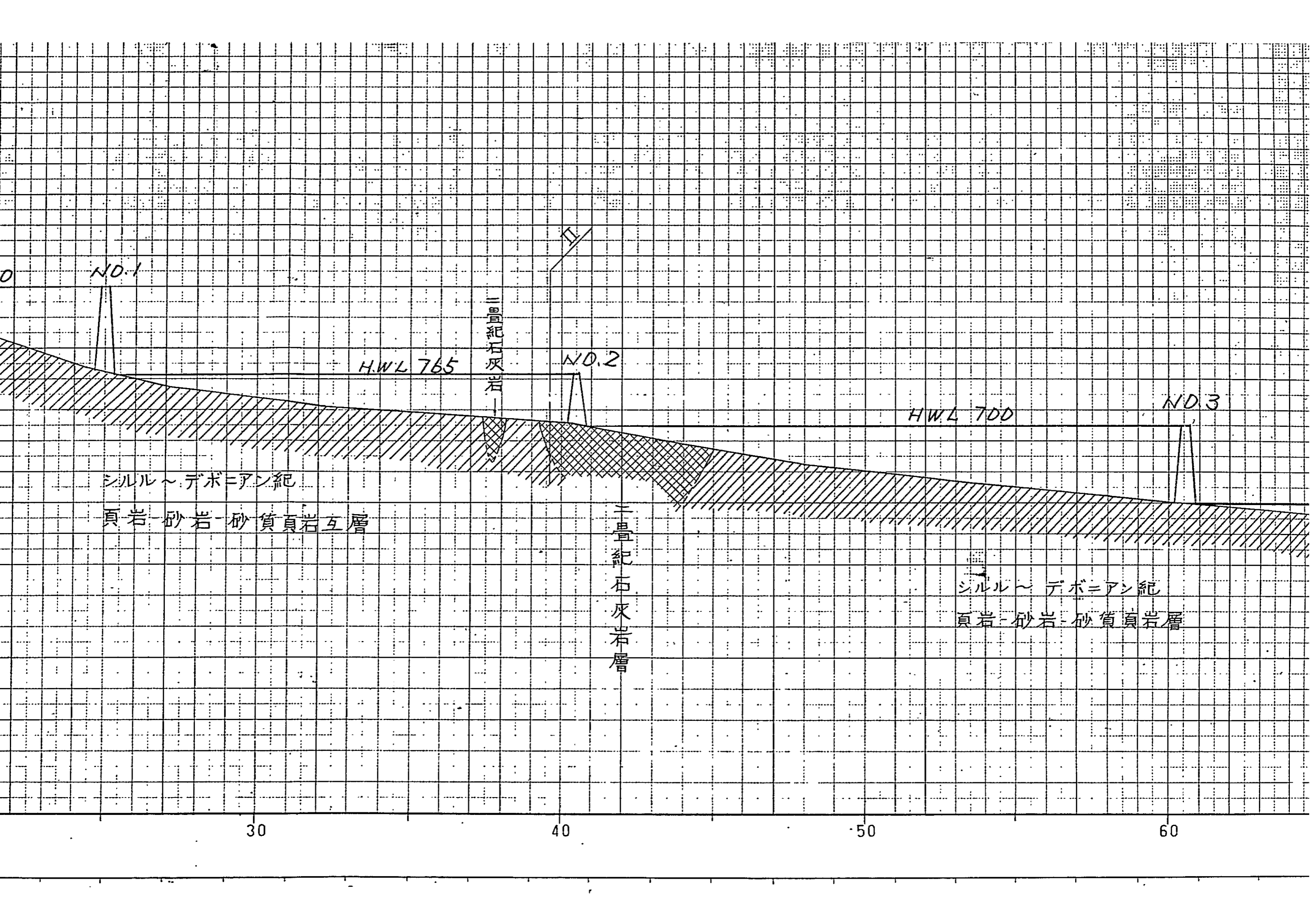
HWL 880

ND-1

H.W.L 765

1:1000000  
1:400

$\times 10^4 m$



NO.1

H.W.L. 765

二疊紀石灰岩

NO.2

H.W.L. 700

NO.3

シルル～デボニアン紀  
頁岩-砂岩-砂質頁岩互層

二疊紀石灰岩層

シルル～デボニアン紀  
頁岩-砂岩-砂質頁岩層

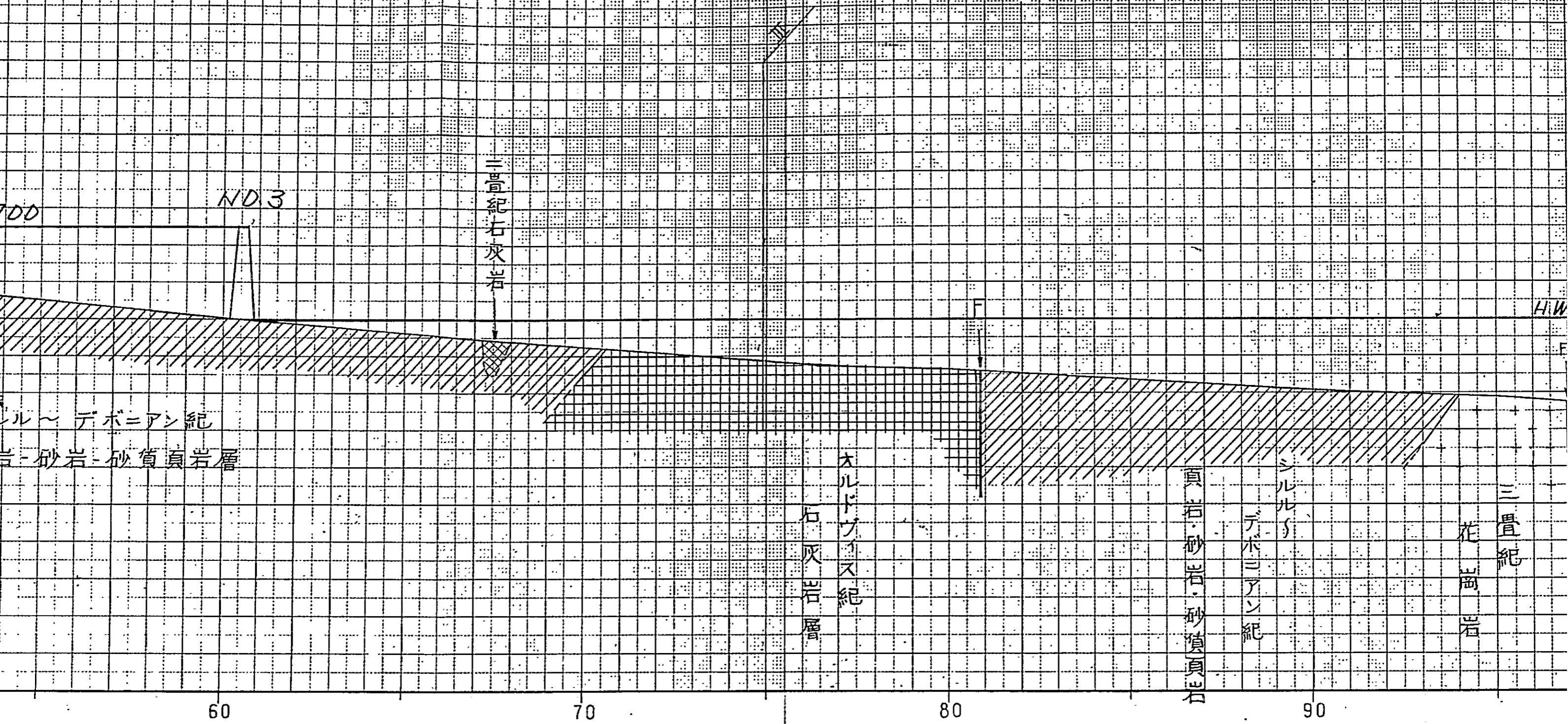
30

40

50

60

# チヤム川地質縦断



100

シルル系  
デボニアン紀  
頁岩・砂岩・砂質頁岩層

H.W.

