SGHL

SAMMAR GAH HYDRO (PRIVATE) LIMITED

~~17 September, 2015~~ 23-SEP-2015

To: Registrar NEPRA

Subject: Submission of Feasibility Stage Tariff Petition of 28 MW Sammar Gah Hydro (Private) Ltd.

To whom it may concern:

This is in reference with the letter received from NEPRA on the 9th September 2015, (NO.NEPRA/TRF-100/SGHPL/13433). Upon review of our Tariff Petition by NEPRA, it was found that certain information/documents were missing. With the help of your honorable institution we have now completed and attached the following documents.

1. Pay order amounting to Rs.9600/- (Total amount Rs.559,904/-)
2. Under Sub rule (2) of rule 3 of the Tariff Rules
3. The name, address of the petitioner and the grounds giving rise to the petitioner's interest forming the basis of the petition and, where the petitioner is a licensee, the number and other relevant details of the license by the applicant as required under Rule 3(2)(a) of Tariff Rules
4. The grounds and the facts forming the basis of the petition in a concise manner as required under Rule 3(2)(b) of Tariff Rules
5. The relief or determination sought as required under Rule 3(2)(c) of Tariff Rules
6. A summary of evidence giving brief particulars of the Data, facts and evidence in support of the petition as required under Rule 3(2)(f) of Tariff Rules
7. Approval of Interconnection Study
8. NOC from the concerned Environmental Protection Agency

Thank you for your assistance. If there are any other queries please do not hesitate to ask us.

Sincerely,

For information & n/c
- DK/SAR
- MS
Copy to:
SAT-I
SA (Tech)

28/9
cc: Chairman
- VC/M(Fin)
- M(T)
- M(M&E)
- M(Lic)

Aamir Mansoor

SAMMAR GAH HYDRO (Pvt.) Ltd.

Registrar
Dy No. 10150
Dated 28-9-15

10-A/3, GULBERG III, LAHORE PAKISTAN
TEL: +92-42-111 777 744 FAX: +92-42-3571 2073

SAMMARGAH HYDRO

(PVT) LTD.

28/08/15

TO: **THE CHIEF EXECUTIVE,**
Peshawar Electric Supply Company (PESCO)

SUBJECT: Submission of Grid Interconnection Study for 28MW Sammargah Hydro Power Project

Sir,

Kindly accept our formal documents for your prestigious organizations review of our Project named Sammargah Hydropower in District Kohistan with a size of 28MW

If further documents/clarifications are required, kindly tell us and we shall furnish those documents with our qualified consultants

Sincerely,

ASAD MUZAFFAR

Despatcher GM
CEO / PESCO
Peshawar

R-H(24)-S(30), F6/1, ISLAMABAD | T: +92 51 227 6552-53 | F: +92 51 227 4736 | E: info@bcipakistan.com

PO No. 02904087

5173282

faysalbank

0452-BLUE AREA BRANCH, ISLAMABAD

INCORPORATED IN PAKISTAN WITH LIMITED LIABILITY

Not Over PKR **********9,600.00**** Date: 15-SEP-2015

Pay Order

Pay To REGISTRAR NEPRA**** Or Order

Pak Rupees NINE THOUSAND SIX HUNDRED AND 0/100 ONLY PKR ********9,600.00

A/C Payee Only
Not Negotiable

This Banker's / Cashier's Cheque Requires Endorsement

On Account of TERIF

This PO is valid for 6 months only

Payable at : Any Branch of FBL in Pakistan

Please do not write below this line.

Azeem Ahmad
B-87

FAYSAL AZIM LEHRI
B-51

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Environmental Protection Agency
Environment Department
Govt. of Khyber Pakhtunkhwa

No. EPA/IEE/28MW-SG/350

Date: 20/03/2012

To

Mr. Afzal Ahmad,
Project Proponent,
Samargah Hydropower Project, District Kohistan,
10-A/3, Gulberg-III, Lahore.
Tel No. 42-111-777-744
Fax No. 42-35712073.

Subject: **Filling of the Initial Environmental Examination (IEE) Report of Construction of 28 MW Samar Gah Hydropower Project near Village Sammar Gah in District Kohistan.**

I am directed to enclose herewith Legal Environmental Approval/ Decision Note on IEE report of Samargah Hydro Power Project. District Kohistan for your information and further implementation. The Schedule VII (copy enclosed) must be submitted to this Agency within a month on Stamp Paper of Rs. 30/- as an undertaking for the compliance of terms and conditions as mentioned in the Legal Approval as well as mitigation measures proposed in the IEE Report.

Deputy Director (EIA)

3rd Floor, SDU Building, Khyber Road, Peshawar Cantt
Telephone: 92 (91) 9210263, Fax. 92 (91) 9210280

SCHEDULE-V

Decision on IEE

1.	**Name, address of proponent:**	Mr. Afzal Ahmad, Head Proposal Department, Samargah Hydro Joint Venture, 10-A/3 Gulbarg-III, Lahore Pakistan. Tel # +92-42-111-777-744 Fax # +92-42-35712073 Cell # 0301-4605116
2.	**Description of project.**	The Samargah Hydro Power Project is proposed to be constructed on Samar Nullah near Samargah Village approximately 2.5 Km high on east of the Samar Nullah Bridge on the Karakuram Highway. The site is approximately 50 Km from Dasu which is the headquarter of District Kohistan. Capacity of the project is 28 MW of electricity which will be added into the national grid to overcome the shortage of electricity in the country.
3.	**Location of project.**	The project is located in **District Kohistan.**
4.	**Date of filing of EIA.**	04/11/2011 (Ref: EPA Diary No.583)

5. After careful review, the Environmental Protection Agency, Govt. of Khyber Pakhtunkhwa has decided to accord approval of the Initial Environmental Examination for Samargah Hydro Power Project (28 MW) District Kohistan, in line with the guidelines issued by Pak. EPA and IEE/EIA Regulations, 2000, subject to the following terms & conditions:-

a) The proponent will adopt all precautionary and mitigation measures identified in IEE Report as well as any un-anticipated impacts during the construction and operation phase of project.

b) Safety of the social & cultural life of the local community shall be ensured.

c) Filters at the entrance of the tunnel shall be installed to protect fish population.

d) The plants/trees on the boundaries as well as at the available space shall be planted to compensate the damaged trees & to enhance the aesthetic beauty of environment.

e) All conflicting issues regarding compensation etc to be settled before executing or commencing of the project activities and a certificate in this regard should be submitted to this Agency.

f) Agreement should be made with the owner of water mill before starting the project activities and copy of the agreement must be submitted to this Agency.

g) The proponent should ensure to avoid dumping of debris into down slope. A prior area should be identified for disposal of debris.

h) Non-technical jobs should be provided to local community and priority should also be given to the technical jobs if available.

i) No extension would be permitted in the future in the existing hydropower project without prior approval of the EPA/Govt. of Khyber Pakhtunkhwa.

j) The proponent shall provide the copy of this approval and IEE report to the contractor for information and compliance.

k) The proponent should ensure the strict and efficient health and safety measures for the protection of workers and passers by backed by a comprehensive emergency response plan.

