CHAPTER 10

STUDIES ON RELATIVE DEVELOPMENT PLANS

Chapter 10 Studies on Relative Development Plans

องว่า ได้ว่า คราสนาขายสำคัญข้า สมเดิด หลังโดยเลย เด็กโดยเลย โดยเกล้า เรียกเรีย

10.1. General

The Tekai Hydro-electric Power Development Project consists of upper dam with a gross reservoir storage of 3,400 \times 106 m³ and lower dam with that of 265 \times 106 m³.

eling for will some in the authorizated which their research

The primary objective of the project is to provide peak power generation which is considered valuable at the upper dam and to cope with flat power generation at the lower dam. Necessary studies were made in connection with flood control, water utilization, diversion scheme and a pumped-storage scheme by means of these dams.

Thể Pahang River Basin includes very few catchment as the catchment area of the Tekai River Basin. Much expectation will hardly be entertained of flood control.

The Project has no definite provision for water utilization. As stable stream regimen into the Pahan River can be expected due to discharge following power generation and the large scale reservoir to be created by the upper dam will sufficiently meet water requirements, it is believed that latent water utilization effect to be provided by this Project will be relatively remarkable.

The diversion scheme is judged to be in appropriate in view of the estimated construction costs of intake facilities and power generation benefits.

The pumped-storage schemes should be determined in due consideration of a trend of power demand in the future, daily load curve and availability of surplus electric power during midnights.

The favorable storage efficiency and less head fluctuation of the upper and lower dans indicate that this Project will be technologically possible.

10.2. Plood Control

In the lower reaches from the lower dam site up to the confluence of the Tembeling River with the Tekai River, there are only houses perhaps belonging to a minority mountain group, and industrial facilities are hardly observed.

医海巴氏线 经收益额 医氯基基二氯甲磺磺酸

Accordingly, no great expectation can be anticipated of effects to be caused by flood control by the upper dam and lower dam upon the main Tekai River.

Land at a lower elevation located in Temerloh and adjacent areas was seriously damaged during the floods occurred in 1926, 1971 and 1972. (Refer to Fig. 10-1)

Since the catchment area of the Tekai River Basin accounts for a very few percentage in the catchment area of the Pahan River Basin where Temerloh site is located, the effect of flood control by Tekai Dam will be small.

Fig. 10-2 indicates relation between inflow and water level at the lower dam site when design flood is mitigated by means of spill-way for the upper dam.

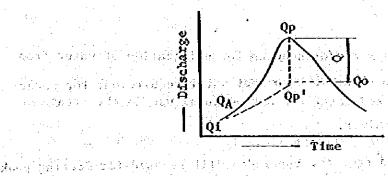
Fig. 10-3 also gives relations between the maximum discharge and flood control discharge in case flood is controlled by means of gates for flood control at the upper dam.

According to the method of flood control, water from the flood will be stored at a certain ratio against the inflow up to the peak inflow. After reaching the peak inflow, a certain quantity of water will be discharged.

The for the part of the land of the vertible because of elements of

and productive continued but has been able to the production of the contraction of

all a traduction of the conjugation in the tests of publicative and three problems and



[Constant Ratio and Quantity Discharge Kethod]

where produce deposition of the language filter beginning as an

The lower participation of the contract of the

QA; Discharge on mitigation start

The Visition of Peak Discharge to the state of the constitution and

, militarit kini kahiri di kara jinghe pakalim je e karakikari

Qpij Peak Discharge after mitigation

, by the responding the field belongs to be a first to the second section of the contract of

Oc : Outflow

10.3. Water Utilization

No concrete plans and/or schemes for utilization of water from the Tekai River have been worked out to meet water requirement for water supply, industrial water and water for agricultural use in the areas down-stream of the Tekai River.

Water discharged from the upper dam will be used for meeting peak demand. Such water will be kept constant by the lover dam.

This will ensure stable vater supply to the main Pahang River, Some of such water will be utilized for meeting the irrigation requirements of agricultural land in the areas, representing latent or potential effect of water utilization.

The plan of operation for irrigation work in the Pahang River Basin is as given in Fig. 10-4. The said plan is being implemented as the National Small Scale Irrigation Project on the responsibility of the Ministry of Agriculture irrespective of hydro-electric dam projects.

Datá and findings on promising crops, acreage under cultivation, irrigation efficiency, agricultural production systems, manning schedules (schedules for mobilization of man power) are not available. Incidentally, benefits accruing water utilization are not incorporated in the economic analysis.

10.4. Diversion Sheeme

Benefits caused by increase in electric energy generation due to intake of water from the upper steam of the Tembeling River to the Tekai River are studied in the economic analysis.

For the purpose of undertaking the work, selection of three candidate sites was made by means of a topographical map on a scale of 1/63,360. Then, calculation of electric energy generation and estimates of costs of intake facilities were prepared by reference to the length of diversion tunnels and the catchment area, thereby obtaining the figure of B/C and B-C. (Refer to Fig. 10-5)

Leyko filoda koliko or zerilikilik his loki rokir bilikerek bizarziban diri bilik debilikerek

hi ki in ma**an ku**nden merukan lain kun lain ki ki ki ki ja matalan alimpia kai matalan ki kan kan kan kan kan ka

Benefits were calculated under the following basic conditions.

होने ने की पूर्व कर के का पात उन्हें अपने

i) The discharge at the intake is to be equivalent to a catchment conversion ratio of discharge at the upper dam site.

$$Qq = \frac{Aq}{Au} \times Qu$$

educidation inicalizacion na apprincipation in externational

Qq = Intake Discharge

Qu = Discharge at Upper Dam

Aq = Catchment Area of Intake (84.4 km²)

Au = Catchment Area of Upper Dam (1,200 km²)

11) The wet discharge (Q: 185 days firm discharge in a year) and normal discharge (Q: 95 days firm discharge in a year) at the intake are so small as 3.1 m³/sec and 1.9 m³/sec. Therefore, the maximum intake volume has been determined according to the minimum section of a tunnel.

Maximum Intake Volume = 3.5 m3/sec

n = 1 8 +

iii) Blectric energy generation and rated output were calculated upon establishment of the optimum scale of upper dam.

The results of this study are as shown in Tables 10-1 and 10-2. It is not judged that this diversion scheme is effective.

10.5. Pumped-storage Scheme

It is apparent that a pure pumped-storage scheme commonly implemented in overseas countries is not suitable topographically, geological and from an economic standpoint in formulating a pumped-storage scheme on the Tekai River. Only a mixed pumped-storage scheme will be conceivable as far as the Tekai River is concerned. The characteristics of the Tekai River has a very gentle gradient with an open valley.

ist male social

())

A favorable storage efficiency of a reservoir (ratio of reservoir storage over dam volume) can be expected if a reservoir is constructed at the gorge construction of a canyon of which geological conditions seem to be favorable.

In view of the above conditions, it will be possible for a large quantity of storage to be obtained if damming up is made to some extent.

Accordingly, a shallow effective depth will ensure a reservoir storage capacity only for pumped-storage purposes. Since there are few fluctuations in the head, the area will be suitable for a mixed pumped-storaged power scheme.

It is proposed that necessary studies be made on a mixed pumped-storaged scheme to be implemented together with the series (two dams) development scheme, one of the components included in the Tekai Hydro-electric Power Development Project, described in this report.

(a) Storage Capacity for Pumped-storage

The effective reservoir storage of the upper reservoir and the lower reservoir involved in the series (two dams) development scheme is 3,400 x 10^6 m³ and 265 x 10^6 m³, respectively.

the application projection is not been appearable to the reference with

- 132 -

Commence it is supported to part that the part is a

The available storage capacity of the upper reservoir will not need a reservoir storage capacity merely for pumped-storage purposes as the effective reservoir storage of the above mentioned reservoir is sufficiently large.

In the event that the full supply level of the lower reservoir under the present scheme should be dammed up by 0.5 m, it will be possible to ensure a reservoir storage capacity of approximately 10⁶ m³ only for the pumped-storage purpose.

(b) Scale of Pumped-storage Power Generation

If the above-mentioned reservoir storage capacity is used for six hours of peak duration identical with the operation hours for peak duration for a power plant in the upstream, the following formula can be expressed in order to obtain a scale of 350,000 kW as a maximum output of the said power plant.

 $\frac{12,000,000 \text{ m}^3}{6 \text{ hr x } 3,600 \text{ sec/hr}} = 556 \text{ m}^3/\text{sec} \text{ (Maximum Turbine Discharge)}$ $9.8 \times 0.82 \times 556 \text{ m}^3/\text{sec} \times 79 \text{ m} = 350,000 \text{ kW}$

(c) Time of Addition of Plant Units for Pumped-storage Power Plant

The time of addition of plant unit(s) for a pumped-storage power plant will be dependent upon a general trend of power demand, configuration of load curve, availability of surplus electric power during the midnight.

Now that the subjects are yet to be studied, it is, of course, impossible to decide on such time of installing additional units.

It is suggested that the same portions of work be carried out in making advance investments beforehand on the occasion of undertaking required works involved in the series (two dams) development scheme in anticipation of addition of units to a pumped-storage power plant in the future.

(d) Desirable Works to Be Undertaken by Advance Investments

Structures of which addition will not be possible or will require an enormous amount of costs at the time of additing plant units to a pumped-storage power plant will be;

(1) Portions to be dammed up for lower dam

to be called a silver the state of the beautiful to section

ong Congression for the second of the second process of the constant of the second of the constant of the second of

人名英格兰姓氏 医克尔氏试验检尿道 医皮肤 医多种性 医自己性皮肤病症

建二氢化二甲基甲烷 的复数美国的外部的 美国的第三人称单数 经制度的 医皮肤皮肤 医鼻上腺

t viden en let neem groegen het de die die die de eer neem neem de degeneerde met de verde die 1900. Die geneerlege de de de verde gedeel de eerste heeft het de die de die de verde de de toer die 1918 bekende we

and a great process of the account of the control of the first the state of the first of the fir

THE SECOND PROCESS OF AN AREA TO A LOW AND A SECOND TO A LONG THE PARTY.

THE PERSON OF COME TO SEE FOR SHE WE WERE THE PROPERTY.

(2) Screen and gate of intake for pumped-storage power plant

为新发生的特殊的 (1985年) (1986年) (1986年) (1986年) (1986年) (1986年) (1986年) (1986年) (1986年)

- (3) Foundation for power plant
- (4) Draft cube and draft gate

CHAPTER 11

DESIGN OF FACILITIES AND STRUCTURES

Chapter 11 Design of Pacilities and Structures

eur ten katir tertik kalisa dalah dari dan dian dalah dalah dalah dalah bilan dalah katir dalah katir kan bala

The conception of a basic design for upper and lower dams is summarized as follows:

(a) Design Plood

The design flood will be a flood with a probability of 1/1,000 year and its hydrograph is drawn according to the tank model method by Type A of a rainfall pattern. (Refer to Fig. 11-1)

Design flood at upper damsite: $Q_D = 4,500 \text{ m}^3/\text{sec.}$, Design flood at lower damsite: $Q_D = 5,000 \text{ m}^3/\text{sec.}$

工有偏类 癌剂 使恐怖 不能受到 的复数无线网络主要斯静勒特

化乳基磺胺基酚 电压压 法通知 西班牙 医细胞蛋白

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

(b) Damaing-up

The height of daming-up will be 5 m.

The design flood discharge of the diversion tunnel has been determined with a probability of 1/20 year flood in case of a fill-type dam and with that of 1/10 year flood in case of a concrete dam.

As far as a dam of fill-type is concerned, floods accuring during construction will be treated only by means of diversion tunnels.

In case of a concrete type dam, arrangements have been made to enable such flood to be inflowed through a bypass on the main dam in addition to the said diversion tunnels for a rockfill type dam so that the burden of the diversion tunnels can be reduced.

(c) Type of Dam

A type of dam which seems most suitable by topography and geology at the dam site has been selected. The types of dams are as follows:

Upper damsite Rockfill type dam
Lover damsite Concrete gravity type dam

ระเมาสุดใจสายสะสานสาน

The dam slope in the upper face of dam has been determined, based upon data concerning Kenyir dam and others. Detailed studies on configuration of the dam are to be made at the next stage with the aim of reducing embankment and economizing construction costs of such dam.

Upstream Batter of Upper Dam 1:1:80
Downstream Batter of Upper Dam 1:1:75
Upstream Batter of Lower Dam 1:0.10
Downstream Batter of Lover Dam 1:0.70

firefit, are the control is being the filter as a file of the

రైట్ కొండుకుండి. మీటికి కామార్క్ మంచారు. ప్రత్యేకికుండోను కామారుకు మీటి నిందుకుండునే నాకే కేందు. కాంట్

rieda y Steffed

(d) Spillway

Studies were made on which side of both banks spillways with gates should be constructed.

As a result of the studies, it has been concluded that spillways should be constructed on the left side bank because the construction costs of the spillways are less.

Both cases of discharge by a free overflow weir and by a regulating gate were studied in connection with the above-mentioned spill-ways. Because of economical aspects, a spillway with gates has been adopted.

Construction Cost (106M\$)

Spillway	with	gates on th	e right bank	-	52
हित्री विकास भी	with	gates on th	e left bank		36
Adrija wat			the left ba		41

Spillways with gates for control of discharge for lower dam seems to be more suitable than those with a free overflow weir, which will reduce the effective head of the upper dam and will cause damning up.

A radial gate will be employed as a gate for control of discharge. The volume of the reservoir is so large as to be $3,400 \times 10^6$ m³ in case of the upper dam. The spillway has been determined upon calculation of reservoir operation in view of a reservoir storage effect.

As for the lower dam, spillways have been designed in the section where the maximum inflow depending on discharge from the upper dam and inflow from the catchment area can be discharged.

(e) Stilling Pool

a spillway be provided with a vertical apron and end sill.

(f) Foundation Treatment

Blanket grouting and curtain grouting as foundation treatment will be required for the purpose of stopping water to infiltrate into a core zone of the dam. Consolidation for improving the conditions of a foundation in loose portions close to the surface of the foundation and consolidation grouting for stopping water will be also required.