E

三疊紀

花崗岩

シルル系

デボニアン紀

頁岩・砂岩・砂質頁岩

大ルドブリス紀

石灰岩層

60

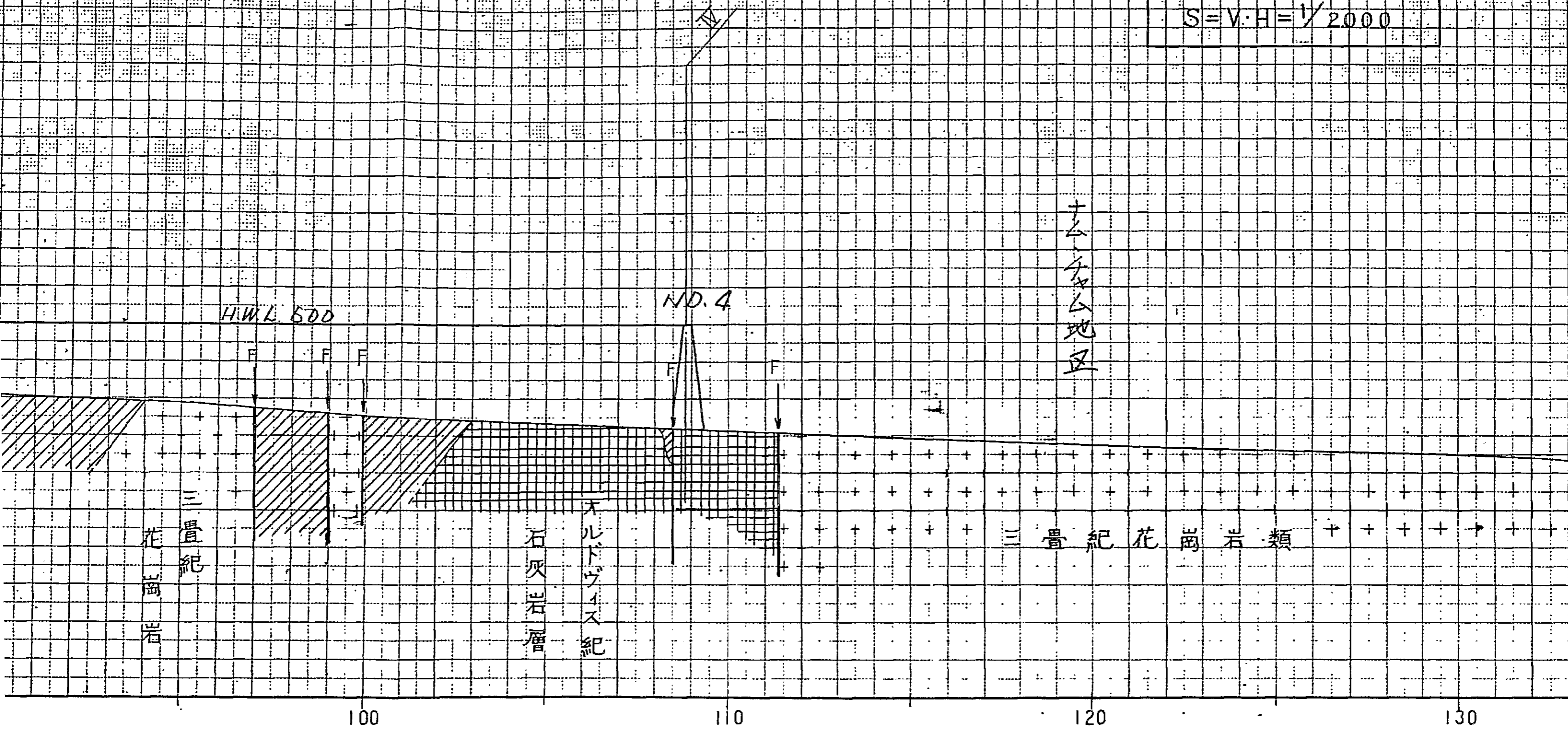
70

80

90

質 縱 新 面 図

升△河 縱 断  
 地 質 断 面 図  
 (河 床 面 基 準)  
 $S = V \cdot H = 1/2000$



オールドマン紀石灰岩層

時代不詳  
片麻岩

H.W.L. 460

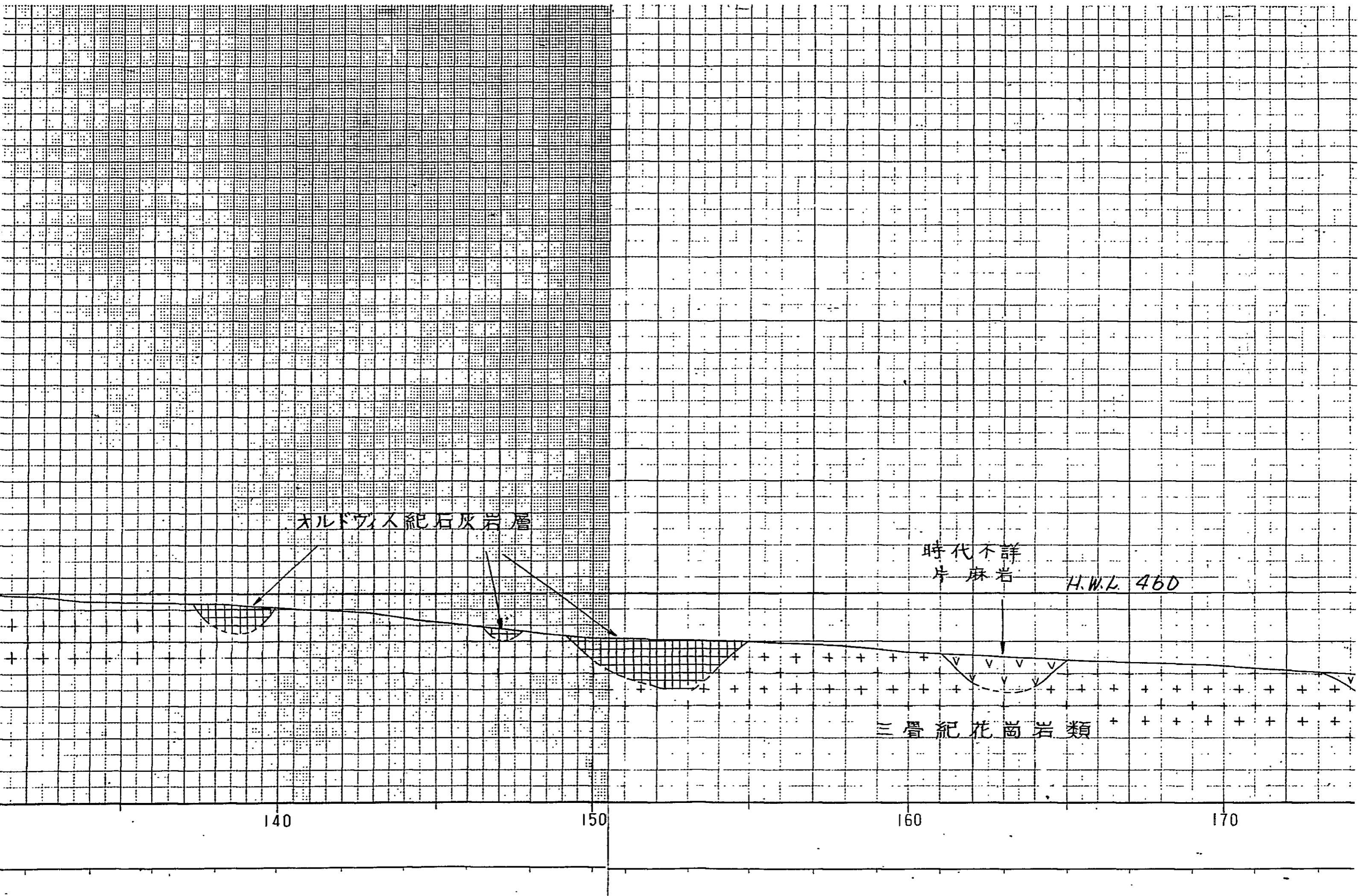
三疊紀花崗岩類

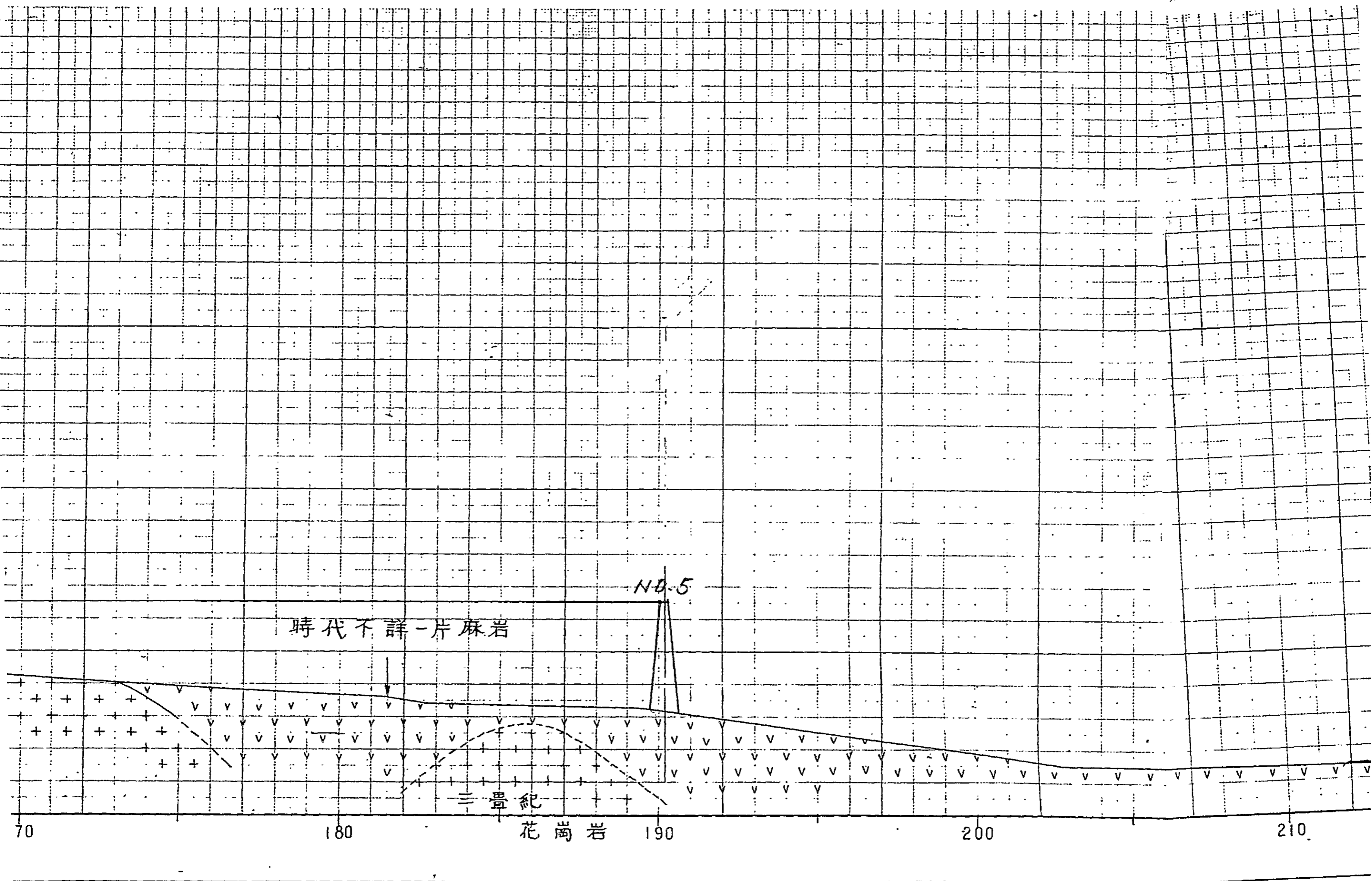
140

150

160

170





時代不詳-片麻岩

NB-5

三疊紀

花崗岩

70

180

190

200

210

H.W.L. 460

ND-5

時代不詳-片麻岩

類

三疊紀

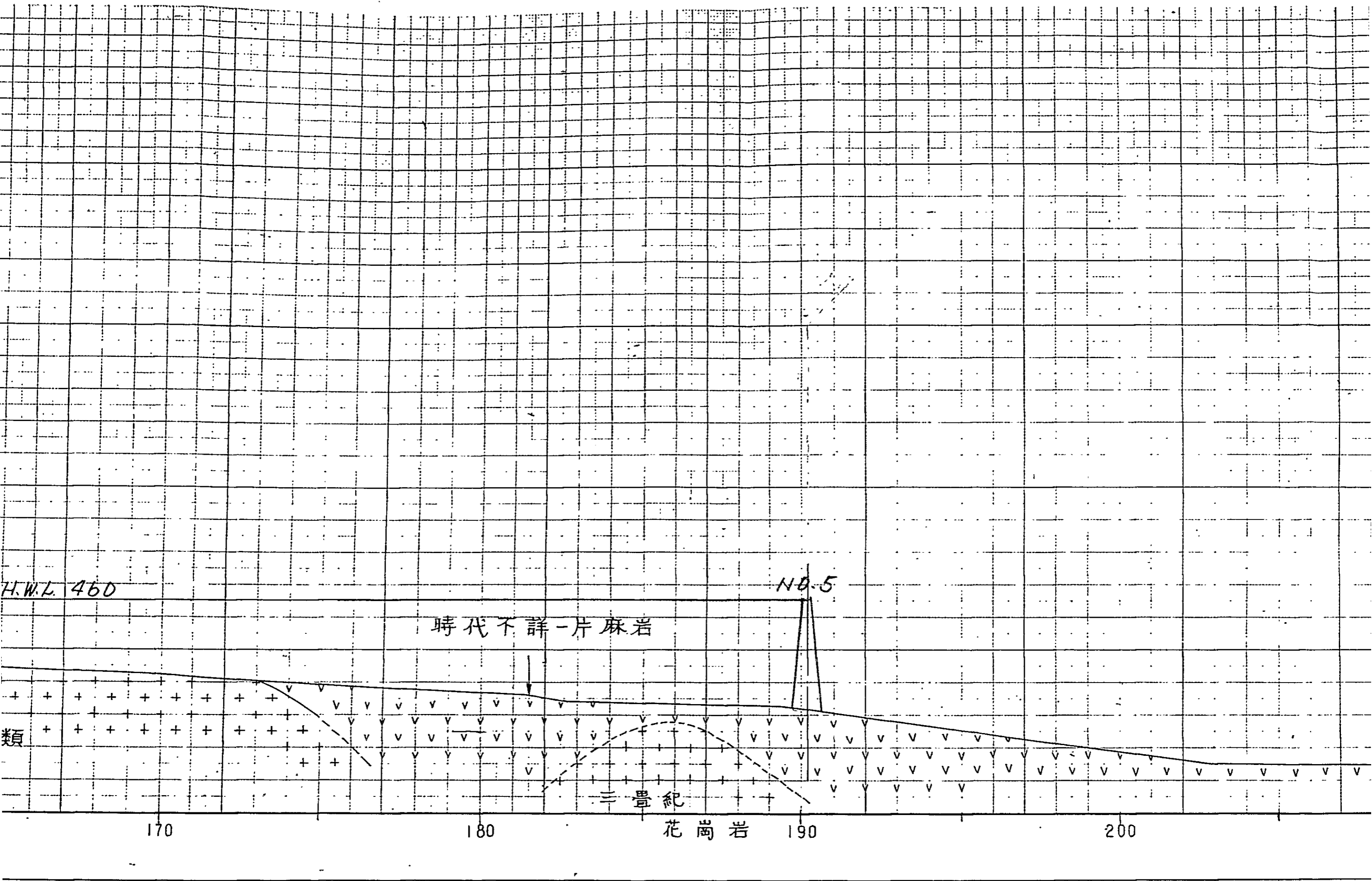
花崗岩

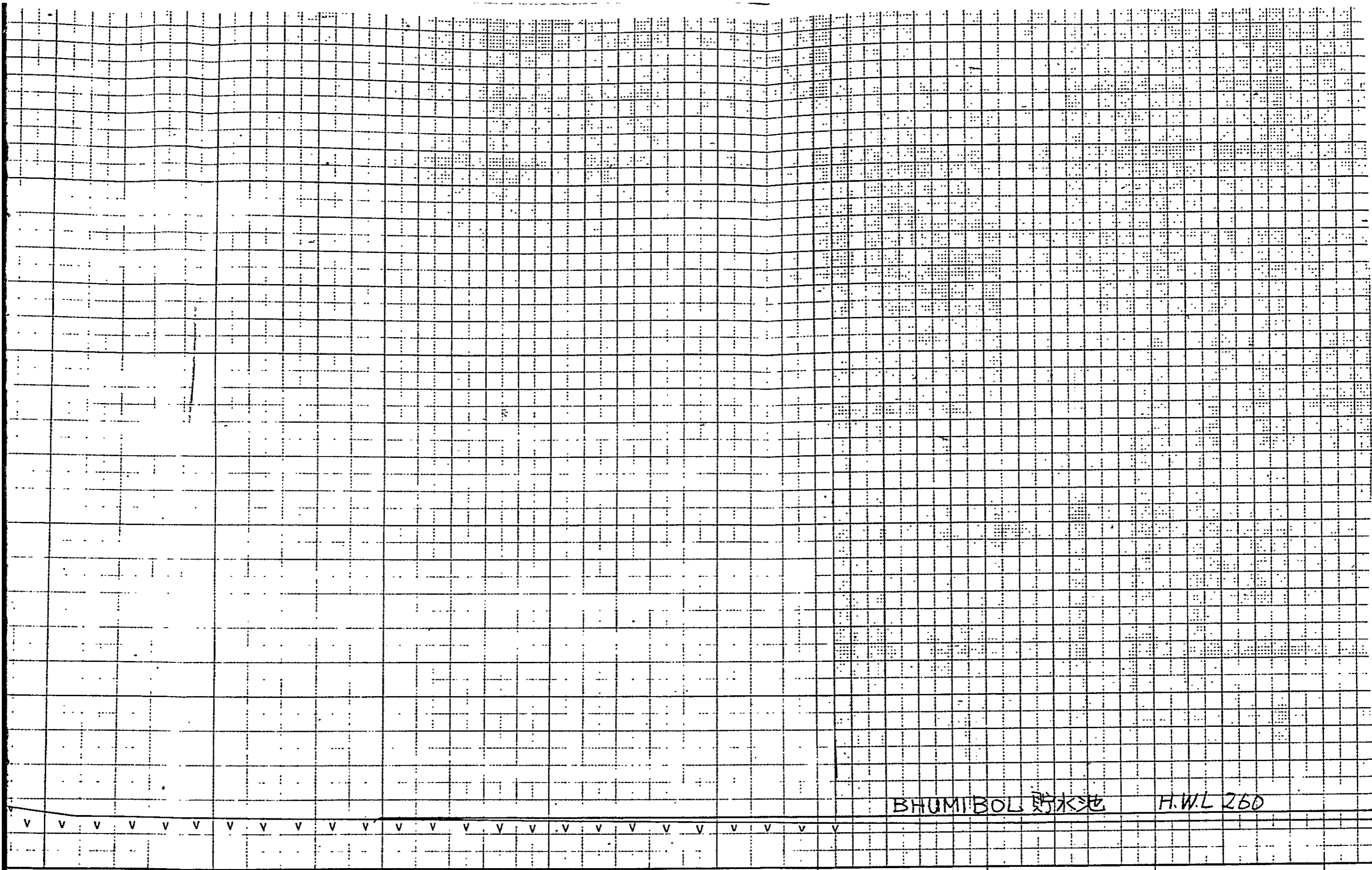
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180

190

200





210

220

230

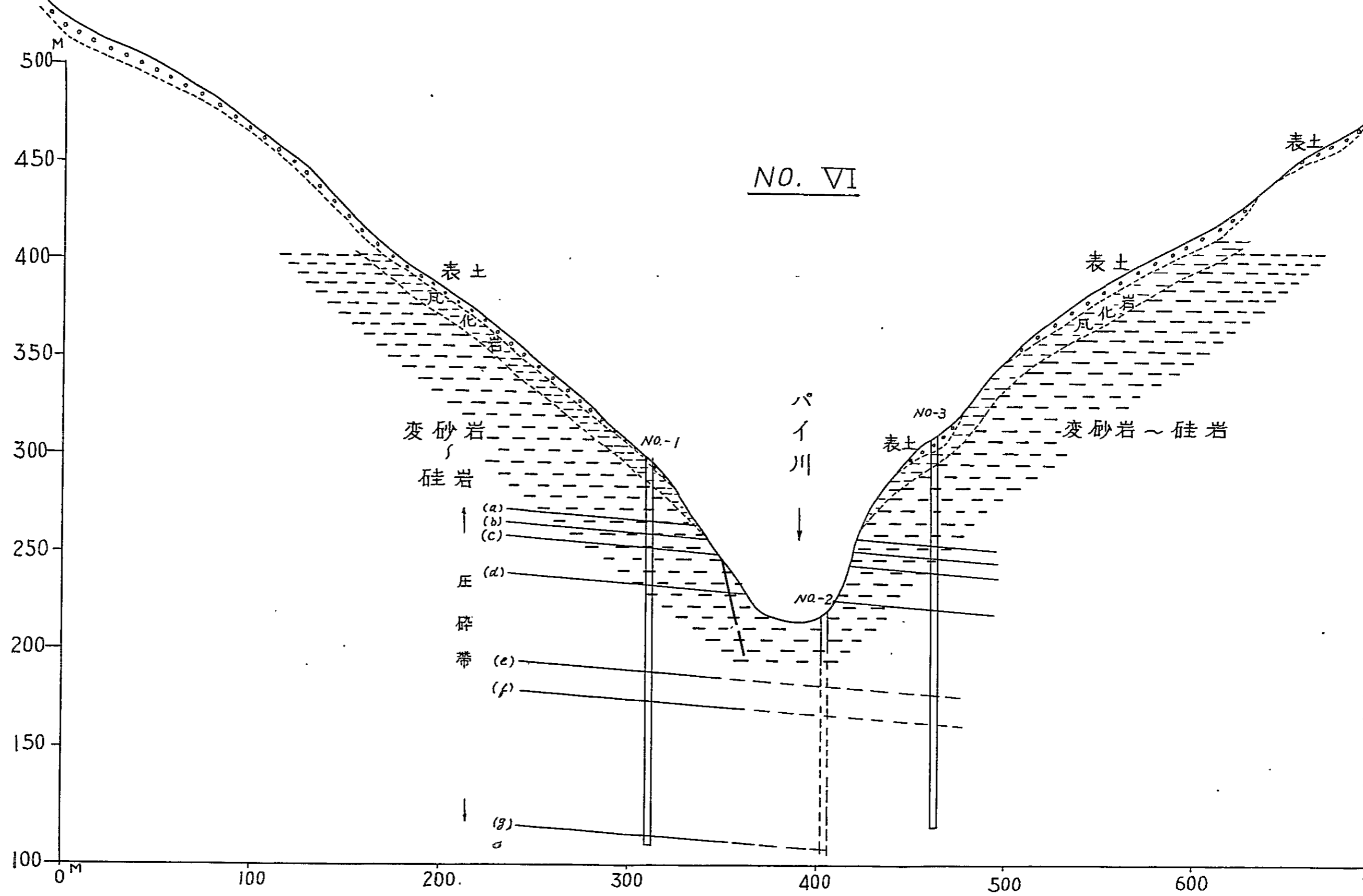
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# パイ川NO.VIダム軸地質断面図