6. The proponent shall be liable for correctness and validity of the information supplied by the environmental consultant.

7. The proponent shall be liable for compliance of Sections 13,14,17 and 18 of IEE/EIA Regulations, 2000, regarding approval, confirmation of compliance, entry, inspections and monitoring.

8. This approval is accorded only for the installation/ construction phase of the project. The proponent will obtain approval for operation of the hydro power project in accordance with the Section 13 (2) (b) and Section 18 of the IEE/EIA Regulations, 2000.
9. Any change in the approved project shall be communicated to EPA, Khyber Pakhtunkhwa and shall be commenced after obtaining the approval.
10. This approval shall be treated as null and void if all or any of the conditions mentioned above is/are not complied with.
11. This approval does not absolve the proponent of the duty to obtain any other approval or clearance that may be required under any law in force.
12. There is no legal case pending in the courts against the project.
13. In exercise of the power under Section 12 of the Pakistan Environmental Protection Act, 1997, the undersigned is pleased to approve the IEE Report for construction phase of the project with above mentioned terms and conditions.

Dated: Peshawar 20/03/2012
Tracking/File.No. EPA/IEE/28MW-SG/350

3...

DIRECTOR GENERAL 16/3/12
EPA, Khyber Pakhtunkhwa.
3rd Floor, SDU Building,
Khyber Road Peshawar Cantt.

TARIFF PETITION
BY
SAMMARGAH HYDRO JOINT VENTURE
10-A/3 GULBERG III, LAHORE.

1. COMPLIANCE WITH NEPRA (TARIFF STANDARDS & PROCEDURE) RULES 1998

NEPRA (Tariff Standards and Procedure) Rules 1998	Description
Rules 3(1)	Tariff Petition Fee of Rs. 440,864/- (Covering the CPI indexation) is attached. (Demand Draft No. D.D.1945637dated October 14th,2011 issued by Askari Bank Shahrah-e-Aiwan-e-Tijarat Branch, Lahore.
Rule 3(2)(a)	Name of Petitioner Mr. Afzaal Ahmad Head Proposal Department Sammar Gah Hydro Joint Venture
Rule 3(2)(b)	Grounds and Facts Provided in detail in this Tariff Petition
Rule 3(2)(c)	Determination Sought Petitioner seeks determination of NEPRA on the following: a) Feasibility Stage Reference Tariff for the 28 MW Hydropower Project on Sammar Nallah at District

	Dassu Kohistan Area, which the Petitioner proposes to set up, for a period of fifty (50) Agreement Years from the Commercial Operation Date; b) Adjustment to Reference Tariff for EPC Cost as contracted and for the Cost Reopeners specific to hydropower projects; and c) Adjustment/indexation of the Reference Tariff components over the period of fifty (50) Agreement Years and other salient terms and conditions of the Power Purchase Agreement.
Rule 3(2)(d)	Not Applicable
Rule 3(2)(e)	Not Applicable
Rule 3(2)(f)	Provided in detail in the attachments to Tariff Petition
Rule 3(8)	Affidavit is attached

2. GLOSSARY

AEB	Area Electricity Board
AJK	Azad Jammu and Kashmir
ANSI	American National Standard Institute
ASTM	American Society of Testing Materials
BOO	Build, Own and Operate
BOOT	Build, Own, Operate and Transfer
CCPP	Combined Cycle Power Plant
COD	Commercial Date of Operation
CPP	Capacity Purchase Price
CPPA	Central Power Purchase Agency of NTDC
CPI	Consumer Purchase Price
Cusec	Cubic Foot per Second
D/C	Double Circuit
DSRA	Debt Service Reserve Account
EPA	Environmental Protection Agency Pakistan
EPP	Energy Purchase Price
EPC	Engineering, Procurement and Construction
ESIA	Environmental and Social Impact Assessment
€	Euro
GOP	Government of Pakistan
GoKPK	Government of Khyber Pukhtunkhawa

GST	General Sales Tax
GWh	Giga Watt Hour
HV	High Voltage
Hz	Hertz (Frequency)
IA	Implementation Agreement
ICS	Integrated Consulting Service
IDC	Interest During Construction
IPP	Independent Power Producer
IRR	Internal Rate of Return
ISO	International Organization for Standardization
Kg	Kilogram
KIBOR	Karachi Interbank Borrowing Offered Rate
KPK	Khyber Pakhtunkhawa Province
Km	Kilometer
kV	Kilovolt
kVA	Kilovolt Ampere
kW	Kilowatt
kWh	Kilowatt Hour
LIBOR	London Interbank Borrowing Offer Rate
LOI	Letter of Interest
LOS	Letter of Support
LV	Low Voltage

M	Meter
M^2	Square Meter
M^3	Cubic Meter
M^3/s or Cumecs	Cubic Meter per Second
MAF	Million Acre Feet
M.A.S.L	Meters Above Sea Level
MVA	Mega Volt Ampere
MW	Megawatt
MWh	Megawatt Hour
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Dispatch Company
NEQ	National Environmental Quality Standard
NOC	No Objection Certificate
NPCC	National Power Control Center
NPV	Net Present Value
NTDC	National Transmission and Dispatch Company
O & M	Operation and Maintenance
PEPA	Pakistan Environmental Protection Agency
PKR or Rs.	Pakistani Rupees
PPA	Power Purchase Agreement
PPIB	Private Power and Infrastructure Board
RAP	Resettlement Action Plan

RFP	Request for Proposal
ROE	Return on Equity
ROEDC	Return on Equity During Construction
RQD	Rock Quality Designation
USD or US$	United States Dollar
US¢ or ¢	United States Cent
WAPDA	Water and Power Development Authority
WB	World bank
WUA	Water Use Agreement
WUC	Water Use Charges
SGHJV	Sammar Gah Hydro Joint Venture (the successful bidder)
SHYDO	Sarhad Hydel Development Organization
SKB	Saadullah Khan & Brothers

3. DETAILS OF PETITIONER

3.1. NAME AND ADDRESS

M/S SAMMARGAH HYDRO JOINT VENTURE

Address: 10-A/3 GULBERG III, LAHORE.