(g) Intake and Penstock

The depth of deposited silt in the reservoir was calculated based on deposition of sediments for a period of 100 years. However, the intake for lower dam will be provided with an inclined type inlet, which will be more economical more than a intake of tower type. A roller gate will be adopted as a gate for controlling discharge.

As far as the lower dam is concerned, a multi-stage gate fixed with the dam will be constructed to meet the irrigation requirements in the future. The number of lines of the penstocks will be two in consideration of maintenance and inspection.

At the entrance of a turbine, a butterfly valve will be equipped with. At the outlet of a turbine draft, a roller gate commonly usable for two outlets will be provided thereby enabling turbine and drafts to be repaired and checked.

(h) Hydraulic Turbine

A francis type turbine is advantageous in respect of handling and maintenance. Costs of manufacturing of and civil works for the said turbine are less expensive, compared with a turbine of Kaplan type. Accordingly, a francis type turbine has been selected for the upper dam.

(1) Power Plant and Switchyard

The power plant is to be located immediately downstream of the dam. Likewise, the layout of providing an outlet immediately downstream of the power plant has been prepared.

Bash Aksa madhiribes . (18)

据1965年1996年1967年1965年 - 美野

โดย เดิมได้ยามู่เกล้า และเกิดกลาก เดยเกล้ม แก้ มีเดิมเมาก็

Since a favourable foundation depth is foreseeable, it is proposed to adopt a barrel type foundation which is more economical. The switchyard is to be constructed close to the power plant in any case because of availability of suitable land.

र्वति केना हो लिखां कुन बर्वतिक संस्थानिक स्थान और नेतृत्व गोर्डन में बेयान्त हो रहिन्द और करी करी के में भी औ

कार्यक्रमात्र । मेर्निक् प्रकृतिक प्रेत्रेष्ट्रकारक प्रकृति प्रकृति । अस् स्वत्वक्रेरे मेर्निक स्वत्वक्रिया ।

Res. Her Colored Professional Branch Feb.

t folker halde til alle flyt folk fill halde gjott best delikalle folke til skrivet i seksitte flytte selt. Delikat folke folke folk folk halde folk sterning och til til kom i blire blad folke til skrivet folke.

के र प्रकृतिक क्रिकेट्ट है। प्रकृतिकित्र के मुंबितिकार कि विक्रास्त्र है है। विक्रास्त्र है कि अपने के किए मेर् एक कर राज्य के स्टब्सिट के सिन्दे के मुख्य की सिक्षेत्र कर है। जो किए सम्बद्धित हैं। किर्देश के सिन्दे के सिक्स

ាក់ស្តែននៅសម្រែក ប្រែក្រោយប្រជាពីស្ថិត ប្រកាស ស្ត្រីស្ថាលថា និងសមាន ក្រោយប្រជាពលនៅប្រជាពលនៅក្នុង ប្រើបានប្រជា ការបានការប្រើសាស្ត្រាប់ ប្រភពទីពេកនៃ ស្ត្រីស្ថិត ស្ត្រីស្ថិត ស្ត្រីស្ថិត ស្ត្រីស្តី ស្ត្រីស្តី ស្ត្រីស្ត្រីស្ត

វិទិញសិក្សា ៩០ ដែរ នៃដាន់ នៃដាន់ក្រុះ បែលស្រាស់ ស្រី នៃការបំពុស ៤ និស័ក មិច្ចាស់ថា ទីវិស សិ

and for the figure of the first and also the first first of the first

ent er er alle fill på literativel elle tredit i disselle fille standar at politike stangs

arcell collect to exclusive a lister in any our feet between their state of the

CHAPTER 12

CONSTRUCTION COST ESTIMATES

The office Chapter 12 Construction Cost Estimates of the cost was a second of the cost of

nd commence both and included as process, hit of subject of all grades give by the or

12.1. General was a general reservation of a state of the contract of a second state of

The estimated construction costs are composed of (a) Costs of civil works, (b) Costs of electro-mechanical equipment, (c) Engineering fee, (d) Administrative costs and (e) Contingencies.

taldar yili kestaka jet tilika era eskuar tibi ta aet juliasi his se sek

and marke autain justine sugassus den let des laditioners aus de le châld gant laber la gas.

Items of estimation are limited to major ones included in the costs of civil works conceivable at the preliminary study stage. In order to make up for items of work which are not incorporated in the major itmes, costs equivalent to approximately 5 to 10 percent of these of civil works are enumerated as an item of miscellaneous costs by reference to the actually recorded construction costs of the Trengganu Project.

13 percent of the costs of civil works stated in (a) plus those of electro/mechanical equipment is regarded as the engineering fee in (c). The administrative costs in (d) are equivalent to 10 percent of the total costs of civil works in (a) and the electro/mechanical equipment in (b). The contingencies are equivalent to five percent of a total of costs of (a), (b), (c) and (d).

12.2. Unit Rate

The unit rates used for estimation of the construction costs are based on those for the Trengganu project under construction by reference to unit rates involved in projects of a similar nature, such as Temengor, Kenering and Bersia Projects.

In settlement of these unit rates, contractual conditions of works, escalation and inflation were also taken into account. In order to refine the work, it is deemed necessary that detailed studies be undertaken in connection with the number of working days in the respective seasons, kinds of construction tools and instruments, determination of the number of the said tools and instruments, computation of hire and rent, transportation distance etc.

(0

The unit rates for civil works are as summarized in Table 12-1.

नक्ष के रोज राज्यां मुख्या, क्षीत अल्लाहर के कि कि का वर्ता के विकास की स्थापन की राज्यां के स्थापन

12.3. Estimates of Construction Costs

Estimated construction costs of the optimum plans viewed from the economical aspects of upper single (one dam) development scheme, lower single (one dam) development scheme and series (two dams) development scheme were as shown in Tables 12-2, 12-3, 12-4 and 12-5.

हिराह है करते का सर्वता करवानु बन्दि हुनको अबिकार है है है है है कि सर्वक्रियको दिन्ति है है कि विकास के कार्यकार

ुक प्रकार अध्यक्ष पर सम्बद्धा हो है दर्जा काम्म्युक्त में हैं पर प्रकृतिक हैं के कि अपने किया है कि है कि स्वी

, or all lightenings lating legal . They have participate an assembled Legal Benefit (1888) (1881) like a the application of the lateral and the second

មកពេល សម្រេចប្រជាជនមានសម្រេចប្រើប្រាស់ ស្រីក្រុមប្រជាជនមានក្រុមប្រឹក្សាស្រី និងប្រធានធម្មទី ម៉ែងប្រឹក្សា មេបាន

Sent for the sent the place of the contract of

CHAPTER 13 BENEFIT

13.1. General

The meaning of the benefit in this chapter is the benefit gained from the alternative thermal power plant for justifying the most optimum size of the project, though detail analysis of the benefit of the Tekai hydro-electric project will be carried through detail feasibility study of the project.

In calculating the benefit out of the alternative thermal power plant, the value in the following table is employed on the assumption that the Tekai project has the undermentioned installed capacity and generating energy. Another assumption, Tekai hydro power station bears the daily load similar to the Sultan Idris II (SINY) hydro power station is also adopted.

Items Location	Installed Capacity (kW)	Annual Generating Energy (10 ⁶ kWh)	Plant Pactor
Upper Site	70,000	243.7	0.40
Lower Site	24,000	62.3	0.30
Total	94,000	306.0	0.37

13.2. Benefit Cost of the Alternative Thermal Power Plant

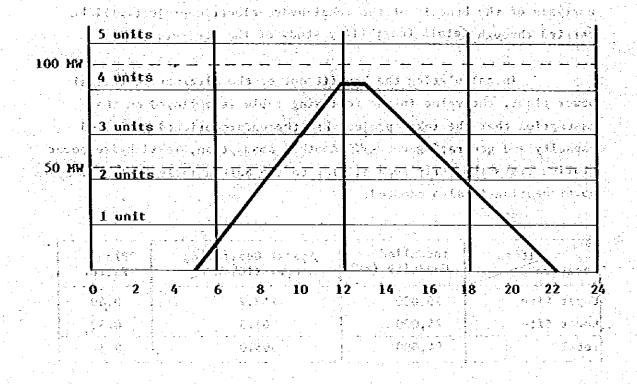
Pive (5) units of package type 22 HW gas turbine are finally picked out as for the total output 94,000 kW on the point of view that the plant cost is lower and operation cost is cheaper compared with another alternative power plant consisting of two (2) units of 22 HW gas turbine and one (1) unit of 50 HW steam power plant.

Daily running hours for these five (5) units are established shown as Fig. 13-1.

Daily operation time, annual energy generation, plant efficiency, annual fuel consumption for generating energy, operation days, fuel consumption for start-up of these five (5) units are calculated as shown in Table 13-1.

. यह , क्र**र**े १७ द्वार्थकोष्ट्राकोष्ट्री (१८१) है है रिक्त होना भी है, उठ होना प्रदेश स्थित

Fig. 13-1 Model Daily Power Generating Curve of Alternative Thermal Power Station



静度导致力力性内的核功效等

ស្នានគ្នាស្ថាន ស្ថាន នៅក្រុម ស្ថាន ស្ថាន ស្ថាន ស្ថាន ស្ថាន ស្ថាន ស្ថាន ស្ថាន ស្ថាន នៅ ប្រេង ស្ថាន នៅ ស្ថាន ស្ថា

ි අති බොහැකි වන අතු වන වන වන නිර්ව නිවේද නිවෙන අතර ප්රකාශ නම් විදේකු මිදුන් නිර් මුණු නිත්පුක් නිද්ධ තිබේ නිව බවද වීති වන වන අතු කර විවිති කියාව වන ඉතිරි විදේකයෙන් වෙන කියු නිද්ධානවදට ඇති නිවේද විද්යා කරන්නේ එදිසු

ងការ៉ាំង កាស៊ីវិទ្ធា កាស៊ីវិទ្ធា កាស៊ីវិទ្ធា និង និង និង និង ម៉ែង គ្នាសាងការ៉ា ស៊ូវិទី៣និ

nergy and the first transfer they are the returned to be a first to be a first the contract of the contract of

计线 海绵 经分级银

Total Fuel Consumption (ton)	34,553 27,247 18,677 10,451 593	7 1 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	XX
Annual Station Service Use (ton)	282 288 348 145	078 8.43 8.43 8.43 8.43 8.43 8.43 8.43 8.4	150 B 100 B
Annual Fuel Consumption for Starting up (tom)	0 0 0 0 75 0 0 0 0 75	do 8d saturates	nsumption for station service use is 2.5% of installed capacity 22 MW
Annual Running Days (day)	365 365 365 365	or only	
Fuel: Consumption (ton)	33,458 26,455 17,987 9,993	.00 494 .00 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	residual of with hear value of 11,000 kcal/kg. sumption for station service use is 2.5% of ins
Thermal Efficiency (%)	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	OOE sarinba	nal off with ion for stat
Annual Generacing Energy (1067/kWh)	117.81 91.54 62.24 33.31 F.TO	306.00 Securbine r	Fuel consumpt
Daily Running Hour	113.5	5 2 3	ି ନ ରଚନ
unite Unite	લ છે છે વ છે	Total Remarks: 1	

13.2.1. Calculation Pormula for Benefit Cost

Benefit cost is expressed by the following formula;

B = Annual fixed cost + Annual variable cost

1) Annual Fixed Cost

(a) Construction cost/kW

Construction cost of 22 MW gas turbine unit on turn key basis is assumed to be US\$250/kW.
US\$250/kW x 2.2 = M\$550/kW (1 US\$ = 2.2 M\$)

Annual capital cost is: M\$550 x 0.1076 = M\$55.89/kW(1)

Presumed life of G/T : 15 years
Interest rate : 6.6%
GRF : 0.1076

(b) Operation cost/kW

Operation shift: 4 persons x 5 group = 20 person

daytime shift = 10 person

Total = 30 person

Annual personnel expense:

M\$8,500 x 30 person = H\$255,000

(Personnel expense: H\$8,500/year person)

Annual personnel expense per kW
H\$255,000 ÷ 94,000 kW = H\$2.7/kW(2)

(c) Haintenance cost/kW

Accordingly, annual fixed cost of (1) + (2) + (3) is 55.89 + 2.7 + 16.5 = M\$75.09/kW

2) Variable Cost

Total annual fuel consumption for gas turbine is 91.521 ton as given in Table 13.2.

Assuming the fuel cost of M\$506/ton for residual oil, fuel cost per kWR will be M\$0.15/kWH.

91.521 ton x M506 + 306 \times 10^6$ kWH = M\$0.15/kWH

Therefore, Benefit cost (B) is:

$$B = 75.09P + 0.15E (H$)$$

Note: P = Output of Tekai hydro station (kW)

E = Annual energy of Tekai hydro station (kWH)

13.2.2. Benefit Cost

Benefit cost of the series (tow dams) development is calculated as follows;

B = (102.3 kW + 11.5 kW)
$$\times$$
 10³ \times 75.09
+ (224.6 kWH + 101.7 kWH) \times 10⁶ \times 0.15
= M\$57.49 \times 10⁶

	Installed Capac (kW)	ity Annual Energy (10 ⁶ kWH)
i) Upper Dam	102.3	224.6
ii) Lower Dam	11.5	101.7

In case of alterntive power plant consisting of two (2) units of 22 MV gas turbine and one (1) unit of steam power plant, benefit cost is expressed by the following formula;

B = 137.1p + 0.151B (M\$)

CHAPTER 14

CONSTRUCTION SCHEDULE

Chapter 14 Construction Schedule

the second of new grant

真暗的医海色的 网络克姆拉斯

As a result of making studies on various alternatives, it has been proposed that upper dam be 90.00 m high and of rockfill type and that the installed capacity of a power plant be 104 MW as the major features of a series (two dams) development scheme in connection with the Tekai Hydro-electric Power Development Project.