(S = 1/2000)

左岸

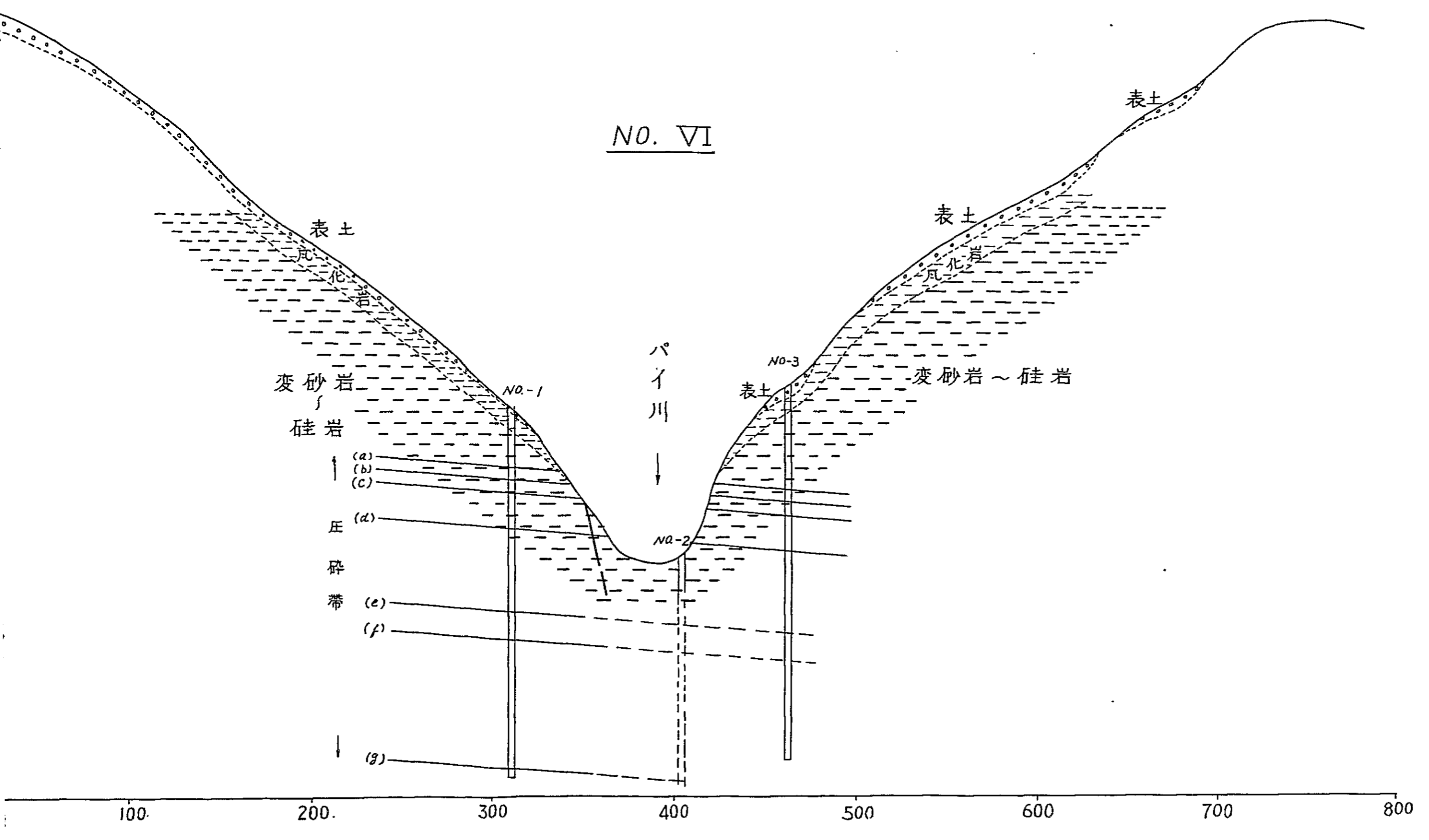


# パイ川 NO. VI ダム軸地質断面図

(S = 1/2000)

右岸

岸



NO. VI

パイ川

表土

変砂岩

硅岩

(a)  
(b)  
(c)

圧

碎

帯

(d)  
(e)  
(f)

(g)

No. 1

No. 2

No. 3

表土

表土

瓦化岩

変砂岩 ~ 硅岩

表土

100

200

300

400

500

600

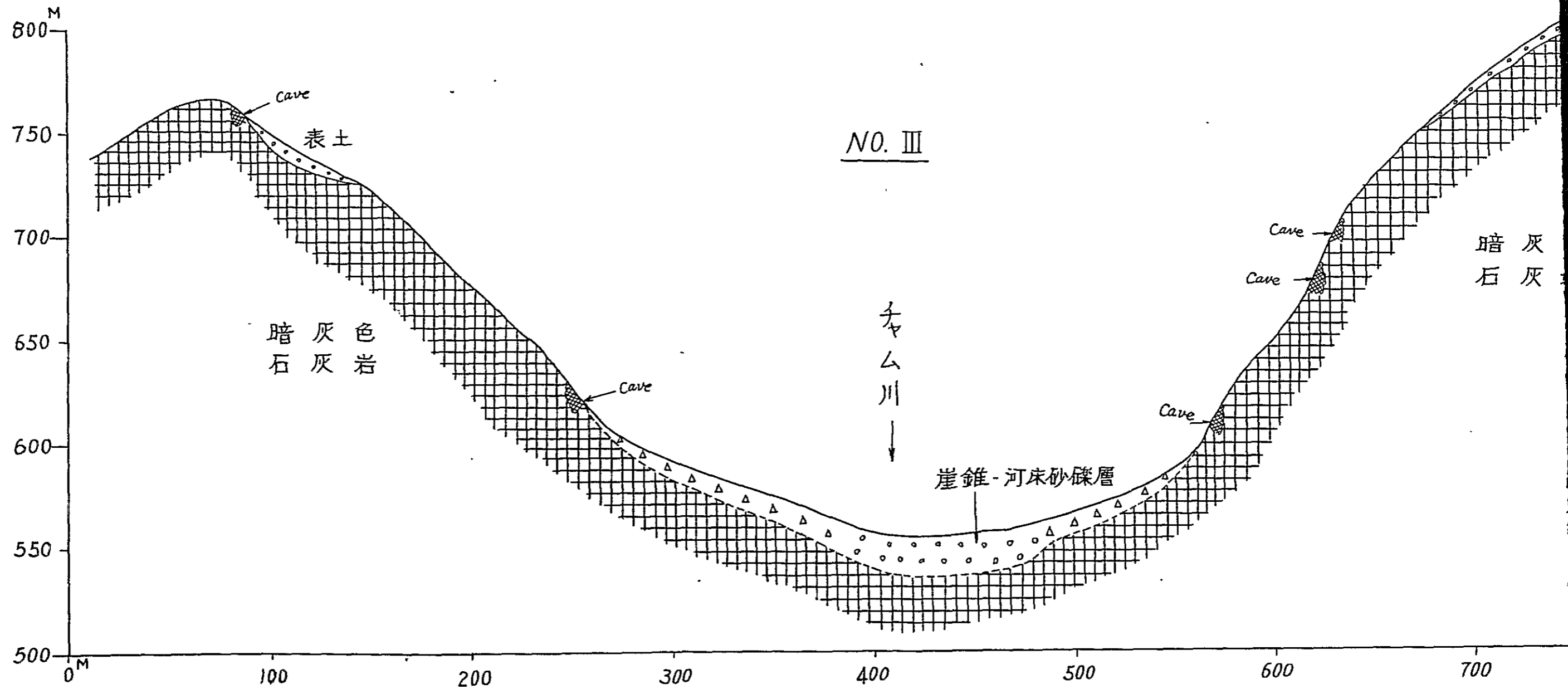
700

800

# チャム川 NO. III ダム軸地質断面図

(S = 1/2000)

左岸



# チャム川NO.Ⅲダム軸地質断面図

(S = 1/2000)

右岸

表土層

NO. Ⅲ

暗灰色  
石灰岩

チャム川  
↓

崖錐 - 河床砂礫層

Cave

Cave

Cave

Cave

200

300

400

500

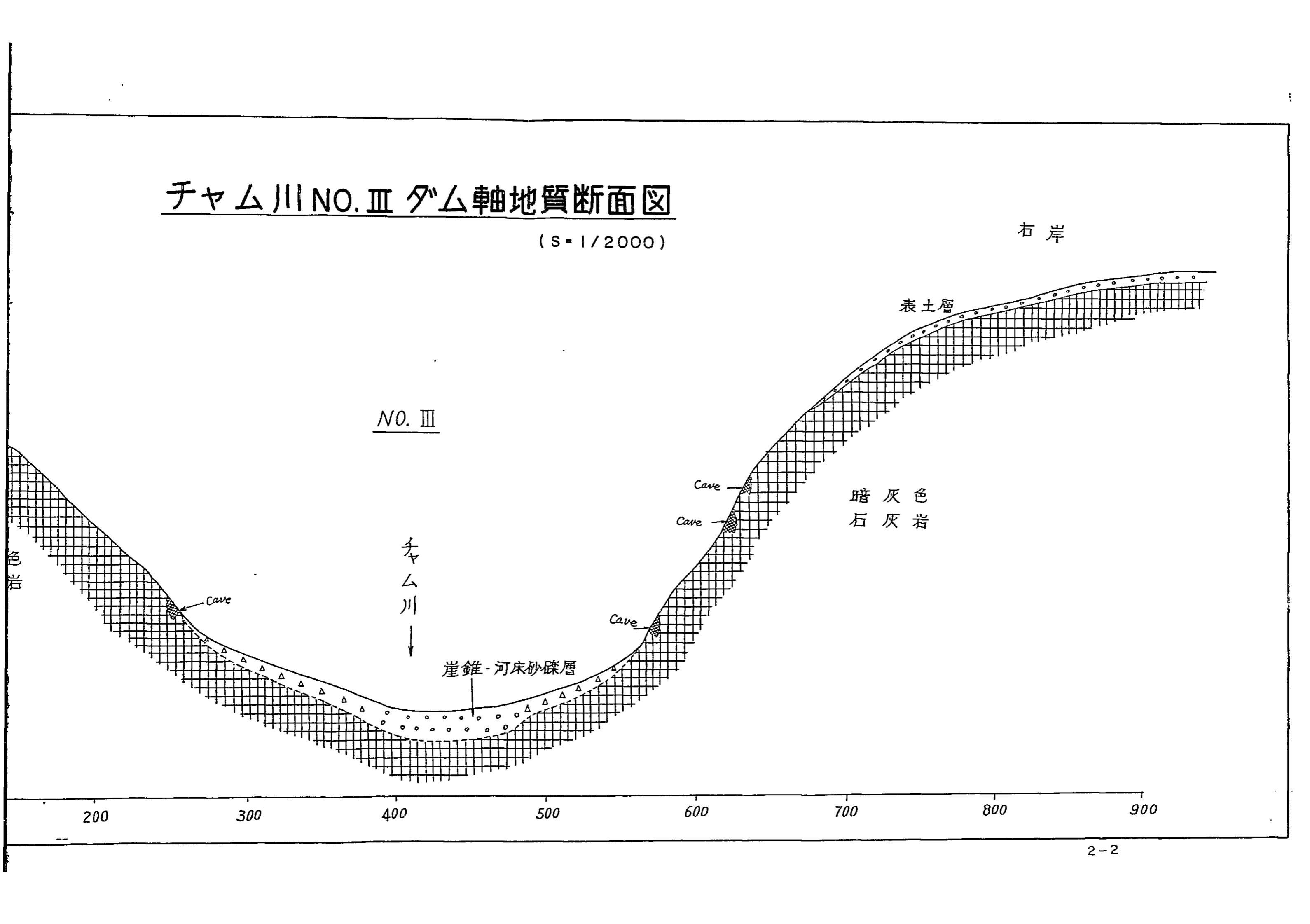
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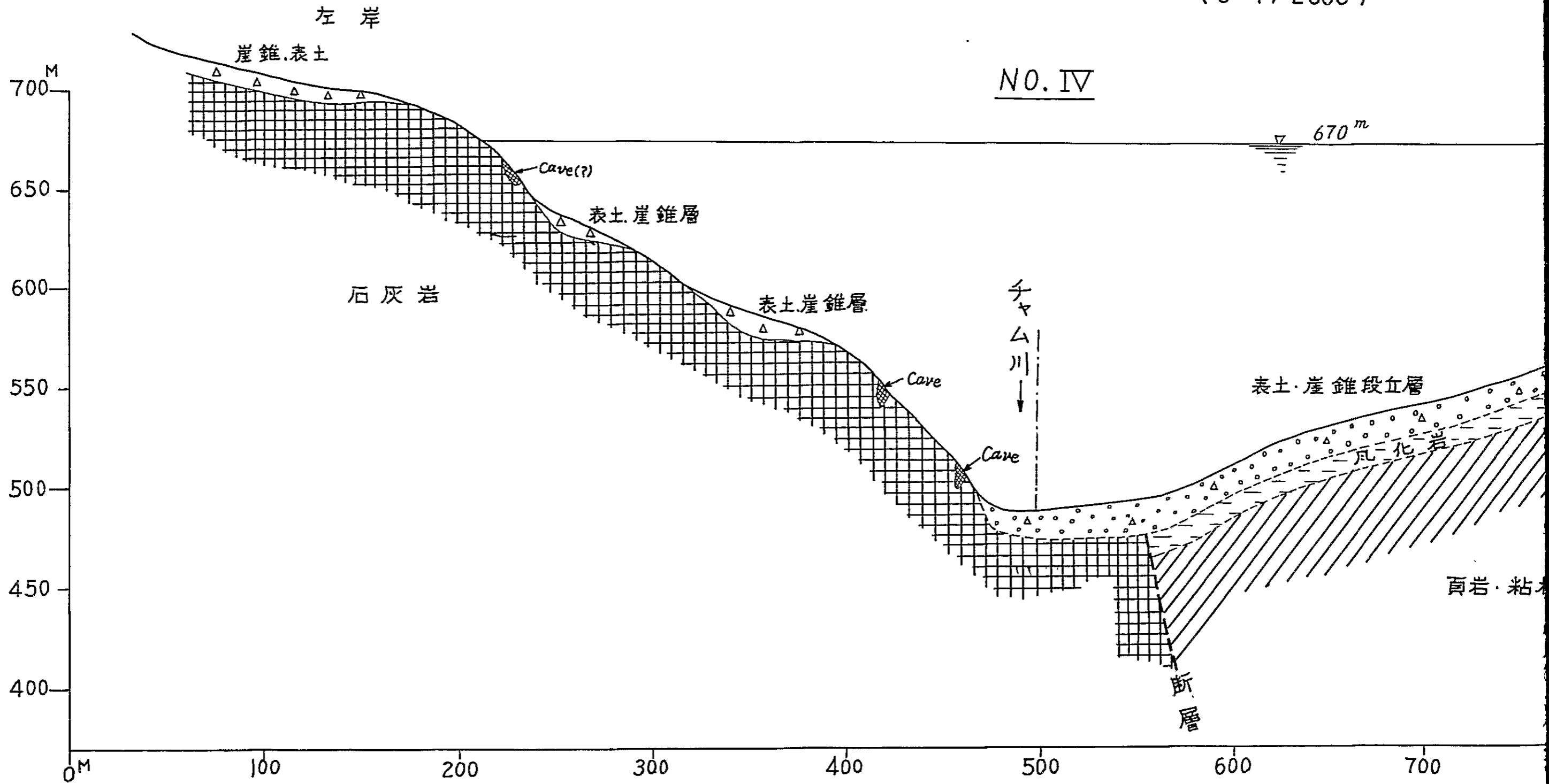
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色



