

Fig. 6-11(a2) Geological Log

Project Name		TeKoi Hydro-electric Development Project		Site Name			
Hole NO.		L-1		Elevation of Ground Level		m	
Date		Beginning		Operator			
		Ending		Site Manager			
				Supervisor			

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>	
22	21.30		Sandstone	Slightly w.	[Hatched pattern]				[Hatched pattern]				10 <sup>-3</sup> (Lugdon)			CL
42	22.60				Fresh	[Hatched pattern]				[Hatched pattern]				[Hatched pattern]		
35	35.10		Shale	Soft Fresh		[Hatched pattern]				[Hatched pattern]				[Hatched pattern]		
38	38.40				Sandstone	Slightly w.	[Hatched pattern]				[Hatched pattern]				[Hatched pattern]	
40	39.80						[Hatched pattern]				[Hatched pattern]				[Hatched pattern]	
					[Hatched pattern]				[Hatched pattern]				[Hatched pattern]			CM

Bit Size ; NMLC (76<sup>m</sup>/m)

R.Q.D. ; Rock Quality Designation

Fig. 6-11 (a3) Geological Log

Project Name		TeKoi Hydro-electric Development Project			Site Name											
Hole NO.	L - 1		Elevation of Ground Level	m		Ground water Level	m									
Date	Beginning				Operator											
	Ending				Site Manager											
					Supervisor											
Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: m/sec)			Rock-classification
					20	40	60	80	20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	
40	41.00		Sandstone	Slightly W.												CH
	42.10															
	43.80		Muddy Shale	Soft												CH
	44.10															
	44.50														CH	
45			Shale	Fresh												CH
50	50.00															

Bit Size ; NMLC (76<sup>mm</sup>/m)

R.O.D. ; Rock Quality Designation

Fig. 6-11(b1) Geological Log

Project Name	Toku Hydro-electric Development Project		Site Name	Lower Dam Site	
Hole NO.	L - 2	Elevation of Ground Level	55.13m	Ground water Level	1.4 m
Date	Beginning	October 2, 1981	Operator		
	Ending	October 10, 1981	Site Manager		
			Supervisor TAKUJI SUGIMOTO		

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	10 <sup>-3</sup>	10 <sup>-4</sup>	10 <sup>-5</sup>	
	0		Gravel (River Deposits)													
	3.30															
	4			Slightly w.												CL
	7.30															CM
	10		Sandstone	Fresh												CH
	15															CM
	18.30															CL
	19.10		Shale	Fresh												CH
	20		Sandstone	Fresh												CM

Bit Size : NMLC (76<sup>mm</sup>/in)

R.Q.D. : Rock Quality Designation

Fig. 6-11(bz) Geological Log

Project Name	Tekoi Hydro-electric Development Project		Site Name		
Hole NO.	L-2	Elevation of Ground Level	m	Ground water Level	m
Date	Beginning		Operator		
	Ending		Site Manager		
			Supervisor		

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification	
					20	40	60	80	20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>		
	21.00		Sandstone	Fresh									1	10	10 <sup>2</sup>	(Lugeon)	CM
	24.00		Quartzose Sandstone	Fresh													CL
	25		Shale	Fresh													B
	28.00		Quartzose Sandstone	Fresh													CH
	30		Sandstone	Fresh													B
	33.70		Shaly Sandstone														CH
	35		Shaly Sandstone														B
	37.00		Shale	Fractured zone													CH
	40		Shale														D

Bit Size: NMLC(76<sup>m</sup>/m)

R.Q.D. : Rock Quality Designation

Fig.6-11 (c) Geological Log

Project Name	TeKoi Hydro-electric Development Project		Site Name	Lower Dam Site	
Hole NO.	L-3	Elevation of Ground Level	72.83 m	Ground water Level	10.5 m
Date	Beginning	August 16, 1981	Operator		
	Ending	September 22, 1981	Site Manager		
			Supervisor		

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	$10^{-5}$	$10^{-6}$	$10^{-7}$	
	0.50		Top Soil													
	1.00		Sandstone	Highly W.												D
	3.50			Moderately W.												CL
	5.40			Slightly W.												CM
	7.10			Moderately W.												CL
	9.10		Quartzose Sandstone	Fresh												CH
	12.00			Highly W.												CL
	15.00			Slightly W.												CH
	18.30			Fresh												D
	20.00			Fresh											B	

Bit Size ; NMLC (76 mm)

R.O.D. ; Rock Quality Designation

Fig. 6-11(c2) Geological Log

Project Name		Teko Hydro-electric Development Project		Site Name	
Hole NO.	L-3	Elevation of Ground Level	m	Ground water Level	m
Date	Beginning			Operator	
	Ending			Site Manager	
				Supervisor	

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)			R.O.D. (%)			Permeability (K: cm/sec)			Rock Classification
					20	40	60	20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	
	21.00		Quartzose Sandstone	Fresh										B
	24.30		Sandstone	Fresh & Slightly W.										CH
	25.20		Saly Sandstone											CL
	27.60		Sandstone	Fresh										CM
	29.30			Fractured										D
	30.80													CH
	32.60		Saly Sandstone	Fresh										B
	35.10													CM
	35.30			Fractured										CH
	37.40		Sandstone	Fresh										D
	39.00		Shale	Fresh										B
														CH

Bit Size : NMLC (16 mm)

R.O.D. : Rock Quality Designation

Fig. 6-11(d1) Geological Log

Project Name		TeKoi Hydro-electric Development Project		Site Name		Lower Dam Site	
Hole NO.		L - 4		Elevation of Ground Level		98.31 m	
		Ground water Level				26.8 m	
Date	Beginning		September 27, 1981		Operator		
	Ending		October 6, 1981		Site Manager		
					Supervisor		
						TAKUJI SUGIMOTO	

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	
0	0		Top Soil													
	1.30			Slightly W.												
	5.50		Sandstone	Highly W.												D
	7.70			Moderately W.												CM
	8.00															CH
	11.30			Slightly W.												CM
	12.00															D
	13.30		Shale	Fractured Zone												Cl
	15.00		Shale	Slightly W.												CH
	17.00		Shaly Sandstone	Slightly W.												Cl
20	20.00															

Bit Size : NMLC (76 #/in)

R.Q.D. : Rock Quality Designation

Fig. b-11(d2) Geological Log

Project Name		TeKoi Hydro-electric Development Project		Site Name	
Hole NO.	L - 4	Elevation of Ground Level	m	Ground water Level	m
Date	Beginning		Operator		
	Ending		Site Manager		
			Supervisor		

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	$10^{-5}$	$10^{-4}$	$10^{-3}$	
	22.20		Sandstone	Slightly W.												CL
	23.70															CM
25	25.80		Shale	Fresh												CH
	30.70		Shaly Sandstone	Fresh												CH
	34.80															CM
35	36.10															CH
	38.60		Shale	Fresh												CM
	39.20															CL
40																CH

Bit Size : NMLC (76m/m)

R.O.D. : Rock Quality Designation



Fig. 6:11 (d3) Geological Log

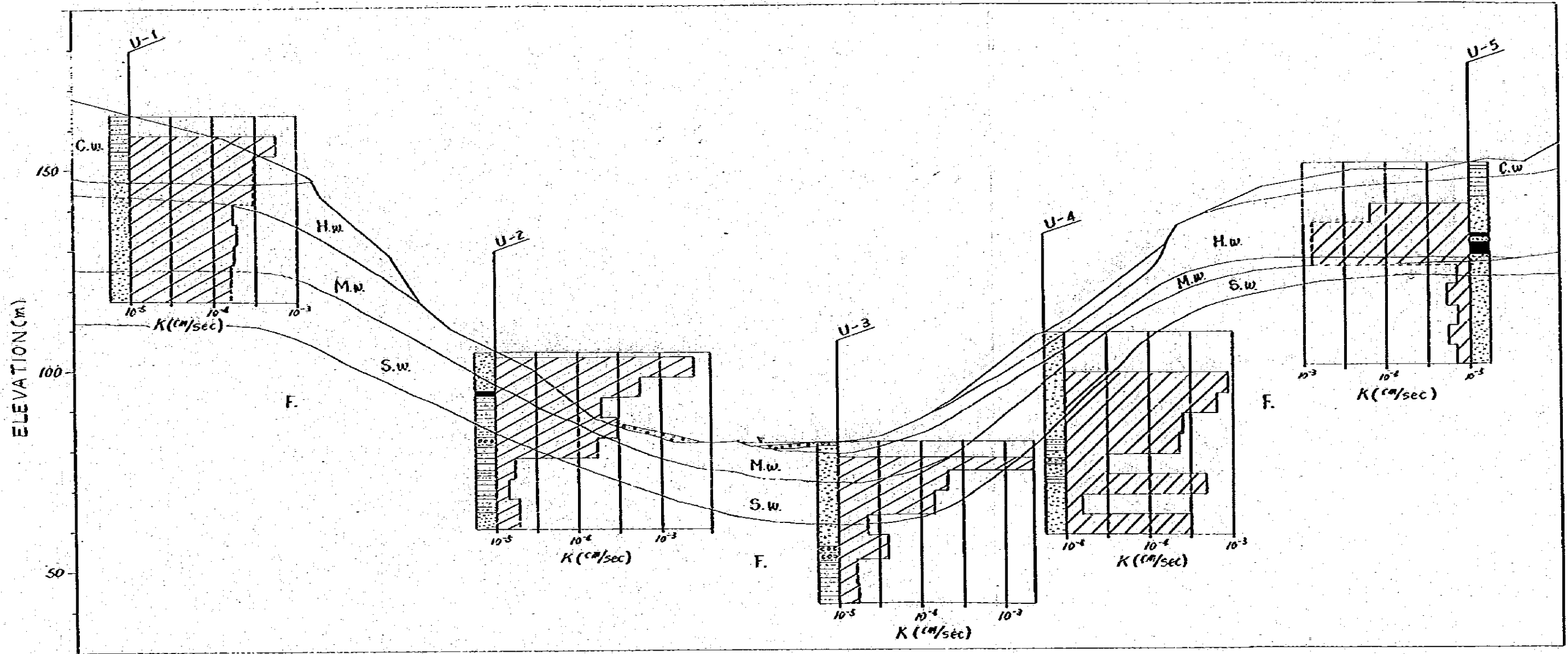
Project Name		Taksi Hydro-electric Development Project		Site Name			
Hole NO.	L-4		Elevation of Ground Level	m	Ground water Level	m	
Date	Beginning				Operator		
	Ending				Site Manager		
					Supervisor		

Scale	Depth	Mark of Sample	Name of Sample	Weathering	Recovery (%)				R.Q.D. (%)				Permeability (K: cm/sec)			Rock classification
					20	40	60	80	20	40	60	80	$10^{-5}$	$10^{-4}$	$10^{-3}$	
	40		Shale	Fresh												CH
	4200															CH
	4300															CH
	45		Sandstone	Fresh												CM
	50															
	5100															

Bit Size ; NMLC (76 mm)

R.Q.D. ; Rock Quality Designation

Fig. 6-12 PERMEABILITY (K) OF UPPER DAM SITE  
(Scale 1:1000)



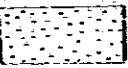
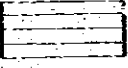
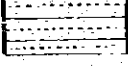
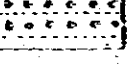
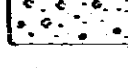
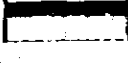
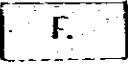
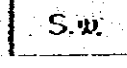
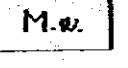
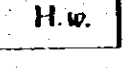
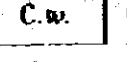
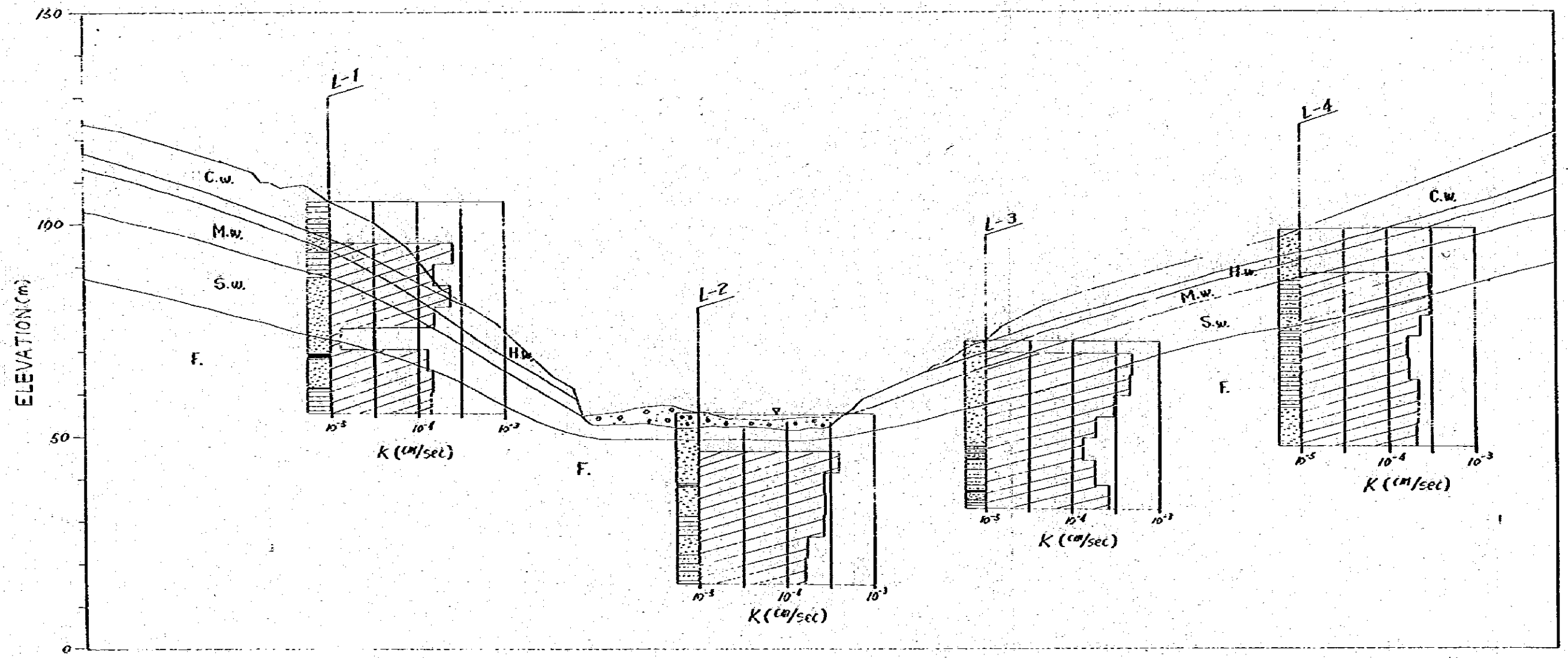
Name of rock :  Quartzose sandstone  Shale  Shaly sandstone  Sandstone and conglomerate  Gravel  Fractured zone  
 Weathering :  Fresh  Slightly w.  Moderately w.  Highly w.  Completely w.

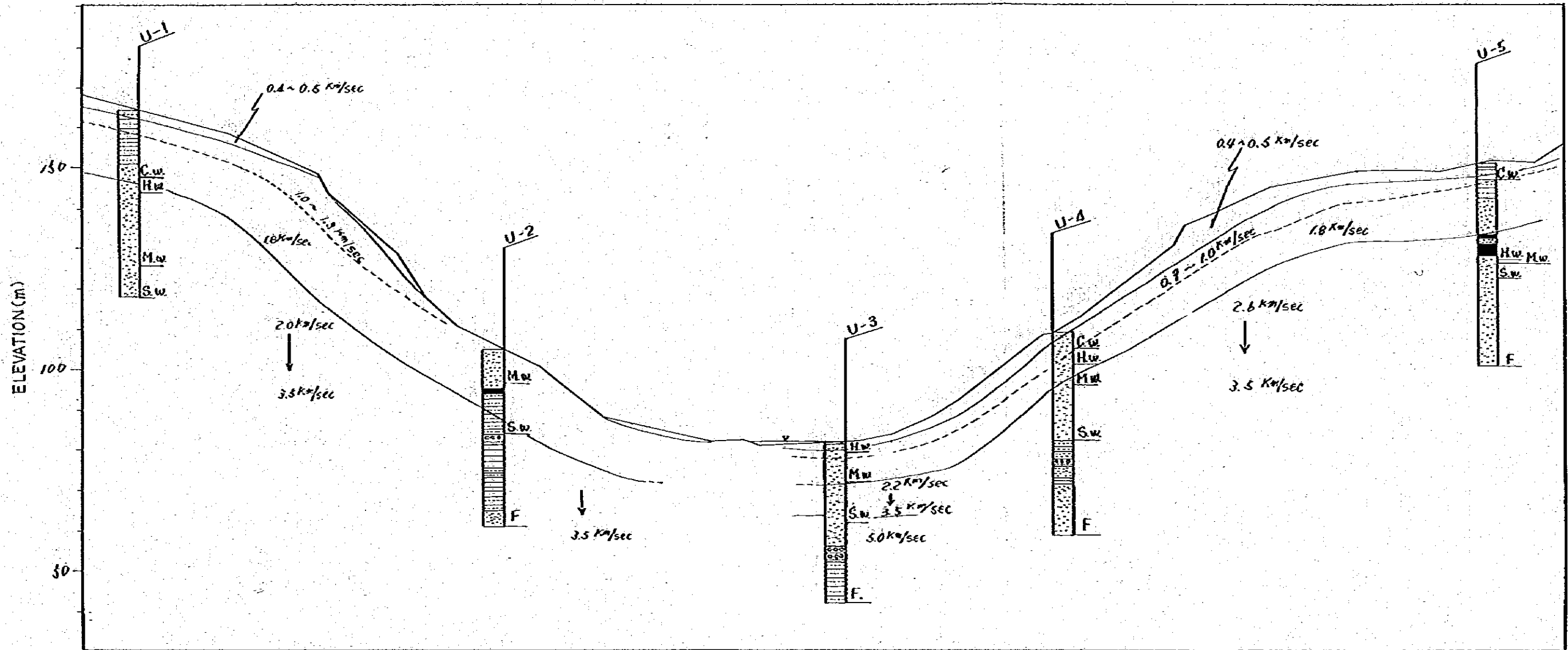
Fig. 6-13 PERMEABILITY(K) OF LOWER DAM SITE  
(Scale 1:1,000)



Name of rock : Quartzose sandstone    Shale    Shaly sandstone    Gravel    Fractured zone

Weathering : Fresh    Slightly w.    Moderately w.    Highly w.    Completely w.

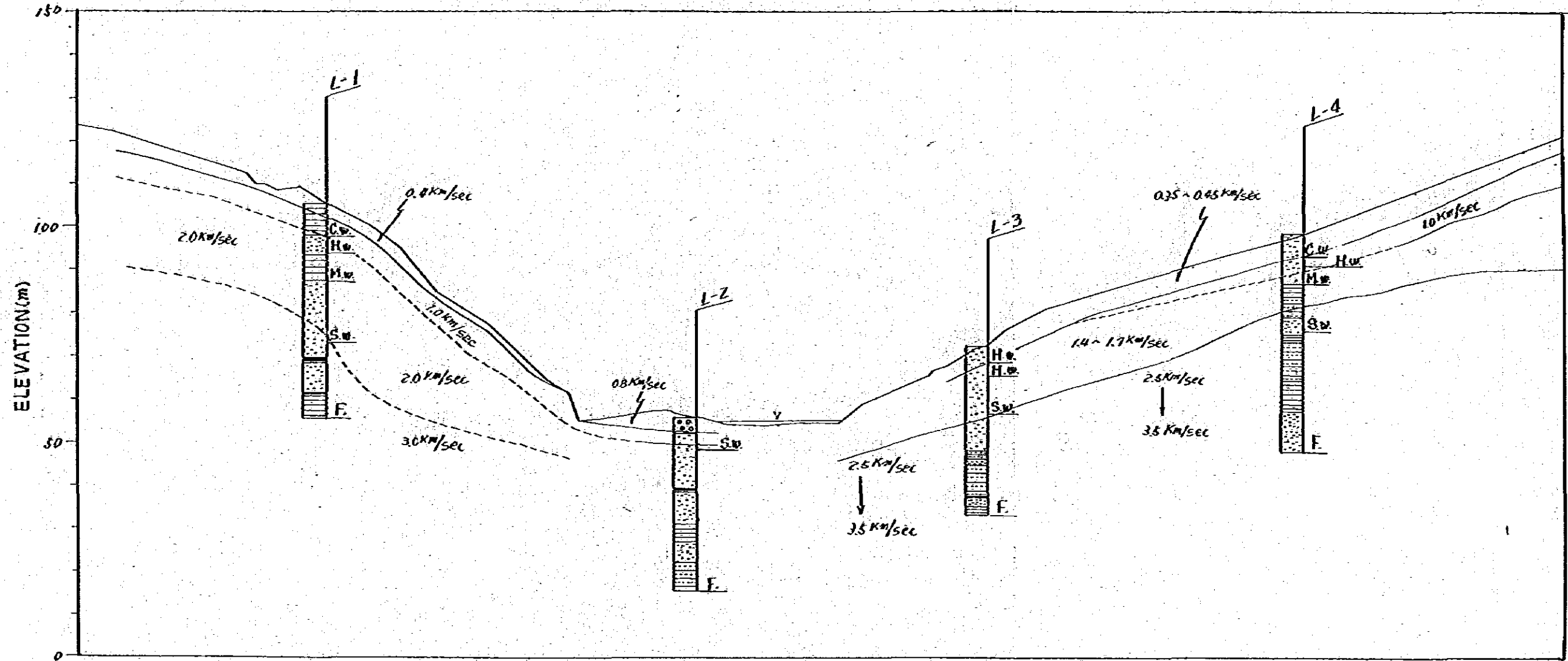
Fig. 6-14 SEISMIC PROFILE OF UPPER DAM CENTER(UA)  
(Scale 1:1000)



Weathering ; **F** Fresh    **Sw** Slightly w.    **M.w** Moderate w.    **H.w** Highly w.    **C.w** Completely w.