Likewise, it is also considered optimal from economic standpoints that the lower dam will be 38.00 m in height and be of concrete gravity type in addition to a power plant with an installed capacity of 12 KW.

This construction schedule has been prepared on the assumption that work involved in the proposed scheme is to be undertaken in a normally conceived standard manner.

As for a construction schedule prior to the commencement of construction work, this feasibility study is expected to be completed around in the middle of 1983. Then necessary investigations, studies, analysis and computations required for the performance of definite studies (designs) will be performed for approximately two years.

Preparation of design reports, bidding documents including specifications, various forms and price tables, bidding for selection of contractors, approaches to financial sources and contract award will require a period of one year.

Accordingly; construction work will be commenced at around the middle of 1986.

The construction schedule after commencement of construction work is as shown in Fig. 14-1. Since construction work is undertaken regarding the series (two dams) development scheme, steps of beginning construction work should be further studied at a stage when the scheme will be finalized.

The following items were fully taken into consideration in preparation of the construction schedule,

- A construction schedule for construction of upper dam of which construction scale will be large and relevant power plant by preference should be considered. ing hally good fill beat ্ৰিত্ৰ প্ৰস্তু (মূল ইয়াই) স্বাধান্ত ক্ষেত্ৰ ক্ষেত্ৰ স্থা হৈ জ
- 11) Construction of lower dam and relevant power plant should be commenced belatedly. Their completion time is to be synchronized with the completion of upper dam and relevant power plant, in order that the said facilities may be put into operation at

अनुद्रात करने हेंद्र की होते. होते हुं संक्रिकेता के हिंदू के हिंदू के हिन्दू है है

111) As for the reservoirs, it will be preferable to commence submergence at a stage when banking and concrete placing for the main dam will be progressed to some extent.

In connection with upper dam and relevant power plant, access roads for construction, temporary buildings, and living quarters will be constructed and arrangement for motive power and telecommunication facilities will be made in the first year. lunger beginn a baran baran ang tanggara

19、15000年,1982年新城市新城市发展的1982

In the second year temporary closure, construction of temporary diversion tunnels will be undertaken. Construction of the main dams will be completed in the third and fourth years, 医骨盖髓炎 化多性化原料 电光线性性 建成化的建筑物

Submergence should be commenced in the middle of the fourth year when construction of the main dams will be progressed to some degree.

go control (Bib) Especially, a constantivity

. 우리 왕은 승규(다음)는 1964년 1 **주소**(다음

Construction of spillways, intakes and serge tanks which have no direct relations with diversion tunnels should be commenced in the third year,

It is also suitable to commence construction of the powerhouse and switchyard in the fourth year to be in time for installation of electro/mechanical equipment which will begin at around the biddle of ំព្រៃទីមមេន ប្រែទីមួយ សេទ្ធិសាស្ត្រាក្សា the fourth year. a the buildings of the bit

Commissioning of the dam and power plant at the end of the fifth year can be anticipated provided that the proposed construction schedule is to be put into practice smoothly.

However approximately twenty two months are allotted to the work of banking the main dam (especially a core zone) which raises the most serious problem in connection with construction work in tropical weather areas with much precipitation.

This period of time will be more than enough to complete the work stated hereinabove. So far as lower dam and relevant power plant are concerened, construction of both facilities may be commenced in the second year because main access roads will have been constructed expect for access roads of which partial portions in a banking area will require construction for transport of materials and equipment.

At the end of the third year temporary closure and temporary diversion tunnels will be completed. It will be possible proceed to construction of the main dam in the fourth year.

In the event submergence should be commenced slightly before completion of the dam, say early in the fifth year, it is anticipated that commencement of dam operation will be materialized at the end of the fifth year.

APPENDIX

FIGURE AND TABLES

8 12 16 20 24 4 8 12 16 20 24 4 8 12 16 20 24 4 8 12 16 20 24 SUNDAY (Source, NEB.) FRIDAY 8 12 16 20 24 4 8 12 16 20 24 4 WEDNESDAY TUESDAY 0 4 8 12 16 20 24 4 THERMAL MONDAY 8 8 8 8 88 8888

FIG. 5-1 TYPICAL DAILY LOAD CURVE (MAY, 1981)

Fig. 5-2 TYPICAL LOAD DURATION CURVE

Tolol; 167 GWH MD (1320 MW, LF., 75.3%)

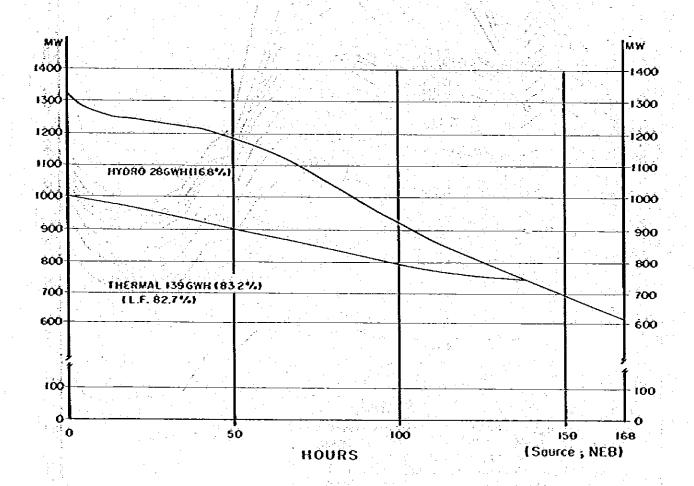


Fig. 5-3 SYSTEM LOAD CURVE (1)

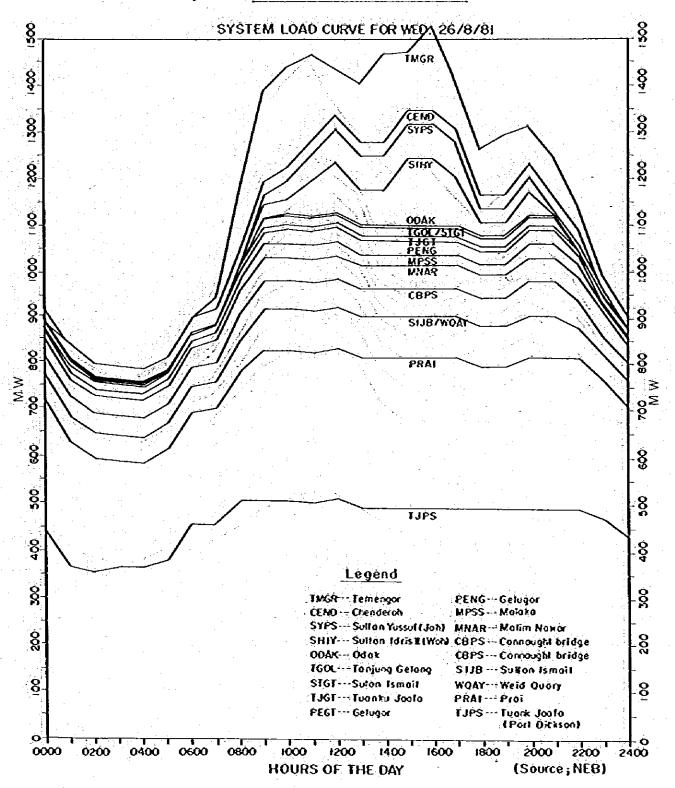


Fig. 5-4 SYSTEM LOAD CURVE (2)

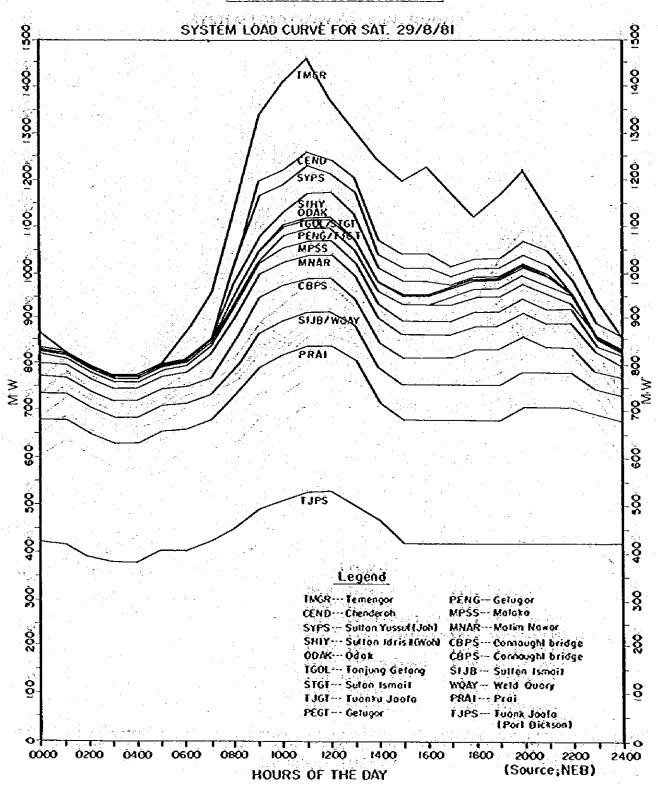


Fig. 5-5 SYSTEM LOAD CURVE (3)

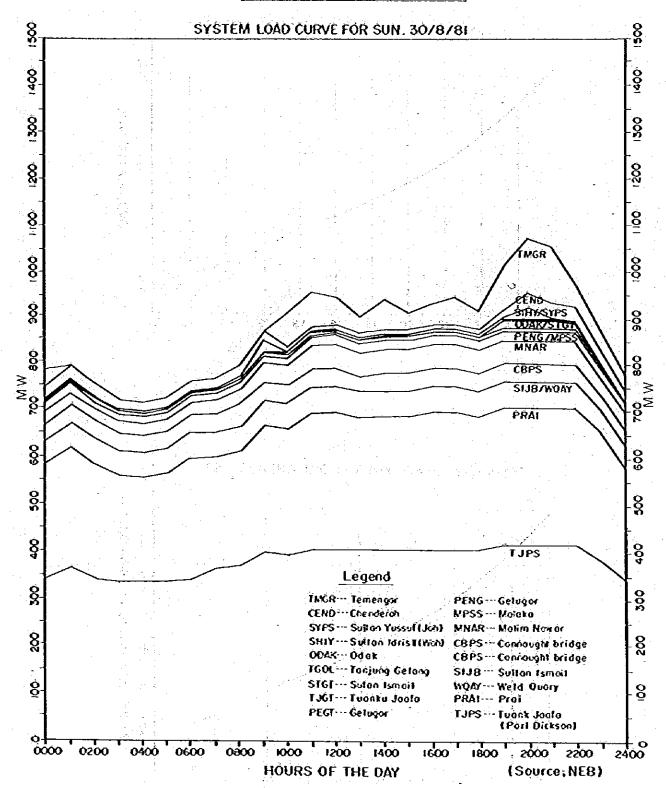
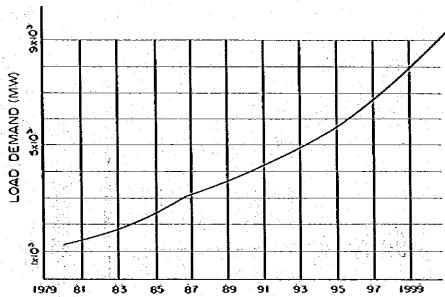
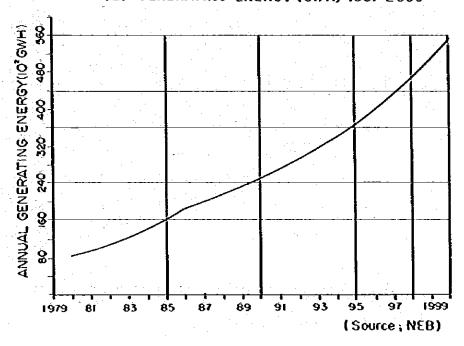