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(S = 1 / 2000)

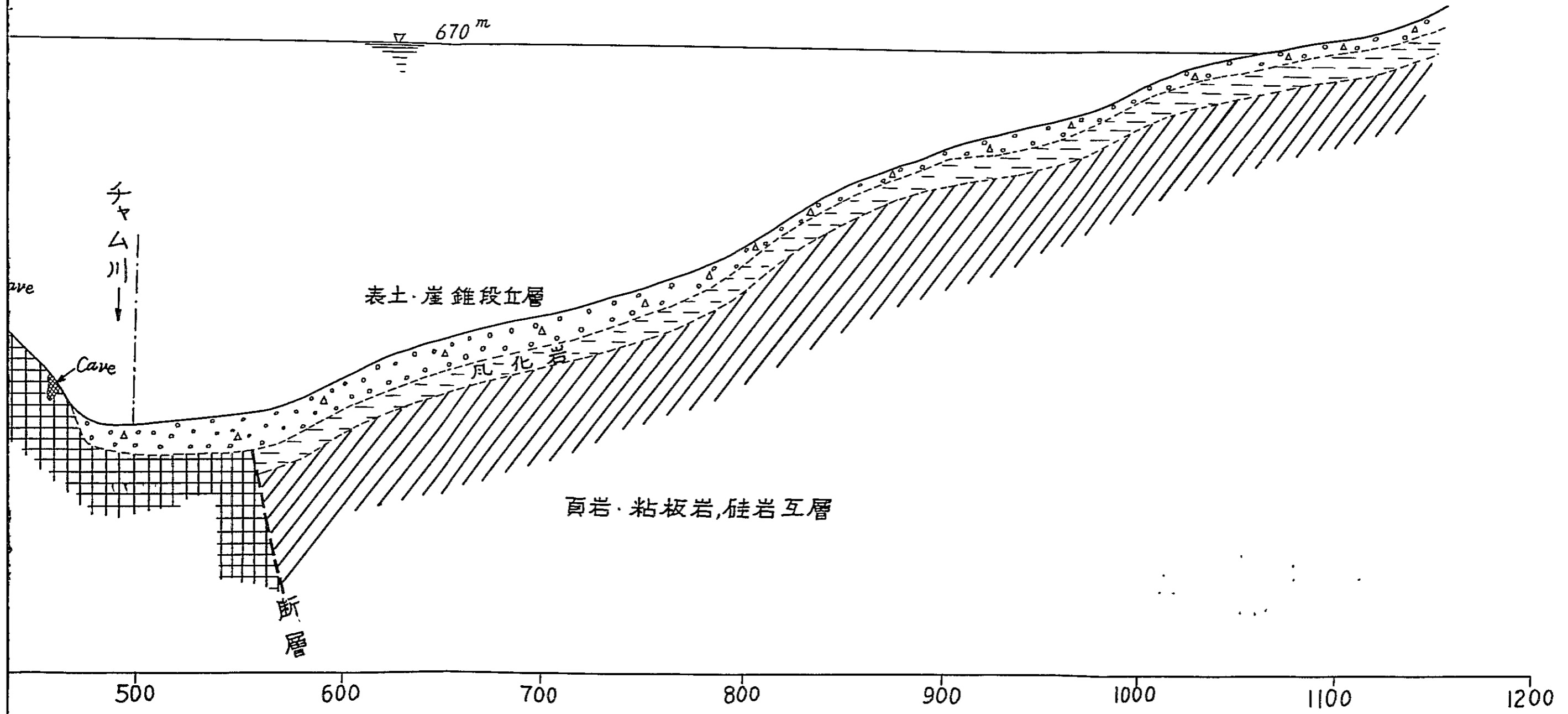


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(S = 1 / 2000)

右岸

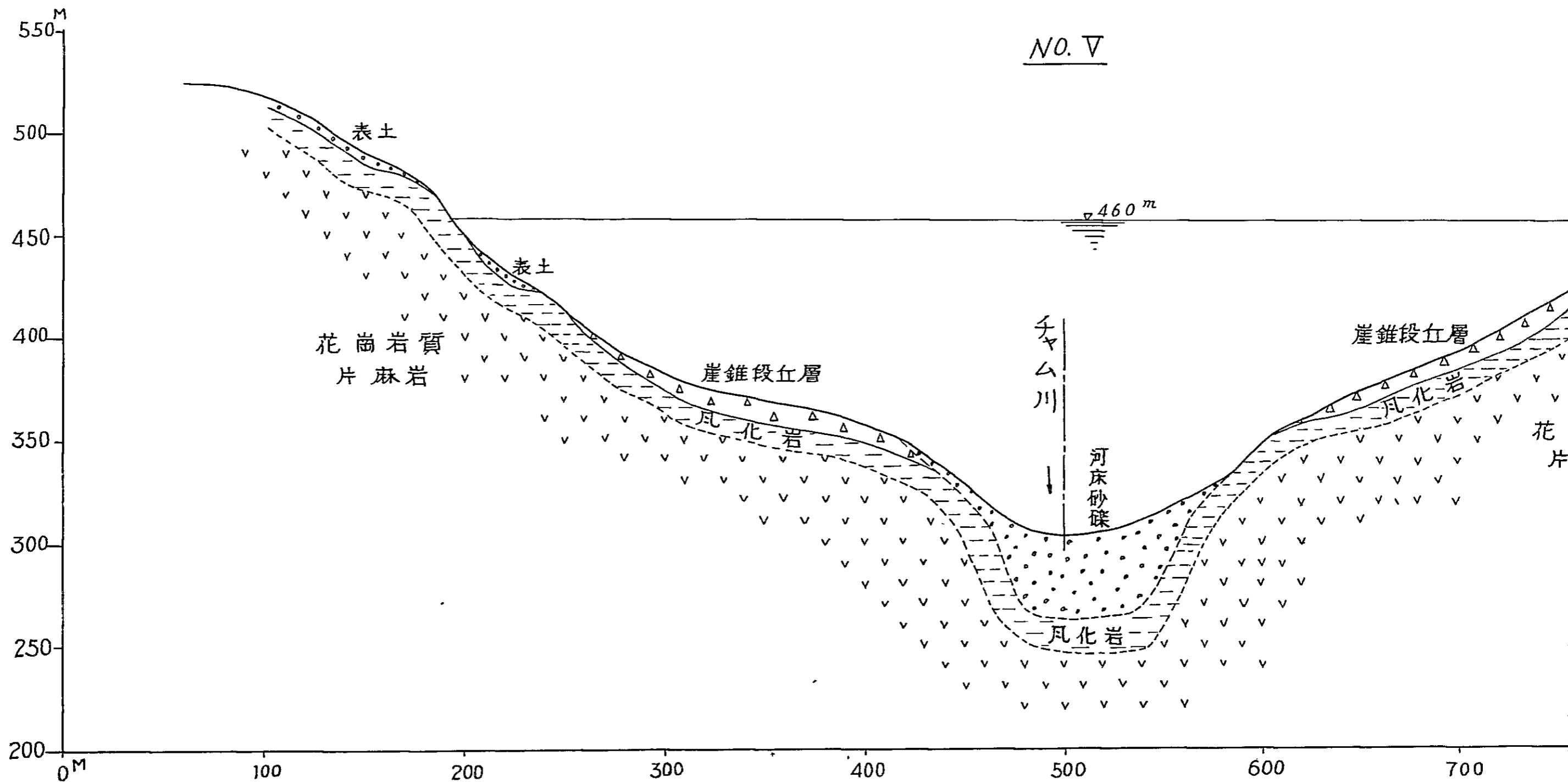
NO. IV



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(S=1/2000)

左岸

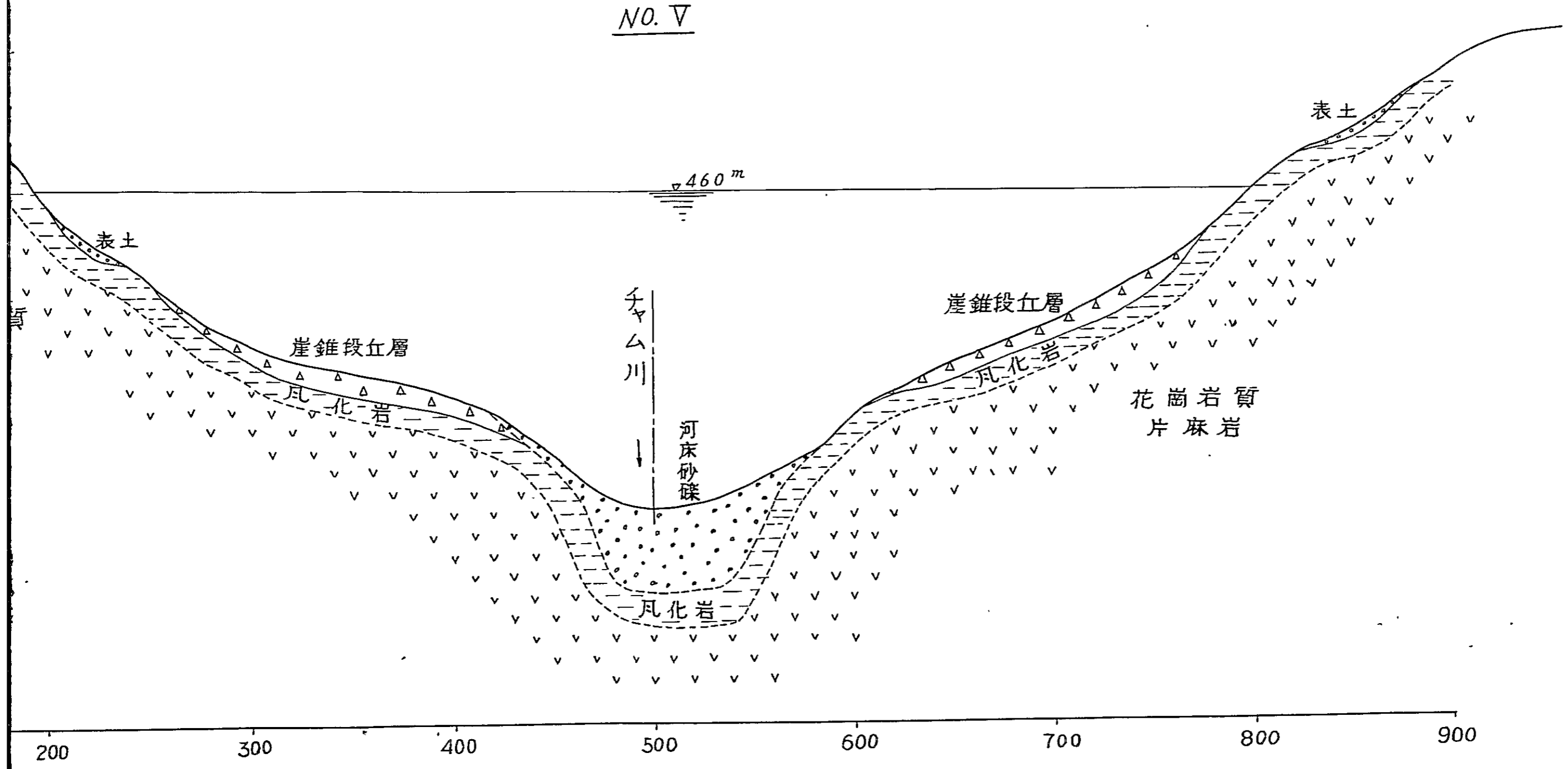


# チャム川NO.▽ダム軸地質断面図

(S=1/2000)

右岸

NO.▽





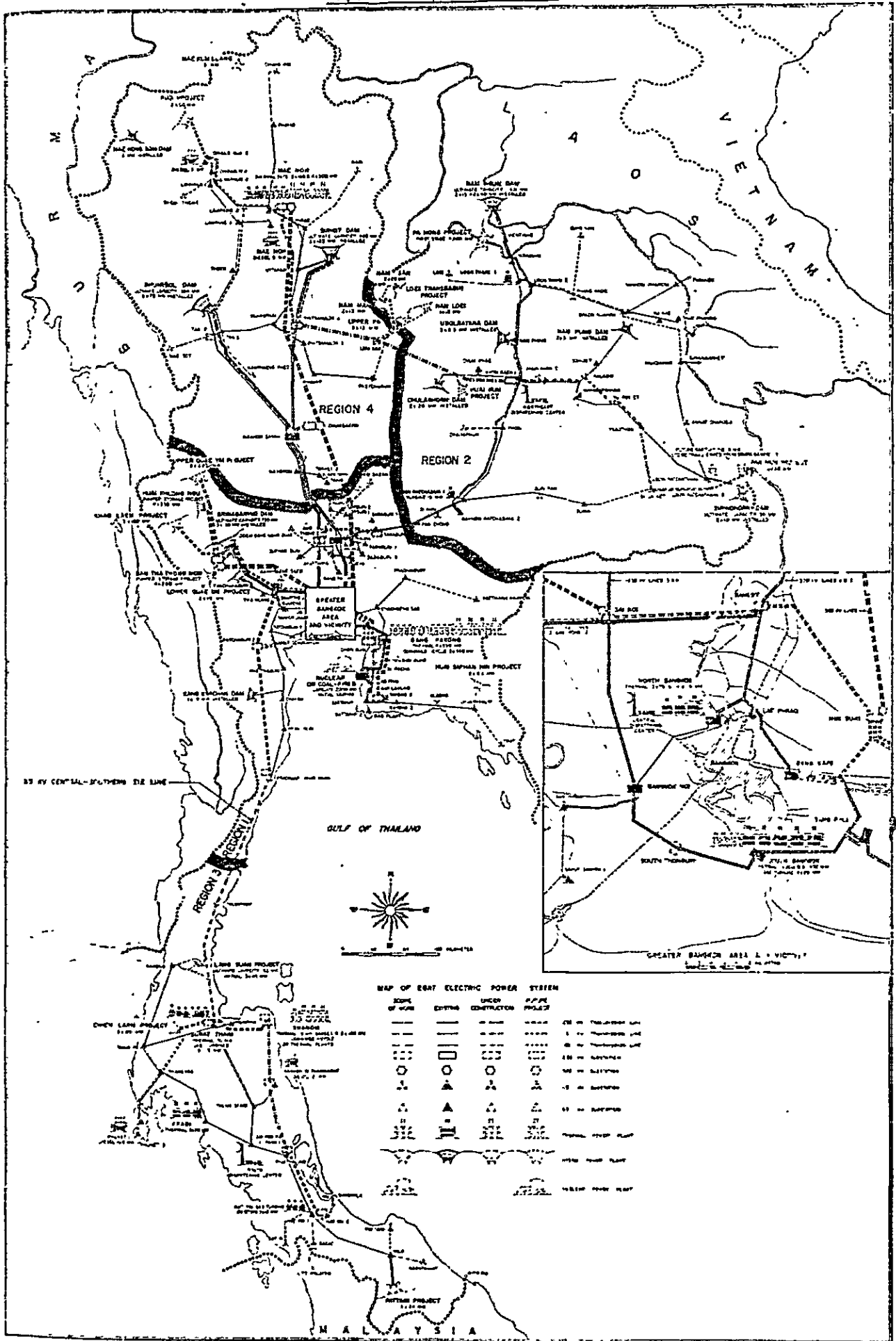


## 9) 電 気 関 係

1. 系 統 図
2. 発電設備概要図
3. 電源開発計画図（工事着手分）
4.       "       （ 1981 ～ 1992 ）
5. 発電方式別実績並びに建設計画
6. 送電線の現在設備
7. 送電線設備と将来計画
8. タイ王国全国発電機別発生出力
9. バンコック日負荷曲線
10. タイ王国、発電計画並びに電力の需要想定
11. タイ王国消費電力別内訳表 1978 年
12. 電気設備の推移
13. 500KV 送電線計画図
14. 送電ルート計画図
15. タイ王国電気料金単価一覧表
16. 電力使用量と GDP の推移表