Phone No. : +92-42-111-777-744

Fax No. : +92-42-35712073

Email: skb@skbpk.com, skb@skb.net.pk

3.2. PROJECT SPONSORS

- SAADULLAH KHAN & BROTHERS (SKB)
- B.C. INTERNATIONAL (PVT.) LIMITED (BCI)

3.3. REPRESENTATIVES OF SAMMARGAH HYDRO JOINT VENTURE

Mr. Afzaal Ahmad

Head Proposal Department

4. BACKGROUND

4.1. Under the Regulation for Generation, Transmission and Distribution of Electric Power Act (XL of) 1997 (the NEPRA Act), the National Electric Power Regulatory Authority (NEPRA) is responsible, inter-alia, for determining tariffs and other terms and conditions for the supply of electricity through generation, transmission and distribution. NEPRA is also responsible for determining the process and procedures for reviewing & approving tariffs and recommending tariff adjustments etc.

4.2. SammarGah Hydro Joint venture "SGHJV" (the successful bidder) intends to set up BOOT basis, a 28 MW hydropower project at Sammar Nallah in District Kohistan in the KPK province of Pakistan. Proposal of the subject project has been approved by SHYDO as conveyed by SHYDO letter No. 204-09/SHYDO/DPP/SummarGah dated July 08th, 2011.In accordance with the policy of the GoKPK and GOP, SGHJV is submitting this petition for determination of Feasibility Stage Tariff for the Project based on the technical data and cost estimates given in the Project Proposal as per SHYDO RFP and Feasibility report and related facts in order to facilitate its financing and implementation. SGHJV is also submitting an application separately for grant of Generation License for the Project.

4.3. In accordance with the requirements of the NEPRA Act and Rules and Regulations made there under, SammarGah Hydro (Private) Limited hereby submits this Petition, in accordance with the NEPRA (Tariff Standards and Procedure) Rules 1998,for determination/approval of the Feasibility Stage Reference Tariff and its Adjustment/Indexation provisions and other terms and conditions for the Project.

5. INTRODUCTION

5.1. The SammarGah Hydro Joint Venture sponsored by "Saadullah Khan & Brothers" (SKB) and B.C. International (Pvt.) Limited (BCI) having the requisite technical and financial strength accepted to undertake implementation in the private sector of the SammarGah 28MW Hydropower Project pursuant to the Policy for Power Generation

Projects 2006 KPK and GOP's Policy for Power Generation 2002. The Summar Gah Hydro Joint Venture. (SGHJV) submitted its proposal on February 2011 in response to RFP issued by SHYDO. The SGHJV was qualified and "NOC" acceptance letter was issued dated July 08th, 2011 (***Attachment-I***). The copy of approved Proposal SGHJV dated February 2011 and Project Feasibility study for Sammar Gah 28 MW Hydropower Project dated November 1994 is attached as ***Attachment-XV*** and ***Attachment-XVI*** respectively.

5.2. Pursuant to the direction of the SHYDO, this Tariff Petition has been prepared and filed by SammarGah Hydro Joint Venture (SGHJV), the successful bidder, in accordance with the requirements of the NEPRA Act and the rules framed there-under. SGHJV is a new prospective Independent Power Producer (IPP), and is currently not a licensee under the NEPRA Act. SGHJV shall therefore, simultaneously file a separate application with NEPRA for the grant of Generation License.

5.3. The Reference Tariff as determined by NEPRA pursuant to this Petition would become a part of Power Purchase Agreement (PPA) to be executed between SGHJV and the Power Purchaser i.e. CPPA/NTDC, based on the PPIB's standardized PPA format and as mutually agreed to by the parties to cover the project specific requirements.

5.4. All the pertinent information about the project i.e. sponsor information, technical description, financial data etc are either explained within or attached with this Petition.

5.5. SGHJV will be pleased to submit any additional information as and when required by NEPRA.

6. PROJECT DESCRIPTION

6.1. The Project envisages development, design, engineering, financing, construction, testing & commissioning, owning, operation, maintenance and transfer of 28 MW High Head Hydropower Plant at Summar Gah Gosak in District Dassu Kohistan area Khyber Paktunkhawa on Build, Own, Operate and Transfer (BOOT) basis in accordance with Power Generation Policy 2006 GoKPK, as revised 2008 and GOP's Policy for Power Generation Projects 2002, as amended from time to time.

6.2. The scheme is a run off the river hydropower station with a limited capacity for daily peaking. The intake consists of a weir with lateral intake as diversion structure combined with a gravel spill and sand trap. The headrace is a 120 m long rectangular canal which leads to 1600 m long tunnel with a storage capacity of about 12800 m^3. A surge tank is situated at the end of the tunnel. From there a 650 m long steel penstock connects to the powerhouse. In the powerhouse three horizontal shaft impulse turbines will be installed. The tail water is discharged to a short canal to Summar Gah/ Indus River.

The main design data of the scheme are:

P = 28 MW

Q = 9 m^3/sec

H = 390 m

E = 101.5 GWh/a

6.3. Pakistan has a total hydropower potential of about 50,000 MW. The present installed capacity of hydropower plants in Pakistan is about 6600 MW. The utilization of the available hydropower resource has thus remained too low in the past for various reasons. The Government is now encouraging development of hydropower plants on priority basis not only to meet power needs but also to support irrigation system.

6.4. Pakistan has been facing power shortage since 2006. The gap between demand and supply is rapidly increasing and the short-fall has at present mounted to about 4000 MW during peak power demand periods and besides discomforts to various segments of the society, the national economy is suffering badly. The Government intends to make up the shortfall as soon as possible by expediting building of the new power generation plants of various technologies and fuel mix. Hydropower plants are being given due attention as they are cheaper and reliable on long term basis.