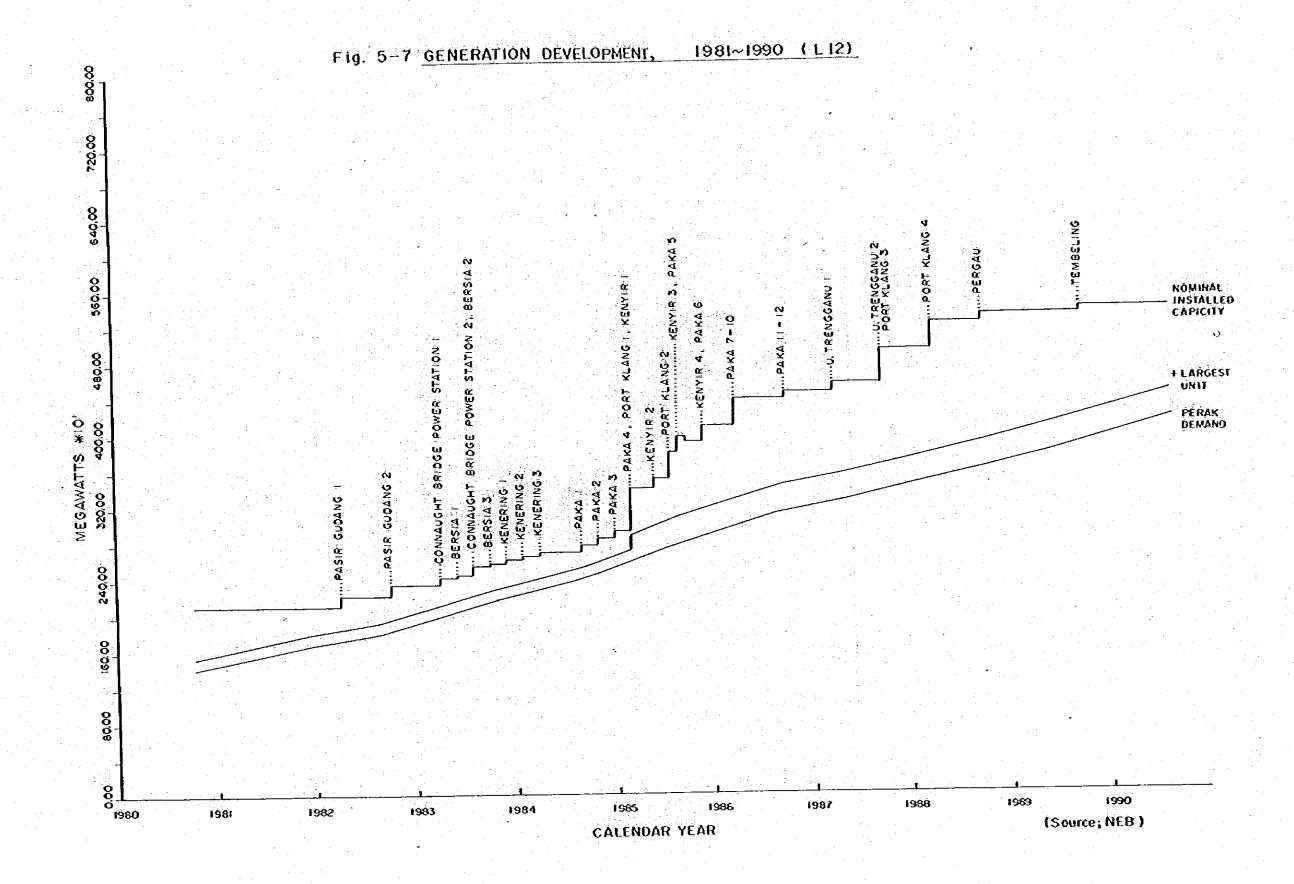
Fig. 5-6 LOAD FORECAST





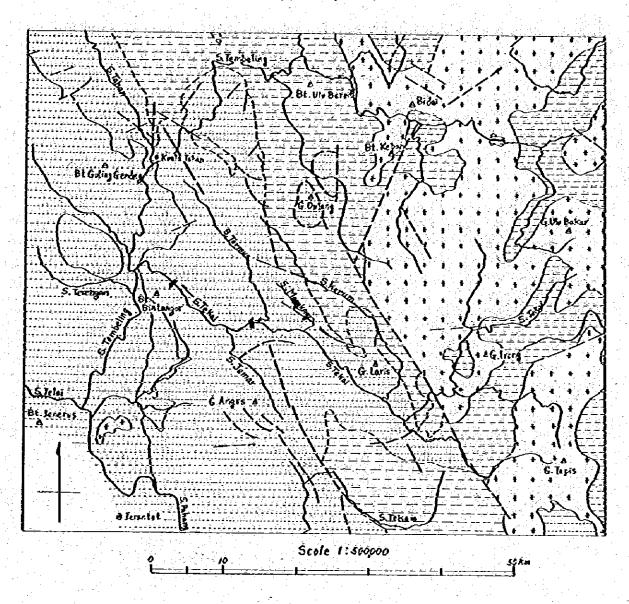
(2) GENERATING ENERGY (GWH) 1981~2000





F18.6-1 DISTRIBUTION OF MOUNTAINS
AND RIVERS IN THE TEXAL RIVER BASIN

(From 1/500,000 Geological Map of West Malaysia, Geological Survey, Malaysia)



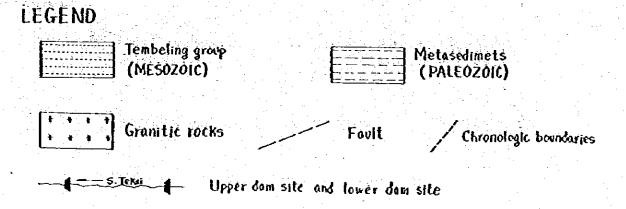
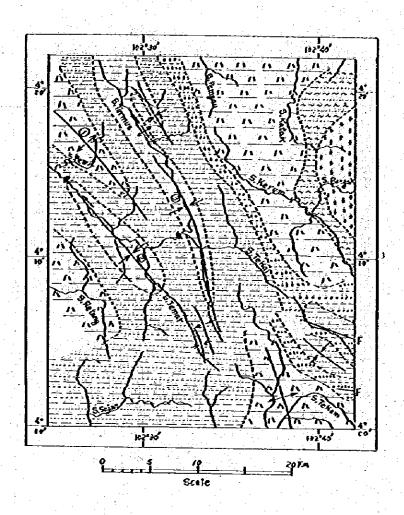
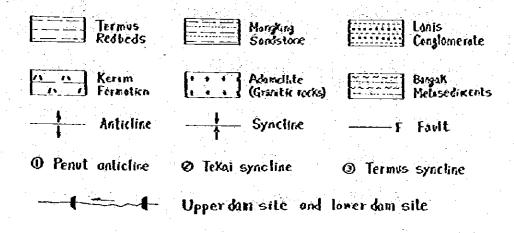
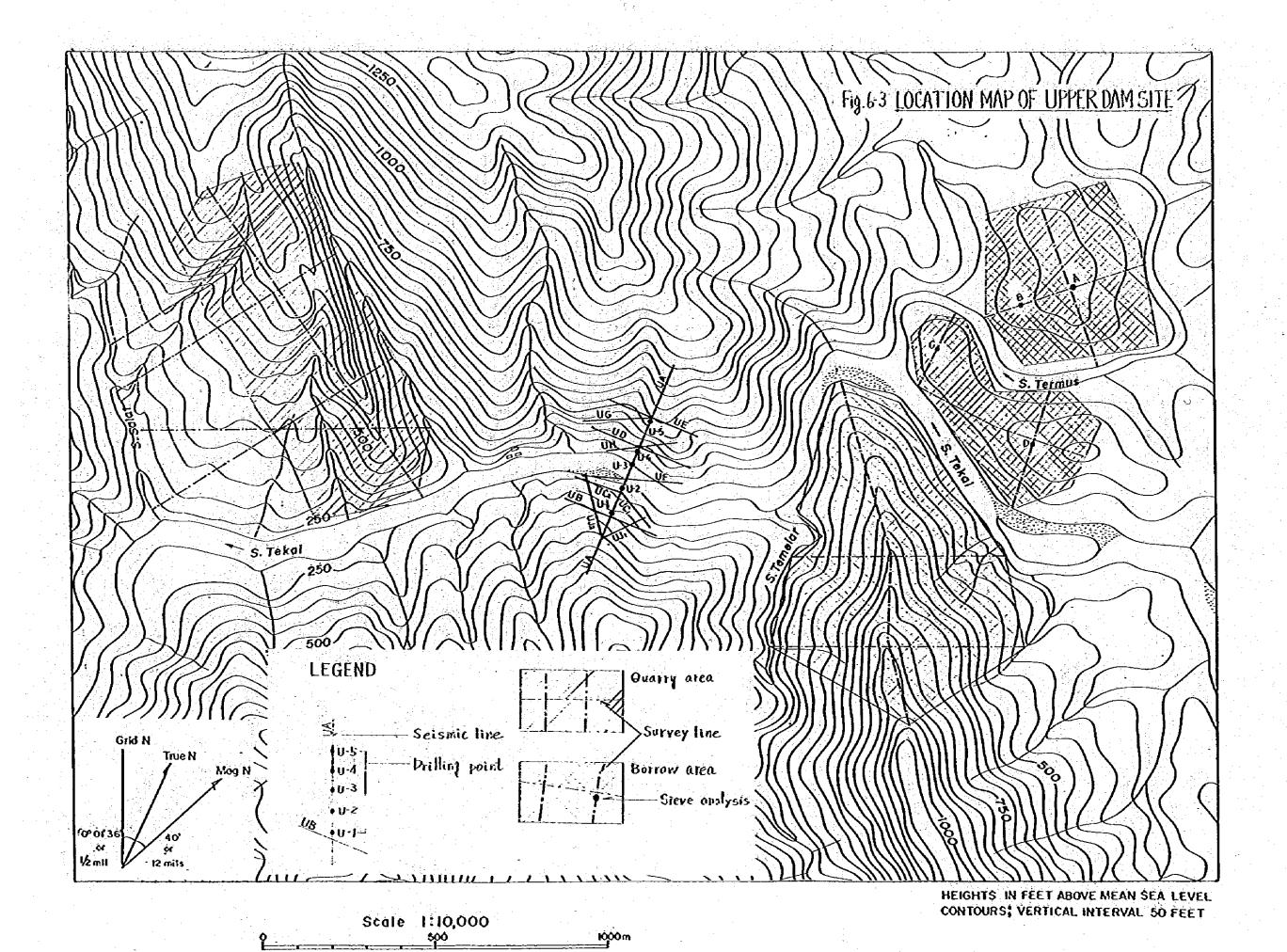


Fig. 6-2 OUTLINE OF GEOLOGY IN THE SUNGAL TEKAL AREA (aster KHOO HAN PENG, 1977, page 93, Annual report of the geological survey of Malaysia)







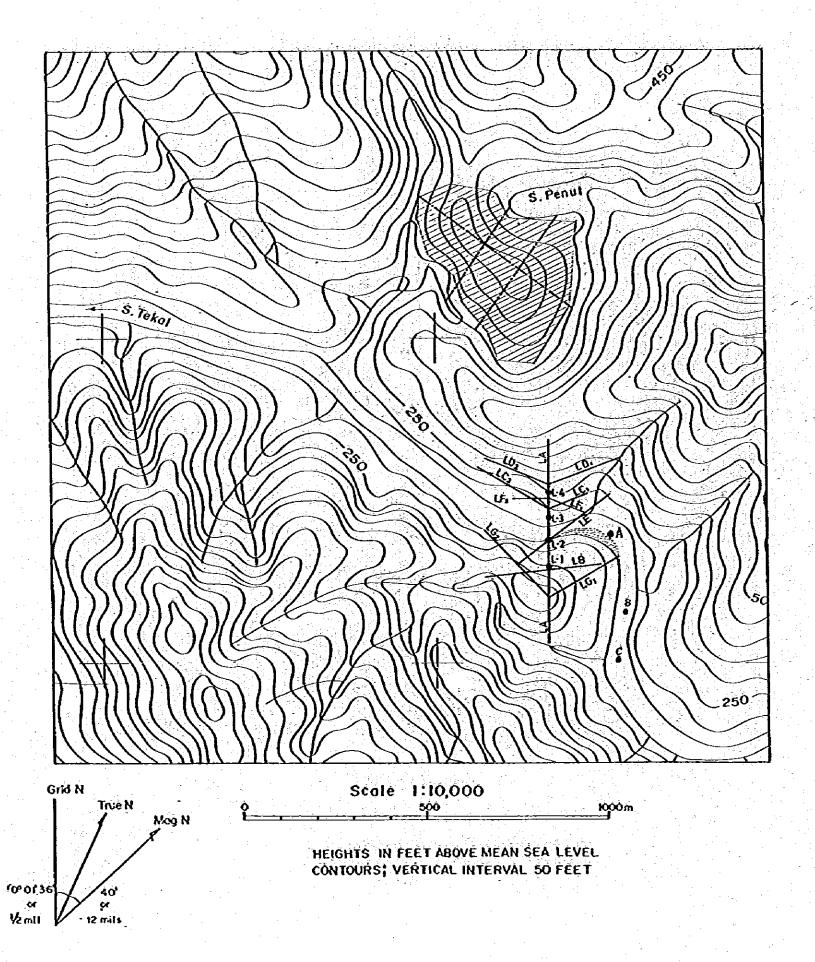
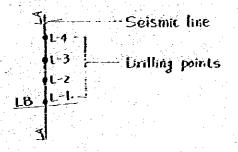
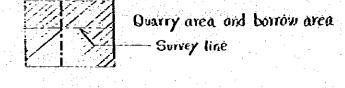