# 系 統 圖

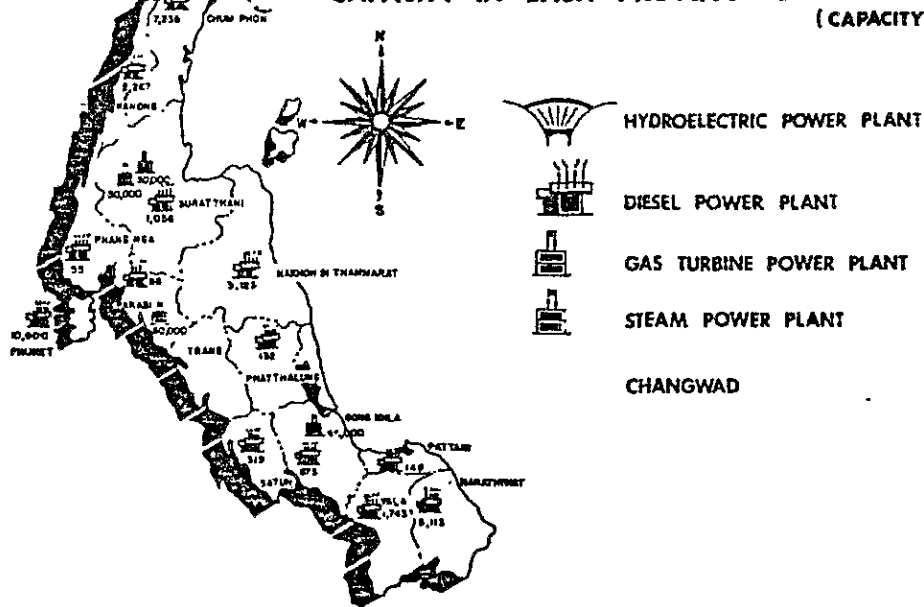




# 發電設備概要圖



MAP SHOWING TOTAL GENERATION CAPACITY IN EACH PROVINCE OF THAILAND (CAPACITY IN KW)





電源開発計画 (工事着手分) (1979-1984)

POWER PLANT	TYPE	UNIT NUMBER	RATING (MW)	TOTAL (MW)	DATE	
SRINAGA RIND	HYDRO	1	120	120	1979	
SRINAGA RIND	HYDRO	2	120	120	1979	
SRNAGA RND	HYDRO	3	120	120	1980	
BANG PAKONG	OIL/GAS	1-4	60	240	1980	GASTURBINE (1)
BANG THEMAL	OIL/GAS	1	75	75	1981	
BANG PAKONG	OIL/GAS	1-4	60	240	1981	GASTURBINE (2)
MAE MOH	LIGNITE	3	75	75	1981	
BHUMI BOL	HYDRO	7	133	133	1981	
PATTANI	HYDRO	1-3	24	72	1981	
BANG PAKONG	—	1	120	120	1982	COMBINED -CYCLE (1)
LOWER QUAE -YAI	HYDRO	1-2	19	38	1982	
BANG PAKONG	—	1	120	120	1982	COMBINED -CYCLE (2)
BANG PAKONG	OIL/GAS	1	550	550	1983	THERMAL UNIT 1
MAE MOH	LIGNITE	4	150	150	1984	
KHAO LAEM	HYDRO	1-3	100	300	1984	
SUBTOTAL				2473		



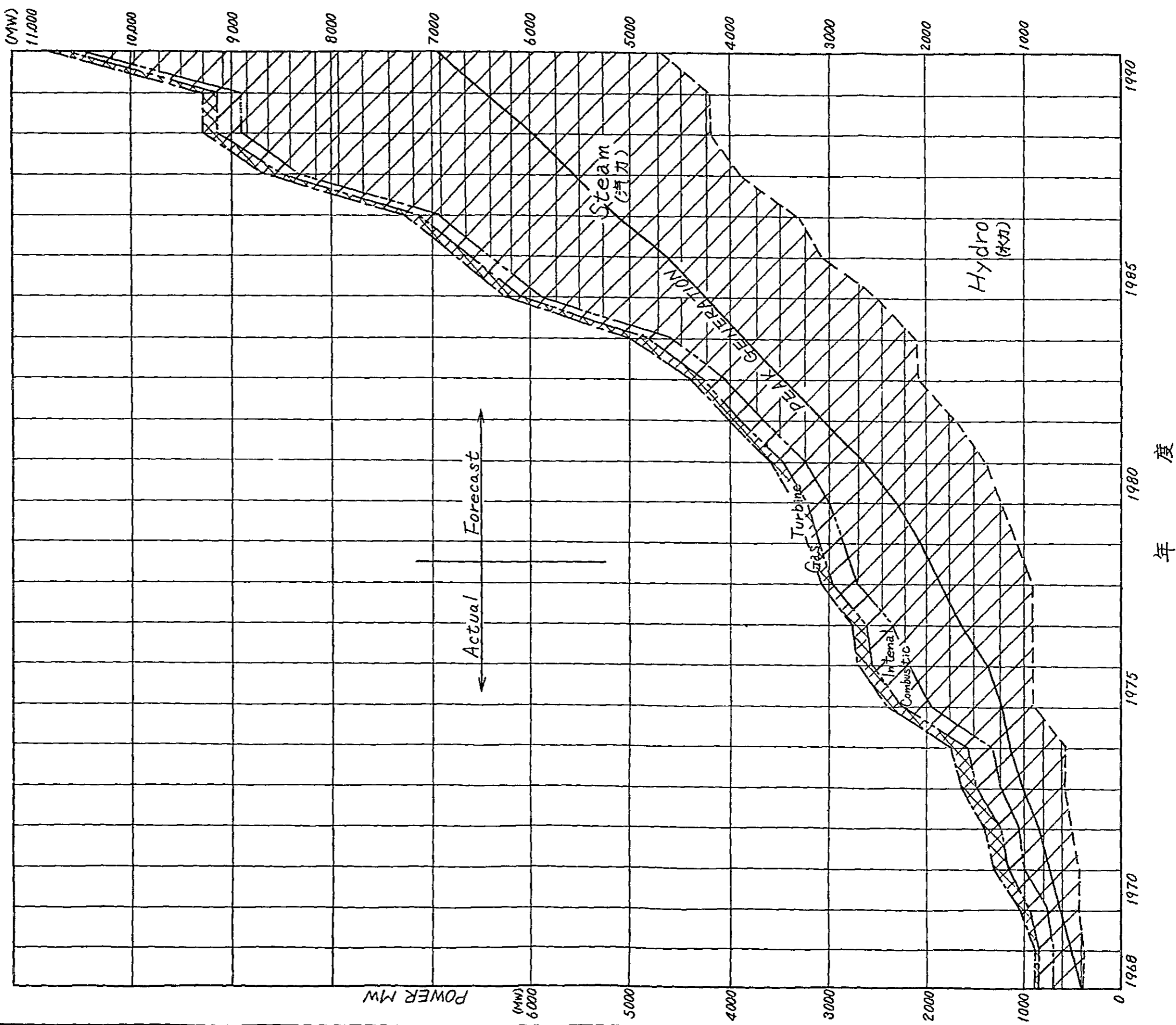


電源開発計画 (1981~1992)

POWER PLANT	TYPE	UNIT NUMBER	RATING (MW)	TOTAL (MW)	DATE	
SOUTH BANGKOK	OIL/GAS	1-4	25	100	1981	GAS TURBINE
SIRIND HORN	HYDRO	3	12	12	1983	
MAE MOH	LIGNITE	5	150	150	1984	
BANG PAKONG	OIL/GAS	2	550	550	1984	THERMAL UNIT 2
LANG SUAM	HYDRO	1-3	45	135	1984	
GAS TURBINE RETRE	OIL	1-11	-15	-165	1985	
SRINAGA RIND STAGE 2	HYDRO	4-5	180	360	1985	
CHIEW LARN	HYDRO	1-3	80	240	1986	
MAE MOH	LIGNITE	6	300	300	1986	
MAE MOH	LIGNITE	7	300	300	1987	
MAE MOH	LIGNITE	8	300	300	1987	
UPPER QUAE YAI	HYDRO	1-2	290	580	1987	
REGION 3 COMBINED-CYCLE	OIL/GAS	1-3	60	180	1987	(1)
MAE MOH	LIGNITE	9	300	300	1988	
HYDRO MISCELLANEOUS	HYDRO			300	1988	
QUAE YAI	HYDRO	1-2	250	500	1990	PUMPED-STORAGE 1
REGION 3 COMBINED-CYCLE	OIL/GAS	1-3	60	180	1990	(2)
KRBILIGNITE RETIRED	LIGNITE	1-3	20	-60	1990	
NUCLEAR OR COAL-FIRED	NUCLEAR COAL	1	1000	1000	1990	
NUCLEAR OR COAL-FIRED	NUCLEAR COAL	1-2	500	1000	1990	
NUCLEAR OR COAL-FIRED	NUCLEAR COAL	2	1000	1000	1992	
NUCLEAR OR COAL-FIRED	NUCLEAR COAL	2-4	500	1000	1992	
QUAE YAI	HYDRO	3-4	250	500	1992	PUMPED-STORAGE 2
SUB-TOTAL				6762		
TOTAL 1+2				9235		

# 発電方式別実績並びに建設計画

注: 1990年1000MW 火力原子力発電





送電線の現在設備 (1980年)

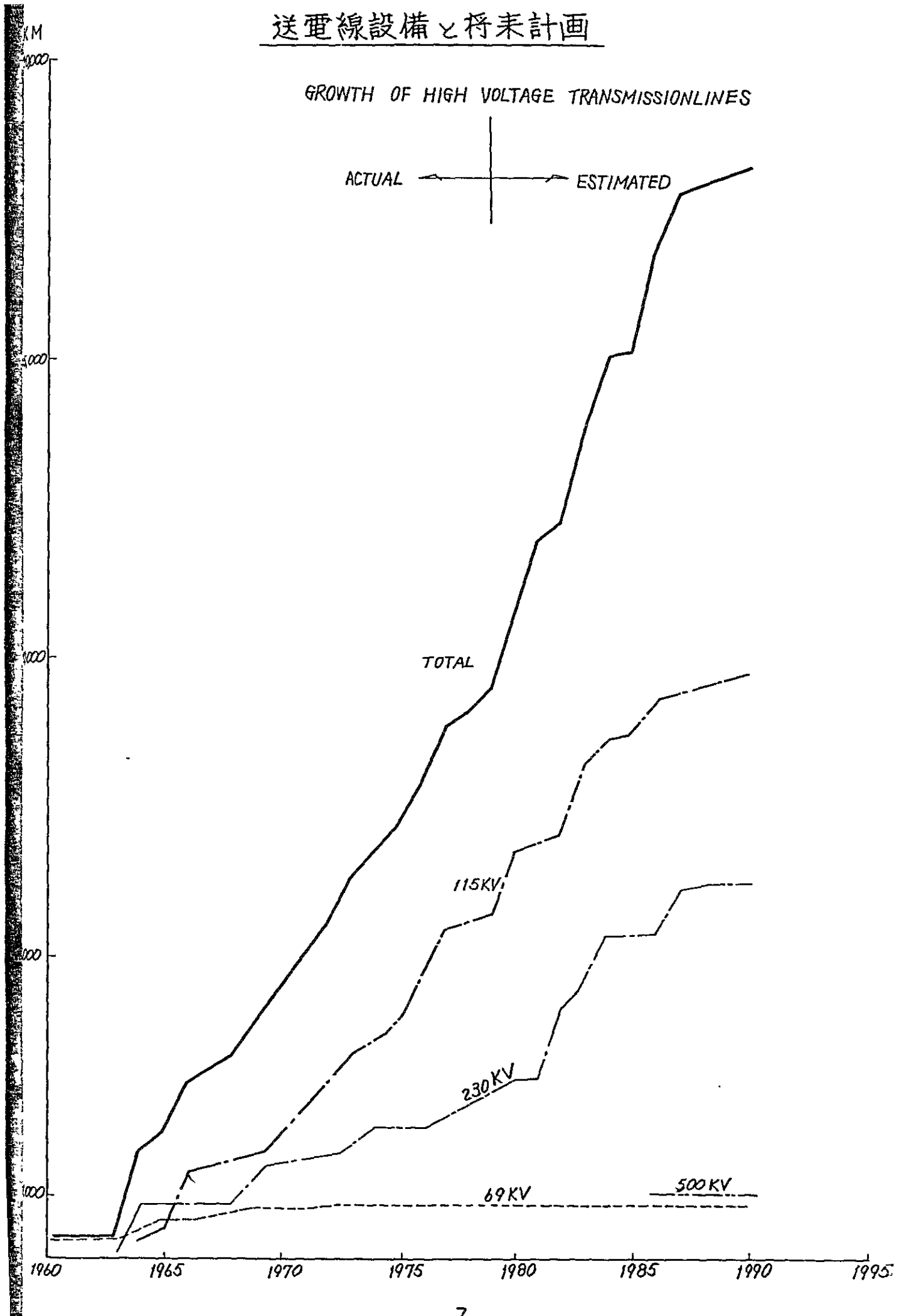
(Km)

		2 cct	1 cct	計
REGION (1)	230 KV	1324	18	1342
	115 KV	137	964	1101
	69 KV		287	287
REGION (2)	115 KV	1193	1257	2450
	69 KV		318	318
REGION (3)	115 KV	321	922	1243
REGION (4)	230 KV	1258	219	1477
	115 KV	352	623	975
	69 KV	7	380	387
ALL REGION	230 KV	2582	237	2819
	115 KV	2003	3766	5769
	69 KV	7	985	992
	合計	4592	4988	9580