6.5. PROJECT LOCATION

Summar Gah Hydropower Project is located on the Summar Gah Gosak which is a left bank tributary of the River Indus about 30 km North-West of Dasu. This area falls under the district administration of Dassu which is the District Headquarter of Kohistan area. The powerhouse is located below the KKH on the left bank of River Indus whereas the intake is located at the village Gosak situated on the left bank of Summar Gah. The scheme is situated at an altitude between 985 m (Powerhouse) and 1385 m (Intake) and a longitude of 35° 30′ and a latitude of 73° 24′.

6.6. SITE ACCESSIBILITY

The powerhouse area is located beside KKH and easily accessible. The access to the intake area is possible through an existing jeep able road, being blocked by a smaller rock fall. Some rehabilitation and protection works will have to be made before construction. The project area does not receive much snowfall in winter and roads area open throughout the year.

The distances of the project area can be shown in figures as listed below:

Peshawar-Mingora	approx.	160 km
Mingora-Besham (via Shangla Pass)	approx.	70 km
Besham-Dasu	approx.	60 km
Dasu-Sammar Gah	approx.	45 km

6.7. TOPOGRAPHY

The project area is located in the mountain range of Kohistan located near Dasu towards Gilgit on Karakoram Highway. The reduced elevation of the project area varies from 975 to 1375 m, steep and unstable slopes are encountered. Most of the left bank of SummarGah Gosak is inaccessible. A jeep able road cut exists along right bank of SummarGah in a neglected state. The jeepable road cut stops short of the village SummarGah.

The weir site is the narrowest place of SummarGah just inside the village located immediately downstream of a river bend. The river banks are almost vertical. At the weir site the left and right bank are held by about 6 m high boulders which have attained a stable position in natural course. These two boulders are proposed to serve as stable abutments for the weir. In between these two boulders, two more boulders, one of about 4 m and the other 3 m height are lying on the proposed weir axis. These shall have to be blasted.

Higher topography on the left bank provides the opportunity of locating the power canal on a high contour to attain the hydrostatic head for the power development. Immediately downstream of the weir on left a narrow strip of relatively flat topography is available. It has a length of about 270 meters and has sufficient width (varying up to about 20 m) to accommodate intake and gravel spill. The sand trap structures and a covered power canal follow a covered connection canal, after which a vertical Rockwall is met. This area has boulders, trees and some houses, which shall have to be acquired and removed. From 270 m downstream of weir sudden change in topography takes places and the level rises from 1380 meters to about 1390 meters. Further onwards there is a steep rise in topography as we move away laterally.

The area of surge tank is high above the KKH (Elev. 1392). The mountain slopes drops up to about 70°. The area below KKH to the bank of Indus drops steeply from Elev. 1017 to the water line in Indus, the edge of Indus being a Elev. 976. The penstock shall have to follow the natural mountain slope up to 70° while the powerhouse will be located between KKH and Indus with turbine axis at about Elev. 985.5 to keep it above

water level in SummarGah river's outfall reach as well as Indus. The penstock shall have to cross underneath the KKH. Since powerhouse area between KKH and Indus is too steep and rugged, access road to powerhouse will be feasible taking off to go down to powerhouse from one kilometer along KKH and downstream of Indus.

6.8. HYDROLOGICAL STUDIES

Hydraulic data for feasibility design comprises of daily flows of the hydrological station Gosak at the village of the Gosak taken from October 1990 to May 1994 and low flow measurements taken during 1973, 1974, and 1975 on Thor river at Katobu, Khanbari Nalla upstream of month, Darel Nallah near Gomari, Tangir river at Jaglot. Details of these flow measurements are given in ***Attachment IV***. Two rating curves, each for a different period of the record were derived from the flow measurements. The two rating curves are parallel then they represent the discharge of two sites is very close to each other with small difference in elevation. Both rating curves along with their application period and the flow measurement are shown in ***Attachment IV***.

The minimum computed discharge from the records of SummarGah at Gosak available 100% of the time is 0.52 m^3/s, the flow available 95% of the time is 0.60 m^3/s and the flow available 90% of the time is 0.60 m^3/s.

Estimation of flood At Intake And Powerhouse

RETURN PERIOD (years)	SUMMARGAH AT INTAKE (A= 147 km^2) m^3/s	SUMMARGAH AT CONFLUENCE WITH INDUS (A= 160 km^2) m^3/s	INDUS RIVER AT CONFLUENCE WITH SUMMARGAH (A= 188.563 km^2) m^3/s
100	490	510	17,570
1,000	670	695	19,320
10,000	845	875	22,670

6.9. GEOLOGY OF PROJECT AREA

The project area lies in Chilas Complex (syn: Bahrain Pyroxene Granulites). It extends west to east from Dir through Swat Valley to Chilas where onwards it follows the flanks of the S-N elongated Nanga Parbet-Haramosh dome and stretch beyond Astor. The complex is predominantly composed of (feldspathic) nortes with subordinate ultramafic rocks, anorthosites, troctolites, gabbros and hypersthenes-quartz diorites. They are intruded by puroxenepegmatities, hornblende pegmatities,

anorthosities (some pegmatitic) and amphibolites dykes. The complex was metamorphosed in pyroxene granulite facies. The rocks especially the feldspathic members were partially degranulitized under amphibolites and greenschistfacies conditions.

The complex is intruded into the volcanic rocks and associated meta sediments of Kohistan. The southern margin is in contact with garnetiferous calcsilicate rocks. The northern contract of the complex is affected by amphibolitization and the intrusion of quartz diorite plutions. However, along the Indus near Bunji, noritic rocks intrude biotiteschists, and near Astor and along Skardu road they contain marble xenoliths.

The noritic members commonly display a strong foliation produced during deformation. The foliation is generally parallel to layering, which follows the E-W trend of the lopalith. Locally, however, it is oblique to layering and in some cases affects the amphibolites dykes, suggesting that it developed after rocks had been metamorphosed.

6.9.1. SEISMICITY

According to the "Preliminary Seismotectonic Map of Pakistan" (1979), the south of Indus Kohistan between Besham and Patan is one of the major earthquake zones of Pakistan, just north of the Main Mantle Trust (MMT), where earthquakes up to a magnitude of M≤7 were observed. The project area proper is situated just south of Agency south of the Northern Megashear (NM). Quakes of up to 6 or even 6.5 magnitude are common. Indus Kohistan as a whole belongs to "Zone 2" of the "Zone Map of Seismicity", which is described as "moderate damages; corresponding to Intensity VII of the MM-Scale". The "Pamir-Karakorum Region" is said to have "seismic activity at moderate to high level".