Fig. 64 LOCATION MAP OF LOWER DAY SITE

LEGEND





A.B.c Sieve analysis



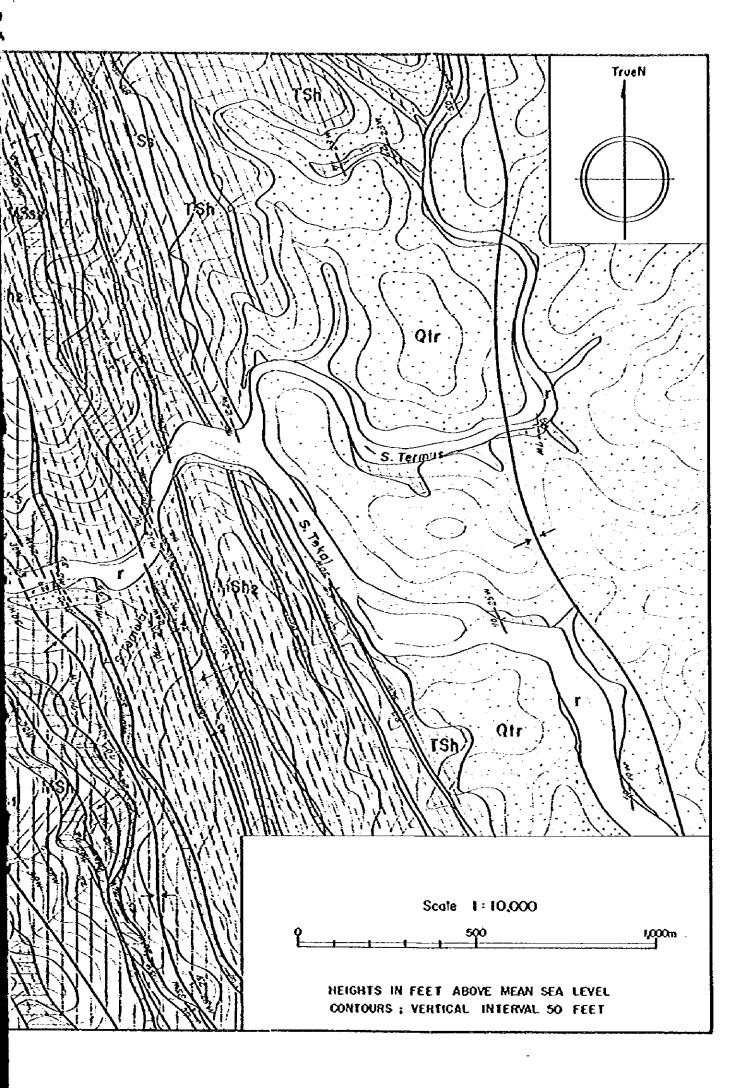
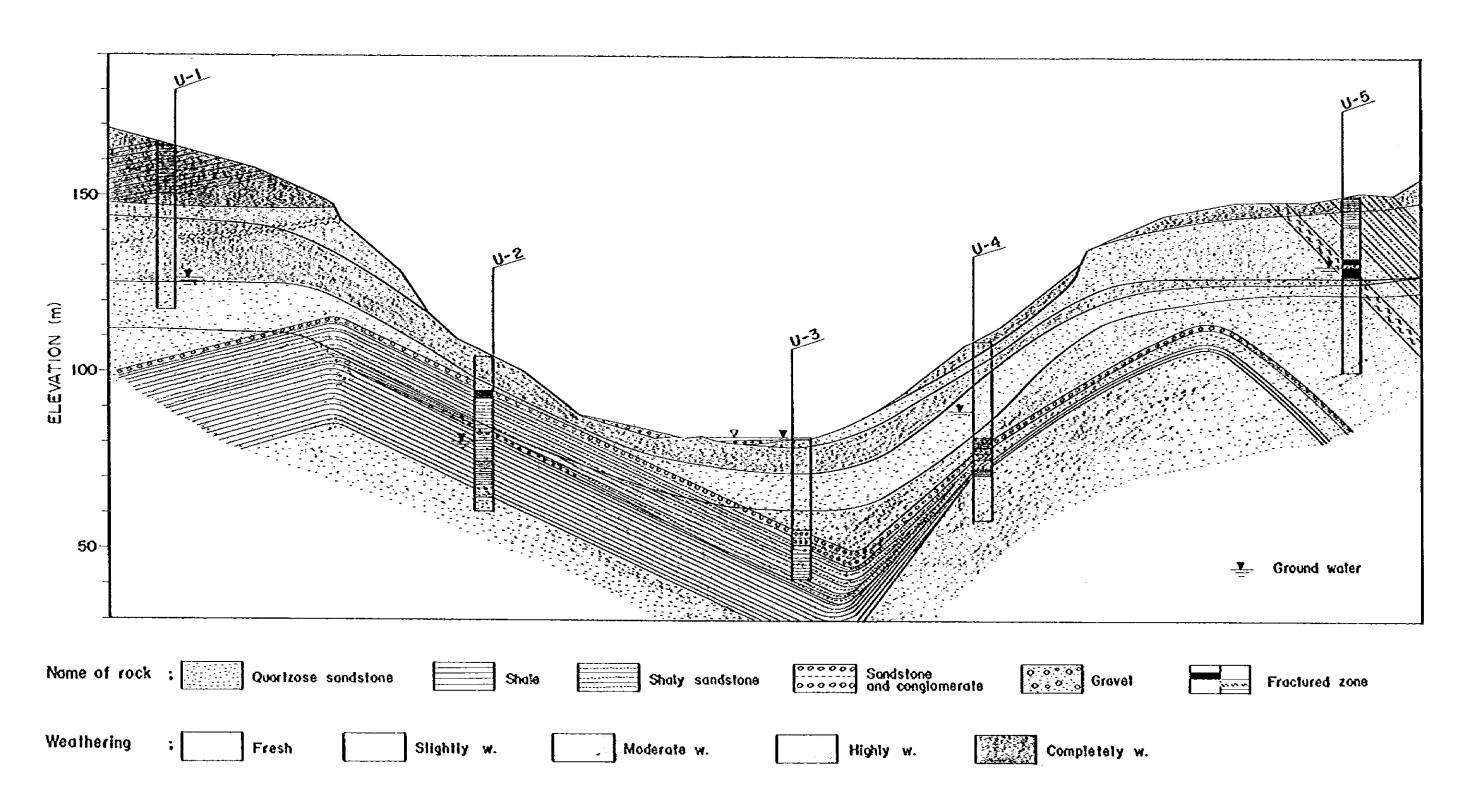


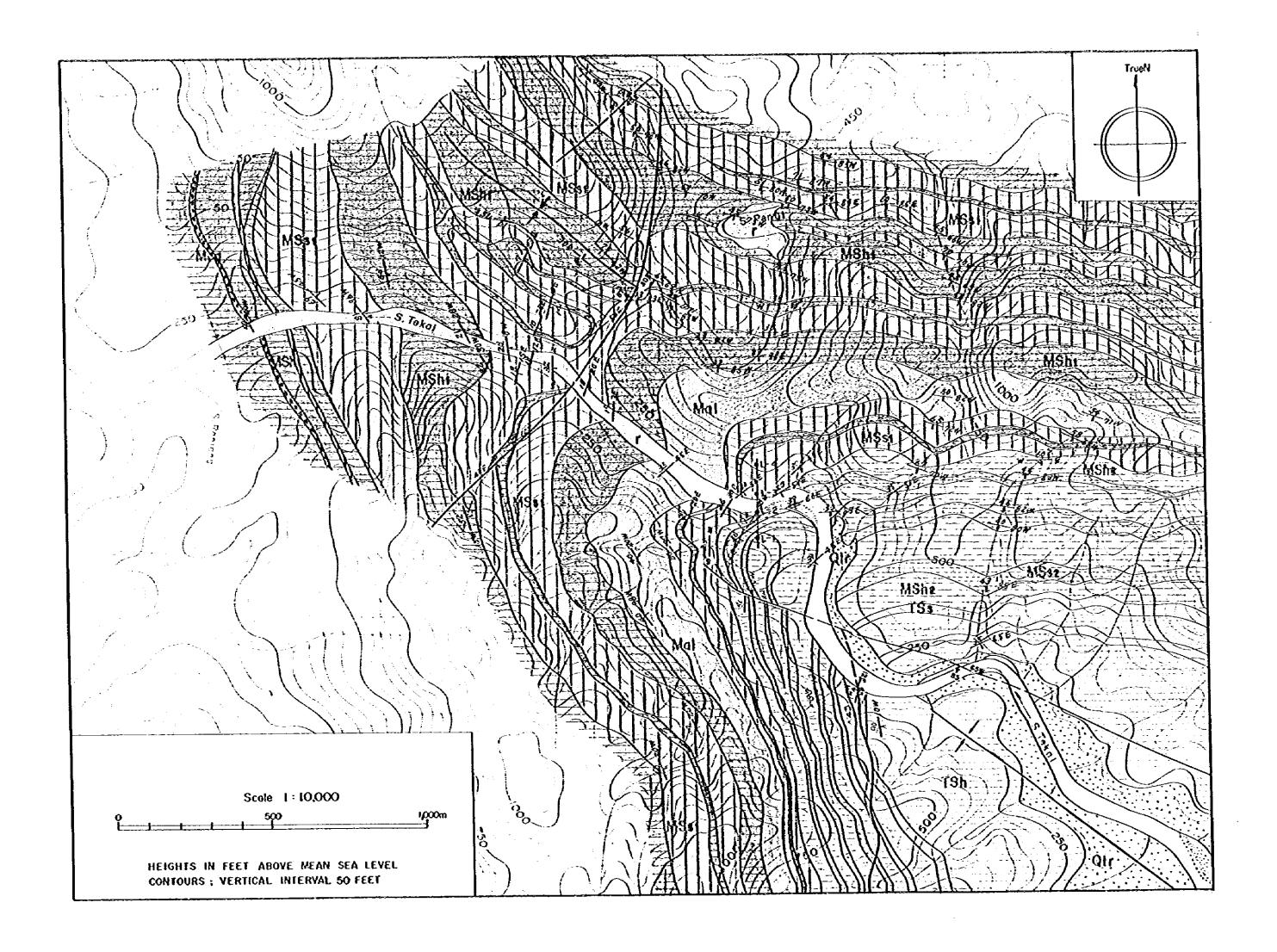
Fig. 6.5 GEOLOGICAL MAP OF TEKAI UPPER SITE

LEGEND

GE	OLOGICAL AGE	COLOR	SYMBOL	FORMATION	LITHOLOGY
CENOZOIC	QUATERNARY		ľ	River Bed Deposits	Mainly quartz sand containing sitt and gravet
CENO	QUALLITATI		Qtr	Terroce Deposits	Mainly clay containing grovel and organic material
	LOWER		TSh	Termus Redbeds	Reddistypurplish-red shale interbeded with mudstone and sandstone
	CRE TACEOUS		TSs	Termos Reobeos	Quartzose sandstone and sandstone
			MSh2		Purplish-red shale interbeded with mudstone and sondstone
ZOIC			MSs2		Predominantly quartzose sandstone interbeded with greyIsh shale
MESOZOIC	UPPER		Mal 2	Mangking	Alternation of sandstone and shale
2	JURASSIC		Mal :	Sandstone	Alternation of sandstone and shale interbeded with shall sandstone and quartzose sandstone
			MSh		Dark-grey and greyish shate interbeded with fine sandstone
			MSsı		Mainly quartzose sandstone interbeded with shale, sitistone and shaly sandstone
		_	80 1-241Y	Strike	and dip of stratum
			† ‡	- Anticline	(—> Plunging)
		-	<u> </u>	- Syncline	(—> Plunging)
			2-13W	– Strike	and dip of fault
		U-1~	U-5	- Drilling	point

Fig. 6.6 GEOLOGICAL PROFILE OF UPPER DAM SITE (Scale 1:1,000)





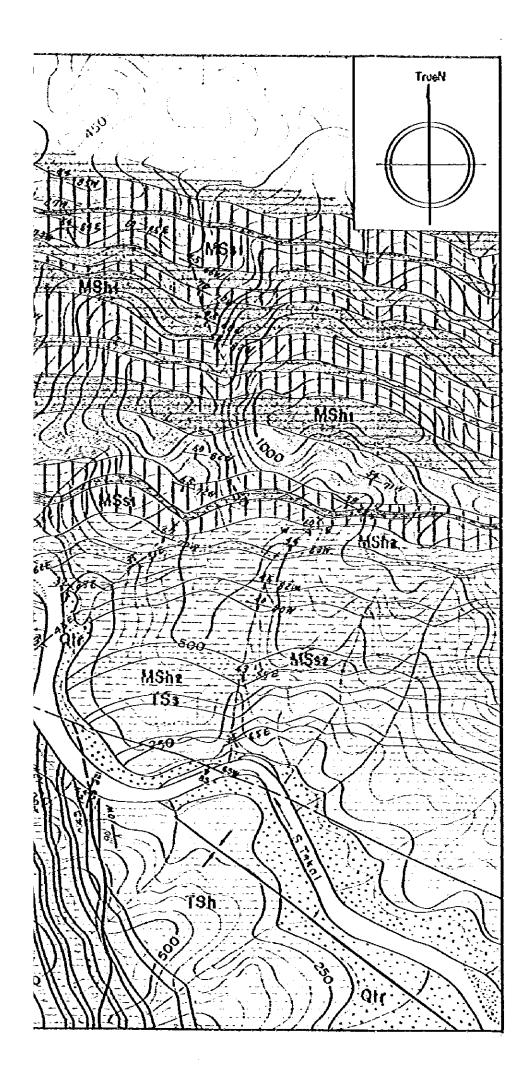


Fig. 6.7 GEOLOGICAL MAP OF TEKAI LOWER SITE

LEGEND

GE	OLOGICAL AGE	∞Lor	SYMBOL	FORMATION	LITHOLOGY
CENOZOIC	QUATERNARY		r	River Bed Deposits	Mainty quartz sand containing sitt and gravet
CENC	QOATE GRAVE		Qtr	Terrace Deposits	Mainty clay containing organic material and gravet
	LOWER		TSh	Termus Redbeds	Reddish/purplish-red shale interbeded with yellow other mudstone
	CRETACEOUS		TSs	Termos Neodeds	Predominantly quartzose sandstone and sandstone
O	<u>.</u>		MSh ₂		Purplish - red shale interbeded with purplish sandstone
SOZOIC	Hongo		MSs2		Predominantly quartzose sandstone and sandstone
MES	UPPER JURASSIC		Mal	Mangking Sandstone	Alternation of quartzose sandstone and state
			MShi	Odilosion	Dork-grey and greyish shale interbeded with tine sandstone
			MSsı		Moinly quartzose sandstone interbeded with shale and shaly sandstone
		* * * * * * * * * * * * * * * * * * *	MCg		Conglomerate interbeded with shale

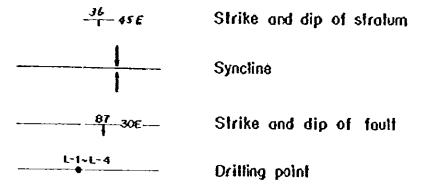


Fig. 6.8 GEOLOGICAL PROFILE OF LOWER DAM SITE (Scale 1:1,000)