# 送電線設備と将来計画

GROWTH OF HIGH VOLTAGE TRANSMISSION LINES

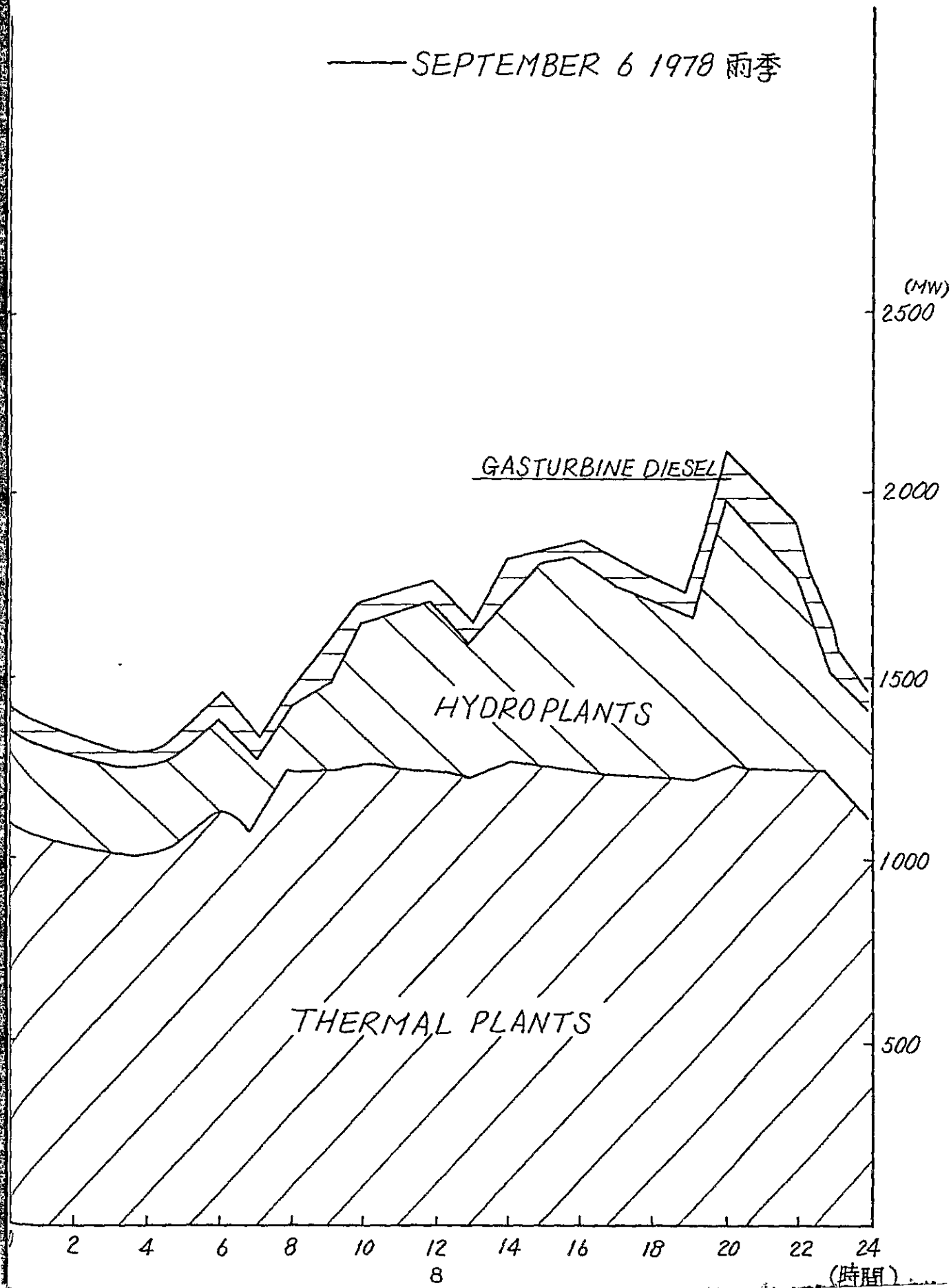






タイ王国全国発電機別発生出力

— SEPTEMBER 6 1978 雨季

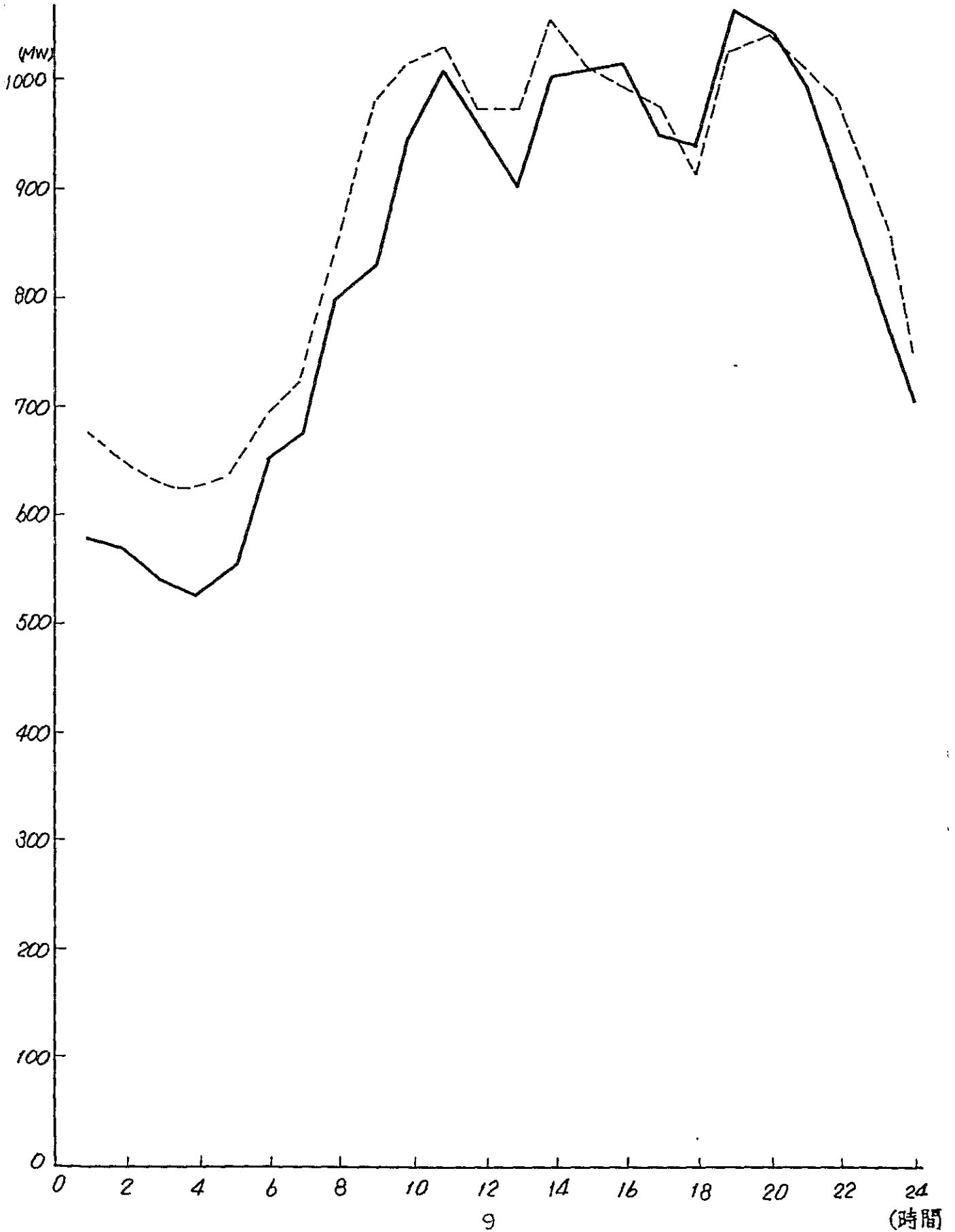




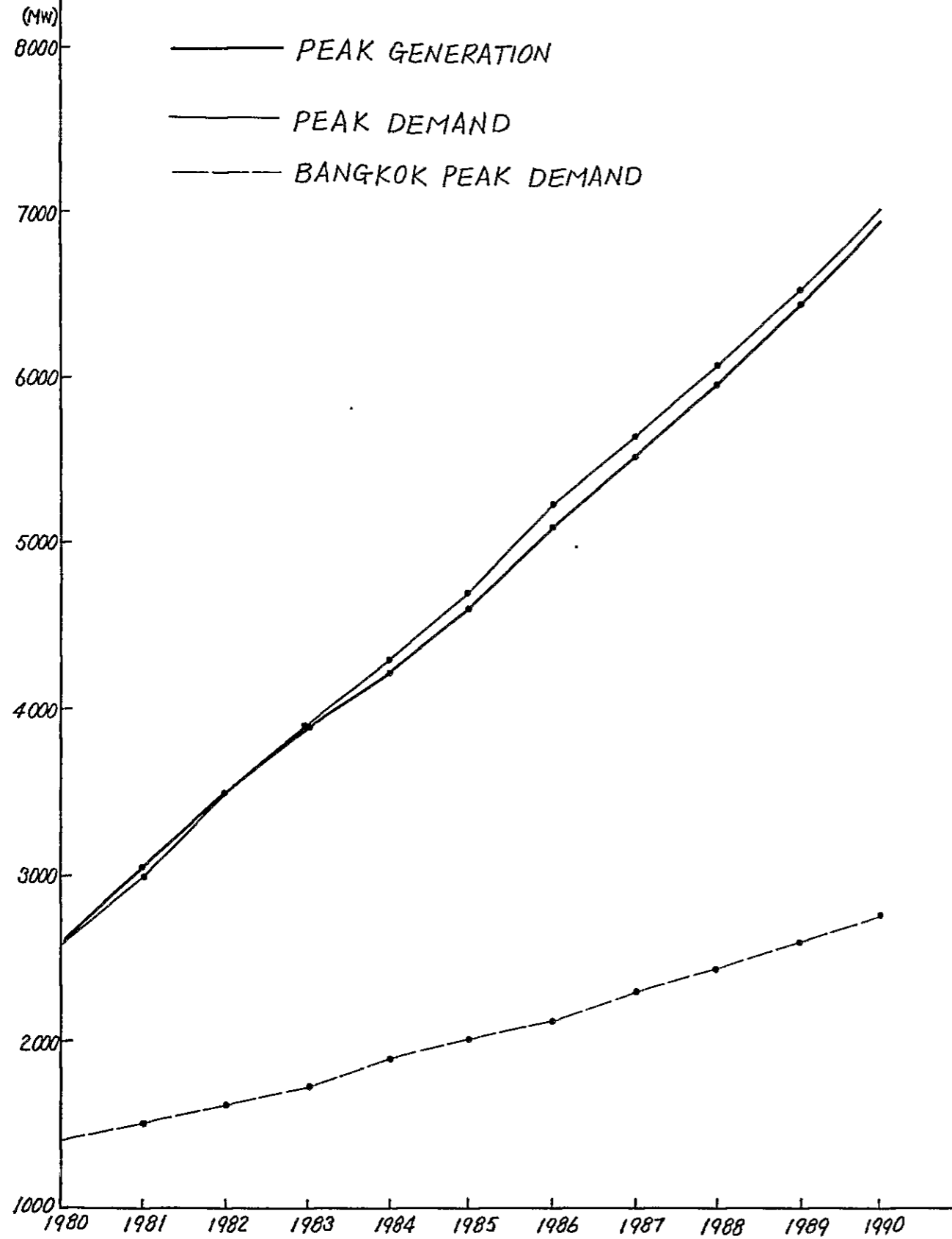
# バンコク日負荷曲線

— MONDAY SEPTEMBER 26 1978 雨委

- - - WEDNESDAY APRIL 27 1978 乾委

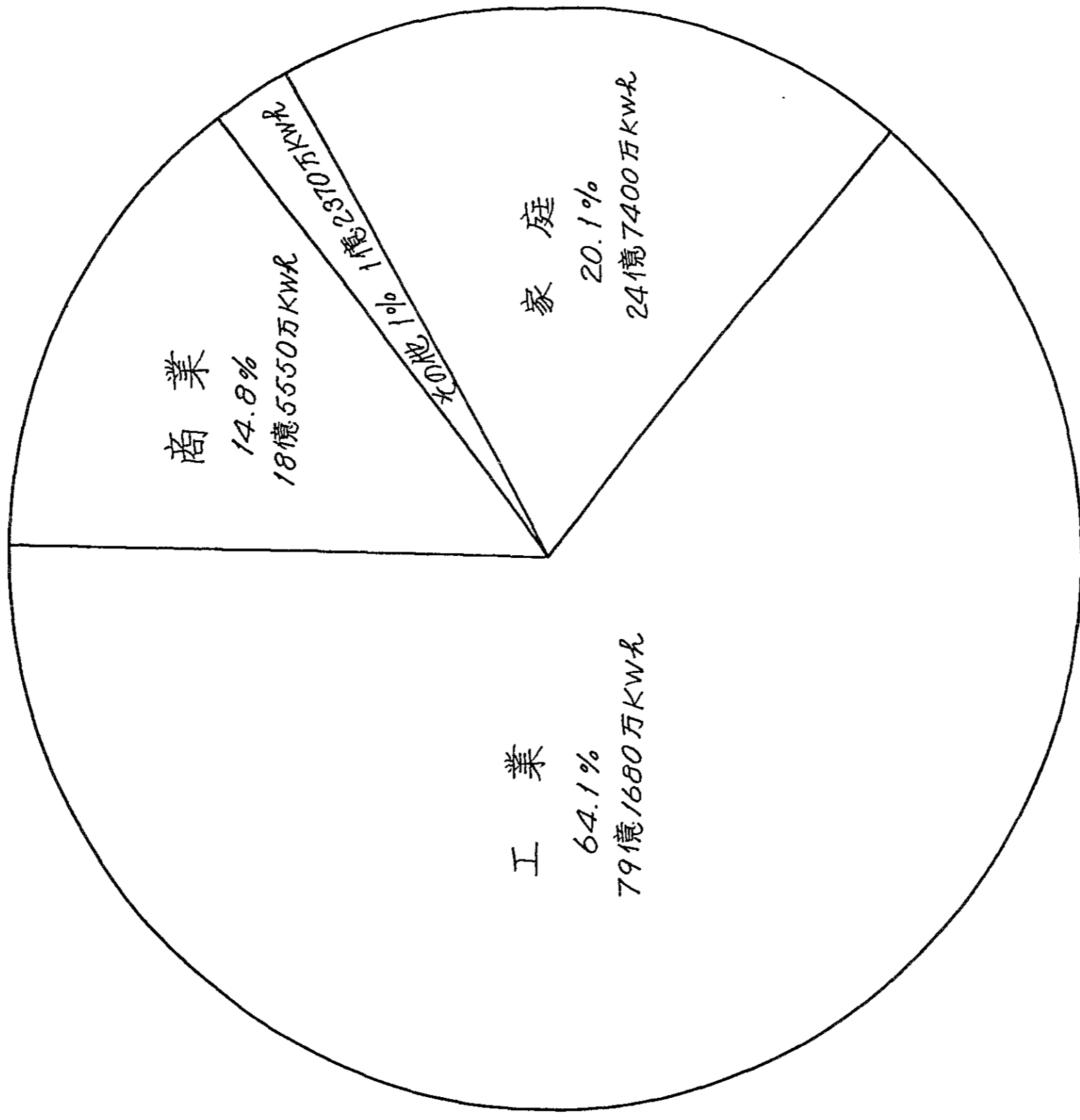


タイ王国発電計画並びに電力需要想定 1980～1990



年度	全国発電計画		全国需要想定		バンコク(MEA)需要想定	
	MW	増加率 (%)	MW	増加率 (%)	MW	全国比 (%)
1980	2,577	14.3	2,630	12.7	1,404	53
1981	2,996	16.3	3,059	16.3	1,519	50
1982	3,449	15.1	3,463	13.2	1,638	47
1983	3,878	12.4	3,846	11.1	1,763	46
1984	4,318	11.4	4,229	10.0	1,893	45
1985	4,715	9.2	4,624	9.3	2,027	44
1986	5,242	11.2	5,107	10.4	2,166	42
1987	5,650	7.8	5,527	8.2	2,311	42
1988	6,086	7.7	5,969	8.0	2,465	41
1989	6,549	7.6	6,441	7.9	2,627	41
1990	7,035	7.4	6,940	7.8	2,798	40
	倍率 2.73	平均 10.6	倍率 2.64	平均 10.2	倍率 2.0	