According to the map of "Structural Geology and Tectonic", round the project area in a distance of 50 km, at least one earthquake took place during the last decades with a magnitude of 6.0≤M≤6.5. furthermore, three earthquakes of 5.5≤M≤6.0 and another 12 quakes of 4.0≤M≤5.5 have been observed.

As the MMT and NM belong to the very active faults, design seismic coefficients Cn = 0.25 and Cv = 0.08 are recommended to be taken under consideration for structural analysis. These design seismic coefficients (horizontal and vertical acceleration) include the valuations and the classification of structures.

6.10. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The initial environmental examination study has been undertaken in accordance with EPA standards. It focuses on the impact resulting from the construction of the project. Both environmental and social impact of the proposed scheme have been Examined and discussed in IEE Report.

The Following are the scope of IEE at this stage:

- Assessment of the spatial, temporal and social dimensions (such as extent, quantum, magnitude and time of occurrence) of the adverse as well as the beneficial impacts
- Assessment of the degree of disturbances to the base line profile, if any.
- Identification of the best-suited measures for mitigating the adverse impacts
- Presenting a workable environmental management plan for insuring long-term environmental socioeconomic sustainability of the project.
- The detail of cost for environmental program is attached as ***Attachment-VIII***

6.11. INTERCONNECTION WITH NATIONAL GRID

It is expected that NTDC, being the Transmission Licensee, will develop the overall master plan for the area at earliest possible. No allowance for construction of transmission lines has been made in the Project's Cost estimates as it is the responsibility of the Power Purchaser/NTDC under GOP's November 2005 Guidelines for Determination of Tariff for IPPs. The scope of work of the Project and the estimated project cost may vary due to any change in the interconnection arrangement. The project cost and the Reference Tariff shall, therefore be adjusted for any variation in the cost necessitated due to change in the interconnection arrangement as finally advised by the NTDC.

7. SCOPE OF WORK

The scope of work of the project encompasses the following:

1) Diversion Structure consisting of Weir Lateral Intake structure with diving wall, trash rack and radial gates controlling flows.

2) Connecting Canal; 46m long

3) Sand Trap Structure

4) Headrace Canal; Covered Connecting Canal

5) Main Tunnel; 1600m long

6) Surge Tank; from elevation 1376-1389 with 12.5m diameter.

7) Penstock; 1600 mm diameter, max. velocity 4.48m/s, 650m long

8) Power House

9) Turbines; Three Pelton turbines for a discharge of 3cum/sec each are to be installed, with three jets per turbine. Capacity of each turbine is to be 9.5 MW for a total of 28.5 MW generation

10) Switch yard will be connected on top of powerhouse to transmission line.

11) Tailrace

Details of the above works are given in the feasibility report (***Attachment-XVI***).

8. SALIENT FEATURES OF THE PROJECT

The salient features of the proposed project are as under:

General	
Location	SummarGahGosak left Bank tributary River Indus 30 km North West Dassu
Province	Khyber Paktunkhawa
District	Dassu, Kohistan
River/Tributory	SummarNallah
HYDROLOGY	
Catchment Area	147 km^2
Design Flood	1000 Years
Discharge in 90% availability	0.69 m^3/s
Discharge In 50% availability	2.82 m^3/s
Percentage available corresponding to design discharge	17%
Lean Discharge	9 m^3/s
Maximum Discharge	30.56 m^3/s
INTAKE/DIVERSION STRUCTURE	
Diversion Structure	Rectangular Canal/Open Channel with diving wall
Elevation of crest(overspill section)	1383m
Intake Type	Lateral Intake with three openings regulated by gates
Maxlmum Water level	1384m
Length	120m
CONNECTING CANAL	
Length	46m
SAND TRAP	
Length	59m approx.
HEADRACE CANAL/OW PRESSURE TUNNEL	
Length	126m
Type	Covered Sectlon
HEAD RACE TUNNEL	
Length	1600m
Design discharge	9 m^3/s
Net inner diameter	3.20m (horiz.) and 2.95m (vertical)
Gross Cross section	Up to 11m^2
Net Cross Sectlon	8m^2(defined); 7.9854m^2(actual)
Number of adits	1
Length of the adit	Approx. 80 m
Rock classes	6 different rock classes
SURGE STRUCTURE	
Type	R.C C Lined
Diameter	12.5m
Height	elevation 1376 to 1389
Connecting Shaft Diameter	2.5m
Connecting Shaft Height	Elevation 1359 to 1375
PENSTOCK/PRESSURE SHAFT	
No. and Type	
Diameter	1600mm

Length of Penstock	650m
Type of steel for penstock liners	X52 steel
Maximum Water Velocity	4.48m/s
POWER HOUSE	
Type	Surface
Installed capacity	28.5 MW (9.5 MW x 3Units)
Size of Machine hall/transformer hall	38.5m x 19.3m
Maximum gross head	399.5m
Net head/Design Head	385.5
Type of Turbine/No. of Units	Three pelton turbines (3.00m³/s each with three jets per turbine)
Switch yard	132kV
TAIL RACE CHANNEL	
Type	Rectangular RCC
Size	4m/2.5m
Length	35m approx.
POWER GENERATION	
Installed Capacity	28 MW
Annual Generation	101.5 GWh/a
FINANCIAL ASPECT	
Total Implementation Cost	66.82 USD
Cost Per MW of Installed Capacity	2.386 USD
Levelized Tariff	12.791 cent/kWh

9. IMPLEMENTATION METHODOLOGY

The project will be implemented through and Engineering Procurement and Construction (EPC) Turnkey contractual arrangement. Feasibility Study envisages construction through an EPC contract, involving a consortium of a main contractor, a consulting firm for detailed design and a supplier of hydropower related E & M equipment and requires that the contractor be prequalified as a part of the international competitive bidding process. Alternatively, the project can be built by engaging two EPC contractors i.e. Engineering and Procurement Contractor and a Construction Contractor. The E&P Contractor will be responsible for the engineering, procurement of E&M plant and equipment, supply, supervision of erection, testing, commissioning and guaranteeing Plant performance and the Construction Contractor will be responsible for civil works, local transportation of imported plant and equipment, supply of local equipment and materials, erection, testing, commissioning of Plant under supervision of the E&P Contractor; the combined performance under the two Contracts will result in standard and fully functional Plant meeting required performance levels and all PPA requirements. In the latter case, a coordination agreement will also be signed by the three

parties i.e. Owner, E&P Contractor and Construction Contractor to delineate responsibilities of each party and thus satisfy the requirement of the project lenders and other stake holders. Final decision in this regards will be taken at the time of finalization of bidding documents by the Consultants to be engaged for the purpose.