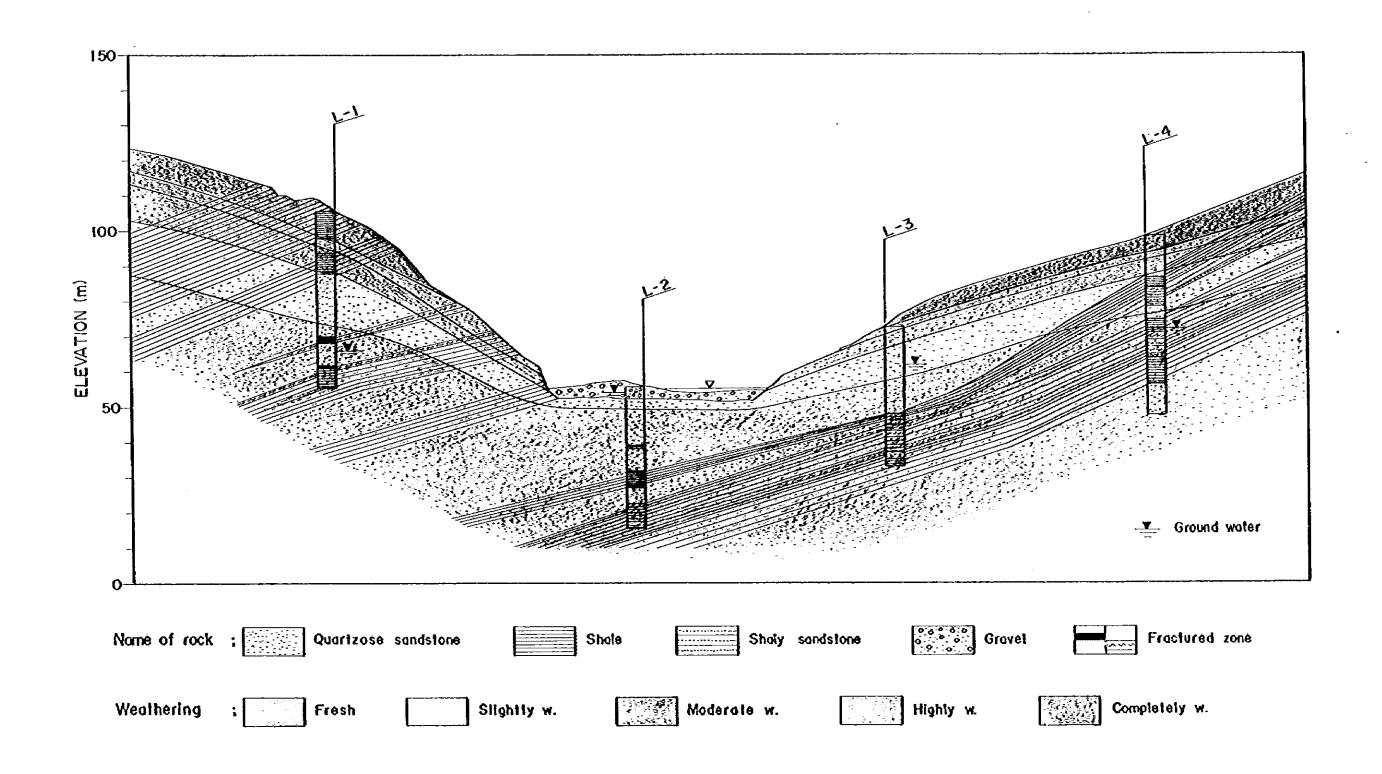


Fig. 6-9(a) RELATIONSHIP BETWEEN R.Q.D. AND QUALITY CLASSIFICATION OF ROCK

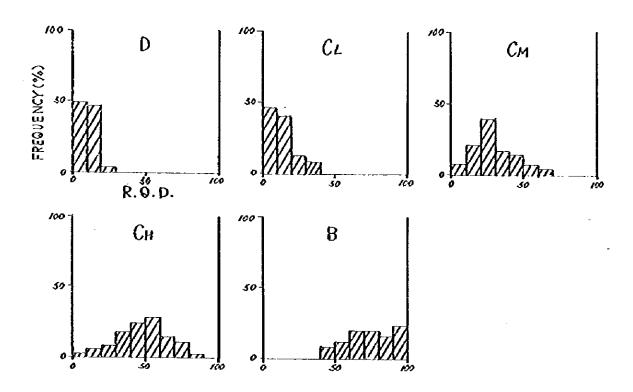


Fig. 6.9(b) RELATIONSHIP BETWEEN R.O.D. AND GRADE OF WEATHERING

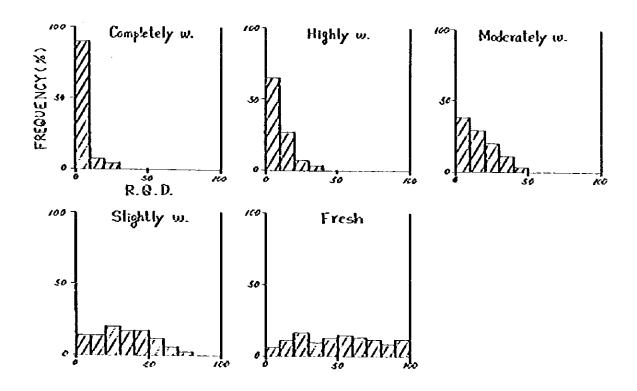


Fig. 6-10 (an Geological Log

		1.2.4	acological	1.08				
Project Nam	e	Tekoi Hydro-elec	tric Development Aroj	ect Site N	lame	Uppe	r Dam	Site
Hole NO).	U-1	Elevation of Ground Level	163.4		Ground Level	water	37.2 m
	В	eginning	August 30, 198	Operat				<u> </u>
Date		<u> </u>		– I Site i	Tanage	٣ .		
	<u> </u>	nding	September 14,198	Superi	visor	TAI	KUJI SI	UGIMOTO
Depth Scale	Mark	Name of	Weathering	Recovery	R,0	D. Pe	rmeabil	lity sax

	7		Mark of Sample	Name of Sample	Weathering	Recover (%) 20 48 68 6	y	R,Q.1 (%)	50	Perm (K	eability	63	Rock cla-
[0	0.60	-Y-	Top Soil		111				7	10	102	
	- 4			-		H T/H	11				(Lv	e or	
	1					rijr							
	<u> </u>					比扎托			Н				
	1			- 1		H1.H	11						•
:		-	- 3.2			<u> </u>			Ш				-
	1	- 125		· · · · · · · · · · · · · · · · · · ·		 				3			
	1					1111	-						
	5-	7.4				M11.		1 - 13 04	Ш		a de la companya de l		
	1	37		Shaly		M	H.						
		in the second se		Sandstone	Completely W.	11/1	1	111					-
	-			Sunastone	₩.	[]/[.	1	1 1					
	4	4				[]/[.	111						: .
	-			្ស៊ីម៉ូម៉ូម៉ូទីសម័នប្	indy at j	[]	- 4						D
	-		- 1 - 2 -			1111	! -1						;
	1	1.5			- 1	[]-[].	11			أسرا			, ***,=
100	,]					[]-[]-	-						
	1				in the second se	[]/]	1				11		1
	4						1]
1.	1		-333			[]/]-	1 1						
	4						! 1			مرار			-
	1	13.00				<u> </u> } }	<u> 1</u>			يسمرا سر	泔		:- '
	1		•				11				∄		1
	1								1	//	1		
	1				Completely	1111				ر ا	1		
1	5 -				W.		H			~	4		
	1444					1111					11		
	لملمنا	16.20	$ \cdot,\cdot $	Quartzose		团化				مر اس	1		
	سلا	1,	٠.	Sandstone	U l. l	1111	المنا] [
	ساس				Highly W.	11.11	1 E			7	1		D
:	بالسا	1830				K1.14] [7	1,1		
	السا				Moderately	Y[]/					11		
	أحستك	₩.,		and the second	W	11.11	月			مر [م	111		CL
L	<u>o</u>]	L	لننا	ze: NMIC (76 W.	<u> </u>	日北	<u> </u>			1-	10		2 - 3

Bit Size; NMLC (76 Mm)

Fig. 6-10 (az) Geological Log

roj	ect N	ame	֓֞֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֓֓֡֓֓֡	ekoi Hydro-electric	Development Proje	έc l	Z	dite	e h	lan	ne							
Ho		NÒ.	1.	U - 1	Elévation of Ground Level		to a time.		 -		ก	Gri	oun	d wate	r	2.		m
	- 3 3 	T	D.	Lista I		 -)óe	rá	Lor	-	Lrc	1	: 	<u> </u>	Li	- ,	
D	ate			eginning	· · · · · · · · · · · · · · · · · · ·							er	-	-11-1-1				<u> </u>
	<u> </u>		E	nding					er									•
'n		က <u>ဒ</u>	٤٦			'n	- -			T			1:					<u>・・・</u>
Scale	Depth	Sample		Name of Sample	Weathering		(ve %	T : 1		(2.D 5)		Permeo (K:	in/s	ity eci	.3	Sock cla-
Ö.	1		•	<u> </u>	<u> 1822 - 1824 - </u>	Ĵ	-		Ĩ	1		$ \tilde{\mathbb{H}}$		1.	10°			3 2
1						-	•		1	U		20.4	1		10	43	90 90	Ī
-		• • • • • •	.]				<i>ا</i> جر	بارر	ł	H					مبا	4		ئى ئىر ئىدىكى ي
. I	475		1			- }) - -	-	口]- 			} · .	1-1			CL
crafata			•					2	1					+	-1			
-			•			-1	-	1	1	b				-	}	110 110		
1	24.00	,	1				٦	-	1.	H			ļ.	1	1	3		
j., =	1.1 °					1		-†]_				1	13.	11	-		,
5							٠		.].		Ļ			سبراً				
	1 (1) 1 (1)		4				-	1					-	مسرا				С
-	26.30						-	1	<i>\\</i>	H	H			اسمه ا				
			•						1				1	ستنال	[.]			
							-	1	-}	1		İ		1				
				Quartzòse	Moderately	, - 	٠	-	1	1							۱	
				Sandstone	W.	, {			1]					-			· ·
			·			1			1		2			1-	-			
Ò		•	1			-1	,	7				11		1	1			•
			┨			· [-{	[۱,	1	H			
-		- •	1	er e	·			-1].			11		1				
							-].	1			ŀ	سيرأ			1	
			.]						. -	1			ŀ	1		ĺ		CL
				· ·			-1		+				1	1				
-		•	.]				-	1	+				1]].]			
	. 5,	• •	•				-	إ_ر	十	H			ľ	James .]{			
5						-{	1	. إ	1						IJ			
		• •				-{	1	, . [·	•						H			
<u>.</u>			:			-1	רַ		1					-	+1	: "		
						1		-+	Ĩ.				1	1	1			
			•] }	1	_	-{].	h				1	† [
	3830						,	-†].	1			-	1	11			
	202	· ·	†					-];				ŀ	ممراً	[]			
1	39.30			Sandstone	Stightly W.		,	1	1		Ц	7	1	ممرآ				Cx
10			:	ORIGOTAL	Landunia M.		_	1	1		口	7 1	ŀ	-				Сн

Bit Size: NMLC (76 4/m)

Fig. 6-10 (as) Geological Log

Date Beginning Operator Site Manager Supervisor Name of Weathering Recovery R.Q.D. Permeability (K: (m/sec) ps 10 4030 Sandstone Slightly W.	roje	ct N	ame	T	ekoi Kydro-electri	ic [Sevelopment Proj	ecl	É	il	e	No) mi	е			! .		. j			• •		
Date Ending Site Manager Supervisor O O Signate Name of Sample Weathering Recovery R.Q.D. Rermeability (K: 19/5ec) in Signation of Signate Recovery R.Q.D. Rermeability (K: 19/5ec) in Signation of Sig	Hol	e l	NO.		υ' ≟ 1 ²		Elevation o Ground Level	F						n	6	rr(vr /el	d	wat	ér		- 1		m
Ending Site Planager Supervisor Recovery R.Q.D. Bermeability (K: 19/56) Sample Weathering Recovery R.Q.D. Respectively (K: 19/56) Sample Address Sample Sandstone Slightly W.				Вe	eginning		platin to								,					: - <u>.</u>				
Name of Weathering Recovery R.Q.D. Rermeability (%) (K: 69/546) Find (%) (K: 69/546) Respectively R.Q.D. Rermeability (%) (K: 69/546) Respectively R.Q.D. Rermeability (K: 69/546) Respectively R.Q.D.D. Rermeability (K: 69/546) Respectively Respectively R.Q.D.D. Rermeability (K: 69/546) Respectively	D	ate													ėY		L	· - 13	 		<u>.</u>	-		1.12 (1
42.10 Sandstone Slightly W.		د در د در در		1.2.2	, S., , §				<u> </u>) U	pe;	T VI	150	r	2 1 2 2 2 2 3 3 4	<u>.</u>	L	-4				<u> </u>		
42.10 Sandstone Slightly W.	Scale	Depth	Sample				Weathering	۴	(%	•		2	(()	1.	1		(K:	(*	/se	t) _		Kock cla-
Sandstone Slightly W.	ю	\$1.53		+		1		-	1,	-	-]	1	1		1	t	7	7		d	ŀ	7	<u>С</u> н
Sandstone Slightly W.	لسيان			-					$[\]$	بر		-][ř,			ŀ	-{	سند. سعد	1	Ή"	9 2	(n\ 	<u>~</u>
Sandstone Slightly W.	reter							[-	-	ا ا	١	1		-	2		ŀ			1	1			VL
43.50	dana.	4210	, 1					-			-	1	7	1		١	ł		أسترمه]		berinder	
			• ;		Sandstone		Slightly W.		1]		-1		1	ί,			ľ		م نسس درسستان درسان				King to a local	C۲
		<u>43.50</u>						1			1			1		۱	Į					,		
		5.5 5.5]	•			1	7	7	扎	ļ	-	ئ مر	- {	1		Agricultura	
	15-	13		1					دز	٠		1		1	7	1	ł	-1		-{	1		en marke	Ç
	ء - ارم	مَدُّن					a .	-	-			1		1	7		ł		بأسمد		 -		See and the see	•
	76_	25.00		1				1		-	-			1		1	1				-		1	
							i i i i i i i i i i i i i i i i i i i	l							4		١		٠.	· .				12
												3		1	Traffic.		1	.			"	1		-
	-																				· .	1		
								ľ			-			200 200			1							
	,										-				3				-				l	
							ing a second se					ii i						-				۱	ı	
	. –						7.0-42	ŀ					-				٠							:
	•				ing Stankspring		sheets A					ŀ					١							
	<u>.</u> 					•			ľ						1	2.0						ĺ		
															-		:					į		
																				.*				
	-	1						1			1 ::			•	- A - 1-4							1		
									• .															
				 														-		-				
	٠	4 .			ាស្ត្រា ទាំងចូច ម ព	ŧ.,		V.		ľ		-				2					7			
		4								•														-
		1			4	- '					1							,						
		1			,													. ·			ŀ	-		
		1						-		7				ľ										
	 -	, min						1	1	ŀ	1	:			1				ĺ					