タイ王国消費電力別内訳表 1978年



その他の内訳

農業	16%	1979万kWh
街路灯	58%	7174万kWh
その他	26%	3217万kWh



# 電気設備の推移

(1978年)

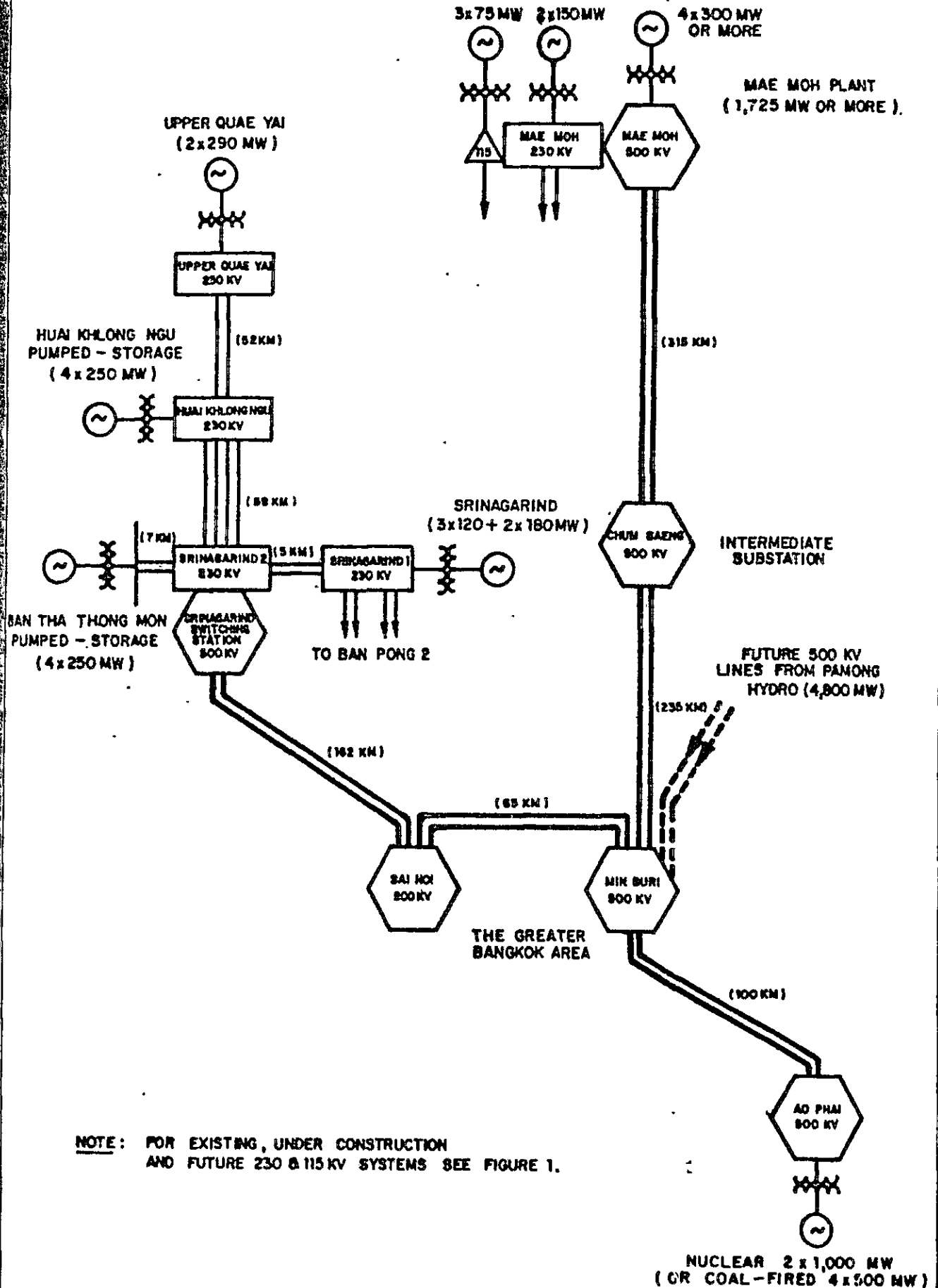
DESCRIPTION	UNIT	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969
<b>OPERATION GROWTH</b>											
<b>Installed Capacity</b>											
Hydra	kW	909,200	909,200	909,200	909,200	909,200	515,300	475,300	451,300	451,300	451,300
Thermal	kW	1,702,500	1,333,750	1,333,750	1,333,750	1,040,000	740,000	710,000	510,000	327,500	327,500
Gas Turbine	kW	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	150,000	90,000
Diesel	kW	34,600	29,600	29,600	29,600	29,600	28,600	41,000	41,000	41,000	42,000
<b>TOTAL</b>	<b>kW</b>	<b>2,811,300</b>	<b>2,437,550</b>	<b>2,437,550</b>	<b>2,437,550</b>	<b>2,143,800</b>	<b>1,448,900</b>	<b>1,391,300</b>	<b>1,167,300</b>	<b>969,800</b>	<b>910,800</b>
<b>Transmission Lines</b>											
230 kV	circuit-kilometers	2,493	2,440	2,243	2,243	2,243	1,697	1,697	1,664	1,633	1,162
115 kV	circuit-kilometers	5,352	5,032	4,620	3,685	3,507	3,142	2,878	2,248	1,813	1,766
69 kV	circuit-kilometers	1,023	1,023	1,023	1,023	1,023	1,023	982	892	892	864
<b>TOTAL</b>	<b>circuit-kilometers</b>	<b>8,868</b>	<b>8,495</b>	<b>7,886</b>	<b>6,951</b>	<b>6,773</b>	<b>5,862</b>	<b>5,557</b>	<b>4,804</b>	<b>4,338</b>	<b>3,792</b>
<b>Transformer Capacity in Substations</b>											
230 kV	kVA	2,672,330	2,572,330	1,972,330	1,705,660	1,672,330	1,605,660	1,596,750	1,403,360	899,000	670,020
115 kV	kVA	1,371,920	1,202,120	987,570	835,570	757,480	679,480	544,820	397,320	240,800	261,660
69 kV	kVA	325,730	277,730	261,730	263,730	235,630	201,400	188,800	140,700	121,150	131,300
<b>TOTAL</b>	<b>kVA</b>	<b>4,369,980</b>	<b>4,052,180</b>	<b>3,221,630</b>	<b>2,804,960</b>	<b>2,665,440</b>	<b>2,486,540</b>	<b>2,330,370</b>	<b>1,941,380</b>	<b>1,260,950</b>	<b>1,062,980</b>
<b>System Generation</b>											
Peak	kW	2,100,600	1,873,400	1,652,100	1,406,600	1,256,300	1,199,300	1,028,800	872,700	748,350	635,000
Annual Energy	million kWh	12,371	10,950	9,414	8,221	7,258	6,872	5,711	4,792	4,095	3,376
Annual Load Factor	%	67.23	66.72	65.05	66.64	65.96	65.42	63.20	62.69	62.47	60.70
<b>Annual Energy Sales</b>											
M.E.A.	million kWh	7,112	6,358	5,594	5,034	4,454	4,420	3,679	3,165	2,744	2,344
P.E.A.	million kWh	3,916	3,314	2,655	2,124	1,797	1,574	1,235	931	766	613
E.D.L.	million kWh	6	6	7	9	8	1	10	48	30	16
Industries	million kWh	482	471	439	422	428	404	369	321	298	187
<b>TOTAL</b>	<b>million kWh</b>	<b>11,516</b>	<b>10,149</b>	<b>8,695</b>	<b>7,589</b>	<b>6,687</b>	<b>6,399</b>	<b>5,293</b>	<b>4,465</b>	<b>3,856</b>	<b>3,160</b>
<b>Personnel</b>											
Staff	persons	12,158	11,090	10,002	6,447	5,655	5,120	4,672	4,070	3,480	3,274
Permanent Employees	persons				2,470	2,146	1,791	1,792	1,535	1,435	1,740
Temporary Employees	persons	3,772	4,436	4,300	3,780	3,965	4,731	3,963	4,148	3,131	1,310
<b>TOTAL</b>	<b>persons</b>	<b>15,930</b>	<b>15,526</b>	<b>14,302</b>	<b>12,697</b>	<b>11,766</b>	<b>11,642</b>	<b>10,427</b>	<b>9,753</b>	<b>8,046</b>	<b>6,324</b>
<b>FINANCIAL SITUATION</b>											
Property Plant and Equipment, at cost	million Baht	17,318	14,301	13,501	11,971	11,585	9,266	8,030	7,145	6,286	5,794
Under Construction, at cost	million Baht	7,196	5,064	3,384	2,683	1,545	2,594	1,865	1,153	1,111	919
Long-Term Debts	million Baht	12,111	9,253	8,456	7,305	6,501	6,092	4,977	4,163	3,777	3,344
Total Electric Sales	million Baht	6,447	4,647	3,823	3,388	2,483	1,826	1,536	1,307	1,148	935
Total Operating Expenses and Interest	million Baht	5,923	4,281	3,145	2,985	1,999	1,356	1,125	902	902	756





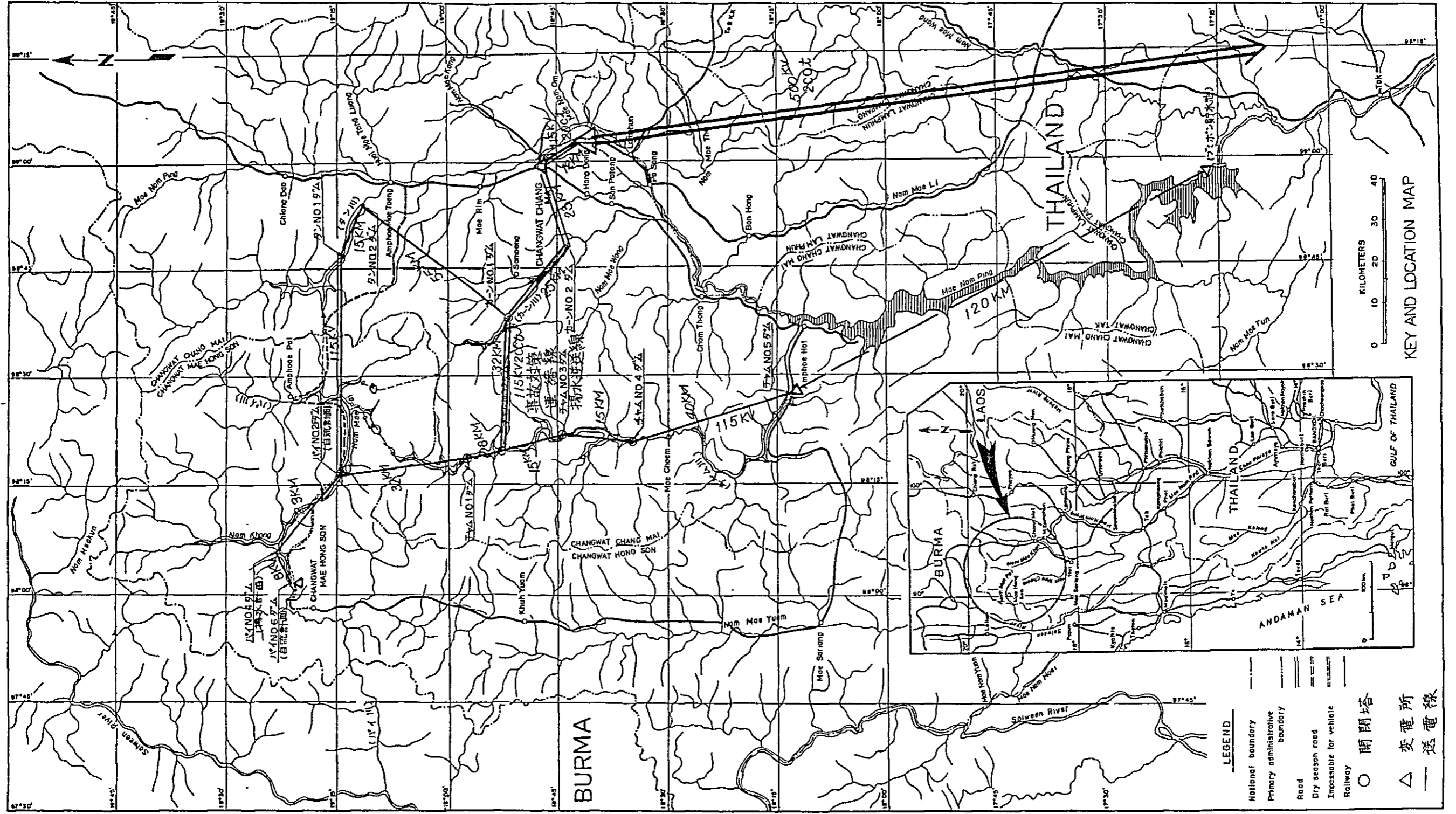
# 500KV 送電線計画図

## 500 KV TRANSMISSION SYSTEM FUTURE DEVELOPMENTS



**NOTE:** FOR EXISTING, UNDER CONSTRUCTION AND FUTURE 230 & 115 KV SYSTEMS SEE FIGURE 1.

# 送電ルート計画図



# タイ王国電気料金単価一覽表

	MEA 方式		PEA 方式	
	使用量別	料金BAHT	使用量別	料金BAHT
家庭	FIRST	5 KWH OR LESS	FIRST	5 KWH OR LESS
	NEXT	10 KWH	NEXT	10 KWH
	"	10 "	"	10 "
	"	75 "	"	75 "
	"	50 "	"	50 "
	"	150 "	"	150 "
	"	100 "	"	100 "
	OVER	400 "	OVER	400 "
	FIRST	40 KWH OR LESS	FIRST	50 KWH OR LESS
	NEXT	260 KWH	NEXT	250 KWH
"	700 "	"	700 "	
"	2000 "	"	2000 "	
OVER	3000 "	OVER	3000 "	
小事務所 30 KW以下	基本料金		基本料金	
	使用料金	98 / KWH	使用料金	96 / KW
大事務所 30 KW以上	基本料金		基本料金	
	使用料金	0.81 / KWH	使用料金	0.92 / KWH
小工場 30 ~ 499 KW 以下	基本料金		基本料金	
	FIRST	50 KWH / KW	FIRST	50 KWH / KW
	NEXT	150 "	NEXT	150 "
	"	200 "	"	200 "
	OVER	400 "	BALANCE	
	基本料金	90 / KW	基本料金	88 / KW
大工場 500 KW 以上	FIRST	200 KWH / KW	FIRST	50 KWH / KW
	NEXT	280 "	NEXT	150 "
	OVER	480 "	"	200 "
	BALANCE		BALANCE	
TEMPORARY	一律	3.0 / KWH	一律	3.0 / KWH
WATER AND ILLIGATION	FIRST		FIRST	100 KWH OR LESS
	OVER		OVER	100 KWH
街路灯			一律	0.9 / KWH
	基本料金		基本料金	87 / KW
SPECIAL	使用料金	0.76 / KWH	使用料金	0.76 / KWH
	OFF-PEAK	基本料金		
大工場 OFF-PEAK	ON-PEAK	基本料金		
		使用料金		