Name of rock ; Quartzose sandstone    Shale    Shaly sandstone    Sandstone and conglomerate    Gravel    Fractured zone

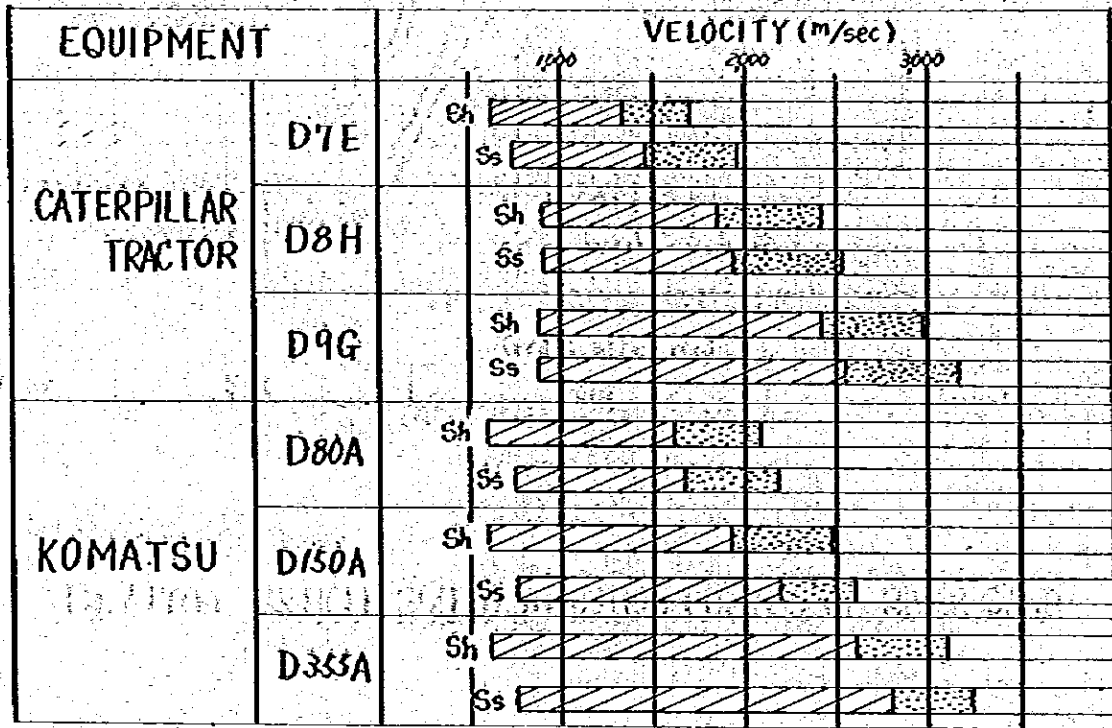
Fig. 6-15 SEISMIC PROFILE OF LOWER DAM CENTER (LA)  
(Scale 1:1000)



Weathering    F.    Fresh    S.w.    Slightly w.    M.w.    Moderately w.    H.w.    Highly w.    C.w.    Completely w.

Name of rock :    Quartzose sandstone    Shale    Shaly sandstone    Gravel    Fractured zone

Fig. 6-16 SEISMIC RIPABILITY CHART



 Rippable     
  Marginal     
  Non rippable  
 Sh; Shale      Ss; Sandstone

Fig. 6.17(a) PARTICLE SIZE DISTRIBUTION CURVES OF TERRACE DEPOSITS

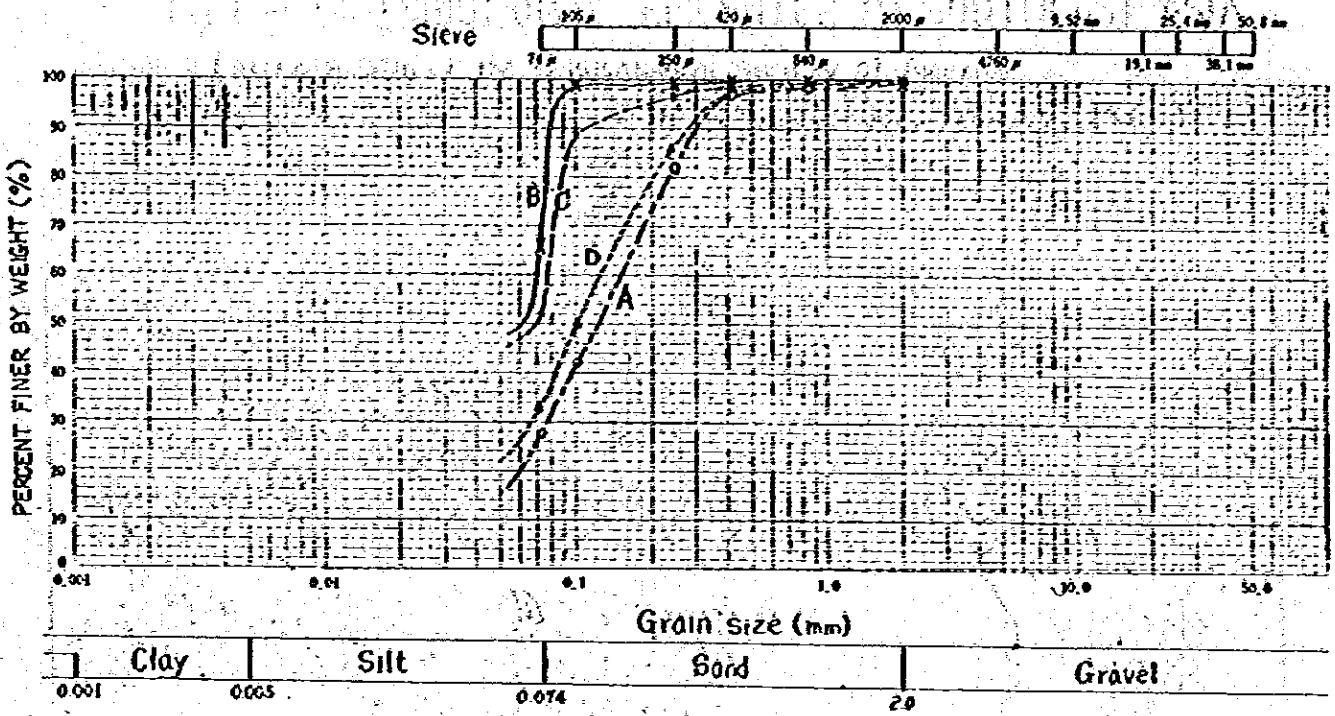
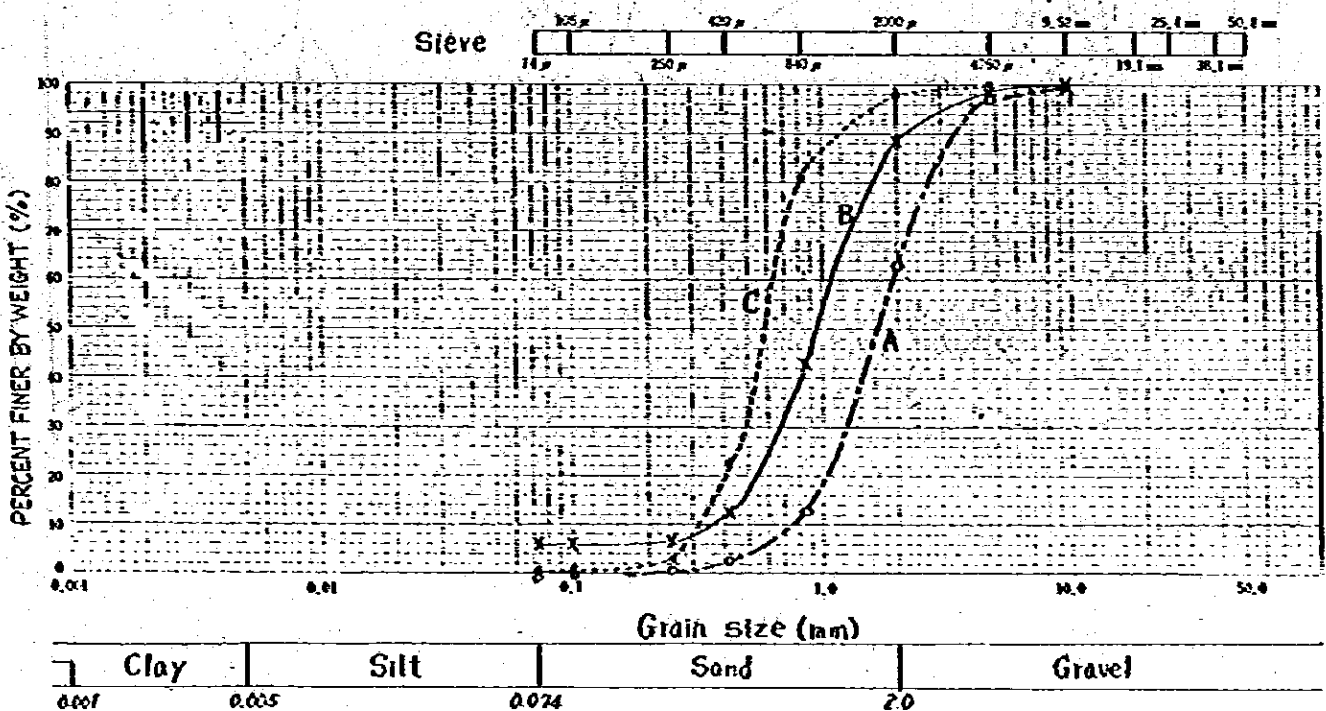


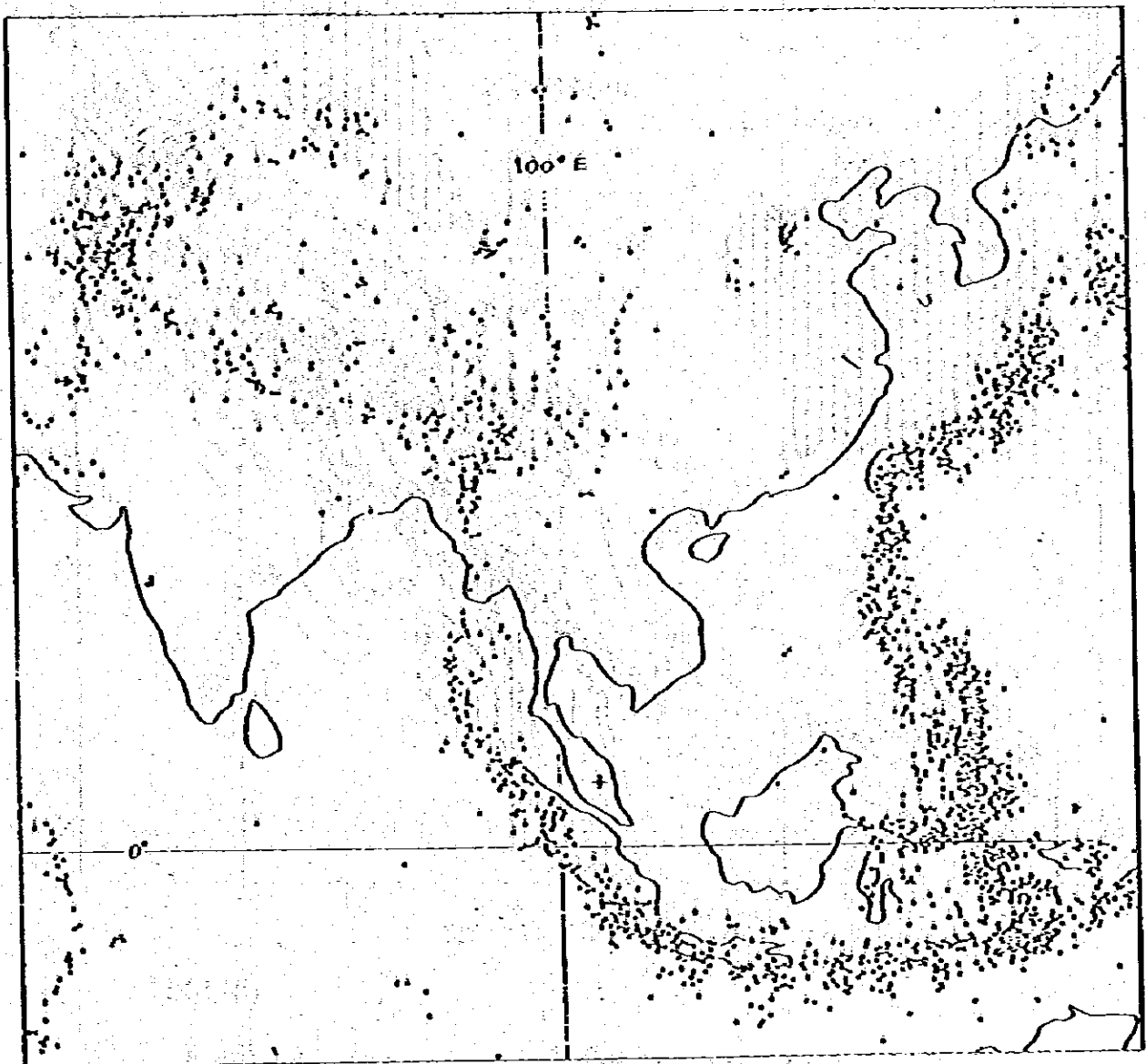
Fig. 6.17(b) PARTICLE SIZE DISTRIBUTION CURVES OF RIVER SAND



**Fig. 6-18 DISTRIBUTION OF EPICENTER IN SOUTHEAST ASIA**

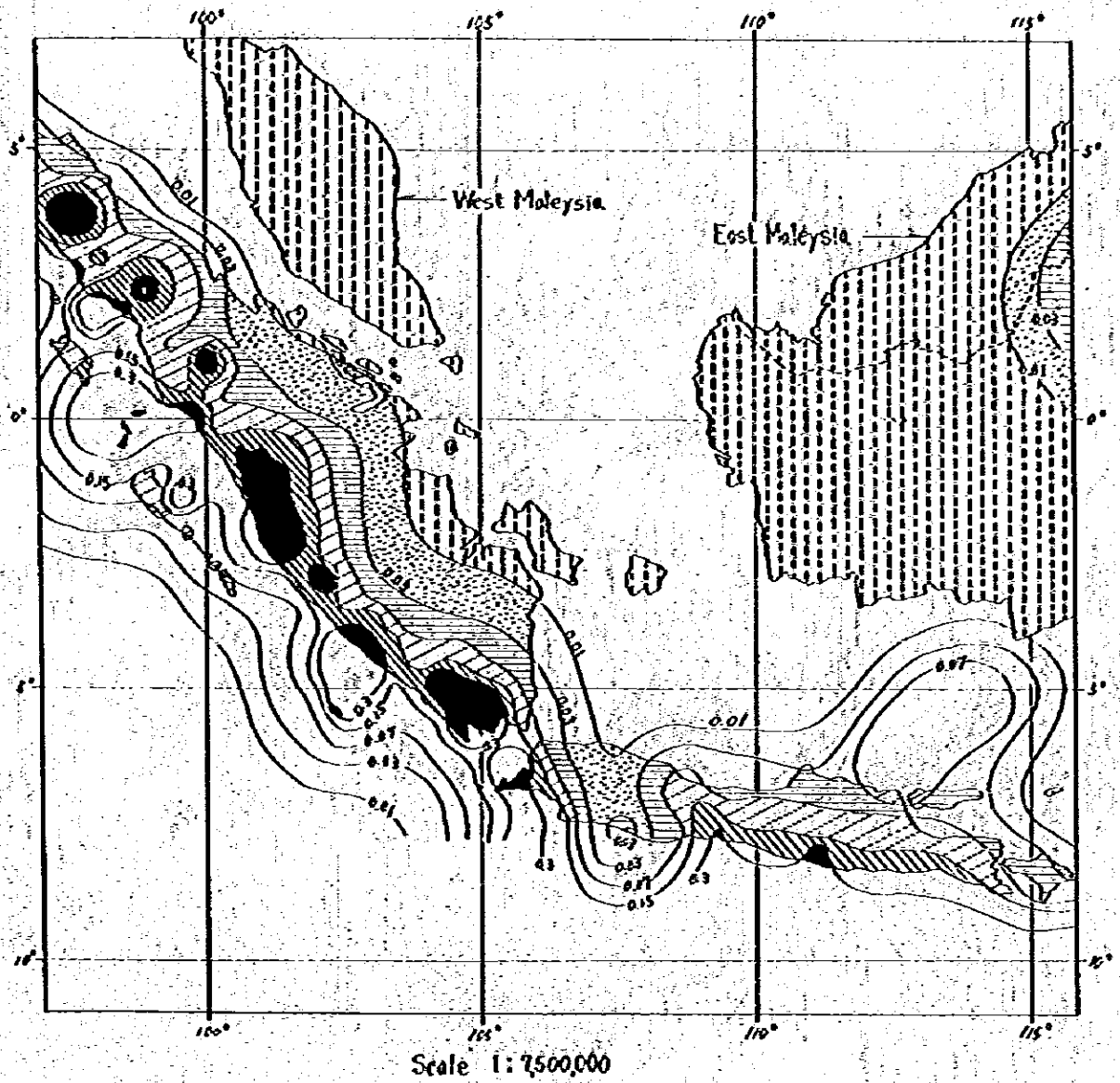
(after Bulletin of the seismological society of America

Vol. 59, No.1, pp. 369-380. February, 1969)





**Fig. 6-19 ISOSEISMAL MAP OF SOUTHEAST ASIA**  
 ( after Peta Iso Seisma Indonesia, Hiroshi Kawasumi )



**LEGEND**







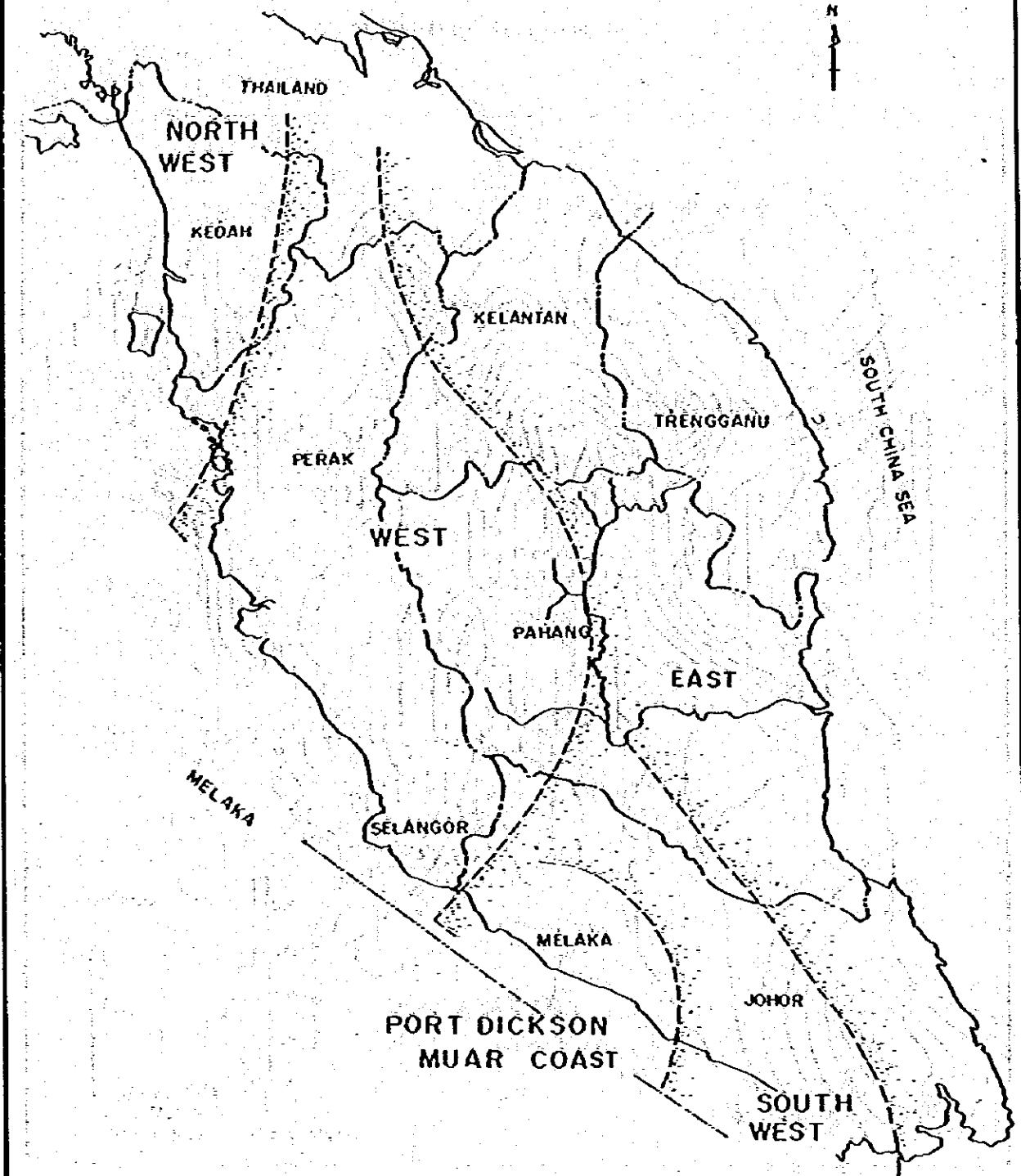
- |   |                    |   |                    |
|---|--------------------|---|--------------------|
|  | $a = 0.3g$         |  | $a = 0.03 - 0.07g$ |
|  | $a = 0.15 - 0.3g$  |  | $a = 0.01 - 0.03g$ |
|  | $a = 0.07 - 0.15g$ |  | $a < 0.01g$        |
- $a$  = Maximum acceleration       $g$  = Gravity ( $9.8 \text{ m/sec}^2$ )

Fig. 7-1 Locations of Meteorological Stations

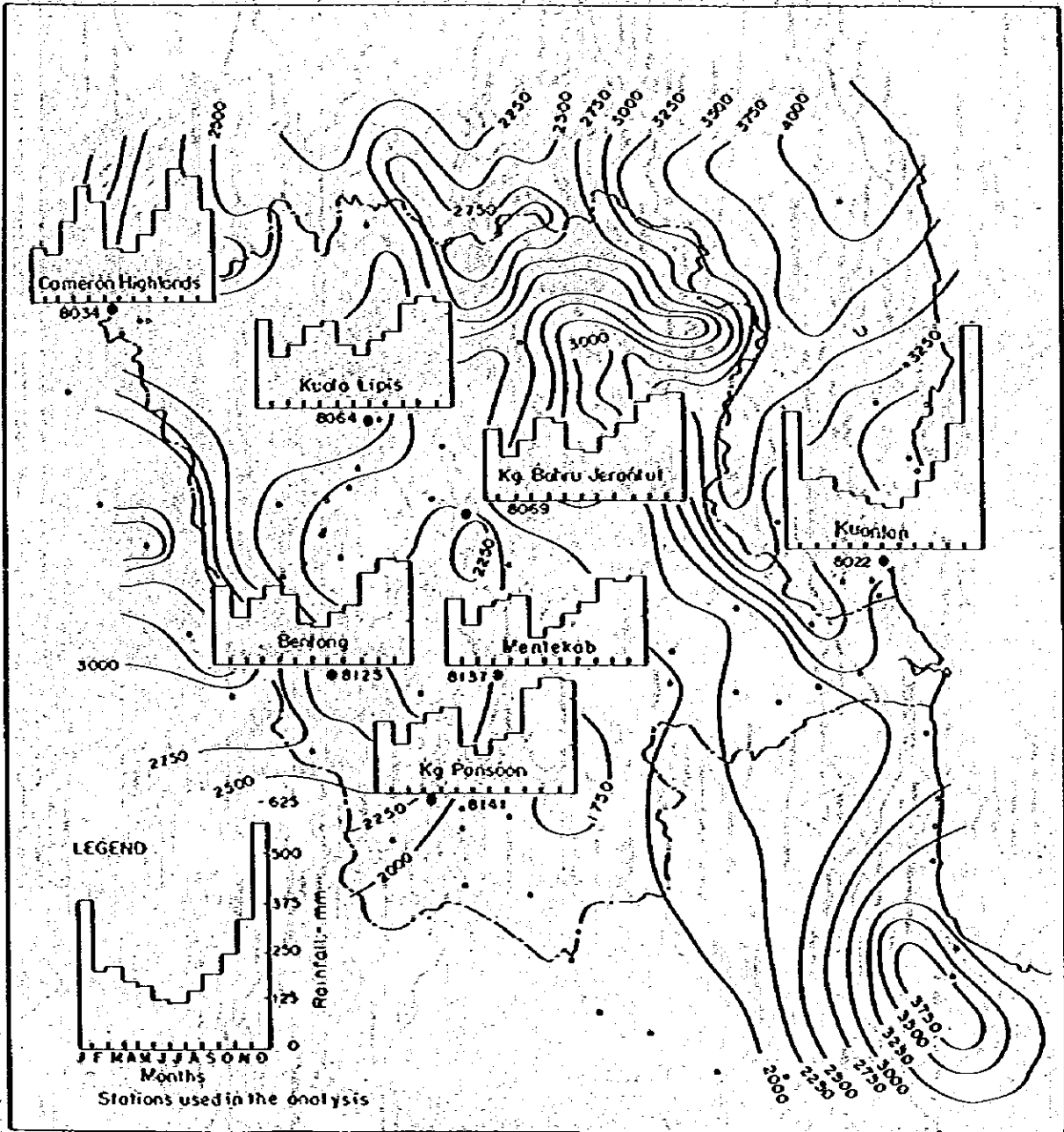


Fig. 7-2 Typical Seasonal Rainfall Pattern  
of Each Region



( Source Dale W. L, the Rainfall of Malaya, 1959 )