Bit Size; NMLC(י/ሪማሕ)

Fig. 6-10(61) Geological Log

roje	ct N	ànic	1	eKon Hydro-elect	rić l	Development Proje	ct	Ċ	iite	N	ame		U	pper D	am	Site	e
Hole	e !	No		U - 2		Elevation of Ground Level	}		10	1,4	1 <i>9</i> m	G	ro	ind wat el	er	23.	.80 m
D	ate			eginning nding		ptember <i>23,198</i> tober 1. <i>198</i>	70.7	3		. 1	lana			TAVII	11	Suci	LAAT/
	<u> </u>			121119	V	10001 1,178		13	oupe	ey v	'iśóy	<u></u>		TAKU	JI ·	OUG	Muic
Scale	Depth	Sample	Mark of	Name of Sample		Wealhering	ľ	(ver %)		[; (Q.,	4.	Perme (K:	abi	lity. sect	Ssification
0	0.0	7	Ý.	Top Soil		19					Here the second			1	10	Lug	
				ji Pad Malija (in di) Najaran				_	-1	-			1				
- Tri	19				-					ļ.,	H				+	المستسر	
alam	* *					Moderately	خ	ش م		1	I			[[]		См
1		:				W.	- 2	ا ا	[]_	1	H					11	`^
11111	4 1			te e general de la company. Transporte de la company de la company.			-	ت.		}	H.				ر ار		
- 1	430	•		Sandston	e					-	1		2		ني إر		
			1						$[\]$	-				- ***			
\$,			Slightly W.	-		٠	+-		1	: 1	1		المستعمد	Ċн
- 1	580						-]-[-	1	1	HI	1		-		
	•	١.,		- · · · · · · · · · · · · · · · · · · ·			7		- -	1	H	TI					
-	1145	7				i ja ja ja Maran sailukkia		[.	-+		1	$ \cdot $]] _			
-		-:				Moderately W.			1	1	7	#1	******	11-	-1		CM
·			:	1. 4	-	γ.	[.		1].	1	#	1	1			
	84	4 -			5.1		[.	-	 			÷.		سر ابرا	f		
				Quartzos		Slightly W.		}-	11]-	1	'	1	1-1-	1		Ċн
10	1000			Sandsto	ne		-	}	[]	Ł	17	11		1-1-			
		7	.	l Salasain Le		Fractured	-	•		-[1	1-1]-		
	•	[]	\sim	Sandstone	•	Zone	-	ŀ		4	1	1	,		_ -		D
	11.50	9 - 4		Sandstone		Slightly W.	╁-	ŀ,		+	H	$\ \ \ $		1-1			Cı
. , -	15 (4	H	<u>*</u>	Sandstone		Oughin W	+-	ľ	-	1	11	4		11.	{	1 :	
3						-	-		1-1	1	H	11	- i		{	1 i	1 14
<u>-</u>	1	-			<i>*</i>		1		-		H]		 			
4	1								-	1	11	Ţ .			竹]	-
	1	E		•				1	+1	1	1] [[.]	-1		1
15	1	E	2 % * **	Shaly				·ł	1].	H	7	1		1.	.	
	1	E		•		Chal Hand	1	1	11				i Ilman	1.	1	.	G
٠.	1		•••	Sandston	C __	Slightly W		ŀ	1]	-}	·11	,				4	~
							1	╁		+	刞			1-1-		-71	
	1						-	1	1.1		11			1-17	 	11	
	1	E					1	个]_	<u>-</u>	甘	1		1-1	}	-11	
	4						ŀ	1	-	-1	\mathbb{H}		Ì	11	}	~]	
	4	E					ł	1.	1-1	-	別	, k				11	
26	112.8	gΕ	- 4 - 4	-Shale			r	1	1-1	-1			İ		{	·] [

Bit Size : NMLC (76 m/m)

Fig. 6-10 (62) Geological Log

7.1		1	y. 6 10 (02)	Geological	·		.0	8		<u>. 535</u>	.				<u> </u>	<u> </u>	· · · · ·
Proje	ct N	anc	Tekoi Hydro-electric	Development Proj	ect	١	ði t	ė	No	me							
Hol	e	NO.	Ú-2	Elevation o Ground Level	f					m	Gi	ov.	nd w	rate	r		m
			Beginning			1)pe	ero	ato	r	<u> </u>	Ï	-	:	1_		
D	ate		nding							nag	er						
- L			-noing		1	} :	<u>მ</u> ს	pe	rvi	or		<u> </u>	<u> </u>				
Scale	Depth	Mark of Sample	Name of	4002186 2222	R	c	γε	"			d.C		Peri	mea	bili	ły	850
	th	ole ole	Sample	Weathering	2	0 4	0 6) Ē	ō		60 t	ő	10 5		"/se	153	Rock cla-
20	5.7	73.7	Shaly	Slightly W.		1	1	-				Park Market	1		10	10	РСм
باديريا	21. 3 0	0000	Sandstone			سرند پ	1				7	1	1				
1111111		0000	Sandstone	in the second		1.	1	-	E	#]	,	1	سىمىرى سىمىرى			्रे च
بالميناء		0000	and Conglomerate	Fresh	٠	1				Ħ]		1				Сн
i arlan	2360	0 0 6 0				1	1		شان سان	Ħ	1	A CONTRACTOR					
111111111111111111111111111111111111111				1	-	-	- 1		+		1			سند			
25	1.57						-		1	#	T		-}			-	В
1	26.20				-	-	1			H]						
1	27.00		Shale	Firesh		1	-		1								См
					-		-				1						
			e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co	*	•	+				1	7			}			В
					-		-			1	1]			
30	3000				-	-	-	-		1	1						·
, ,			Shaly Sandstone	Fresh	-	-	- م - م			=	1		٠				
	31.60	- ÷ • •	Sandstone			-	-			\exists	泪		+	}			
					-		-			1	#		1	: :		İ	
1			1			ر در	-			#	1						В
			Shale	Fresh	[.	-	-	-		1	Ŧ		-]]				
					-			-		\mathbb{H}							
<i>3</i> 5-	35.90				-	-				#	1	-		<u></u>			
					-		[.	سند	士	H	#						Сн
	35.80		Cl. 1		-		-	 		‡	1]			
			Shaly Sandstone	Fresh	-		[.	-					-	1		İ	
			Otto to to to		-	-	-			1			·†.				См
	3000				-		[.	-		刊				1			1
40	1 N	Sit S	Sandstone ize; NMLC (76%)	Fresh-	Ľ	L	<u> </u>	-	LE	山			٠٥.	1_			<u> </u>

Bit Size; NMLC (76 m/m) R.O.D.; Rock Orality Designation

Fig.6-10(c1) Geological Log

Proje	ect No	one	Tekor Hydro-elect	ric		ct	3	ite	N	a mi	e	Up	pe	r Dam	Site	e	· · · · · ·
Hol	e !	NO.	U-3		Elevation of Ground Level			8	i. ዓ	8 1	m	G	rou e ye	nd wate	r	0.0	m
	. L .		Beginning	Αu	gust 26, 1981	-:	_	per					\downarrow		<u> </u>	<u>.</u>	· · · · ·
υ	ate		Ending	Se	ptember 11,198	•		si te Supe			. 5	<u> </u>		TAKUJ I	Ŝl	IGIM	ото
Scale	Depth	Sample Sample	Name of Sample		Weathering		(ver %)	1	:	. G (x)	- * . 		bjli m/s	ty co	Rock cla-
	090	0.0	Gravel				e ig							1	NO (L)	17500	
	1,60				Highly W.]	F								CL
							- 5	-}-									
					Moderately W				-		Ц	# -					См
	3.40 400		Sandstore		11 1			1			1				<u> </u>		CL
							1	1	-	i i				10		-	
5			€ -				 			9					}		
					Highly W.	14 -	- 1	1	L			,		1			D
				•			1								-		
	740		Shole		Slightly W.			1]-								См
_		, i		· .			1	1	1				1	شمند سند	-		См
<u>ئ</u> ے	930				Moderately W.	-	-		-						-		
10	10.00						-	$ \cdot $]-		D
•	10.00	 : .	2				٠ -] .			1					Сн
	11.60		-		Slightly W.			-									См
-				-		-	-		}	P	目	, jaranga T			j	'	Сн
	13.10 13.50		Sandston	ė			ļ.,	-		E	月	7 (1			\mathbb{H}		CL
: :		•			-	}-	-		-	E	Щ	1	İ	11-	1		
15	1				Fresh	-	[-	┟╂	1.	L	H	1			-		8
13	15%	 :.			A STATE OF THE STA	-		[]	╁	E		$\int_{\mathbf{i}}$	ļ	11-	1		4.5
	1					-	-	┟┤	1	E	Ħ	4	ĺ				
	- Tarana							ţ.]	1	F					1		См
	180	<u>.</u>			Slightly W.].	}-			$ \mathbf{j} $			1-11			
	THE PERSON NAMED IN	[:•				-	+	ŢĬ	- -	E	Ħ	i		1.1	#		Ċн
	100	.				<u></u>	ļ.	╏	士	E	H	7		1-1-1			"
<u> </u>	188	<u>ዓ</u> ቴ. ነ	: Size ; NMLC (0.0		L	. ا	1-1	1	Ł	1	4	_1	t-t-t xk Oxality			

Fig. 6:10 (cz) Geological Log

_	يننت	~~~~		7. 0.10 (0.17	Q CO TO G TCW			<u> </u>	-									
	Proje	ct N	ane	Tekoi Hydro-electric		ect	S	ite	N	lame				.i .			: .	
	Hol	e	NÒ.	ับ ~ 3	Elevation of Ground Level	^			1 S	ŕ	n	Gro	und el	V/O	ter		. !	m
	:		1	Beginning			Ó	ρei	at	or				,				
	D	ate							$\overline{}$	lan		r						
Ļ	- 3			Ending		. :	8	ψρ	eri	/i50	r		<u>. 11</u>		<u> </u>) i j	100	2.3
ſ	ίÒ	U	ώζ			Ω _e	ĊĂ	γėτ	Ü	Ô	Â	'n	Ta	الندمة.	٠	:1:1.		क्टु शु
	Scale	Depth	Mark of Sample	Name of	Weathering	* :	• (%)				. D.)		(K	(a)	ility /sect		¥X 8∂
l		3	<u> ი გ</u>	Sample		20	4	60	ε <i>ι</i>)	Żo I	40	60 80 L L	<u></u> _ '	o-s L	10	4 /0		Rock cla- ssidication
1	20		7 <u>}</u>		Slightly W.	1	4						[7-	ľ	0	O ²	
	4	21,40									$\frac{1}{2}$		_			(Lug	,	См
	4	X 2	5				-1	1	-		\mathcal{H}	H	سبا					
l	Lum					-{	1	ر[1		7	1						
ı	1			Sandstone		-1	1		1	1	7	11	-		*			
1	4				Fresh			-	ł	1	1	11						Á
Ì	4					ł				17	1	H		٧.				В
	25	- 4					إ ـ	- -		1	七	H						-]
1							-]	1	7	羾			\mathbb{I}	-		
ı		26.KQ					-	1	۔ ا	1	1	払			\parallel			
ı	dan		0000			 	1		-		1	H	سينا		\parallel			
۱	, Janet		6000	Sandstone		-	1	·	ŀ		1	H	-		\parallel			
	Lini		0000	1	Fresh	┞┨	1		1	H	7	门	-	سيأ	1	**		В
	4 in Fig.		0000	Conglomerate		<u>- 1</u>		سائي	1		1	H]	1	:		
	The state of the s		0000 0000			11		-			1	14		يرا	1			
۱	2 ^	3000	0000					1		1	7	17	L	H				
	~		-4,444]:	П		П	1-	} 1				
۱		3.2.		建加州农 沙山	Fresh		-	1	-	挕	$\frac{1}{4}$			11		e Let		Сн
	1	31.50	•••••			$ \cdot $	-		-	H	\mathcal{H}		-			-		
ŀ						ŀ·l	1		1	1	#		-		ı			-
						┟╢			·† .	H								- u u
ı						1		+	1	17	1	\mathbb{H}		11		.*		
	- 3					l 1		-{	1	H	1	17		-	-			-
:	35			Shaly Sandstone				1].	H	1			}		. 434		
	J3-				Very Fresh					U	1	Ħ	1	1				В
	:						2		1	1	1	口	1.	†1				
							,,		-}-	U	1	11	1	11				
		1	,	3		-		-	- -	H	1	廿	1			a.*		-
		1				$ \cdot $		7	1	14	1	11	1	\prod		•		
				3				-1	1	U	士	-		H	-			1
						[]	<u>ا</u> د	: 1	1.	H	7	14		11	.			
	40			3	1	[]		-+		H	1	li		H				
١		-		ize : NMI C (9/8		1	لــا				_#_	الل		.LL			1	

Bit Size; NMLC (76明m)