Keeping in view the scarcity of time available for EPC contractor(s) to carry out the additional investigation and develop the design of the project, it is envisaged that additional geotechnical investigations and hydraulic studies will be carried out to firm up the feasibility level design for inviting the EPC tenders.

10. CONSTRUCTION PERIOD & IMPLEMENTATION SCHEDULE

According to Construction planning / Implementation Schedule ***Attachment V***, completion of construction of the Project and commencement of the commercial operation is envisaged in 36 months from the start of the detailed design which follows Financial Closing. Accordingly, for the purposes of Reference Tariff calculations for this Petition, the construction period of 36 months commencing from the "Financial Closing/ Notice to Proceed" has been assumed and Tariff Calculation have been made accordingly.

11. EXPENDITURES IN FOREIGN CURRENCIES

The Project costs are defined in US Dollars only while the actual payments are likely to be made in other currencies as well. In this connection GOP has already decided that IPPs would not be exposed to impact of exchange rate variation between US Dollars, Euros, Pound Sterling and Japanese Ten up to the Commercial Operation Date. Pursuant to this decision, the EPC price and other costs will be expressed in other currencies as applicable and NEPRA will be requested to allow indexation/ adjustment at the EPC or COD stage.

12. SUMMARY OF PROJECT COST

The summary of the project cost based on the information and data available as per feasibility documents and used for computation of the Reference Tariff for the project is given below:

	Description	Equivalent Total (Million Rs.)	Equivalent Total (Million US$)
	Direct Costs		
1	Civil Works	1,806.11	21.12
2	Electro-Mechanical Works	2,091.95	24.47
3	Studies	40.00	0.47
4	Feasibility Studies Cost - to be paid to SHYDO	10.63	0.12
5	Initial Works/other works	82.04	0.96
	Sub-Total Direct/Construction Cost	4,030.75	47.14
6	Engineering Services/Project Development	191.46	2.24
7	Owner's Administration	119.91	1.40
	Sub Total Engineering & Admin Cost	311.38	3.64
	Total Base Cost	4,342.12	50.79
	Indirect Costs (Non-EPC)		-
8	Insurance (1.35%)	52.62	0.62
9	Other Financing Fee/Expenses	7.12	0.08
	Sub-Total Indirect Costs (Non-EPC)	59.75	0.70
	Total Project Cost Excluding (IDC)	4,401.87	51.48
10	Interest During Construction (IDC)	1,311.15	15.34
	Total Project Cost Including (IDC)	**5,713.01**	**66.82**

Detailed Component wise Project Cost is attached as ***Attachment-VII***.

13. DETAILS OF PROJECT COST

13.1. ENGINEERING SERVICES / PROJECT DEVELOPMENT

The Engineering Services include pre-construction and during construction engineering required for project development. This includes SHYDO & NEPRA fee / securities, purchase of RFP documents and other expenses associated with project development. The Engineering Services also inclusive of preparation of Engineering Design, EPC Tender documents, evaluation of bids and other associated engineering, technical assistance & Quality Control.

13.2. OWNER'S ADMINISTRATION

The Owner's administration cost include local and foreign procurement administration, internal expenditures associated with the undertaking of the Project during construction covering salaries and related costs of the company employees, office costs including rents, supplies and furniture & maintenance etc. and the costs associated with supervision and monitoring of the construction contract and all other aspects of the project.

13.3. PRE-COD INSURANCE COST

Pre-COD insurance costs covers the insurance cost of Project Company's assets during construction and the same are incurred prior to COD. This cost is estimated at 1.35% of EPC costs.

13.4. CUSTOM DUTIES AND TAXES

Custom Duties and taxes have not been included in Electrical & Mechanical equipment at this stage. SGHJV will submit necessary details for reimbursement (if any) of custom duties and taxes on imports at COD stage for tariff adjustment.

13.5. INTEREST DURING CONSTRUCTION (IDC)

Interest during construction (IDC) has been calculated on the basis of the construction period of 36 months. Actual IDC, however, shall be subject to change depending on the fluctuations in the base rate (3-month KIBOR) and funding requirements (draw-downs) of the project during the construction period etc. The tentative implementation schedule is attached as ***Attachment V*** and an estimated draw down schedule is attached as ***Attachment IX***.

Basis for IDC Calculation

3-month KIBOR	13.00 %
Spread	3.00%
Total Interest Rate	16.00%

13.6. FINANCIAL CHARGES

Financial Charges include the costs related to the Debt financing of the Project. Such costs include, inter alia, the lenders' up-front fee and commitment fee; charges related to various letters of credit to be established in favor of various contracting parties; fees payable and stamp duty applicable on the financing documents; agency fee; security trustee fee etc. the Financial Charges are estimated as Rs. 7.12 Million.

14. REFERENCE TARIFF

14.1. CAPITAL STRUCTURE

The capital structure of the Project is as follows:

	Rs. Million	US$ Million
Debt	4570.41	53.46
Equity	1142.60	13.36
Total Capital Cost	5713.01	66.82
Debt Equity Ratio	80:20	

14.2. WATER USE CHARGE

According to Policy for "Hydropower Generation Projects 2006 Government of Khyber Pukhtunkhawa (8.2.3/103)", the Government of Khyber Pukhtunkhawa will not levy any Water Use Charges for projects up to 50 MW capacities thus water use charges have been taken as Rs. 0.00/Kwh.

14.3. OPERATION AND MAINTENANCE COSTS

The operational cost of the project has been divided into two parts:

- Variable O & M Cost
- Fixed O & M Cost

14.3.1. VARIABLE O & M COSTS

Variable O & M component caters the cost of the services of the O & M operator, contractors' mobilization and replacement of spare parts on completion of their service life as well as replacement on account of premature failure of the parts. It also includes cost of maintenance for unscheduled / unforeseen outages and consumption of lubricants,

chemicals etc. 80% of this component is in foreign currency to cater for the procurement of the spare parts and technical services from abroad.