**Fig. 7-3 Average Annual Rainfall Distribution for the Pahang River Basin, and Distributions at Typical Stations**

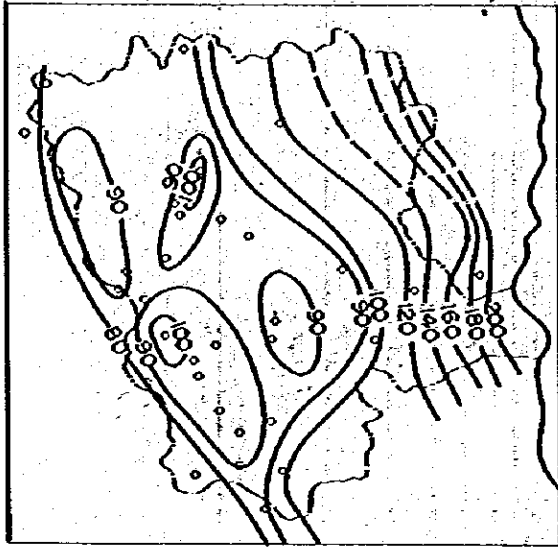


( Source: 3.2.2, Vol. 3, Pahang River Basin Study )

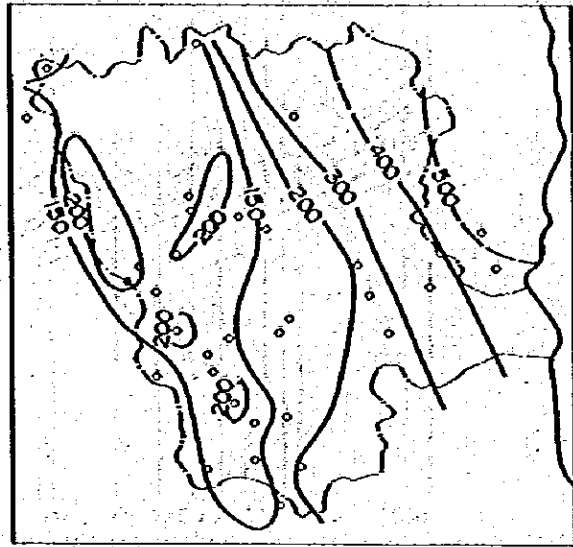
Fig. 7-4 Location of Rainfall Stations used in Correlation Analysis



**Fig. 7-5 Spatial Distribution of Rainfall**

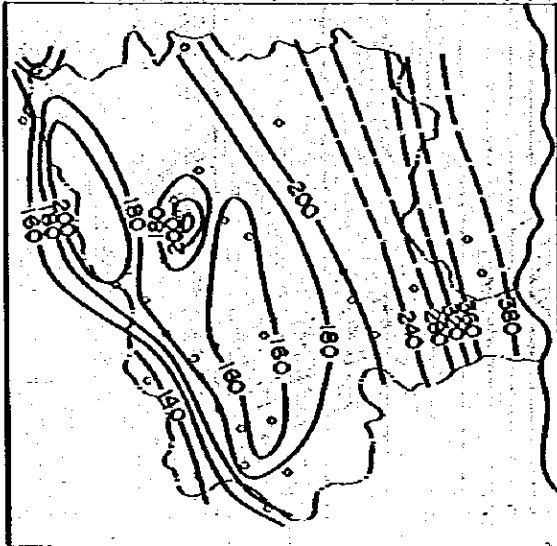


**2 Year Return Period**

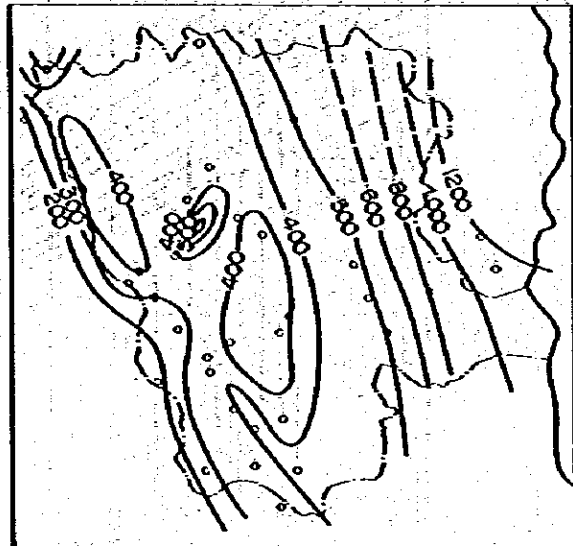


**100 Year Return Period**

**1 Day Maximum Rainfall**



**2 Year Return Period**



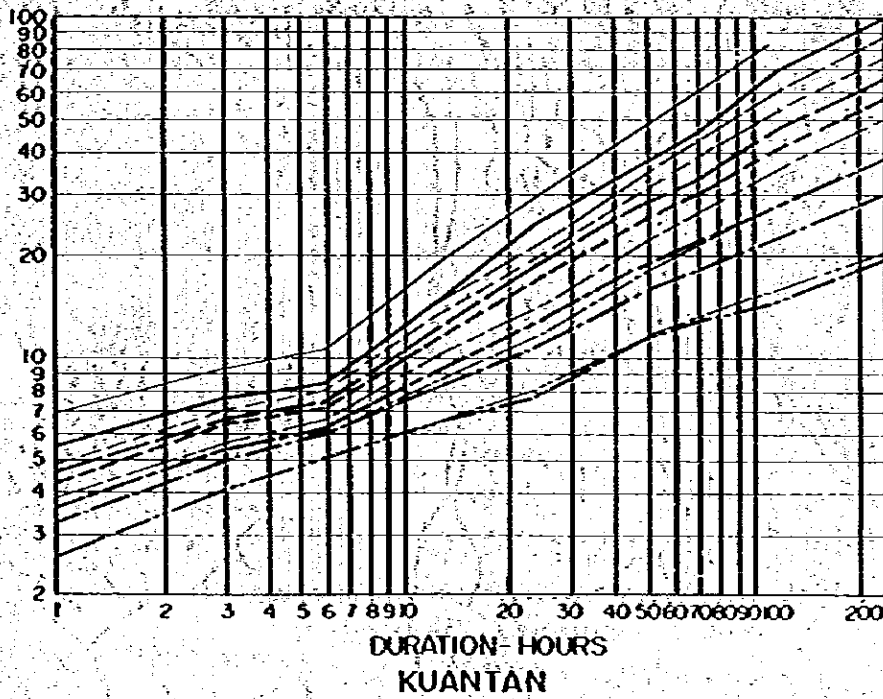
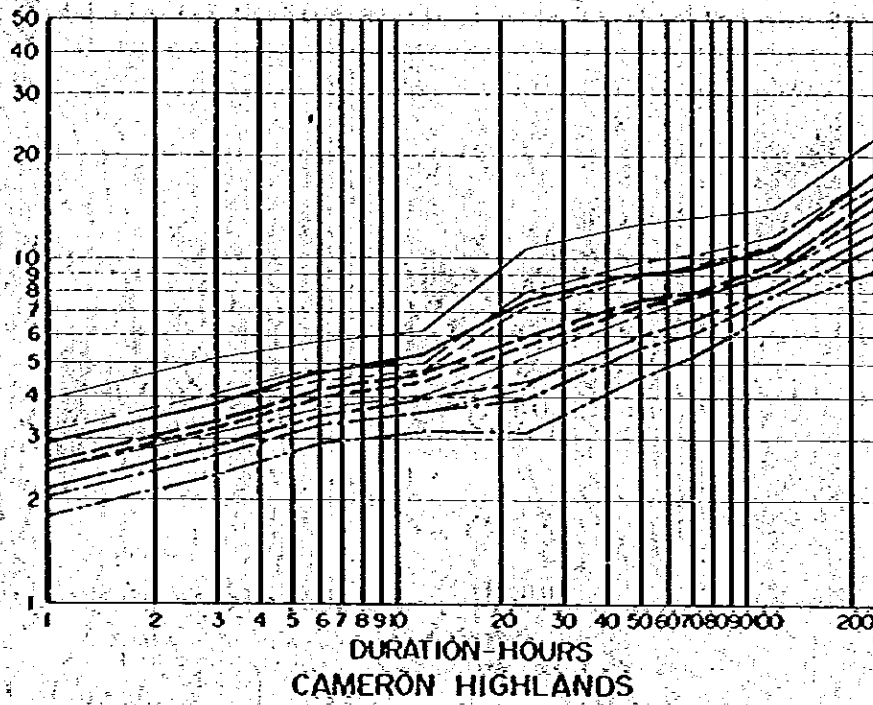
**100 Year Return Period**

**5 Day Maximum Rainfall**

- LEGEND**
- Isohyet in millimetres
  - - - - Approximate isohyet
  - Position of stations used in analysis
  - Pahang River Basin Boundary

( Source; 3.2.6, Vol.1.3, Pahang River Basin Study )

Fig. 7-6 Rainfall Depth-Duration Frequency Curves



**LEGEND**

RETURN PERIOD (Years)	LOG NORMAL DISTRIBUTION	GUMBEL DISTRIBUTION
10000	—————	—————
1000	—————	—————
100	—————	—————
50	—————	—————
10	—————	—————
5	—————	—————

Source; Ex.8, Vol.3, Pahang River Basin Study

Fig.7-7 Gauging Stations used in checking the Rating Curves

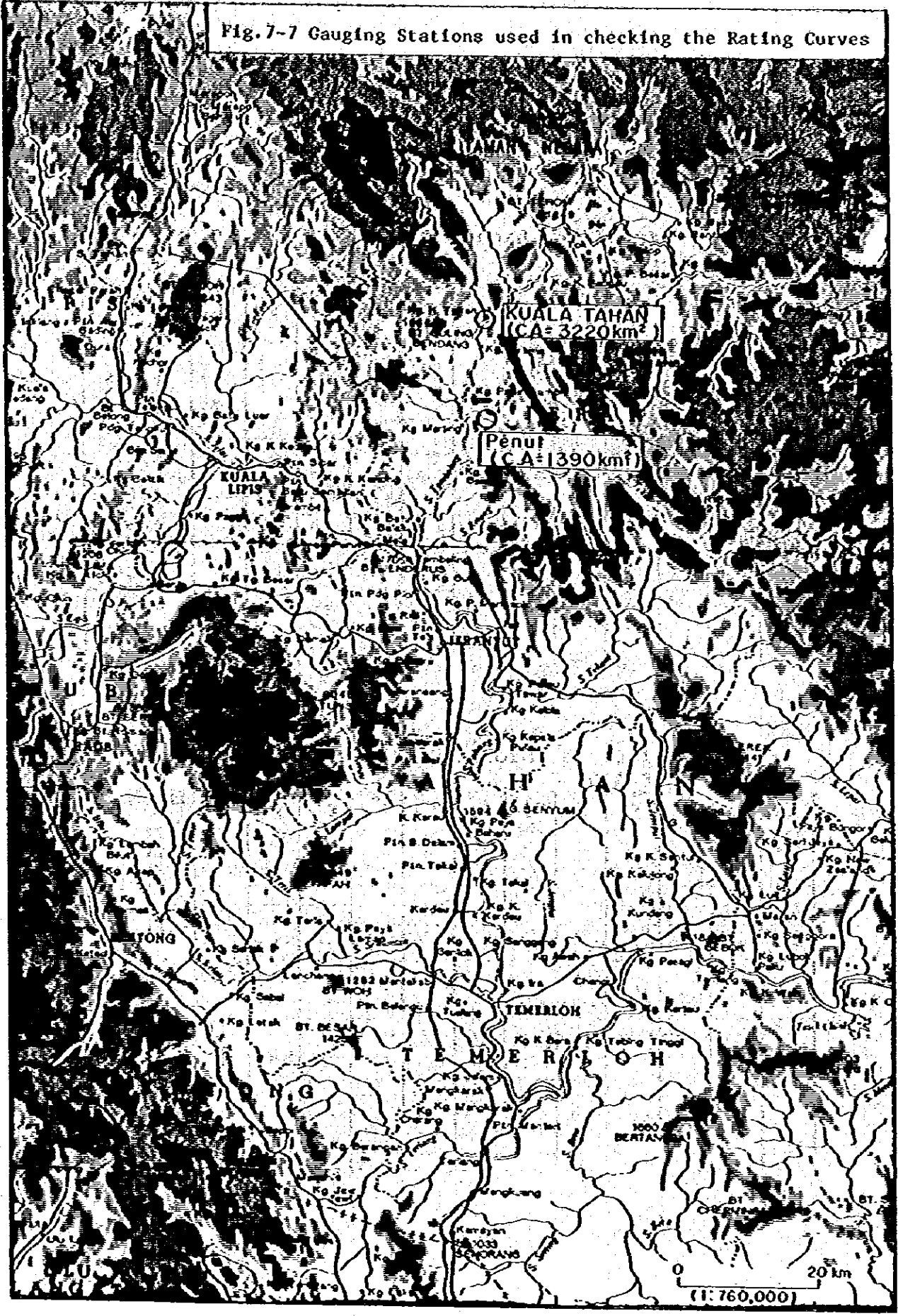






Fig. 7-9 Rating Curve ( Kuala Tahan 1972 )

KUALA TAHAN YEAR : 1972

(1) OBSERVATION

H	Q	H	Q
1.201	151.001	0.861	74.701
1.211	159.001	0.791	68.901
1.291	126.001	1.371	134.001
1.381	135.001	0.901	79.301
1.581	165.001	1.131	101.001
1.621	140.001	1.081	107.001
1.991	87.801	1.091	77.501
0.931	83.001	0.841	70.801
1.231	119.001	0.761	66.301
1.061	195.101		

(2) H-Q TABLE

H	Q	H	Q
0.301	30.161	1.281	120.641
0.461	40.361	1.371	133.671
0.611	51.681	1.461	147.261
0.761	63.441	1.521	155.761
0.911	78.301	1.831	202.491
0.981	84.961	2.131	232.051
1.071	95.161	2.441	305.861
1.161	105.371	2.741	362.501
1.221	112.711		

(3) H-Q EQUATION:

$Q = 41.660 H^{2.773} H = 24.306$

H	Q	H	Q
0.201	30.531	1.501	152.201
0.401	40.081	2.001	236.491
0.601	52.971	2.501	341.611
0.801	69.191	3.001	467.571
1.001	88.741	3.501	614.351
1.201	111.621		

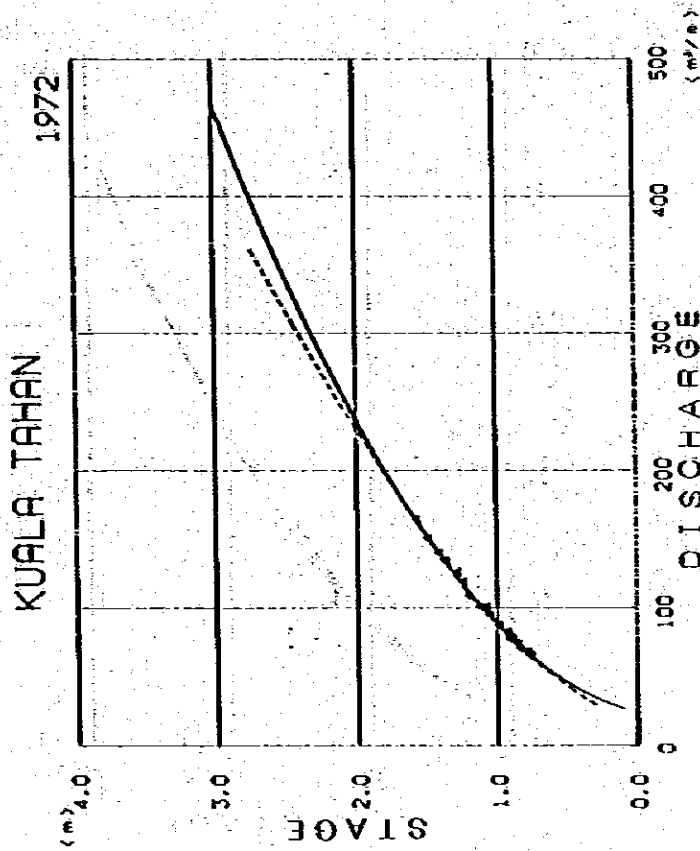


Fig. 7-10 Rating Curve ( Kuala Tahan 1973-1974 )

KUALA TAHAN YEAR : 1973-1974

(1) OBSERVATION

H	I	Q	H	I	Q
0.661	53.401	0.831	0.831	68.401	
0.671	50.401	0.731	0.731	59.601	
0.611	51.501	0.861	0.861	72.701	
0.761	44.301	1.311	1.311	121.001	
1.851	199.001	0.551	0.551	65.201	
1.201	103.001	1.141	1.141	99.701	
1.681	157.001	0.981	0.981	82.701	
1.051	85.401	0.991	0.991	77.001	
0.741	55.401	1.001	1.001	82.601	
1.281	107.001	1.301	1.301	120.001	
0.581	44.901	1.261	1.261	114.001	
1.431	131.001	1.281	1.281	101.001	
1.431	130.001	2.161	2.161	251.001	
1.311	120.001	1.411	1.411	134.001	
1.821	197.001	0.921	0.921	77.001	
0.671	54.401				

(2) H-Q TABLE

H	I	Q	H	I	Q
0.301	30.161	1.281	1.281	120.641	
0.461	40.361	1.371	1.371	133.671	
0.611	51.681	1.461	1.461	147.261	
0.761	65.441	1.521	1.521	155.761	
0.911	78.301	1.831	1.831	202.491	
1.071	84.961	2.131	2.131	232.051	
1.161	105.161	2.441	2.441	303.861	
1.221	112.711	2.741	2.741	362.501	

(3) H-Q EQUATION

$Q = 40.912H^{1.6} - 16.683H^{1.4} - 24.451$

H	I	Q	H	I	Q
0.201	29.421	1.501	1.501	141.521	
0.401	37.671	2.001	2.001	221.461	
0.601	49.191	2.501	2.501	321.851	
0.801	63.981	3.001	3.001	442.701	
1.001	82.041	3.501	3.501	584.001	
1.201	103.381				

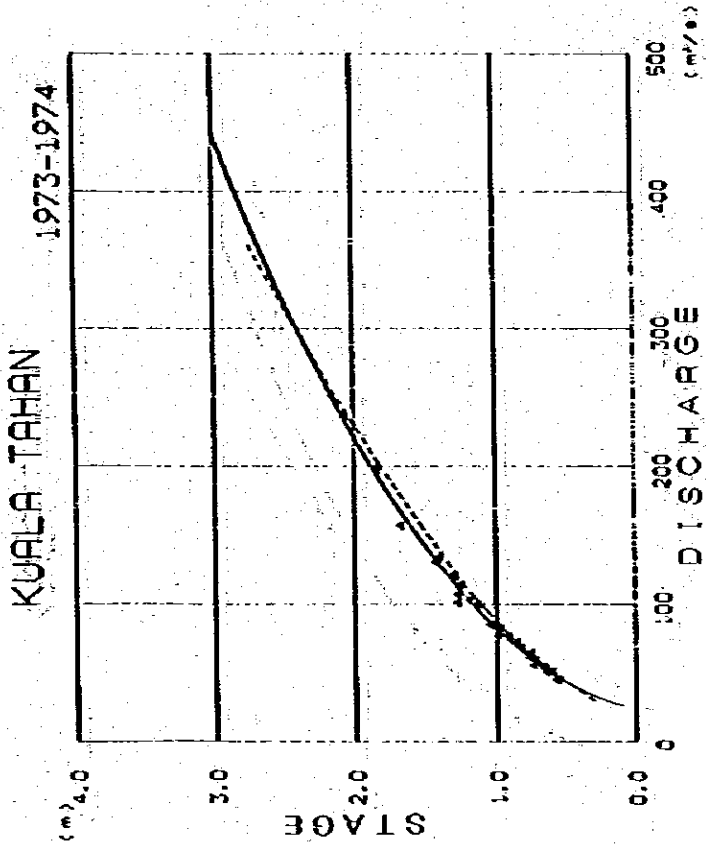


Fig. 7-11 Rating Curve ( Kuala Tahan 1975-1980 )

KUALA TAHAN YEAR : 1975-1980

(1) OBSERVATION

H	Q	H	Q
1.801	101.001	1.801	101.001
1.691	193.501	1.691	193.501
1.141	46.501	1.141	46.501
0.741	17.701	0.741	17.701
0.921	26.701	0.921	26.701
0.851	34.201	0.851	34.201
1.231	51.001	1.231	51.001
1.171	55.401	1.171	55.401
1.001	52.101	1.001	52.101
1.161	46.301	1.161	46.301
1.781	108.001	1.781	108.001
1.211	53.001	1.211	53.001
1.481	79.501	1.481	79.501
0.981	35.501	0.981	35.501
1.691	97.301	1.691	97.301
1.841	113.001	1.841	113.001

(2) H-Q TABLE

H	Q	H	Q
0.301	4.251	1.681	95.161
0.611	14.731	1.831	112.711
0.761	21.811	1.681	133.671
0.911	30.161	2.131	152.761
1.071	40.361	2.441	202.691
1.221	51.081	2.741	232.051
1.371	63.441	3.051	302.861
1.521	78.301	3.351	362.501