1980年2月 SYSTEM ANALYSIS SECTION NEA



# タイ王国電力使用量とGDPの推移

Comparative Growth Trend of Index: Electric Consumption Per Capita and GDP Per Capita :  
(1962=100)

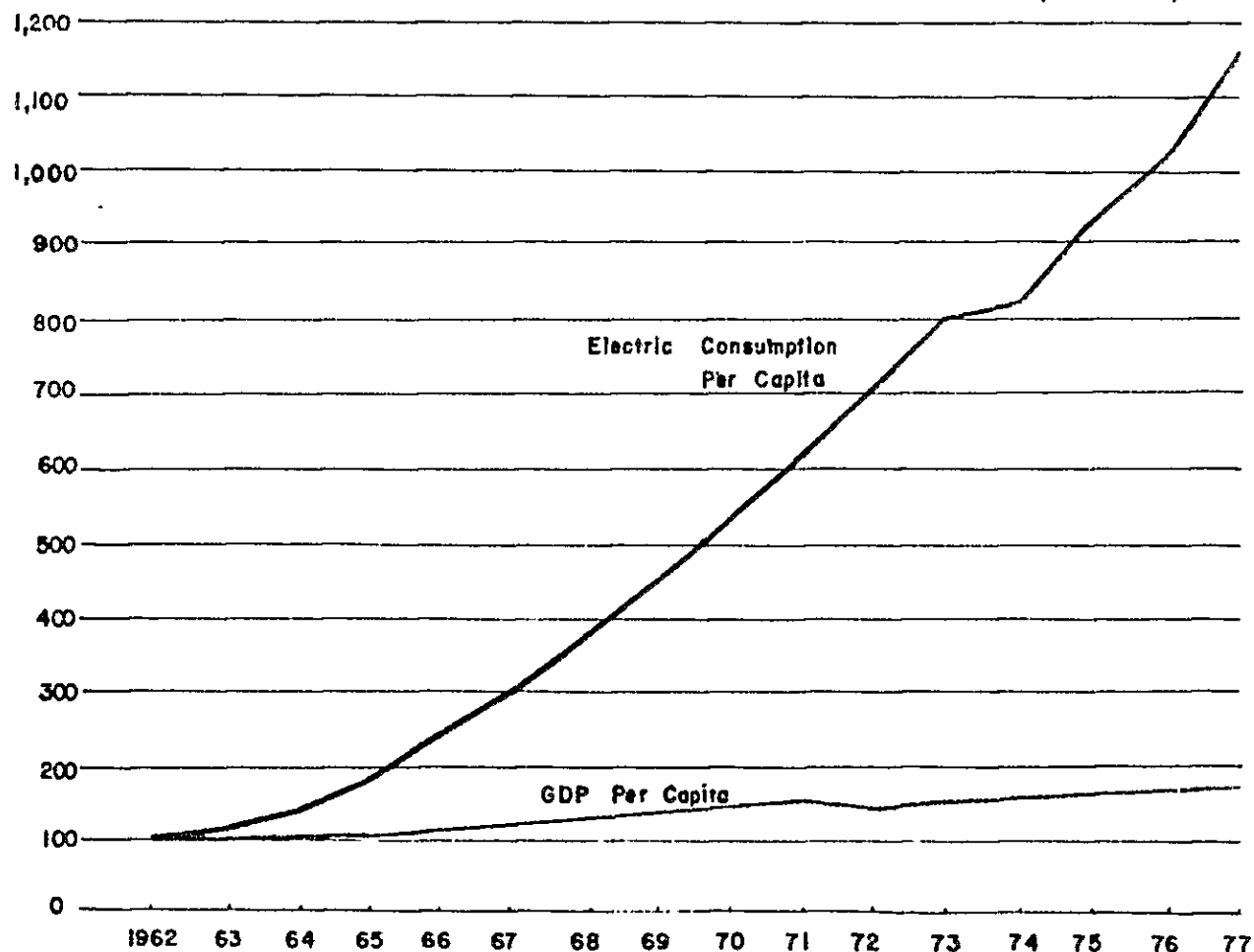
Year	Electric Consumption Per Capita <sup>2/</sup>		GDP Per Capita (at 1962 prices) <sup>1/</sup>	
	kWh	Index	Baht	Index
1962	19.3	100.0	2,325	100.00
1963	22.7	117.6	2,442	105.03
1964	27.1	140.4	2,492	107.18
1965	36.0	186.5	2,599	111.78
1966	47.5	246.1	2,808	120.78
1967	60.5	313.5	2,898	124.65
1968	75.1	389.1	3,057	131.48
1969	89.7	464.8	3,243	139.48
1970	107.4	556.5	3,371	144.99
1971	121.8	631.1	3,529	151.78
1972	138.9	719.7	3,523	151.53
1973	155.3	804.7	3,730	160.43
1974	159.1	824.3	3,774	162.32
1975	178.9	926.8	3,883	167.01
1976	199.0	1,031.1	4,047	174.06
1977	225.0	1,165.8	4,226	181.76

Source: <sup>1/</sup> Office of the National Economic and Social Development Board.

<sup>2/</sup> Compiled by NEA.

CHART 24

TREND OF ELECTRICITY CONSUMPTION PER CAPITA AND GDP PER CAPITA (1962=100)





#### 4) 上水道工業用水

1. バンコック市上水道関係一覧表（実績並びに将来計画）
2. タイ王国首都圏上水道使用実績と将来計画
3. バンコック市上水道水源の推移





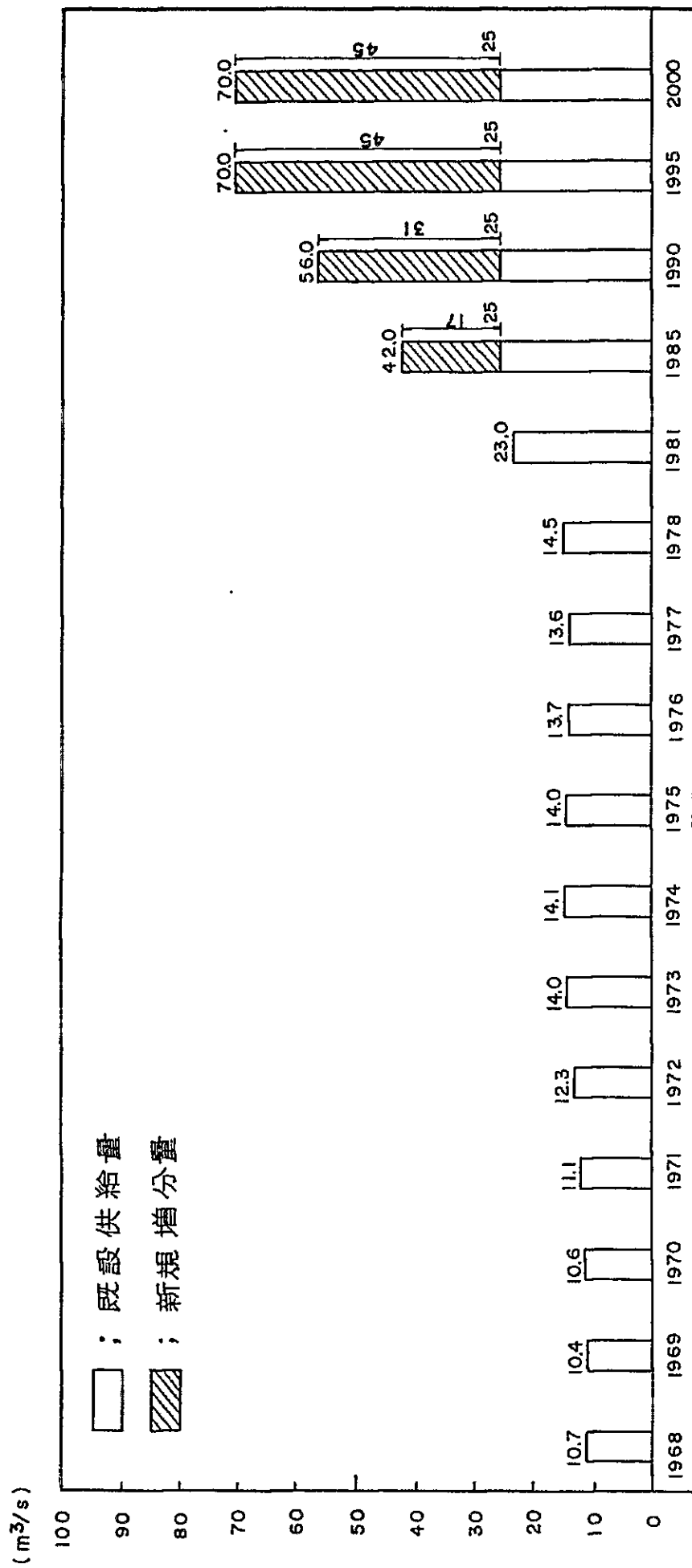
# バンコック市上水道関係一覽表(実績並びに将来計画)

年平均日使用水量 1000CMD

西 歴	給 水 量						水 源				
	全市民人口	給水人口	給水率 (%)	生活用水	商業・公共施設用水	工業用水	一般公衆用水	漏水	使用水合計	河川水	地下水
1969	2,876,157	1,873,820	65.2	439	234	28	36	159	896	586	310
1970	2,974,730	2,003,880	67.4	437	247	30	38	165	917	610	307
1971	3,090,949	2,074,550	67.1	450	262	33	42	172	959	625	334
1972	3,222,934	2,181,000	67.7	502	288	37	44	190	1,061	743	318
1973	3,343,151	2,244,820	67.1	588	317	40	47	216	1,208	846	362
1974	4,067,288	2,307,780	56.7	578	330	44	53	217	1,222	852	371
1975	4,284,082	2,384,830	55.7	540	346	48	60	215	1,208	857	351
1976	4,475,355	2,469,740	55.2	499	351	54	64	210	1,179	851	328
1977	4,658,000	2,582,000	55.4	516	362	57	62	214	1,211	850	354
1978	4,848,000	2,675,000	55.2	535	375	62	62	216	1,250	850	400
1979	5,045,000	2,820,000	55.9	508	395	85	62	262	1,311	951	360
1980	5,251,000	2,958,000	56.3	532	408	115	63	228	1,346	1,022	324
1985	6,413,000	4,059,000	63.3	771	548	203	65	300	1,887	1,696	191
1990	7,197,000	5,027,000	69.8	1,005	659	307	60	357	2,388	2,388	—
1995	8,078,000	6,260,000	77.5	1,283	795	470	63	388	2,999	2,999	—
2000	9,067,000	7,797,000	86.0	1,637	967	717	62	374	3,758	3,758	—



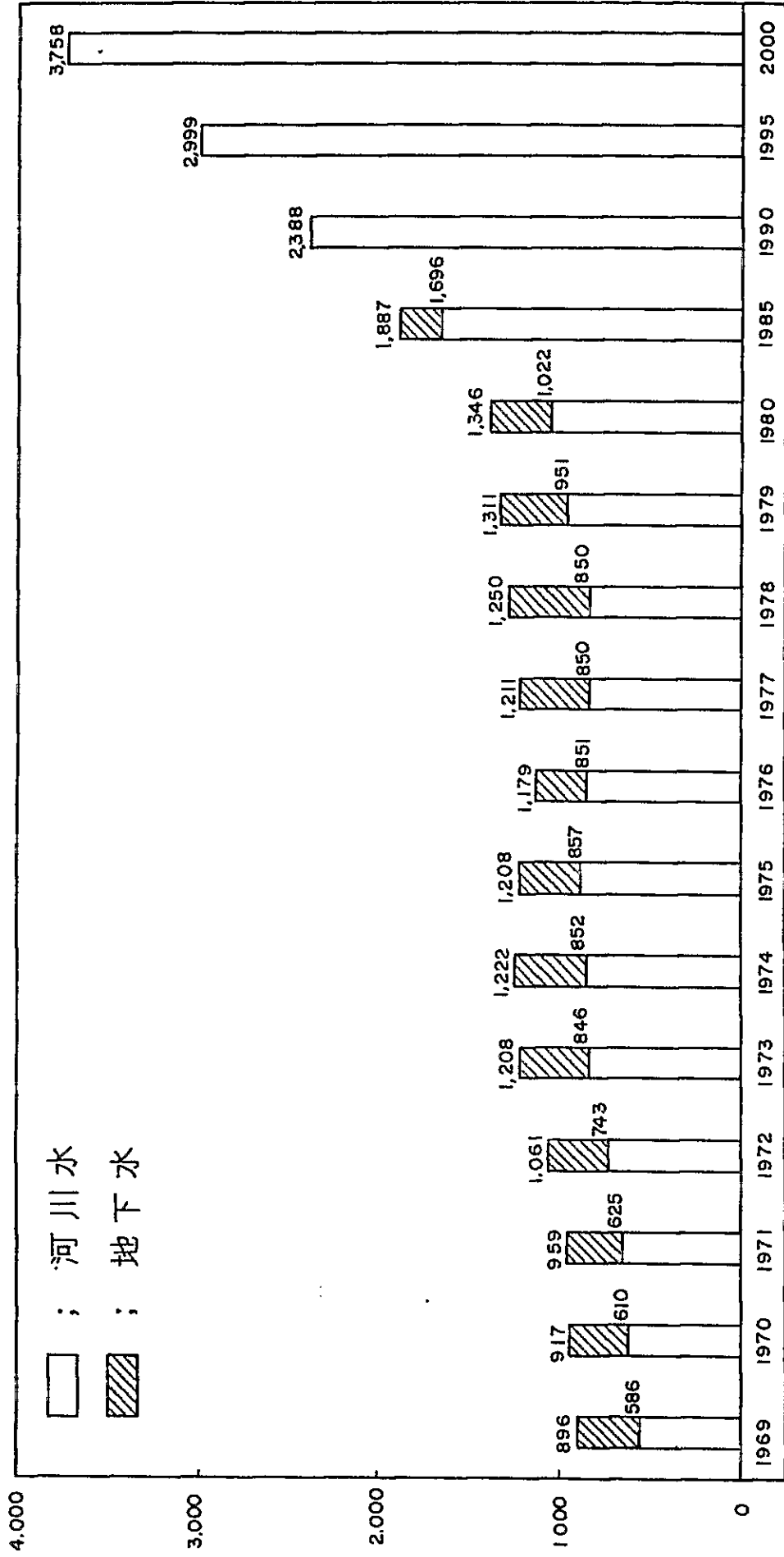
# タイ王国首都圏上水道使用実績と将来計画 (m<sup>3</sup>/s)





# バンコック市上水道水源の推移

年平均日使用水量, 1000 CMD



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