14.3.2. FIXED O & M COSTS

This component mainly includes management fee and cost of expatriate services for operation and maintenance of the plant. It also includes remuneration to the staff and other administrative costs including rents, utilities, NEPRA fees, audit fees, legal retainer ship, consultancy fees, environmental monitoring and reporting fees. The fixed O & M cost includes 20% foreign component and 80% local component.

The break-up of annual estimated operating cost are as follows:

Description of Expense	Amount in Rs.	Amount in US$
Variable O & M Cost	43,831,357.3	512,647.45
Fixed O & M Cost	54,316,768.85	635,283.85
Total	98,148,126.15	1,147,931.30

14.4. INSURANCE COST

The insurance component consists of all risk insurance/reinsurance for the project, as well as business-interruption insurance, which are lenders and PPA stipulated requirements. Insurance policies are required to be maintained for the plant life as specified in the standardized PPA. The risks to be covered through insurance shall include machinery breakdown, natural calamities (like earthquake), sabotage and consequential business interruption, etc. The annual insurance estimated as 1.35% of the EPC has been worked out to US$ 6,36,433.53 (Rs. 54,415,066.7). This component would also be subjected to indexation both for US CPI inflation as well as Rs / USD exchange rate variations.

14.5. RETURN ON EQUITY

The ROE component includes 17% return (IRR based) on the invested equity. Under the Generation Policy 2006 GoKPK, as amended, the hydropower project is to be constructed on Build, Own, Operate and Transfer (BOOT) basis, Pursuant to GOP's November 2005 Guidelines for Determination of Tariff for IPPs, equity has been redeemed after completion of the debt servicing. The project on expiry of the concession

period would be transferred to the government against national cost as stipulated in the Punjab Power Generation Policy 2006, as amended.

14.6. DEBT SERVICING COMPONENT

The debt servicing (repayment of principal and interest charges) would be on quarterly basis for a 19-year period after the grace period. There would no charge under this category for the next 31 years of plant operation. The debt portion is presently estimated as 80% of the project cost.

14.7. LAND LEASING COST

The land leasing cost has been established as per "Policy for Hydropower Generation Projects 2006 GoKPK" Clause 35(i). The Land Leasing Cost included in Reference Tariff Table is as follows;-

Duration	Lease Cost Per Year (Rs.)
1 to 10 years	28,000,000
11 to 20 years	35,000,000
21 to 30 years	43,750,000
31 to 40 years	54,687,500
41 to 50 years	68,359,375

14.8. REFERENCE EXCHANGE RATE

The local currency components of total capital cost have been translated to US$ at the following reference exchange rate:

US$ 1 = PAK Rs. 85.50

14.9. CARBON CREDITS

Hydropower is a clean form of electricity. The project will reduce C02 emissions and would mitigate other pollutants, such as S02, NOx and particulates associated with power generation from fossil fuels. The actual amount, timing, other details of the monetary gains from carbon credit schemes are uncertain at this point. So the Generation Tariff for the project is calculated irrespective of the outcome of the carbon credits.

14.10. HYDROLOGICAL RISK

For Hydel Power Projects, water inflows to generate electricity do not remain the same throughout the year rather they depend on seasonal variations. The output of power plant is accordingly dependent on water inflows. During a period of lean water inflows, the power project will not be able to cover its fixed costs due to actual operation of the plant at less than average estimated plant factor. According to Power Generation Policy 2006 GoKPK the hydrological risk shall be borne by the power purchaser.

14.11. BASIC DATA FOR ECONOMIC ANALYSIS

The basic financial data for economic and financial evaluation are shown below:

Item	Unit	Value
Estimated Plant Gross Capacity	MW	28.00
Estimated Plant Net Capacity	MW	27.72
Annual Gross Energy Generation	GWh	101.5
Auxiliary Consumption @1.0%	GWh	1.015
Estimated Annual Net Energy	GWh	100.485
Annual Plant Capacity Factor	%	41.38
Project Basis		BOOT
Operation time		50 years
NPV Discount rate	%	10
Debt to equity ratio		80 : 20
Debt finance-loan terms:		
Loan Tenure	Year	19 years plus 36 months grace period
Interest rate	%	3 month KIBOR at 13.00% per annum + 350 base points
Payment Schedule		Quarterly payments inclusive of principal and interest
Equity finance:		
Return on Equity During Construction	%	17.0
Return on Equity (IRR basis)	%	17.0
Withholding Tax on Dividend	%	7.5
Variable O & M Costs	USD/a	512,647.45
Fixed O & M Costs	USD/a	635,283.85
Insurance		1.35% of EPC Cost
Water Use Charge		NIL

Cost Components	Adjustment/ Escalation
Cost Variation in Civil Works, Hydraulic Steel Structure and M&E Works	Based on EPC Contract(s) Price
Cost Variations of Civil Works due to Detailed Design	Item-wise variation in BOQs based on detailed design after EPC Contract(s)
Civil Works Escalation	As per variation in escapable input cost items
Cost Variation Due to Geology of Tunnel Works	On actual basis supported by documents
Variation in Settlement Costs	On actual basis supported by documents

Tariff Components	Indexation Factor
Fixed Charges (Rs./KW/Month)	
Fixed O & M Costs Local Foreign	 WPI PKR/US$, US CPI
Insurance	PKR/US$
Return on Equity	PKR/US$
Return on Equity during Redemption	PKR/US$
Debt Service	Variation in KIBOR
Variable Charges (Rs./Kwh)	
Variable O&M Local Foreign	 WPI PKR/US$, US CPI
Water Use Charge	NIL

14.12. OTHER GENERAL ASSUMPTIONS

The proposed Reference Tariff is based on the following assumptions. Any change in any of these assumptions will result in changes in the Reference Tariff:

a) Project financing structure is based on **80:20** debt-equity ratios.

b) The exchange rates are assumed to be **85.50** for PKR /USD.

c) 100% of Debt has been assumed to be financed through local banks and financial institutions.

d) A constant ROE is assumed which results in an IRR of 17% over 50 years.

e) Custom Duties have not been included on the import of plant and equipment at this stage. Any cost incurred in the Custom Duties as per actual payment will be adjusted at COD.

f) No tax on any income of the SGHJV including sales proceeds from NTDC is assumed. Corporate Tax, General Sales Tax, and all other taxes shall be treated as pass through items.