(3) H-Q EQUATION

$Q = 60.004 H^{2.96} - 66.296 H + 41.597$

H	Q	H	Q
0.201	30.341	1.501	74.161
0.401	23.881	2.001	145.021
0.601	22.221	2.501	245.881
0.801	25.361	3.001	376.741
1.001	33.301	3.501	537.601
1.201	46.051		

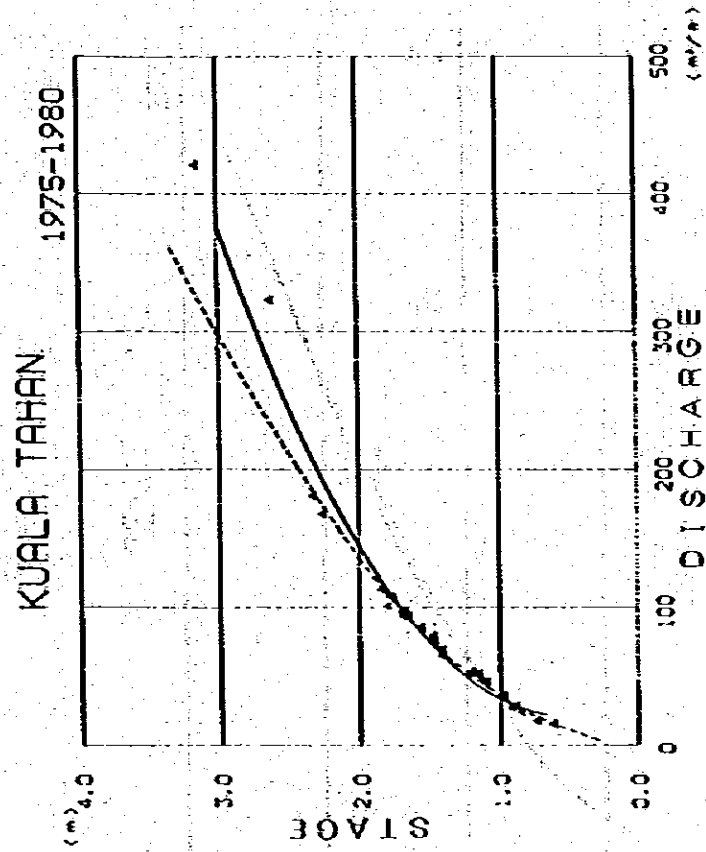


Fig. 7-12 Rating Curve ( Penut 1972 )

PENUT YEAR = 1972

PENUT

(1) OBSERVATION

H	I	Q	H	I	Q
1.001	12.001	0.991	12.301		
1.004	12.701	0.981	12.001		
1.481	36.201	0.984	9.101		
1.461	32.401	1.621	4.2.701		
0.981	12.201				

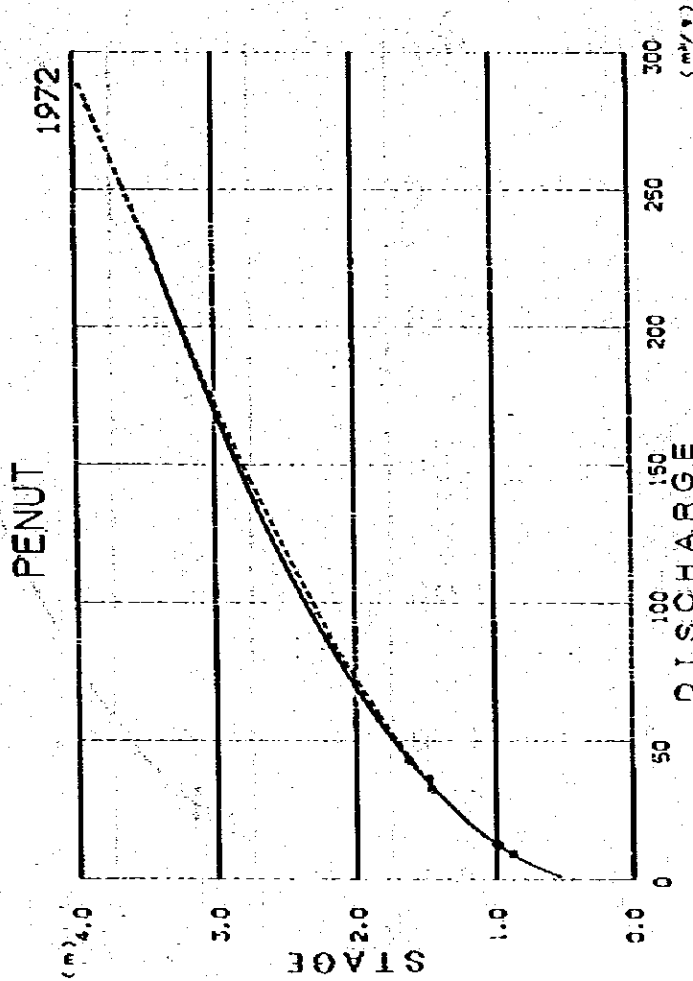
(2) H-Q TABLE

H	I	Q	H	I	Q
0.881	9.351	1.341	27.191		
0.911	10.201	1.371	28.891		
0.941	11.041	1.401	30.291		
0.981	12.031	1.431	32.281		
1.011	13.031	1.461	33.981		
1.041	14.161	1.491	35.681		
1.071	15.231	1.521	37.381		
1.101	16.361	1.551	39.071		
1.131	17.561	1.581	40.771		
1.161	18.821	1.611	42.471		
1.191	19.821	1.641	44.171		
1.221	21.101	1.671	45.871		
1.251	22.371	1.701	47.571		
1.281	24.071	1.731	49.271		
1.311	25.491	1.761	50.971		

(3) H-Q EQUATION

$Q = 21.597H^{0.84} - 8.010H + 0.752$

H	I	Q	H	I	Q
0.201	-1.401	1.501	35.831		
0.401	-0.501	2.501	69.621		
0.601	2.221	3.501	114.201		
0.801	6.661	4.501	169.391		
1.001	12.841	5.501	235.771		
1.201	20.741				



PENUT YEAR : 1973-1975

PENUT

(1) OBSERVATION

H	I	Q	H	I	Q
1-31	21-80	1-31	17-90		
1-16	19-40	1-65	34-00		
1-20	20-50	1-81	42-40		
1-47	28-20	1-68	33-40		
1-47	16-40	1-70	35-60		
1-42	26-70	1-98	32-90		
1-52	28-80	1-72	33-90		
1-21	31-20	2-03	54-40		
1-24	15-00	2-06	82-90		
1-36	16-50	2-42	44-80		
2-36	84-40	1-02	27-80		
2-17	66-20	1-57	20-40		
2-03	57-40	1-43	30-00		
1-20	48-90	1-62	30-40		
1-18	73-70	1-53	42-00		
1-84	45-50	1-84	48-00		
1-80	31-40	1-42	48-00		
1-78	40-90	1-65	51-70		
1-57	30-70	1-85	52-20		

(2) H-Q TABLE

H	I	Q	H	I	Q
0-91	7-36	1-37	20-87		
0-94	8-07	1-40	22-12		
0-98	9-40	1-43	23-36		
1-01	10-20	1-49	24-91		
1-07	11-02	1-52	27-19		
1-09	11-84	1-83	43-05		
1-13	12-69	2-13	83-44		
1-16	13-54	2-44	89-23		
1-19	14-41	2-74	116-40		
1-22	15-31	3-05	148-68		
1-25	16-24	3-35	185-20		
1-28	17-19	3-64	223-73		
1-31	18-16	3-94	266-21		
1-34	19-15				

(3) H-Q EQUATION

$Q = 26.896H^{1.47} - 47.408H + 32.708$

H	I	Q	H	I	Q
0-20	24-38	1-50	26-01		
0-40	18-37	2-00	33-48		
0-60	14-67	2-50	94-79		
0-80	13-28	3-00	150-55		
1-00	14-20	3-50	220-76		
1-20	17-43				

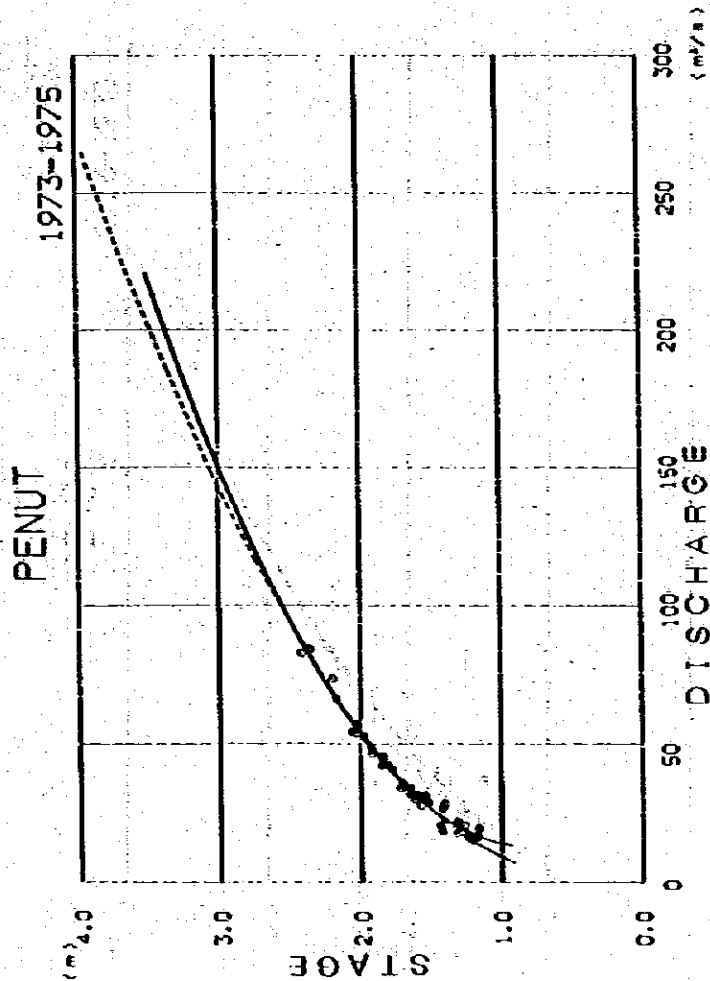


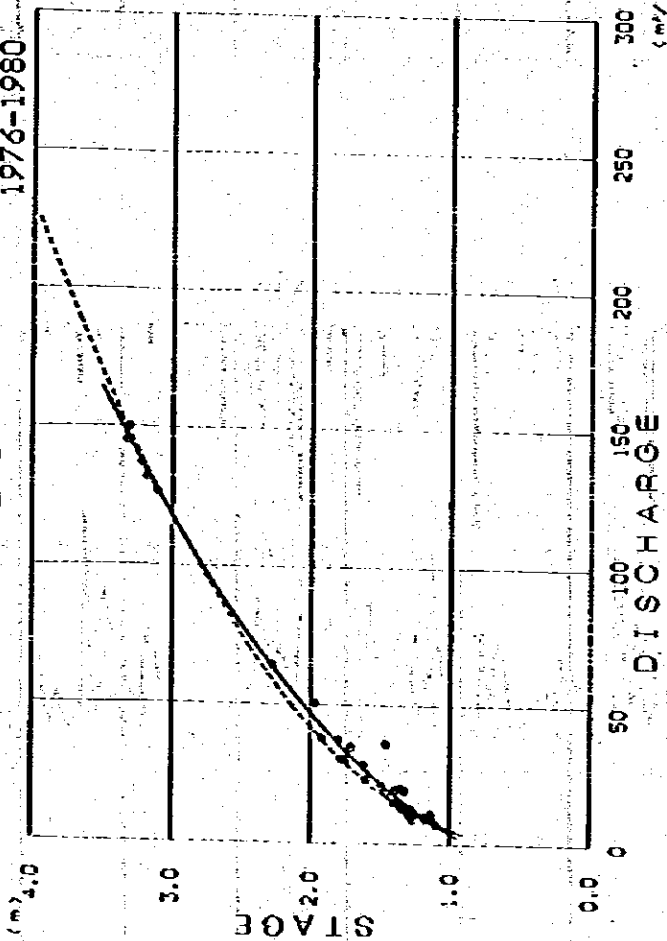
Fig. 7-13 Rating Curve ( Penut 1973-1975 )

PENUT YEAR : 1976-1980

PENUT

PENUT

1976-1980



(1) OBSERVATION

H	Q	H	Q
1.46	35.90	1.18	8.90
1.41	9.80	1.28	11.00
1.53	19.50	1.29	18.00
1.55	19.90	1.78	30.40
1.71	19.70	1.33	12.70
1.97	10.00	1.60	23.20
1.62	28.50	1.27	11.90
1.71	37.70	1.35	13.50
1.80	37.40	1.75	10.50
3.22	127.00	1.35	30.40
3.31	150.00	1.28	12.70
3.32	145.00	1.40	14.90
3.18	132.00	1.40	14.90
1.28	17.10	1.29	18.00
1.10	7.10	1.49	12.80

(2) H-Q TABLE

H	Q	H	Q
0.91	3.96	1.37	15.30
0.98	4.81	1.40	15.29
1.01	5.32	1.43	17.28
1.07	6.43	1.46	17.27
1.10	7.00	1.52	19.26
1.15	7.59	1.83	52.37
1.19	8.21	2.13	70.28
1.23	9.74	2.44	95.16
1.28	10.54	3.05	122.34
1.31	11.53	3.35	152.93
1.34	12.32	3.66	188.33
	13.31	3.96	226.50

(3) H-Q EQUATION

$$Q = 14.059H^3 - 0.631H - 10.955$$

H	Q	H	Q
0.20	10.29	1.50	21.92
0.40	5.37	1.00	46.94
0.80	1.29	2.50	78.99
1.00	3.93	3.00	118.07
1.20	10.29	3.50	164.17

Fig. 7-14 Rating Curve ( Penut 1976-1980 )

Fig. 7-15 Discharge Comparison in Kuala Tahan and Penut (1973/74)

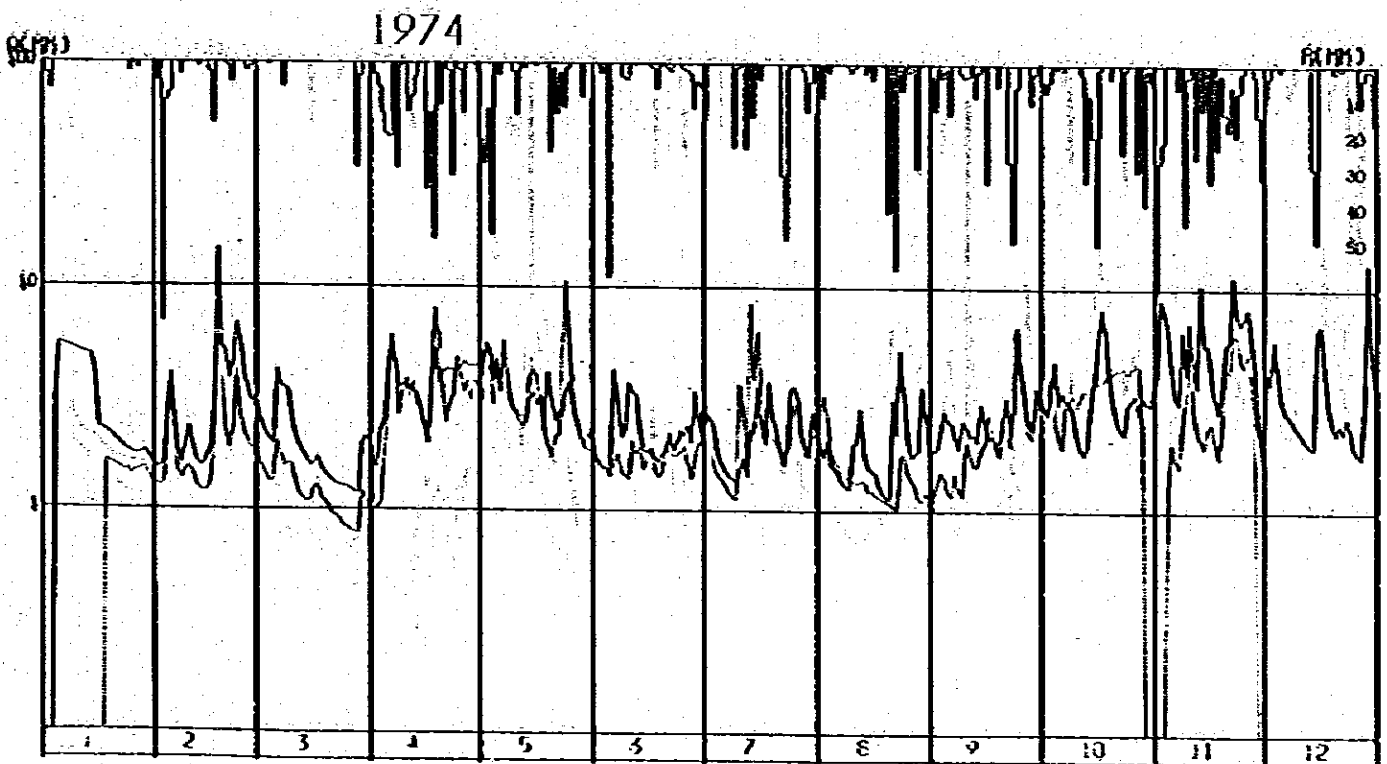
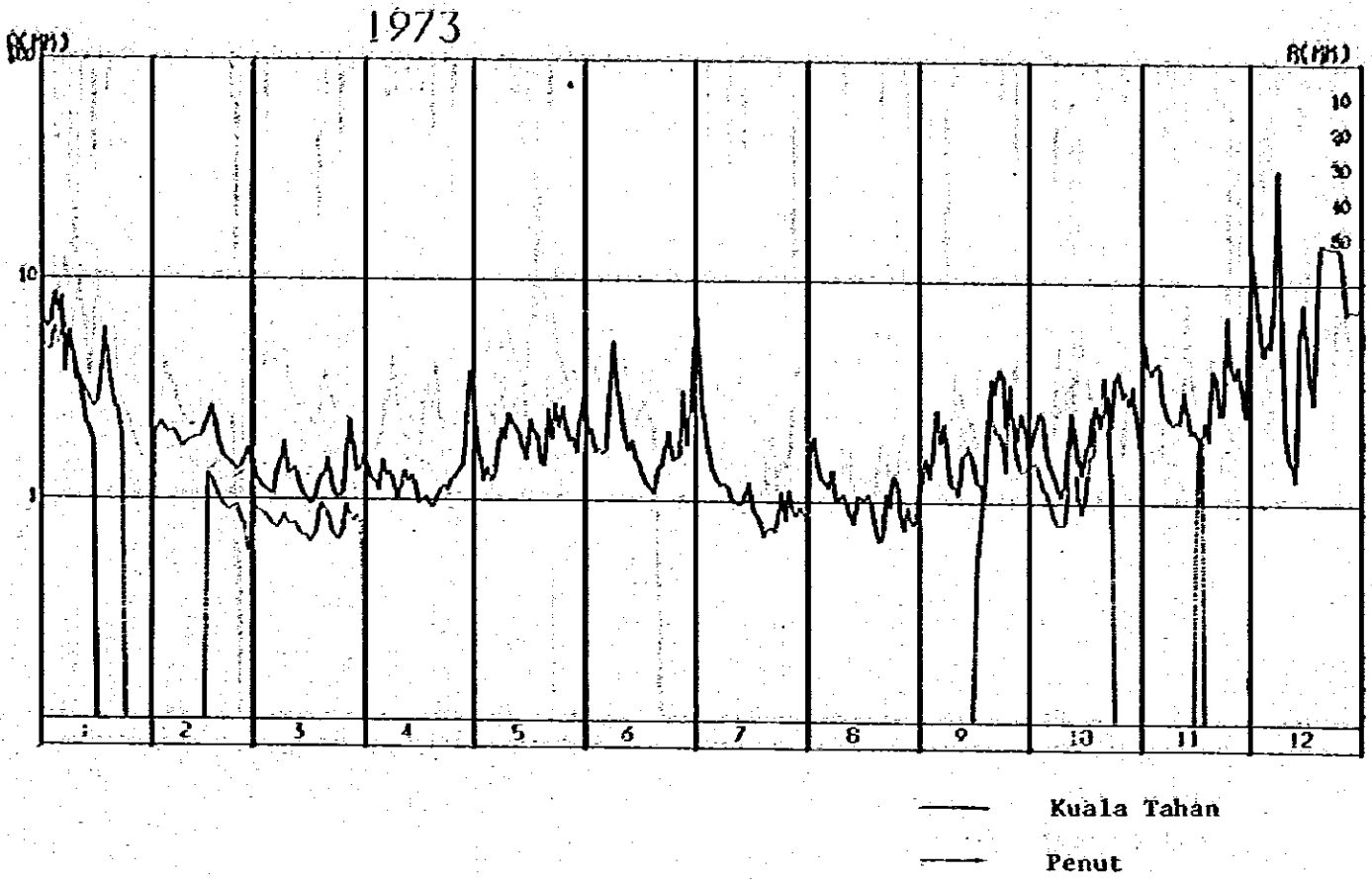
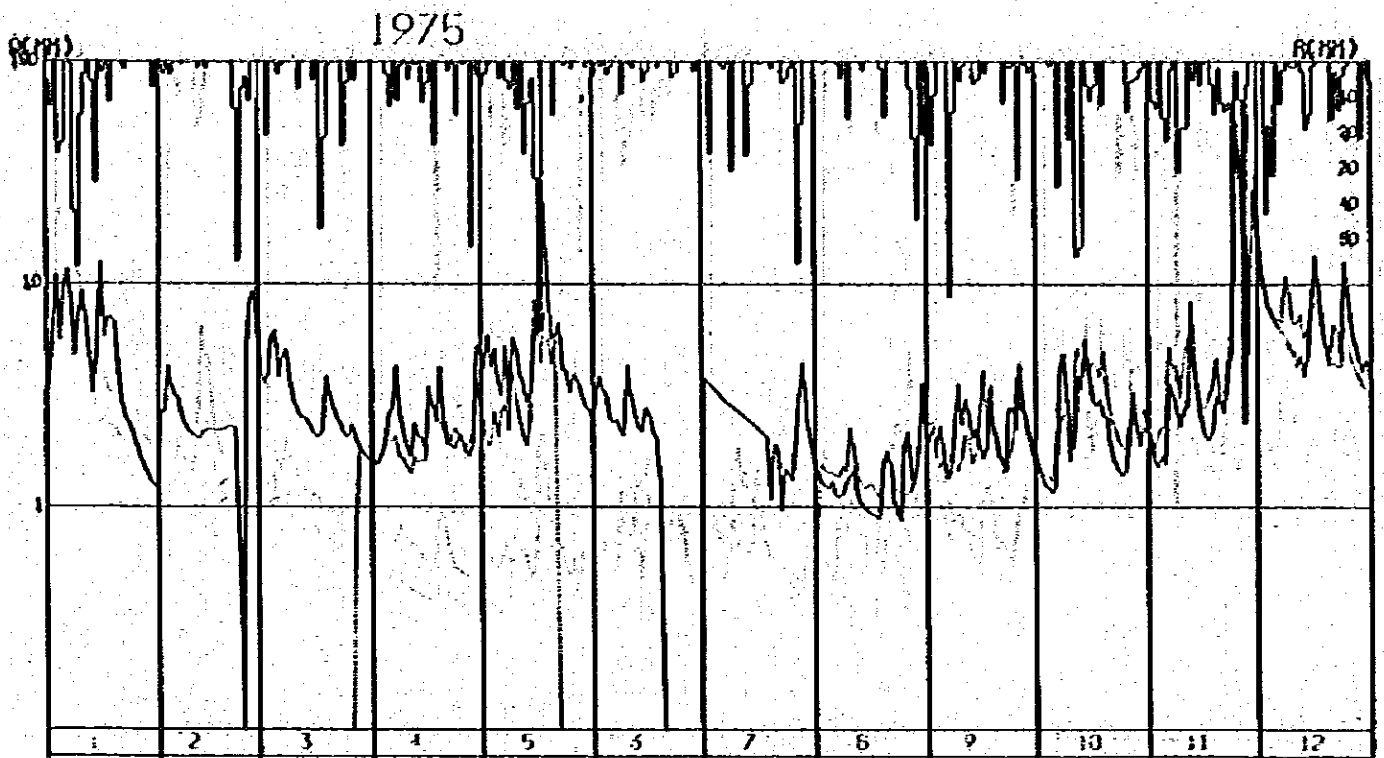