Fig. 6-10(di) Geological Log

	<u> </u>	<u> </u>		4			_	Q	<u>۔</u> ء			٠,				
ļ	Proje	ct N	ane	Tekoi Hydro-electric	<u> </u>	ect	W	ite	No	me	•	Jope	er Da	m Sit	ė	
	Hol	е	NO.	U-4	Elevation of Ground Level	-	-	·	3.57		Gra	und rel	wate	r	Q. I	Ö m
	Ď	ate	E	Beginning S	eptember15,198				ato	r nagi	~~		· · ·			
		u co	[nding S	eptember 29,198	}			y vi		51	7/	\KUJ1	SUG	IM(OTO
	Scale	Depth	Mark of Sample	Name of Sample	Weathering		(ver %)	. I	()).D.	R	ermea (K: s	bility */sec)	3	Rock cla- sestication
		130	Y Y Y	Top Soil			•	7						O (Luge	on)	-
	enting the state of	2.70			Completely W.									er produktiva oraz i independente		
	en annean each			Sandstone	Highly W.									este principal de la companya de la companya de la companya de la companya de la companya de la companya de la		D
	5	5.10												mand place and with making		
	milion				Moderately W.									egodino Diffusiona Africa S		CĽ
	dientinali	7.40	13. 13. 14.					1						A IMMONEST CONTRACT		D
	o managaran	870 970			Highly W.									e en en en en en		CL
	10	ю 30	: : :		ModeratelyW				14		1					См-
	tron line	**		Quartzose Sondstone						H	1					
	Transfer of the contract of th															Сн
				e 12sa in descrip	Slightly W.					\prod		-				- •• - 1
	15	2 8 52					•]			مر معرف		-
	Linnston	16.10									of the second	1				См
	Tours Present Land	17.80								1			مرمر ا			
	1	مذمرا		Sandstone	Ślightly W.	$\left \cdot \right $	مرد		#	#	4					Сн_
	20	18.60	<u>-:-</u>	ze : NMLC (76 m	<u> </u> (m)		ر	ĽĹ	1-1	1/		1)vality (1:-	 ^
		,	-, 01		·· •				~	. V. U .	. N	i XX	waity !	ncell!!	u (14)	• •

Fig. 6-10(12) Geological Log

				~~~~~~~~~	<del></del>		_ <b>.Q</b>	-					•	
Proj	ect N	om€	Tekoi Hydro-eketr	ic Development Proj	ect	3	te	No	me	U	pper Dam	Site		
Но	le	NO.	U-4	Elevation of Ground Level			108	.57	m	Gro Lev	und water el	19,1	0 m	
Beginning				September 15,19	BI			ato						
`	ate		Ending	September29,19	: M		1. 1.		anag		911444	4 1 2 1 2 2	. A A	
							upe	YV	SOY		TAKUJI SUGIMOTO			
Scale	Depth	Mark of Sample	Name of Sample	Weathering		(1) (1)	<b>(, )</b> '		(	Q.D. K) 60 60	Permeable (K: 4m/s	ec)	Rock cla- sociation	
20	1 15 a				1	1	1		扣	2	1 10	10		
2		•			-		łŕ	H	玔	1 1	1-1-14	950,		
			erse filmen				╢		<b>#</b>		1	]	См	
	2230			Slightly W.	r	.  -	11		7		11-1	<b>}</b> [:		
	23.00					<i>.</i> }	1].	1	14	-	1-1-	11	Сн	
			Sandstone			1	1.	1	11			11		
						1	]-	11	ſIJ		3-	11	Си	
25-	25.00		jetsåeret tjilværid. Di		-		-		ЩІ			1		
				Fresh	-	1	1		扣			]		
					1		Ł		#	3		]	Сн	
	24.80 27.90 27.90		Shale Sandsto	Tre	1	1	Ĺ	1	11	3		]  -	-Cլ-	
	27.50	***	- SIRVIC			- {			$\mathcal{H}$			1	Ct Ct	
	28.30 28.68		Sandstone			1	1	1	11			1	Ся	
	29.60		Shole	Firesh		1	-	łľ	Щ			11	CL	
	20.00		Sandstone		-	1	1		H		1/1/	] [	Сн	
30	30.00 30.20		Shale		1	1.	}		71	3 3	1/1/	<b>J</b>	CE	
	3L30		Sandstone		1		1		11				Сн	
	31.50		Sandstone		<b>†</b> 1	<u> </u>	1	1	11		-[			
		0000	Conglomenat	e Fresh		1	[.	-	11	4		į	Сн	
	32.50					-{	]-	1	7			j		
						1	1	1	#	1				
			Sandstone	Fresh	$ \cdot $		/:		11	4			ا _ ا	
35-					-		1		1				Сн	
					<b>H</b>	1	1	H	17		HT	7	[ ]	
	36.00		Shale	Fresh		1	1.	H	#		1	1		
	3670 3720		JIIII6	riesn		-{	Ţ.	ŀŧ	11			1	B B	
1	JA 20				$[\ ]$	1	]-	1	们	T		1	P	
-			Sandstone	Fresh		1	1.	1	71				Cr-	
	38.80		ORGANIS	riesh /	H	1	1		11		1.			
			1		-		1		羽		1	.	В	
140	i	<u></u> 	1 ize ; NMLC (76"		-		<u>!</u>	Ľ	11		<u> </u>	<u> </u>	<u> </u>	
	C	יור טוי	ize, nmuutiin	7M)				R	0.0	.; Re	ck Quality Des	izralk	r).	

Fig. 6-10(d3) Geological Log

Project Name Hole NO.		one.	Texoi Hydro elect	Site 1	Vame		Upper Dam Site					
		NO.	U ~ 4	Elevation of Ground Leve	Elevation of County Level			Gro Lev	round water 19.10			
D	ate	. } =	Beginning	September 15, 1	189	Opera Site		er	•			
			Ending	September29,1	981	<b>Éuper</b>			TAKUJI S	UGIMOT		
Scale	Depth	Mark of Sample	Name of Sample	Weathering	1	covery (%)	()	).D.	Permeability (K: cm/sec) (E)			
10					1	11	17		1 10	(0 ¹		
dini					11	11	111	3	<u> </u>	*** "		
بعياس	î.					111						
11/11						111		711		. B		
June					11	111		71				
4					1	111						
4111	A 6 A A		Sandstone	Fresh	1				M 1			
\$- <u> </u>	45/0					111			1-1-	า I ├		
بيسان				ja ja ki saga		11				111		
41.14						11				11		
املسب			l - ·			<del>/</del> 1]}				111		
lunt			_			/ <b> </b>  }	1   [			]    G		
						111	111		1			
artum		•			-	14						
٠. ا	5000		<u> </u>		1	141				<del>                                      </del>		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		7			11			11		1		
بطيب										İ		
بانييا	7.	* . ;	្រីប្រែក្រុម									
1		-										
untan												
111111												
Lunt			. •									
unit.												
. alum												
1												
مسلسا			·									
utur												
1 miles												
1111	내 -											

Bit Size; NMLC (76 1/m)

Fig. 6-10 (e) Geological Log

	Proje	ct N	ome	TeKoj Hydro-elec	trik Development Pro	sect	۶	a Site	No	me	T	l là	nor	D.A.	S:+4		
ŀ	Hol		No.	U~ 5	Elevation	Elevation of			Site Name			Upper Dam Site Ground water					70 m
ŀ					T	Ground Level			ató			Lev	el	·		7. /	111
	D	ate	-	Beginning	October 1,1981			site	Me	ana		r					
Į	11.5			Ending	October 11,198	Ctober [],[98]			ryi	SOY	• 		TA	KUJ	SUC		ото]
	Scale	Depth	Sample	Name of Sample	Weathering	1		very %)		Ŕ. 204	(8)		1	(K:	bility */sec) o ⁻⁴ //	, 3 	Rock cla- sassication
	0	0.90	Y	Top Soil			1	/					-	,	(Lege	(OA)	
	Learton	1.90	7.7.	Shale.	Completely W.		7		1								
	بالسباد	T.YV			Completely	-	1						100				
	1		232		w.′		Act of						-				
	mehan	370		Shaly					2				-	<b>3</b>			D
	5			Sondsto	ne	-	/		1			*.					
	hundi				Highly W.		1					,	-		٠.		
	melene						ر ر	1	1	*   N				)			
	ملدستان							1			A 1.	· .	: + :- :-:::::::::::::::::::::::::::::::				-
	- Transfer	8.20				-	- <b>-</b> -	, <b>}</b>									<u>.</u>
	111111111111111111111111111111111111111								7	3			-				D.
	10	9.80					-			1							• 21
	1.00			Park Artist		-	1			1			ر ر				
				Quartzos	e								-				- -
	1			Sandsta	I HEARIN LA		-		1	]		* -					
						-	ł		4	3				,			CL
	1		<b> </b>	·]				#-	H	Teyer			-				
	15	415 415					<b> </b>	$ \cdot $	$ \cdot $	5			-		1	ر- ا	_
		2.5a					-										_
			· ·													֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	
		17.60			IT 1			才					-			-	
		1870		Shale	Fractured Zone		-	H					1		//		D-
	100			Quartzos	e Highly W.	-	H	H				ž.		7			CL
	20	19.90		Sandsto	10		1	Ш			<u></u>		$\prod_{i}$	<u> </u>			

Bit Size; NMLC(76 Wm)

Fig. 6-10(e2) Geological Log

Project Nam	e Tekoj Hydro-electric	Development Aroject	Site Name	<del></del>
Hole NO		Elevation of Ground Level	6	Around water m
Date	Beginning Ending		Operator Site Manager Supervisor	
Sample Depth	Name of Sample	Weathering	covery R.Q. (%)	(R: 49/sec)
20 1/0/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/	Shaly Sandstone	Fractured Zone Moderately		CL
24.00		W. Slightly W.		См
22.20				C _L
3/30	Sandstone			Сн
33.80 35_35.00		Fresh		C _M
3500				C _M

Bit Size: Depth 20-24m = NMIC (76 m/m)
Depth 24-40m = 66 m/m

R.O.O. Rock Orality Designation

Fig. 6:10(es) Geological Log

£	· · ·	<del></del>	<del></del>	·		0		
	Proje	ct N	ame	Texo; Hydro-electric		Site Name	jeya i ja	
	Hol	e i	NO.	U - 5	Elevation of Ground Level	ma ey m	Ground water Level	m
1	Ď	ate		Beginning		Operator Site Manag		
	- 17 mg	<b>u</b> (		Ending		Supervisor		
	Scale	Depth	Mark of Sample	Name of Sample	Weathering	(%)   (	Q.D. Permeable (K: 64)	કલ્ઇ ફિંહે
	40							163 Cion
١	استلامه	7.1	•					cageon)
	ملسديات					111111		
-	untur							
	11111111		•					См
	danta	1 J		Sandstone	Fresh			-
	45			- Curas tone	i i e sii	111		
1	milini	45 <i>0</i> 0						
	Jenish						<b>1</b> 1	
	minute					111111		CH
	and the	44.00						
	nhaaet			A STANT				В
	50	50.00	•				11111	
	,							
٠	Triangle of							-
	1		2 .					
	1							
					].			
								, : . <del>-</del>

Bit Size: 61 m/m

R.O.D. : Rock Pratity Designation

Fig. bill cars Geological Log

Hole NO. L-1 Elevation of Ground Water 39.6 m  Date Beginning July 17 1981 Operator Ending August 14 1981 Supervisor TAKUJI SUGIMOTO	Project Name Texos Hydro-electric Development Project Site Name Lower Dam Site																
Date Beginning July 19 1981 Ending August 14 1781 Ste Manager Site Manager Supervisor TAKUJI SUGIFIOTO  Color St. Sample Weathering Recovery R.Q.D. (%) So Sample Weathering Recovery (%) Top Soil  Top Soil  Shale Completely W.  130 Sandstore  Moderately W.  150 Shale  Slightly W.  Slightly W.  Ch				110								Lower Dam Site					
Date Ending August 16 1781  Site Manager Supervisor TAKUJI SUGIMOTO  Co	Hole IVU. L - I				<u> </u>	Ground Level						Le	vel 39.6 m				6 m
Ending August 16 1781 Supervisor TARUJI SUGIMOTO  OF STATE Sample  Weathering Recovery R. G. D. Rermeability (K.: "/sec.")  Sample  Top Soil  Top Soil  Highly W.  Sandstore  Moderately W.  Moderately W.  Shale  Slightly W.  Slightly W.  Chi	Dot	امًا	E	Beginning	1	uly 17 198	/	-					_	<del></del>			<del></del>
Colle of Sample Weathering Recovery R.Q.D. Rermeability (%) (K: "%sec) (%) (K: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R: "%sec) (R	vale		E	nding	August 14 1981			•					TAKUJI SUGIMOTO				010
Shale Completely W.  Sandstore  Moderately W.  and Soft  Slightly W.  CH	14 × 1 1	Sample	Mark of		:	Weathering	•	. (	%)		. (	<b>*</b> )		∵(K; (	1º1/sec	}	Rock cla-
Shale Completely W.  Sandstore  Moderately W.  and Soft  Slightly W.  CH	4	<u>r</u> .10 =	r	Top Soil			/	1	7		a design of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the contr			,	10 (LX	920	1
Highly W.  Sandstore  Moderately W.  and Soft  Slightly W.  CH	minim						<u></u>										
Highly W.  Sandstore  Moderately W.  and Soft  Slightly W.  CH	ammilana						1	1	- - - -								
Highly W.  130 Sandstore  Moderately W.  1150 Shale  Shale  Slightly W.  Ch				Shale	:-		1	1		$\left[ \cdot \right]$				3.	the second of		_
Highly W.  Sandstore  Moderately W.  and Soft  Slightly W.  Ch	5						1	1									D
Moderately and Soft  Shale  Slightly W.  CH	1 7	<u>ده</u>					1	1					4	:			_
Moderately W. and Soft  Shale  Slightly W.  Ch						Highly W.	1		-  - -		,						
Moderately W.  and Soft  Shale  Slightly W.  Ch	1	30		Sandstone			ر ر				7						-
Moderately and Soft  Shale  Slightly W.  CH	[O					Moderately W.	- 1 - 1	1	 		31						CL
And Soft  Shale  Slightly W.	, Lundan	50		<del></del>	-	<u></u>	1	1	-  - -  -					 			
Shale Slightly W.  CH	بطيطيس					W.	-	<u> </u>					-		 		D
Slightly W.	111111111111111111111111111111111111111	70		Shale		ana soji	1	/					-				
1760				 			1		-						<b>\</b>		
	باسساسا					Slightly W.	1	-					1				Сн
Sandstone Slightly W. CL	17.	ω =					- -	  -  -			#				H		
	utradiani			Sandstone		Slightly W.		-			7		-	   			CL

Bit Size : NMLC (16 4/m)