Fig. 7-16 Discharge Comparison in Kuala Tahan and Penut ( 1975/76 )



— Kuala Tahan  
- - - Penut

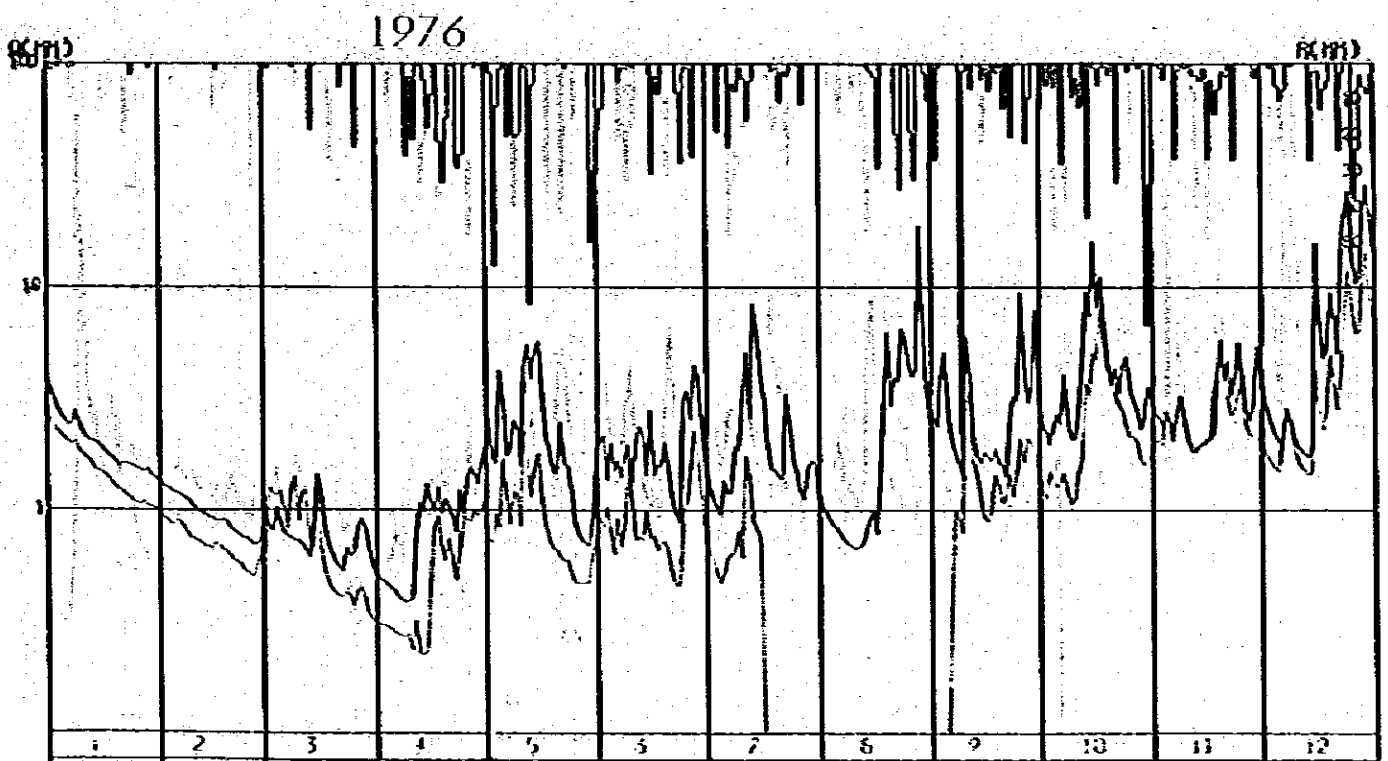
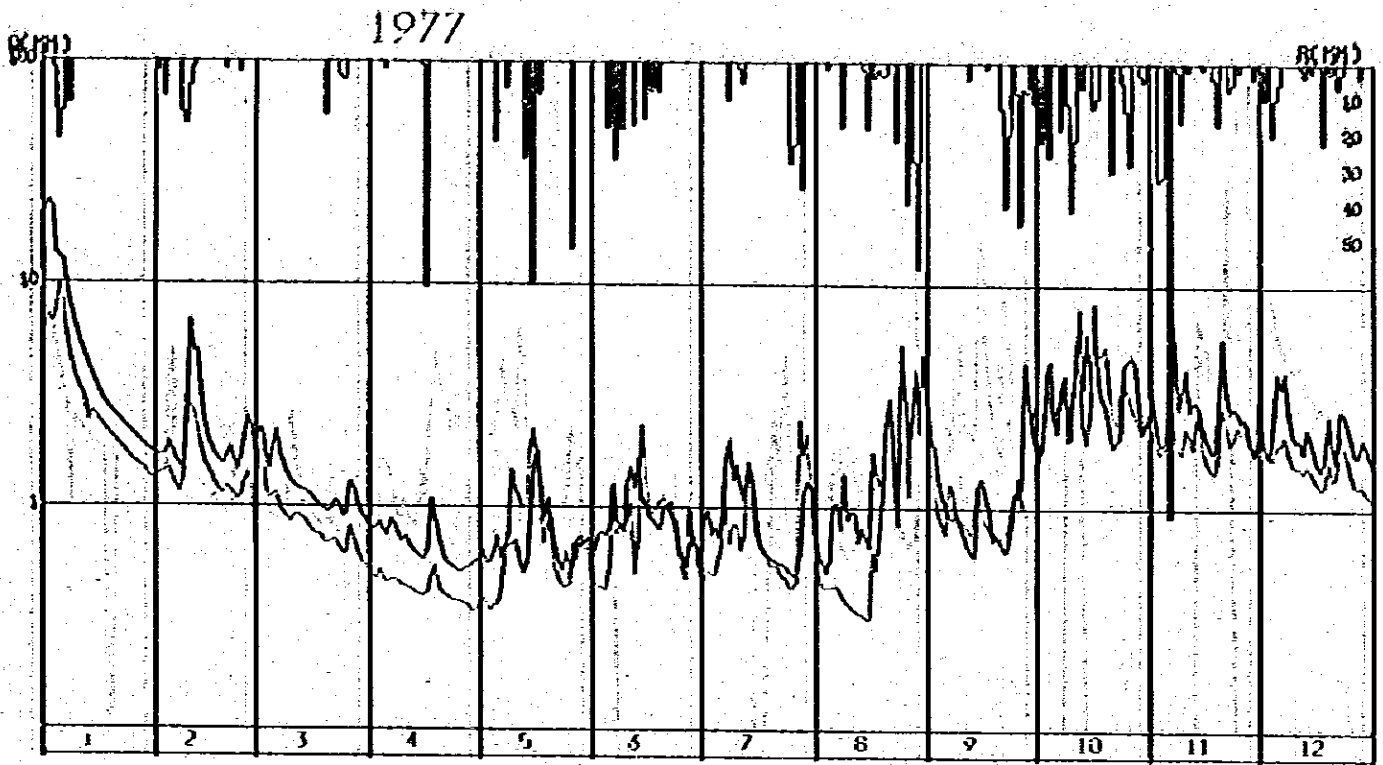


Fig. 7-17 Discharge Comparison in Kuala Tahan and Penut ( 1977/78 )



— Kuala Tahan  
— Penut

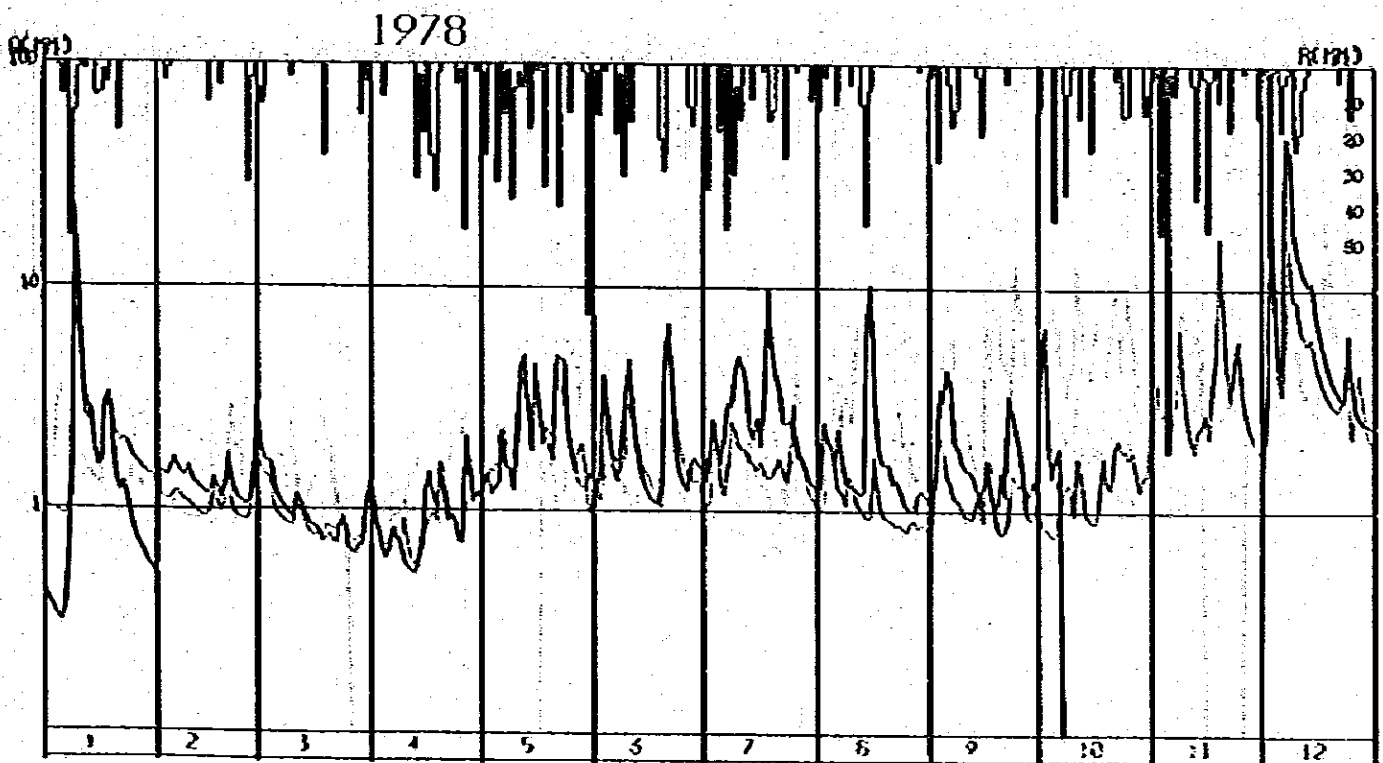


Fig. 7-18 Discharge Comparison in Kuala Tahan and Penut ( 1979/80.)

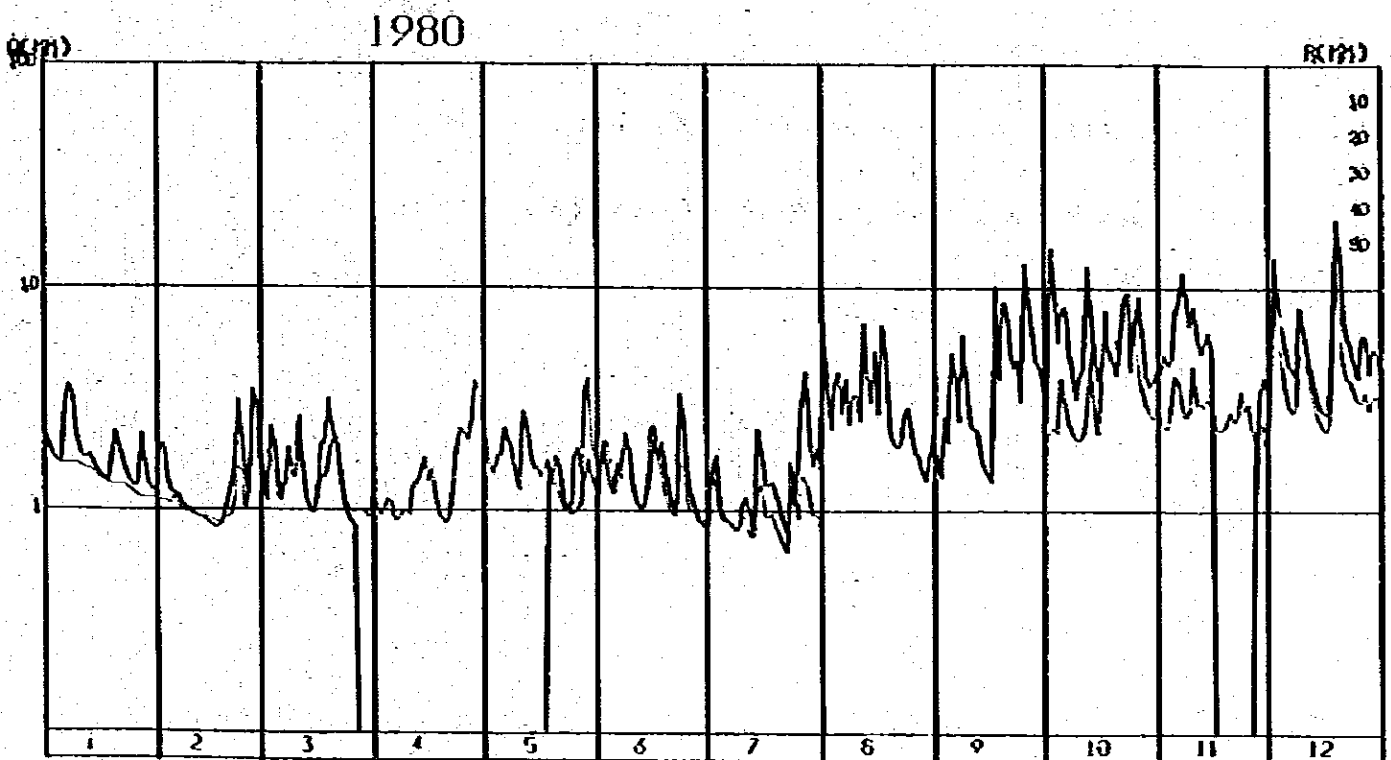
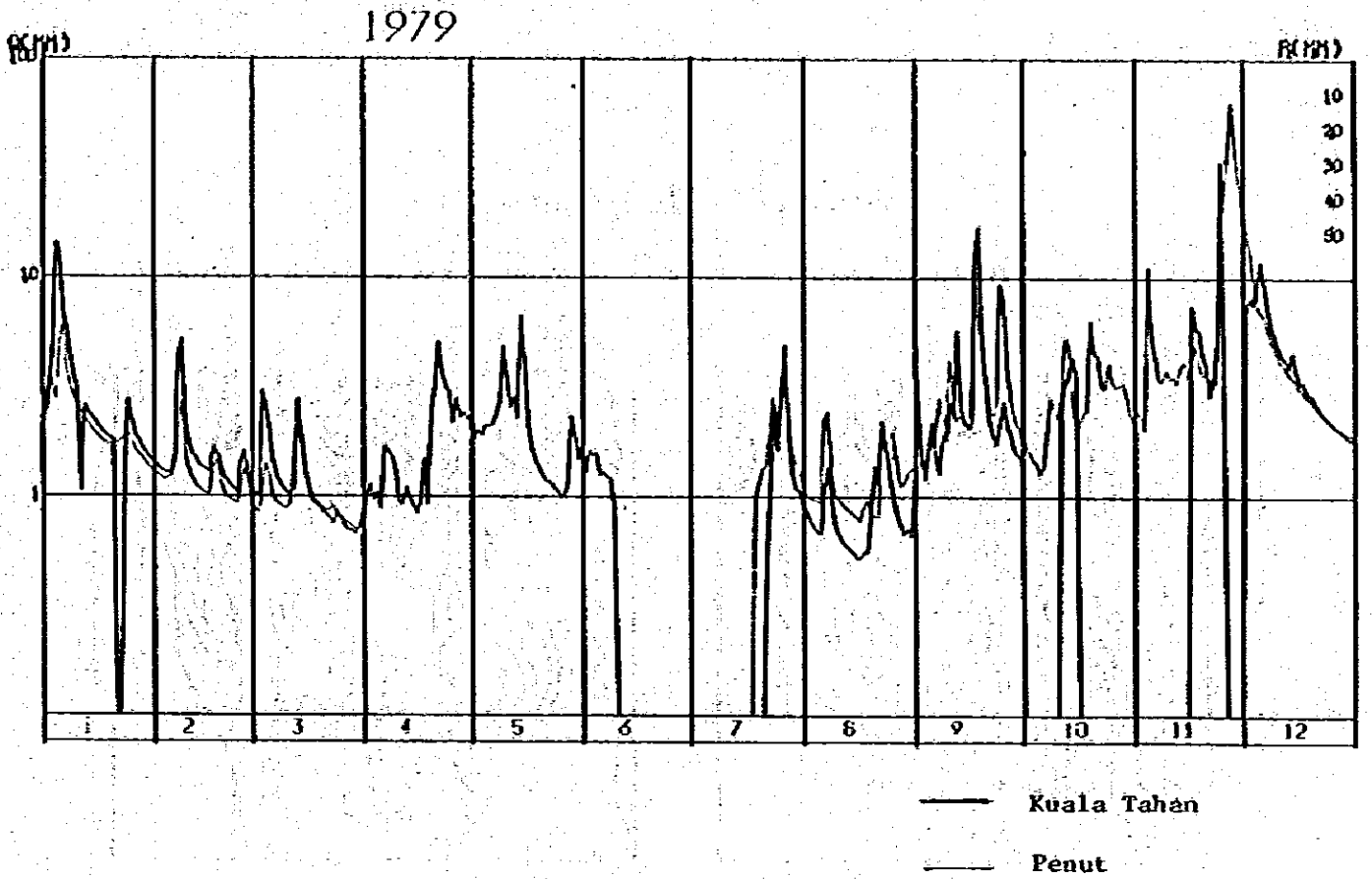
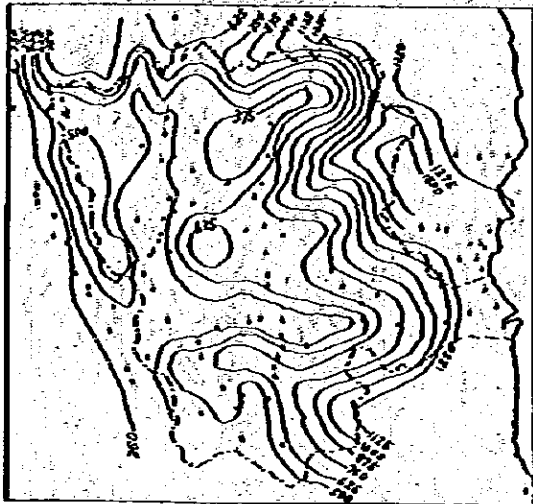
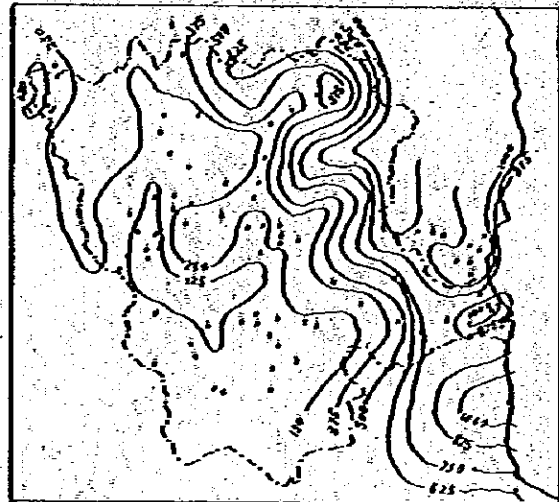


Fig. 7-19 Storm Rainfall Distribution



20 December - 5 January  
1971



11 December - 23 December  
1972

Note: All Isohyets are in Millimeters

( Source; 3.2.6, Vol.3, Pahang River Basin Study )

Fig. 7-20 Discharge Stations used in Derivation and Checking the Regional Flood Frequency Procedure

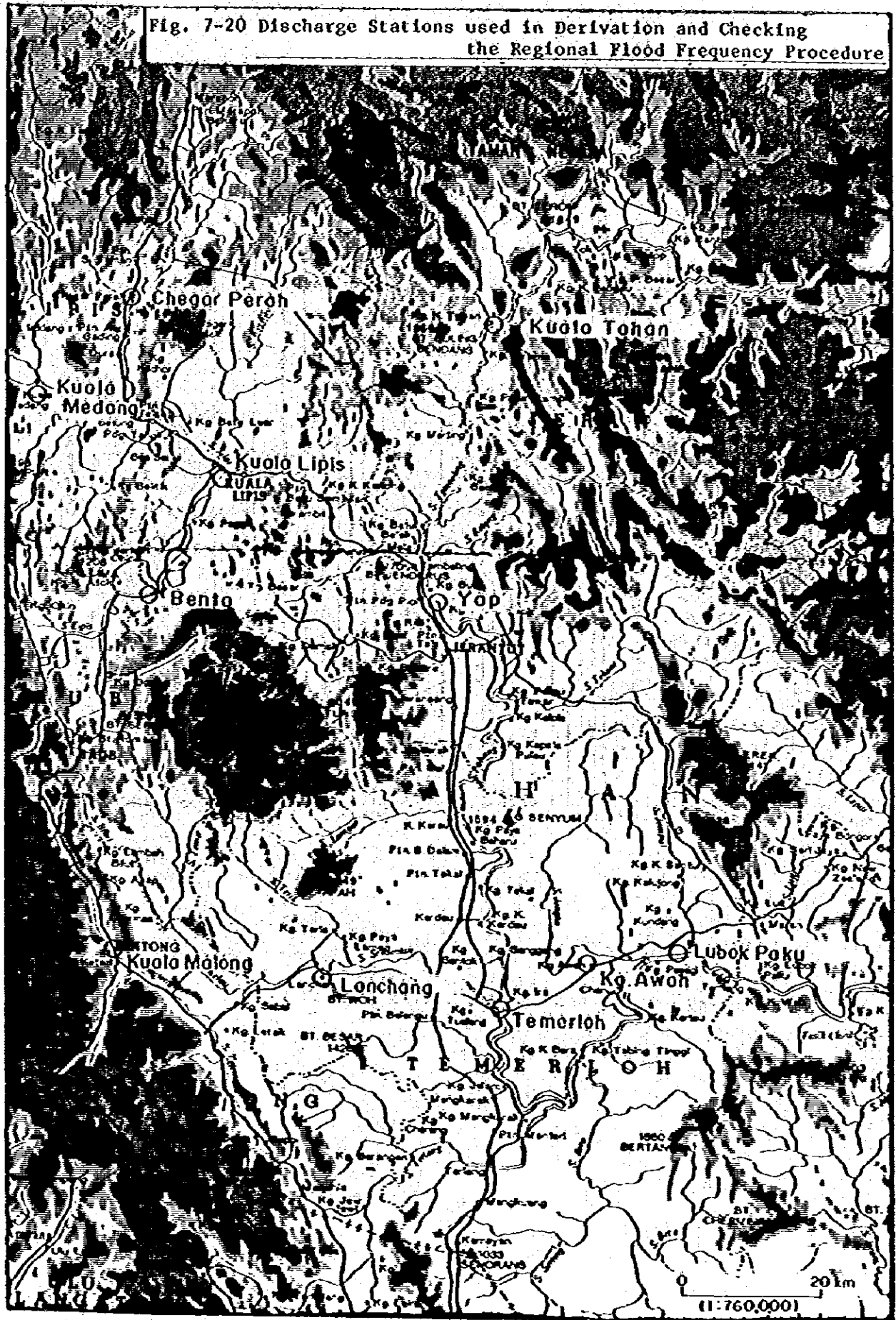
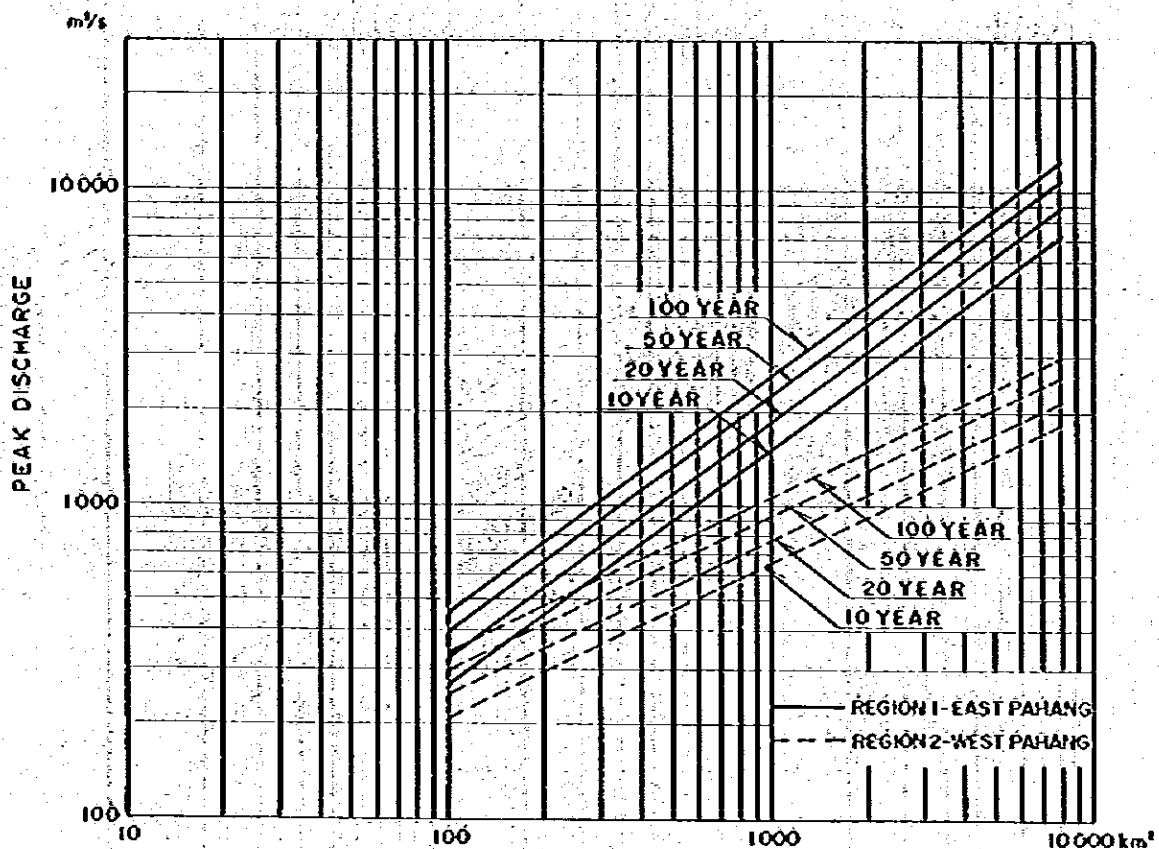
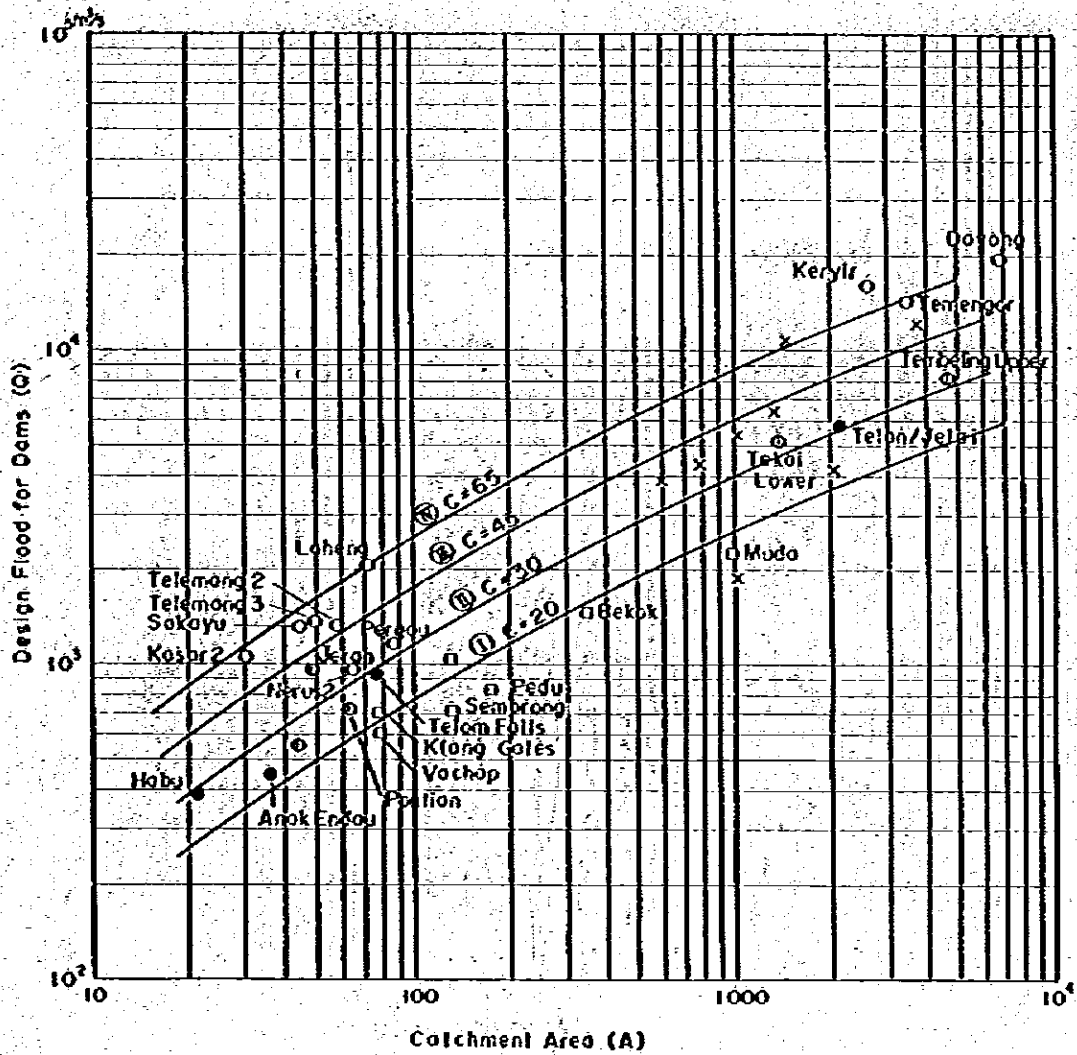


Fig. 7-21 Resional Flood Frequency Curves



( Source; Ex.12, Vol.3, Pahang River Basin Study )

Fig. 7-22 Design Flood Envelope Curves



- ① □ West coast
- ② ● Johor of Pahang - West
- ③ ○ Pahang - East
- ④ ○ Kelantan, Trengguru, Perak-North
- × Projects in other S.L. Asia countries
- C Creager's value

( Source; 3.5.13, Vol.3, Pahang River Basin Study )

Fig. 7-23 gauging Stations with Sediment Data

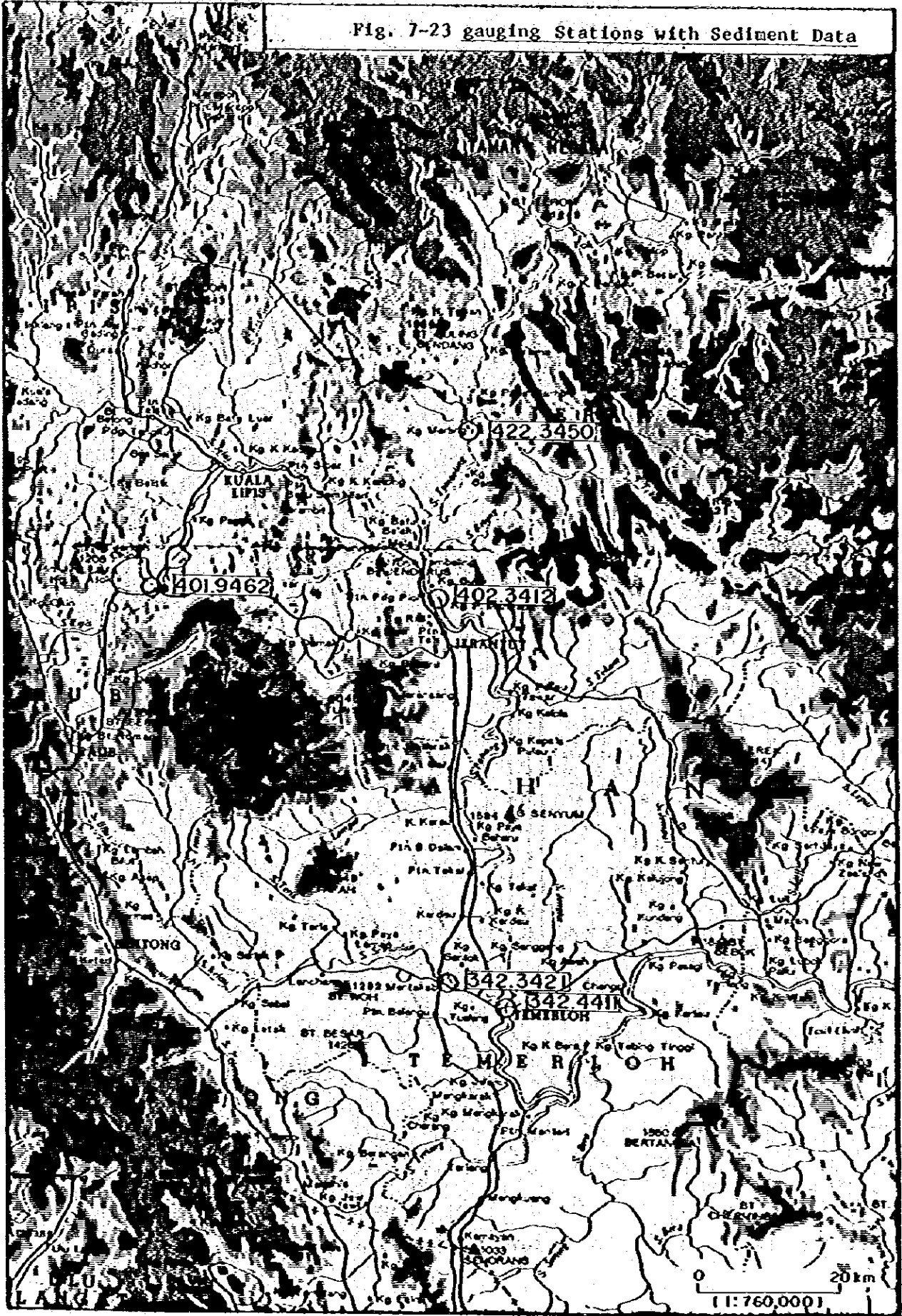
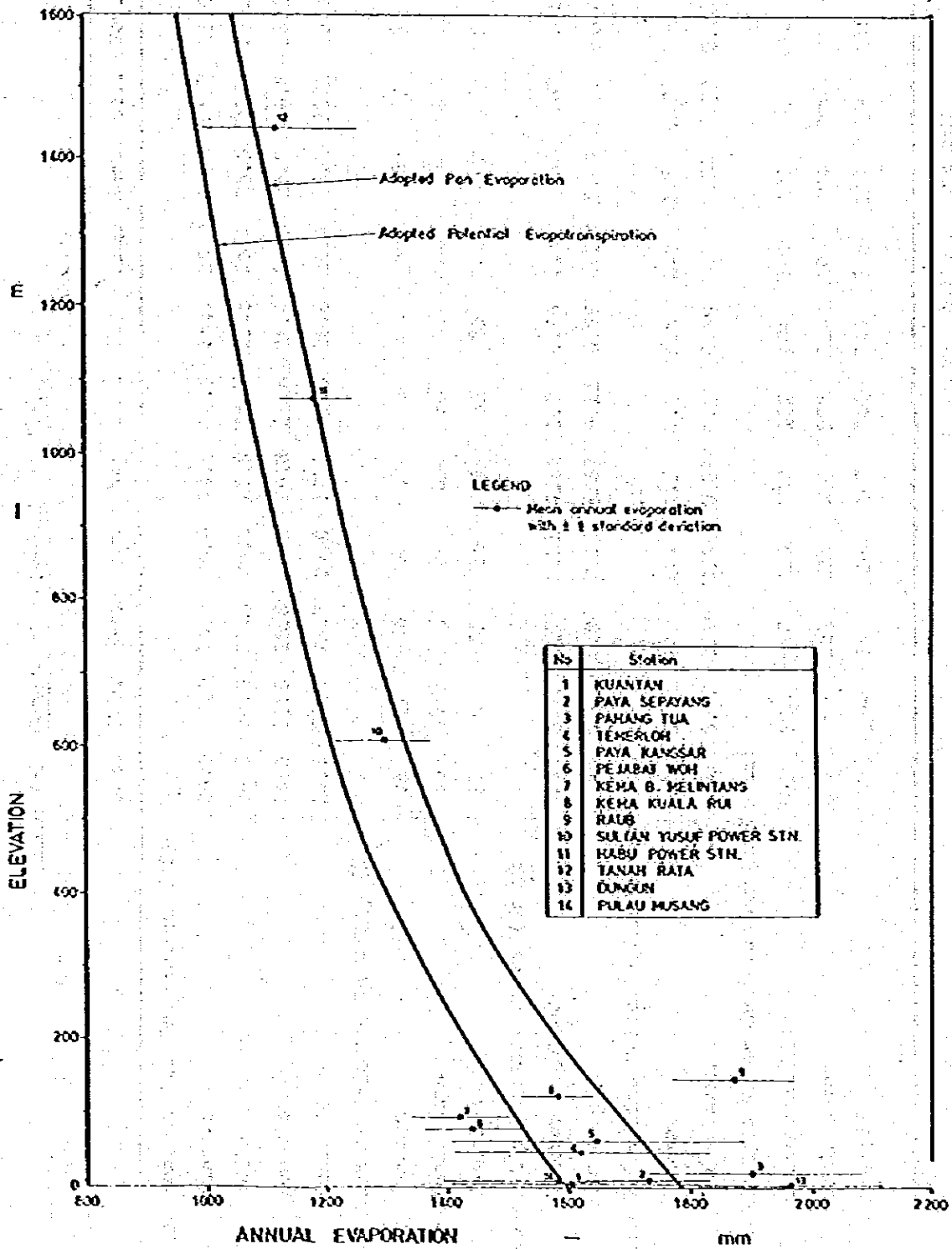




Fig. 7-24 Evaporation Elevation Relationship



( Source; 3.3.1, Vol.3, Pahang River Basin Study )

Table 7-1 General Meteorological Condition

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<b>Mean Monthly Air Temperature (°C)</b>												
Kuantan	24.5	25.0	25.7	26.4	26.6	26.5	26.1	26.0	26.0	25.7	25.0	24.4
Kuala Lipis	24.0	24.8	25.6	26.2	25.9	25.6	25.6	25.4	25.5	25.4	25.2	24.6
Temerloh	24.6	25.0	26.0	26.9	26.8	26.4	26.4	26.3	26.2	26.2	26.0	25.4
Kuala Tahan	24.1	24.9	25.7	27.0	27.1	27.0	26.6	26.4	26.2	26.1	25.8	25.1
<b>Max Monthly Relative Humidity (%)</b>												
Kuantan	88	87	86	86	87	86	86	86	86	87	90	90
Kuala Lipis	89	88	86	86	88	86	87	86	88	89	90	88
Temerloh	87	86	85	85	86	85	85	85	86	87	89	88
<b>Mean Daily Sunshine Hours (Unit: h)</b>												
Cameron Highlands	5.38	5.70	5.78	5.21	4.86	5.03	4.96	4.61	3.86	3.69	3.41	3.54
Kuantan	5.49	6.45	6.90	7.15	6.67	6.11	6.59	6.20	5.60	5.20	3.67	3.41
<b>Mean Daily Wind Velocity (Unit: m/sec.)</b>												
Kuantan	2.5	2.3	1.9	1.4	1.3	1.4	1.6	1.6	1.5	1.3	1.4	2.1
Kuala Tahan	0.41	0.42	0.46	0.41	0.38	0.33	0.39	0.37	0.34	0.33	0.28	0.30
<b>Monthly Open Water Evaporation (Unit: mm)</b>												
Cameron Highlands	101	102	118	110	102	102	104	101	101	97	90	87
Kuala Tahan	100	99	121	125	116	108	110	104	104	100	90	96
Kuantan	130	134	156	156	147	141	144	146	147	136	116	106

( Source: N.W.R.S. and NEB )

Table 7-2 Rainfall in the Pahang Basin in Period 1926 to 1979

Month	Rainfall (mm)															
	Kuantan			Mentekab			Cameron Highlands			Kuala Tahan						
	Mean	Min	Max	Mean	Min	Max	SD	Mean	Min	Max	SD	Mean	Min	Max	SD	
January	388	15.7	986	242	173	19.3	468	116	143	23.1	410	87	117.75	1.00	332.00	89.24
February	217	10.2	1,269	225	105	6.9	418	87	121	22.9	255	55	72.27	0.00	227.00	52.63
March	221	27.4	596	166	146	13.7	344	83	204	46.5	514	105	92.26	3.00	180.00	54.29
April	174	19.8	469	101	182	28.2	350	74	294	51.6	539	92	171.15	65.90	482.00	96.22
May	152	43.2	307	70	196	76.2	404	84	261	115.8	447	76	217.58	77.00	369.00	80.04
June	124	28.4	295	58	119	6.1	254	54	133	55.9	258	57	162.99	39.30	301.00	71.25
July	121	18.8	330	76	115	23.9	220	49	138	17.0	424	75	160.77	34.00	301.00	64.02
August	145	40.9	330	77	131	46.0	253	55	174	36.6	362	79	177.90	49.00	352.00	75.06
September	210	101.1	398	82	179	73.9	323	58	248	95.5	520	101	255.45	91.70	354.90	70.61
October	243	57.7	526	105	224	79.2	373	70	335	125.2	608	98	235.39	93.20	477.00	91.99
November	333	138.7	804	149	233	51.6	503	100	312	113.0	511	86	249.16	38.00	446.30	92.70
December	646	62.7	1,962	432	237	15.9	765	127	231	41.7	672	131	222.00	26.90	540.00	128.39
Annual	2,974	1,737	4,529	600	2,040	1,382	2,713	349	2,596	2,098	3,233	296	2,105	1,506	2,808	382
Statistics of																
Mean Monthly Values																
Mean	247.8	170.0	216.3	175.39												
Standard Deviation	149.3	46.9	74.9	57.81												
Coeff. of Variation	0.60	0.28	0.35	0.33												

Note: SD - Standard Deviation  
Kuala Tahan, period 1960 to 1979

Table 7-4 Correlation Table

Y	X	3924071	3924072	3923003	4023117	4223115	4023001	4127001	4227001
4324113	COR. COE.	0.552	0.717	0.508	0.651	0.735	0.558	0.455	0.623
	REG. (A)	0.781	0.924	0.241	0.759	0.906	0.977	1.283	0.689
	REG. (B)	49.09	1.46	114.33	49.31	20.94	19.12	-22.51	29.35
	SAMPLE	120	120	117	119	119	67	23	31
4227001	COR. COE.	0.643	0.712	0.351	0.671	0.562	0.708	0.945	
	REG. (A)	1.222	1.395	1.762	1.242	1.431	1.134	2.633	
	REG. (B)	9.69	-20.85	-90.20	10.75	-45.52	4.28	-198.33	
	SAMPLE	31	31	30	30	31	28	7	
4127001	COR. COE.	0.554	0.479	0.323	0.392	0.477	0.259		
	REG. (A)	0.506	0.800	0.128	0.303	0.630	0.414		
	REG. (B)	69.80	13.80	126.27	97.16	41.71	90.59		
	SAMPLE	23	23	22	23	23	23		
4023001	COR. COE.	0.564	0.633	0.354	0.557	0.515			
	REG. (A)	0.771	1.079	0.219	0.739	0.893			
	REG. (B)	27.86	-35.14	111.43	33.25	-3.95			
	SAMPLE	57	67	65	66	67			
4223115	COR. COE.	0.608	0.646	0.515	0.632				
	REG. (A)	0.869	1.020	0.267	0.842				
	REG. (B)	23.08	-21.50	103.35	30.85				
	SAMPLE	119	119	116	118				
4023117	COR. COE.	0.524	0.649	0.569					
	REG. (A)	1.033	1.209	0.336					
	REG. (B)	-17.73	-61.68	81.66					
	SAMPLE	119	119	116					
3923003	COR. COE.	0.535	0.594						
	REG. (A)	3.225	3.681						
	REG. (B)	-279.42	-440.18						
	SAMPLE	117	117						
3924072	COR. COE.	0.628							
	REG. (A)	0.860							
	REG. (B)	46.07							
	SAMPLE	120							

Correlation Formula;  $Y = (A)X + (B)$

Where,

Y: Rainfall at Y-Station

X: Rainfall at X-Station

COR. COE: Correlation Coefficient

REG. (A): Variable (A)

REG. (B): Variable (B)

SAMPLE: Sample No.

Table 7-5. Correlation Table

CROPER	1	2	3	4	5	6	7	8
4324113	4227001	3924072	4023117	4227001	4023001	3828091	3933003	4127001
COR-COE	0.735	0.717	0.621	0.623	0.548	0.532	0.508	0.455
REG-(A)	0.906	0.924	0.759	0.689	0.577	0.761	0.741	1.283
REG-(B)	20.94	1.46	49.31	29.35	19.12	49.09	114.33	-22.51
SAMPLE	119	120	116	118	120	120	117	31
4227001	4127001	3924072	4023001	4023117	3828091	4324113	4223115	3933003
COR-COE	0.945	0.712	0.708	0.671	0.641	0.623	0.562	0.351
REG-(A)	2.634	1.395	1.134	1.242	1.222	1.431	1.431	1.762
REG-(B)	-19.33	-20.45	4.50	10.75	9.69	-42.60	-45.52	-90.20
SAMPLE	31	31	30	31	31	30	27	11
4127001	4227001	3928091	3924072	4223115	4324113	4023117	3933003	4023001
COR-COE	0.965	0.554	0.479	0.477	0.455	0.392	0.323	0.259
REG-(A)	0.379	0.506	0.800	0.620	0.779	0.303	0.128	0.414
REG-(B)	75.19	68.80	13.80	41.71	17.34	97.16	126.27	90.59
SAMPLE	7	23	23	23	22	30	27	31
4023001	4227001	3924072	3928091	4324113	4023117	4223115	3933003	4127001
COR-COE	0.723	0.633	0.564	0.558	0.557	0.515	0.354	0.259
REG-(A)	0.882	1.079	0.771	1.023	0.739	0.883	0.219	2.418
REG-(B)	-3.98	-35.14	27.86	-19.56	33.25	-3.95	111.42	-219.04
SAMPLE	28	67	67	23	65	30	27	31
4223115	4324113	3924072	4023117	3828091	4227001	3933003	4023001	4127001
COR-COE	0.723	0.646	0.632	0.608	0.562	0.515	0.515	0.477
REG-(A)	1.103	1.020	0.842	0.866	0.699	0.267	1.133	1.586
REG-(B)	-25.10	-21.19	30.85	28.04	31.82	103.35	4.47	-66.17
SAMPLE	19	119	87	119	65	30	27	31
4023117	4227001	4324113	3924072	4223115	3933003	4023001	3828091	4127001
COR-COE	0.671	0.651	0.649	0.632	0.557	0.524	0.524	0.392
REG-(A)	0.805	1.317	1.209	1.188	0.336	1.354	1.053	3.300
REG-(B)	-8.58	-64.94	-61.98	-36.65	81.66	-45.00	-17.73	-320.60
SAMPLE	30	119	119	116	65	30	119	31
3933003	4023117	3828091	3924072	4223115	4324113	4023001	4227001	4127001
COR-COE	0.509	0.525	0.534	0.515	0.458	0.354	0.351	0.323
REG-(A)	2.976	3.225	3.681	3.740	4.142	4.557	0.568	7.814
REG-(B)	-242.85	-278.42	-440.18	-386.51	-473.60	-507.72	51.20	-986.65
SAMPLE	116	117	22	116	65	30	119	31
3924072	4324113	4227001	4023117	4223115	4023001	3828091	3933003	4127001
COR-COE	0.717	0.712	0.649	0.646	0.633	0.628	0.534	0.479
REG-(A)	1.042	0.717	0.827	0.980	0.927	0.860	0.272	1.250
REG-(B)	-11.38	14.95	51.02	21.08	35.58	46.07	119.60	-17.25
SAMPLE	120	31	119	116	65	120	119	31
3828091	4227001	3924072	4223115	4023001	4127001	4324113	3933003	4023117
COR-COE	0.643	0.628	0.608	0.564	0.554	0.552	0.535	0.524
REG-(A)	0.813	1.183	1.155	1.298	1.972	1.313	0.310	0.950
REG-(B)	-7.93	-55.36	-52.43	-36.16	-152.87	-64.46	86.32	7.34
SAMPLE	31	120	119	116	117	117	119	31

Table 7-6 Monthly Rainfall at Kuala Terahan

(Unit: mm)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1960	10	0	0	0	0	0	0	0	0	0	0	0	1960
1961	34	9	145	134	7	0	94	240	323	125	294	123	1961
1962	20	1	161	254	223	0	141	215	325	125	268	126	1962
1963	17	1	100	166	120	0	135	123	145	205	194	239	1963
1964	11	6	120	32	11	0	30	138	208	208	237	146	1964
1965	14	6	100	115	12	0	11	130	229	277	256	285	1965
1966	12	6	130	115	11	0	27	150	235	110	245	377	1966
1967	13	2	130	135	12	0	11	181	199	238	38	114	1967
1968	6	4	260	137	30	0	34	161	187	319	123	230	1968
1969	9	2	150	137	20	0	1	152	182	128	179	227	1969
1970	2	2	150	137	20	0	1	152	182	128	179	227	1970
1971	2	1	150	137	20	0	1	152	182	128	179	227	1971
1972	2	1	150	137	20	0	1	152	182	128	179	227	1972
1973	2	1	150	137	20	0	1	152	182	128	179	227	1973
1974	2	1	150	137	20	0	1	152	182	128	179	227	1974
1975	2	1	150	137	20	0	1	152	182	128	179	227	1975
1976	2	1	150	137	20	0	1	152	182	128	179	227	1976
1977	2	1	150	137	20	0	1	152	182	128	179	227	1977
1978	2	1	150	137	20	0	1	152	182	128	179	227	1978
1979	2	1	150	137	20	0	1	152	182	128	179	227	1979

(Source: N.W.R.S. AND NEB)

**Table 7-7 Comparison of 1 and 5 Days Rainfall  
at Mentekab  
Estimated with Various Frequency  
Distributions**

**Period of Record 1930-72 (30 full years)**

Duration (Days)	Return Period (Year)	Rainfall Estimated by Each Distributions				Log Pearson III
		Normal		Extreme Value		
		Arithmetic	Log-normal	Gumbel	Chow	
One Day	2	98	94	94	94	93
	5	123	120	124	123	119
	10	136	136	144	142	137
	50	159	170	188	184	167
	100	167	183	207	202	195
	1000	190	228	268	261	257
	10000	209	273	330	319	329
Five Days	2	176	168	168	168	169
	5	221	218	223	221	218
	10	245	250	259	256	249
	50	286	317	338	334	311
	100	301	344	372	366	369
	1000	342	435	483	474	417
	10000	376	530	594	582	498

( Source; 3.2.6, Vol.3, Pahang River Basin Study )

Table 7-8 Maximum Rainfalls Recorded at  
Climatological Stations

Duration	Rainfall (mm)			
	Mersing	Kuala Trengganu	Kuantan	Cameron Highlands
15 mins	45.7 (182.9)	45.2 (180.9)	42.9 (171.7)	27.2 (108.7)
30 mins	58.7 (117.3)	66.5 (133.1)	67.1 (134.1)	41.7 (83.3)
45 mins	74.9 (99.8)	75.9 (101.1)	94.0 (125.2)	50.8 (67.8)
1 hour	87.4 (87.4)	98.5 (98.5)	106.7 (106.7)	59.7 (59.7)
3 hours	186.9 (62.2)	170.2 (56.6)	142.5 (47.5)	81.3 (27.2)
6 hours	287.8 (48.0)	251.0 (41.9)	206.0 (34.3)	85.3 (14.2)
12 hours	353.8 (29.5)	343.2 (28.7)	273.6 (22.9)	91.2 (7.4)
1 day	433.1 (18.0)	481.3 (20.1)	345.7 (14.5)	119.4 (5.1)
2 days	547.6 (11.4)	658.6 (13.7)	535.4 (11.2)	163.8 (3.3)
3 days	677.4 (9.4)	892.8 (11.4)	691.1 (9.7)	169.4 (2.3)
5 days	707.7 (5.8)	934.7 (7.9)	944.4 (7.9)	221.7 (1.8)
10 days	1,242.1 (5.1)	1,114.3 (4.6)	1,391.2 (5.8)	248.4 (1.0)

Notes: ( ) The figures in brackets are the average rainfall intensities in millimeters per hour.

Mersing is 160 kilometers south from Kuantan.

Kuala Trengganu is 170 kilometers north from Kuantan.

( Source; 3.2.6, Vol.3, Pahang River Basin Study)



Table 7-9 Flow Regime at Upper Damsite (C.A. = 1,200 km<sup>2</sup>)

	Q max	Q-95	Q-165	Q-275	Q-355	Q min	Q average	Annual Flow
1973	457.83	35.76	24.26	16.99	11.21	9.24	36.59	13,355.2
1974	203.23	51.29	35.08	26.72	17.81	15.59	42.93	15,668.5
1975	748.74	56.43	34.85	26.07	13.41	11.93	51.63	18,844.9
1976	398.75	40.33	25.10	14.33	7.48	5.43	39.00	14,273.7
1977	325.07	31.13	20.67	11.07	7.41	6.85	28.79	10,509.1
1978	665.53	41.26	22.99	16.66	7.70	4.33	39.23	14,319.4
1979	552.36	41.67	29.90	17.64	9.31	6.52	41.00	14,963.3
1980	283.35	54.60	28.32	18.66	12.11	11.06	42.28	15,476.0

Flow Regime at Lower Damsite (C.A. = 1,390 km<sup>2</sup>)

	Q max	Q-95	Q-185	Q-275	Q-355	Q min	Q average	Annual Flow
1973	530.32	41.42	29.10	19.68	12.98	10.71	42.38	15,469.8
1974	235.41	59.41	40.63	30.95	20.63	18.06	49.72	18,149.4
1975	867.29	65.36	40.37	30.20	15.53	13.81	59.80	21,828.7
1976	461.89	46.71	29.07	16.60	8.66	6.29	45.17	16,553.7
1977	376.54	36.06	23.95	12.82	8.58	7.93	33.35	12,173.1
1978	770.90	47.79	26.63	19.30	8.92	5.02	45.44	16,586.6
1979	639.82	48.27	34.63	20.44	10.78	7.55	47.49	17,332.5
1980	328.21	63.25	32.81	21.62	14.03	12.82	48.98	17,926.4

( Source NEB )

Table 7-10 Discharge Stations Used in Derivation and Checking  
the Regional Flood Frequency Procedure

Station Name	Area (km <sup>2</sup> )	Type of Record	Length of Record	Location
S. Pahang at Lubok Paku	25,600	Staff Gauge	1948-72	North of Temerloh
S. Pahang at Temerloh	19,000	Staff Gauge	1948-72	Temerloh
S. Pahang at Yap	13,200	Staff Gauge	1948-72	East of Temerloh
S. Tembeling at K. Tahan	3,300	Staff Gauge	1948-72	North-East of Temerloh
S. Lipis at Benta	1,670	Staff Gauge and Chart	1948-72	North-West of Temerloh
S. Bentong at K. Marong	240	Chart	1948-72	West of Temerloh
S. Jelai at K. Lipis	6,280	Staff Gauge	1948-72	North-West of Temerloh
S. Jelai at K. Medang	2,630	Staff Gauge	1961-72	North-West of Temerloh
S. Semantan at Lanchang	2,230	Staff Gauge	1965-72	West of Temerloh
S. Tanum at Chegar Perah	732	Staff Gauge	1962-72	North-West of Temerloh
S. Jengka at Kg. Awah	490	Staff Gauge	1965-72	East of Temerloh

( Source: 3.7.1, Vol.3, Pahang River Basin Study )

Table 7-13 Pan Evaporation Data in Pahang River Basin

Period	Evaporation (mm)							
	Pahang Tua		Temerloh		Cameron Highlands		Kuala Tahan	
	US Class Pan		US Class Pan		US Class Pan		US Class Pan	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
January	148	16.4	130	19.1	94	11.2	100	9.6
February	144	15.0	136	21.5	99	18.7	99	20.5
March	175	21.5	148	16.0	107	19.2	121	14.2
April	172	19.9	147	29.7	93	15.2	125	15.1
May	175	27.7	149	28.9	96	14.8	116	6.2
June	167	26.6	138	31.0	90	15.2	108	9.0
July	166	16.0	135	28.1	92	14.4	110	6.1
August	170	26.2	134	19.4	90	13.5	104	10.5
September	163	21.2	129	18.6	90	9.8	104	12.0
October	157	17.9	129	17.4	82	23.8	100	17.3
November	133	15.4	124	17.2	78	20.6	90	20.9
December	136	14.0	119	25.4	74	21.5	96	20.6
Annual	1,910	187.7	1,620	215.4	1,090	133.5	1,280	88.6
Mean	158.8		134.8		90.42		106.8	
S.V.	15.03		9.50		9.03		10.56	
C.V.	0.095		0.070		0.10		0.10	
EL	5 m		49 m		1,450 m			

Note: SD - Standard Deviation, CV - Coefficient of Variation

( Source; 3.3.4, Vol.3, Pahang River Basin Study )

Table 7-14 Actual Evapotranspiration Computed from Rainfall and Runoff

Catchment	Period of Record*	Catchment Area (km <sup>2</sup> )	Average Annual Values (mm)		
			Rainfall	Runoff	Evapo-Transpiration
S. Tekad at Penu	1973-80 (8 years)	1,390	2,340	1,060	1,280
S. Lipis at Benta	1966-72 (7 years)	1,670	2,240	890	1,350
S. Pahang at Temerloh	1959-72 (14 years)	19,000	2,630	1,160	1,470
S. Kelang	1961-69 (9 years)	464	2,460	1,100	1,360
S. Selangor at Randau Panjang	1950-70 (14 years)	1,450	2,720	1,420	1,300
S. Kelantan at Guillemard Bridge	1961-70 (10 years)	11,900	2,760	1,420	1,340

\* The number of complete years used are shown in brackets.

( Source: 3.3.4, Vol. 3, Pahang River Basin Study )

Table 7-15 Evaporation

- Kuala Tahan -

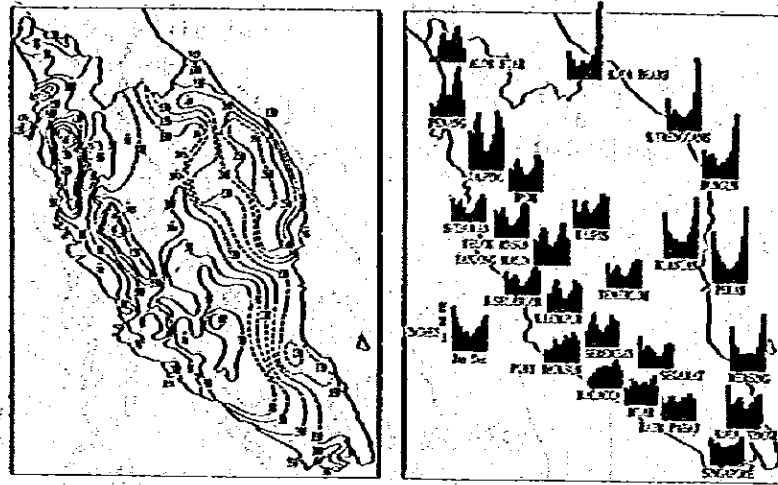
(Unit: mm)

	1974	1975	1976	1977	1978	1979	1980
1	95.0	83.6	96.5	99.8	100.6	111.0	111.3
2	77.5	94.5	124.0	86.6	77.0	126.7	103.4
3	127.0	116.3	149.9	114.0	115.1	105.7	118.4
4	103.1	106.4	138.2	142.5	127.0	132.3	128.3
5	108.7	109.2	121.7	118.6	116.1	125.0	112.8
6	104.9	93.7	101.1	106.4	112.3	114.8	120.4
7	105.7	100.6	107.7	106.9	112.0	117.9	115.8
8	110.2	116.1	108.7	86.1	94.0	110.2	104.4
9	90.4	94.2	107.2	95.0	121.2	104.6	118.1
10	103.9	93.4	65.8	98.8	115.1	114.3	111.8
11	73.7	78.5	63.8	82.6	94.5	113.5	120.1
12	99.1	75.4	65.9	96.3	93.5	111.8	126.9
Total	1,199.2	1,161.9	1,250.5	1,233.6	1,278.4	1,387.8	1,391.7

Note: US Class A Pan Observation

( Source: NEB )

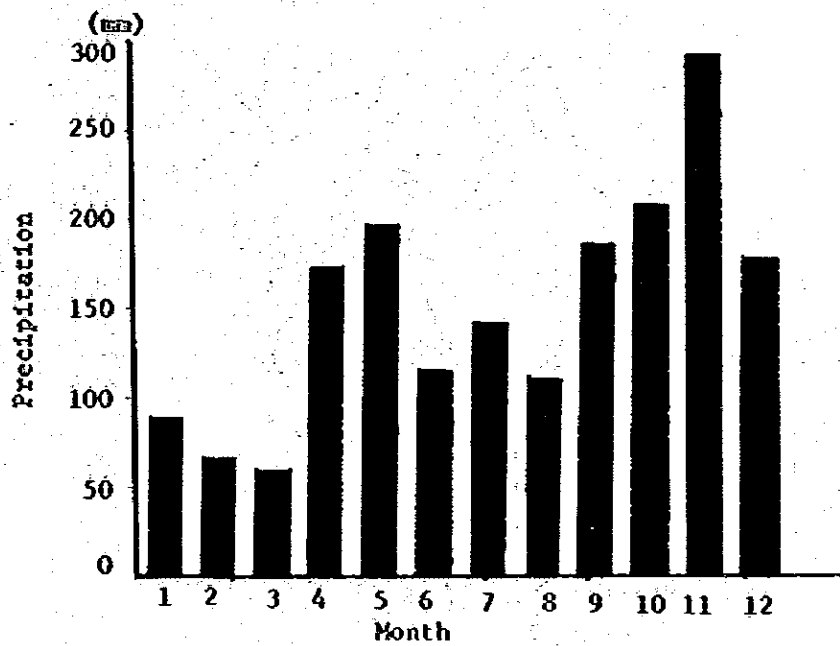
Fig. 8-1 Annual Rainfall in West Malaysia



( Source; Wyatt-Smith, Malay Forest Rec. 23, 1963 )

Fig. 8-2 Annual Rainfall in Kuala Tahan

( Average 1973 - 1981 )



( Source; NEB )

Fig. 8-3 Location of Water Test Sampling in 1981

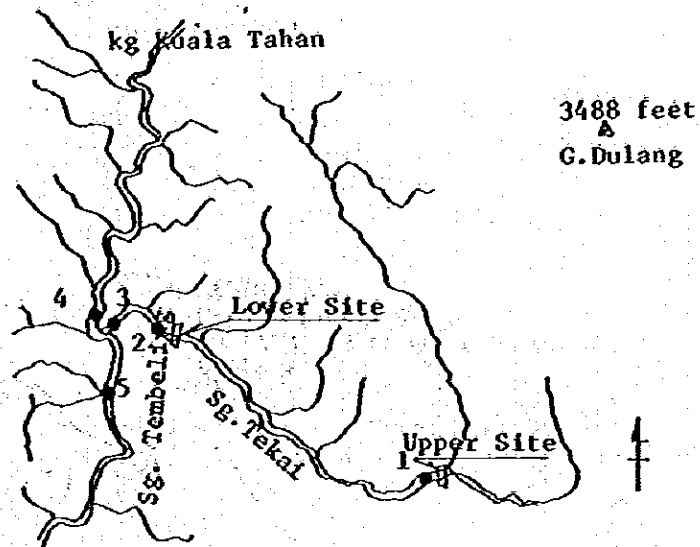
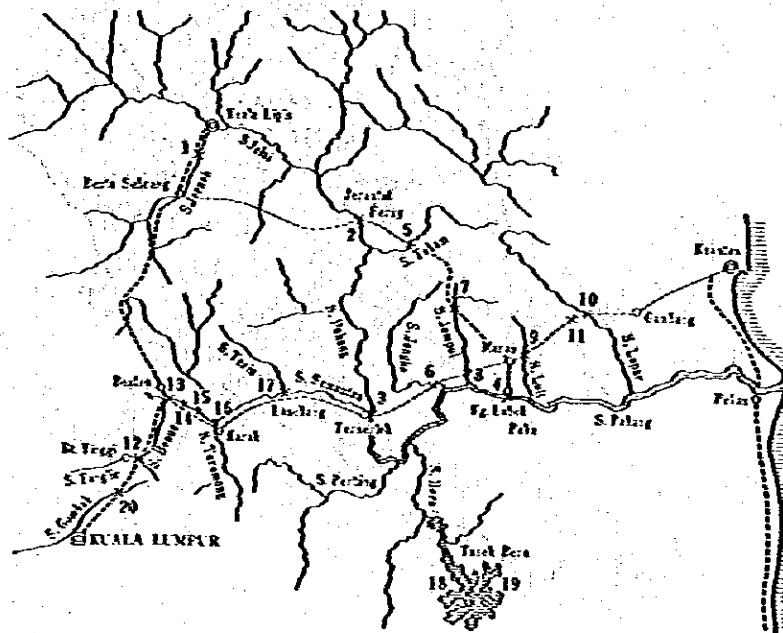
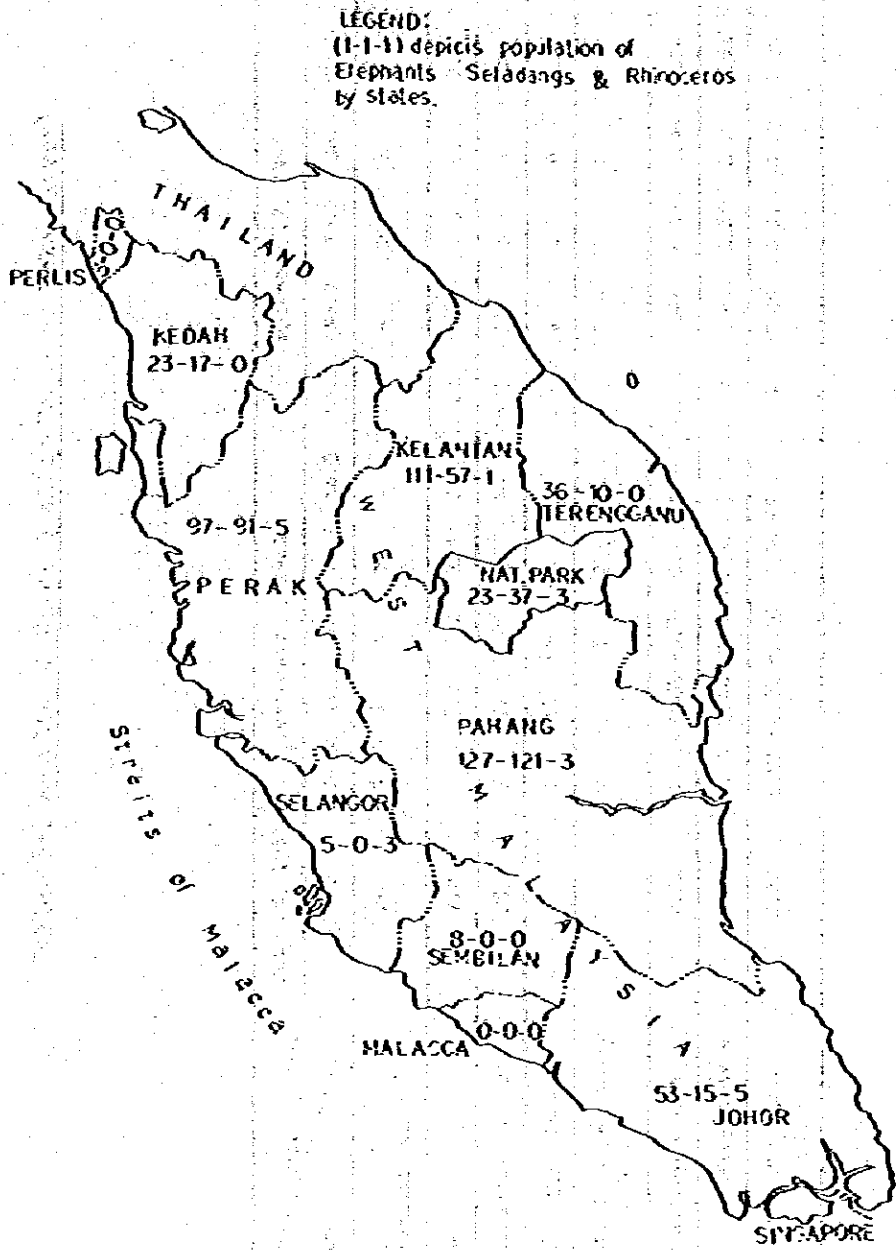


Fig. 8-4 Location of Water Quality Sampling in Pahang



( Source; Mizuno and Mori, University Report of  
Ohsaka Educational Univ., 1969 )

Fig. 8-5 Estimated Population of  
Elephant, Seladang, Rhinoceros  
 (West Malais)



( Source; Environmental Overview, Temengor  
 Hydro-electric Development Project )



Table. 8-1 Results of Water Quality Tests at Tekaf River

Item	July 28, 1981					September 1, 1981					September 22, 1981					October 14, 1981				
	No.1	No.2	No.3	No.4	No.5	No.1	No.2	No.3	No.4	No.5	No.1	No.2	No.3	No.4	No.5	No.1	No.2	No.3	No.4	No.5
Turbidity (APHA Formazin Units)	45	5	5	5	5	2	4	5	1	2	74	114	33	26	24					
pH Value	7.2	7.2	7.2	7.3	7.5	7.3	7.1	7.3	7.2	7.3	7.1	7.2	6.8	6.9	7.1					
Total Suspended Solids	5	10	10	10	10	5	10	5	5	15	300	285	50	35	25					
Chemical Oxygen Demand	35	15	<5	10	10	8	6	8	6	4	50	30	15	40	35					
Biochemical Oxygen Demand @ 20°C for 5 days	9	5	2	3	3	2	1	3	2	1	5	5	5	5	5					
Nitrate Nitrogen as N	0.91	0.82	0.74	0.91	0.78	0.62	0.66	0.58	0.54	0.54	0.91	0.62	0.91	0.82	0.54					
Ammoniacal Nitrogen as N	3.13	1.44	1.40	2.55	1.48	1.40	1.48	1.56	1.19	0.91	1.77	1.69	1.89	1.36	1.61					
Hydrolyzable Phosphate as PO <sub>4</sub>	<0.01	<0.01	<0.01	0.04	<0.01	0.08	0.09	0.11	0.23	0.08	0.19	0.01	0.24	<0.01	0.32					

**Table 8-2 Water Quality in the Pahang River**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. S. Juruch	22-VI	17:00	32.0	28.5	6.9	15	B	
2. S. Jelai	23-VI	12:00	31.0	28.0	6.8	17	B	
3. S. Pahang	25-VI	13:10	30.8	30.5	6.8	14	RB	
4. S. Pahang	25-VI	12:10	29.0	26.5	5.7	20	RB	
5. S. Tekan	25-VI	12:45	31.0	27.0	6.7	18	B	
6. S. Jengka	25-VI	14:00	34.0	29.0	6.6	50	B	
7. S. Jampol	23-VI	14:00	34.0	29.0	6.6	50	B	
8. S. Jampol	25-VI	12:30	29.0	27.0	6.6	19	YB	
9. S. Luit	25-VI	10:25	27.0	26.5	7.0	30	YB	
10. S. Lepar	23-VI	15:40	33.0	29.0	6.2	18	RB	
11. S. Lepar	23-VI	16:00	33.0	33.0	6.2	45	RB	
12. S. Tanglir	22-VI	10:25	27.2	23.0	6.9	12	YB	
13. S. Benus	25-VI	14:25	29.5	28.3	6.8	29	YB	
14. S. Benus	25-VI	14:10	30.0	28.0	6.8	14	YB	
15. S. Benus	25-VI	15:35	30.5	27.0	6.8	60	T	Insects
16. S. Telomony	25-VI	15:00	32.5	27.0	6.6	25	Y	
17. S. Teris	25-VI	14:00	32.0	27.0	6.2	5	YB	
18. Tasek Bera	16-V	9:00	27.0	26.5	4.7	-	DB	
19. Tasek Bera	16-V	14:00	30.2	27.8	4.6	-	DB	
20. S. Combak	22-VI	9:00	-	23.0	6.9	60	T	Insects, Shrimp

(1) Name of River

(9) Insect, etc.

(2) Date: *Malayan Yearbook of Hydrology, Vol. 1 of Malayan*

(3) Time : *Hydrology for the Tropics* B : Brown

(4) Atmospheric Temperature (°C) RB : Red Brown

(5) Water Temperature (°C) YB : Yellow Brown

(6) PH Y : Yellow

(7) Depth (m) T : Transparency

(8) Colour of Water DB : Dark Brown

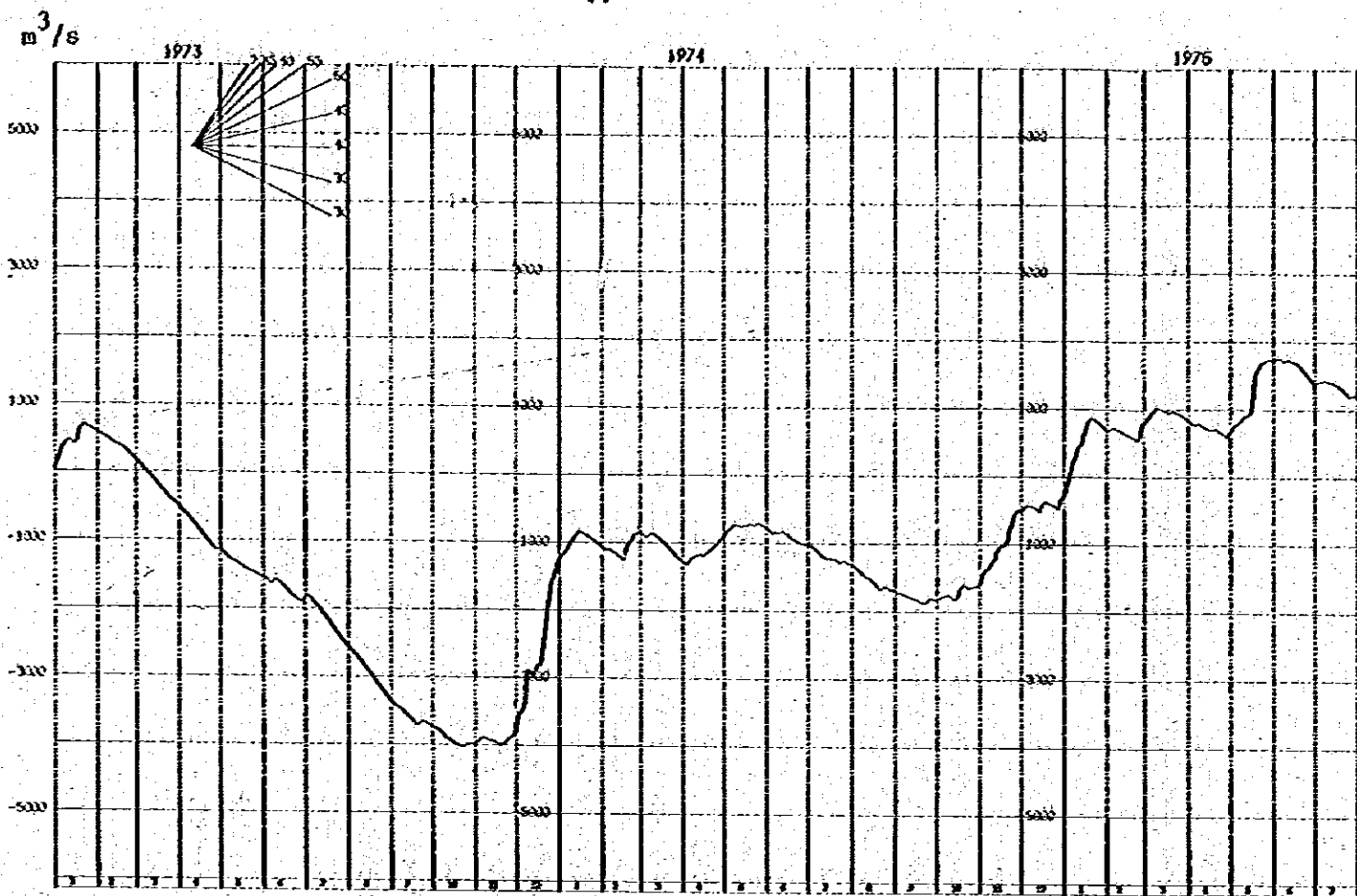
( Source; Mizuno and Mori, University Report of  
Ohsaka Educational Univ., 1969 )

Table 8-3 Major Species of Trees consisting Lowland Dipterocarp Forest  
(Effective Lumber )

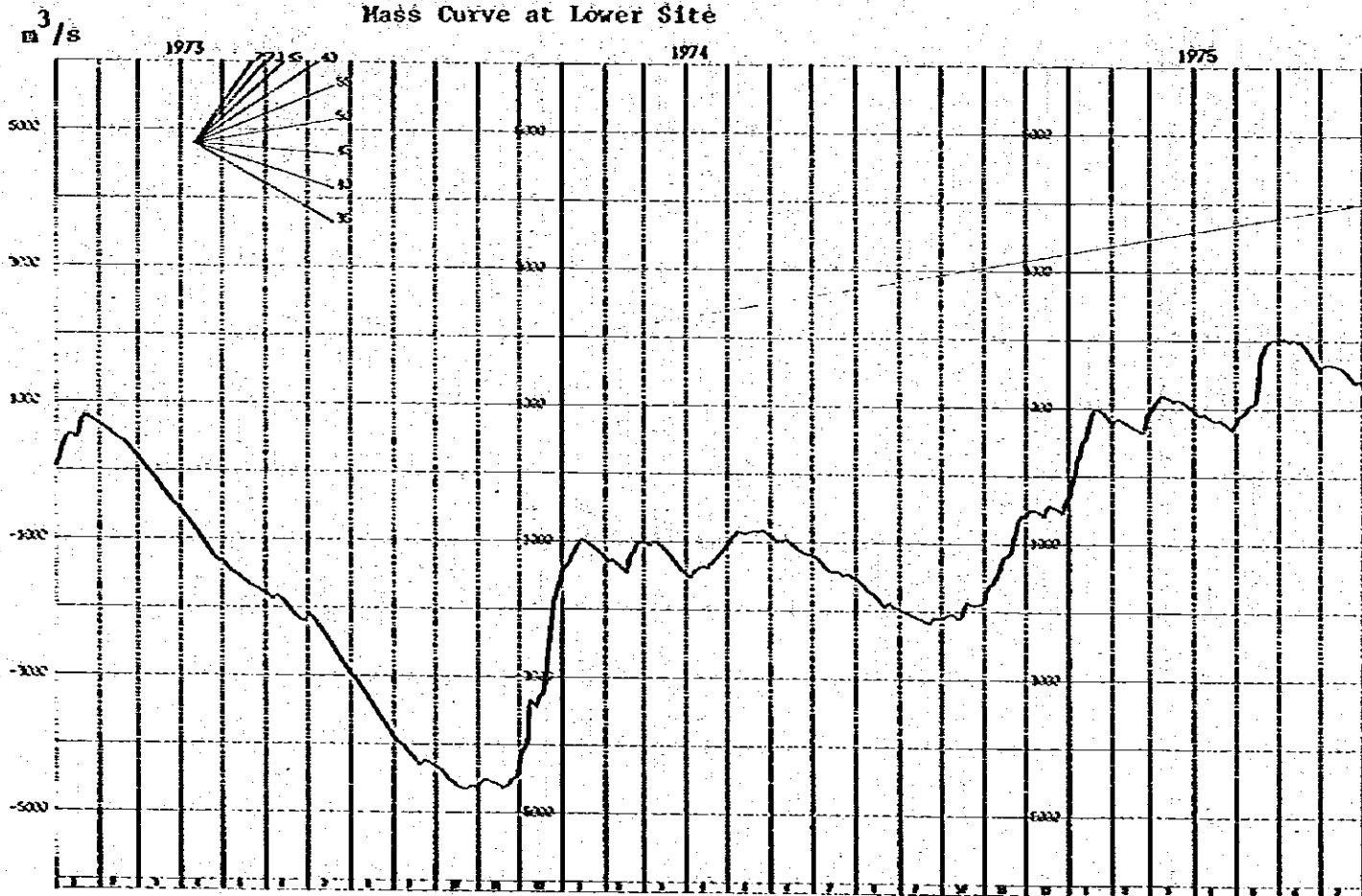
Common Name	Botanical (scientific) name	No. & area of lumber group		
		JT 6/78 650ac	JT 03/79 1000ac	JT 7/79 670ac
Balau	Shorea, Shorea	8,691	1,796	117,820
Résak	Vitica	6,758	24,994	14,549
Keruing	Dipterocarpus	17,771	44,156	37,754
Kempas	Leguminosae (Pulse family) Koompassia, K.malaccensis	10,215	29,570	32,308
Kelal, Keleday	Moraceae (Mulberry family) Artocarpus	3,568	16,615	30,210
M. Piolit	Shorea, Rubroshorea (Red meranti)	85,185	66,039	454,629
Meranti Kuasing	Shorea, Richetoides (Yellow meranti)	4,617	4,175	32,810
M. Putih	Shorea, Anthoshorea (White meranti)	149	6,321	2,140
Mengkulang	Sterculiaceae (Firmiana platanifolia) Heritiera, H.simplifolia	2,588	5,126	1,916
Kasai	Sapindaceae (Sapindus mukurossi) Sapindaceae, Ponettia Pinnata Forster	4,676	22,706	43,530
Mersawa	Anisoptera	2,786	9,161	38,201
Jelutong	Apocynaceae, Dyera D.costulata	1,540	4,091	9,026
Nyatoh	Sapotaceae	400	911	2,369
<b>Total (Sg.feet)</b>		<b>149,244 cu.ft.</b>	<b>235,661 cu.ft.</b>	<b>827,262 cu.ft.</b>

( Source; Malayan Forest Records No.23, Manual of Malayan  
silviculture for Inland Forests Vol.II )

### Mass Curve at Upper Site



### Mass Curve at Lower Site



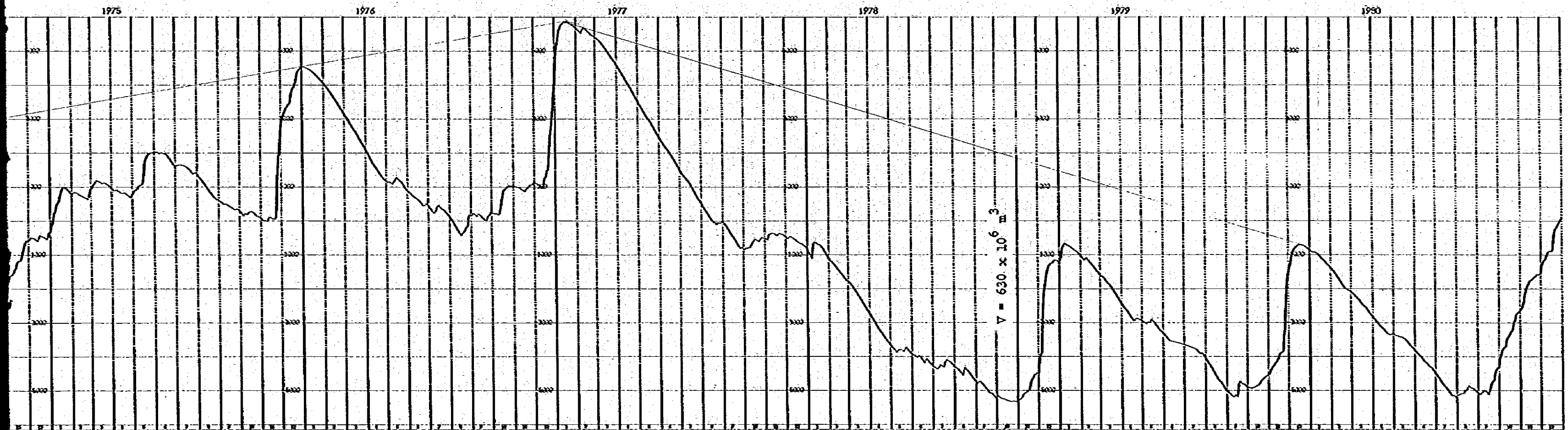
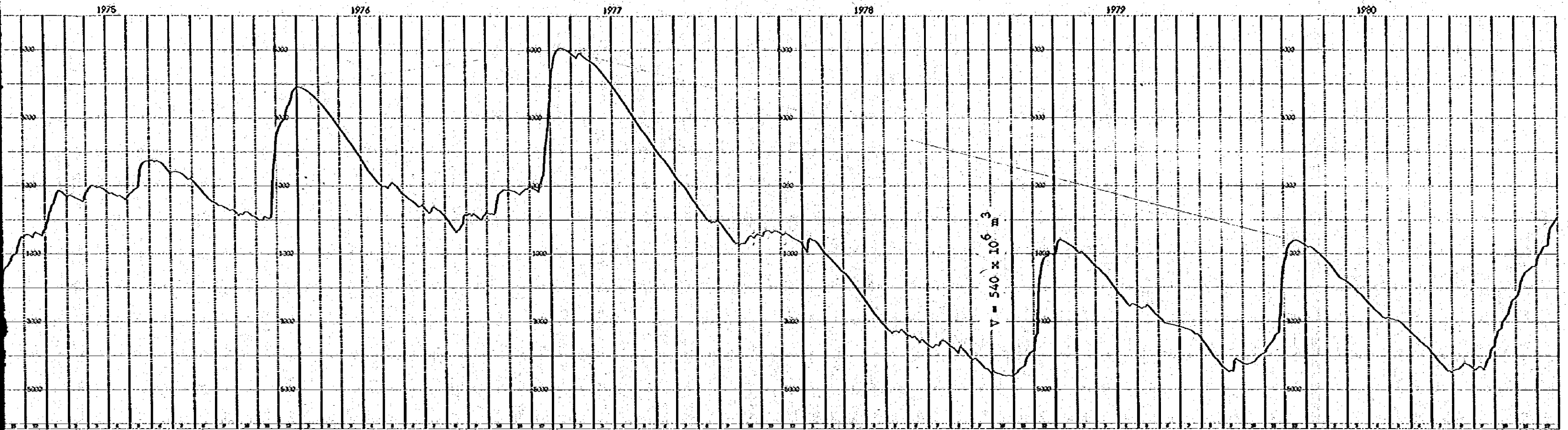
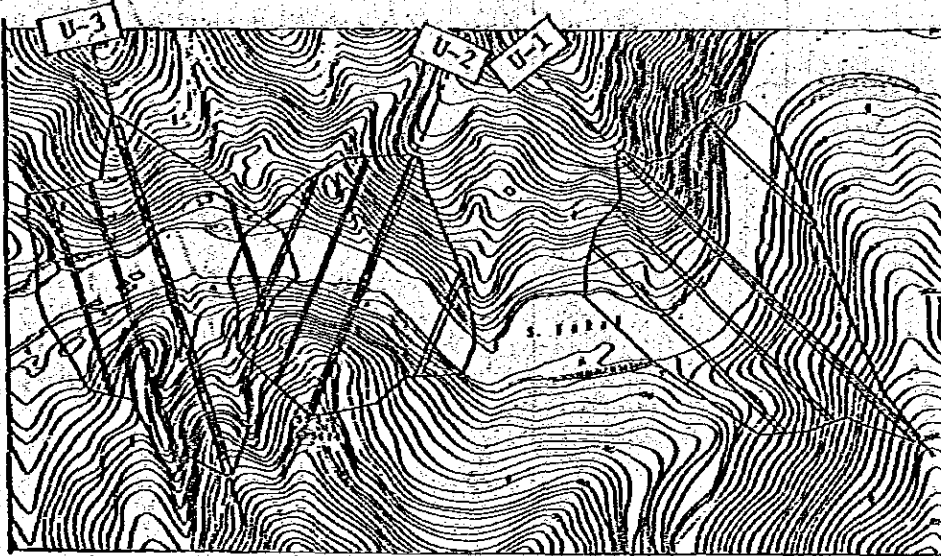
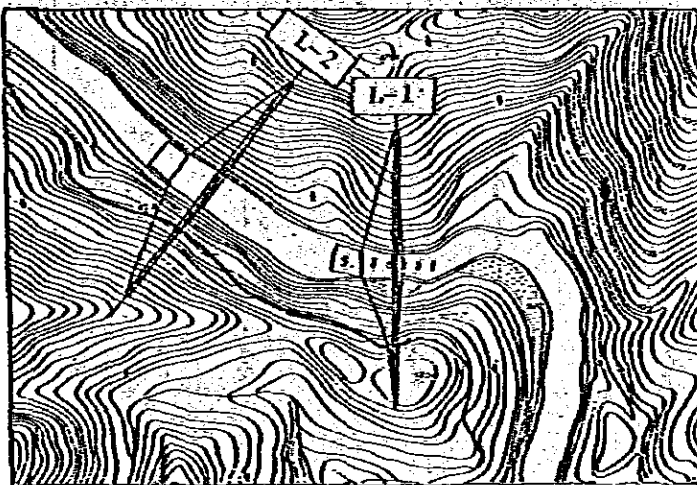


Fig. 9-4 Selection of Dam Sites

(1) Upper Dam Sites



(2) Lower Dam Sites



0 100 250 500m