g) The construction period for the purpose of Reference Tariff calculations has been assumed as 36 months from the 'Notice to Proceed' to the EPC contractor. In case the completion of the project takes more than 36 months, IDC and ROEDC shall be adjusted based on the actual time taken for the completion of the project.

h) Power Purchaser shall make payments to SGHJV to cover all the energy delivered to the Grid during the pre-COD period on account of the trial runs and during testing/resting, Commissioning of the Plant and during additional Commercial Operations Tests until COD is achieved. Payments will be invoiced to the Power Purchaser as per the EPP component of Reference Tariff in accordance with the mechanism specified in the PPA. Similarly, the price of energy delivered during post-COD testing shall be paid as per the EPP component of the Reference Tariff.

i) The Power Purchaser shall be solely responsible for the financing, engineering, procurement, construction, testing and commissioning of the Interconnection and facilities. The Power Purchaser shall complete all activities and commission the Transmission facilities at least three months prior to the Schedule commissioning of the first unit.

j) All generable energy from the plant shall be fully dispatched / accepted by the Power Purchaser or payment in lieu thereof shall be made by the Power Purchaser.

k) Withholding Tax on dividend @7.5% as required under the Income Tax Ordinance, 2001 is assumed. Any change in the rate of the withholding tax would be pass-through to the Power Purchaser.

l) Zakat deduction on dividend (at 2.5%) as required under Zakat Ordinance is considered as a pass through.

m) No Debt service Reserve Account (DSRA), Maintenance Reserve Account or Contingency Reserve Account or any other Reserve Account has been considered in the tariff model.

n) During construction period, the timing of debt drawdown may vary from that estimated now; as such, the actual 'Interest during construction' (IDC) will be updated at COD and the Reference Tariff table will be adjusted accordingly. Similarly the adjustments for variations in the assumed benchmark interest rates etc shall be applied.

o) Tolerance of +/- 3% in Dispatch is assumed.

p) No hedging cost has been assumed for exchange rate fluctuations during construction.

q) In case of any unintentional error or omissions, typographic errors, and any genuine assumption being overlooked, the same will be corrected/ incorporated and advised to NEPRA as soon as SGHJV becomes aware of it.

r) Any additional indexation or concession allowed by the GOP, NEPRA or another Government functionary to any IPP shall be allowed to SGHJV without any discrimination.

14.13. SUMMARY OF FEASIBILITY STAGE REFERENCE TARIFF

The summary of Feasibility Stage Reference Tariff is given below:

Tariff Components	Year 1-19	Year 20-50
Capacity Purchase Price (CPP)	**Rs/Kw /Month**	**Rs/Kw/Month**
Fixed O & M- Foreign	32.331	32.331
Fixed O & M- Local	129.326	129.326
Insurance	161.950	161.950
Return on Equity	578.102	582.586
ROE during Construction	176.708	176.708
Withholding Tax @7.5%	61.201	61.564
Debt Service	2,292.750	2,292.750
Land Lease Cost	83.333 (1-10 Years) 104.167 (11 to 20 Years) 130.208 (21 to 30 Years) 162.760 (31 to 40 Years) 203.451 (41 to 50 Years)	
Energy Purchase Price	**Rs/Kwh**	**Rs/Kwh**
Variable O & M- Foreign	0.349	0.349
Variable O & M- Local	0.087	0.087
Water Use Charges	NIL	NIL
Total Levelized Tariff (Rs./Kwh)	**10.936**	
Total Levelized Tariff (US¢./Kwh)	**12.791**	

14.14. NEPRA MECHANISM FOR TARIFF DETERMINATION

NEPRA's Mechanism for Determination of Tariff for Hydropower Projects dated July 18, 2008, requires determination / revision of tariff for hydropower projects at the following three stages:

a) The **first stage** foreseen in the Mechanism is for a tariff based on the costs at Feasibility Study of the Project. Feasibility Study is required to be complete, accurate and supported by relevant details including unit rates for various activities.

b) The **second stage** envisaged in the Mechanism provides revision in the Feasibility Stage tariff on the basis of EPC Contact(s). Following adjustments are allowed at this stage.

   i. **Cost Variation due to Geology in Tunnels**: The cost variations are allowed either due to escalation of rates or changes due to a different classification of rocks encountered during execution.

   ii. **Civil Works Cost Escalation**: Adjustment in costs is allowed due to escalation in prices of Steel, Cement, Labor and Fuel.

   iii. **Cost Variation in Hydraulic Steel Structure and M & E Works**: The costs of Hydraulic Steel Structure and M & E Works are adjustable based on the costs in the EPC contract(s).

c) The **third stage** visualized in the Mechanism is the final revision in costs (arrived at after EPC contracts) allowed at COP. The adjustments include:

   i. Cost Variation due to Geology in Tunnels;

   ii. Civil Works Cost Escalation;

   iii. Cost Variation in Hydraulic Steel Structure and M & E Works; and

   iv. Cost Variation due to Resettlement Cost.

The adjustments on account of (i) and (ii) above are allowed in the same manner as at EPC stage up to the date the project is scheduled to achieve COD. The Cost Variation in Hydraulic Steel Structure and M&E Works item

(iii) is allows at EPC stage or alternatively at COD provided no adjustment is sought at EPC stage. As regards item (iv) above, variations in resettlement cost and land costs from those given in the Feasibility report are allowed provided the initial rates and variation in them are certified by the concerned provincial government and approved by NEPRA.

Feasibility Study of the project has been prepared by the renowned consultants in November 1994 and cost were updated through by SGHJV dated February 2011 (approved proposal). It is supported by the relevant details including unit rates for various activities. The Reference Tariff proposed for the project through this petition has been computed based on the cost estimates provided in the Proposal Reference Tariff initially determined pursuant to this Petition shall be subject to adjustment in accordance with NEPRA Mechanism for Determination of Tariff for Hydropower Projects as discussed below.

i. Cost Variations Due to Geology In Tunnel

ii. Civil Works Cost Escalation;

iii. Cost Variation in Hydraulic Steel Structure and M&E Works; and

iv. Cost Variation due to Resettlement Cost.

The adjustment would be sought at EPC and COD stage substantially in accordance with the provisions of the specified Mechanism.

14.15. COST VARIATIONS DUE TO GEOLOGICAL CONDITIONS

The Proposed Tunnel alignment of the SummarGah Hydropower scheme extends for approximately 1600 m through a range of rock units and structures. A summary of Principal Lithologies and geology faults that are anticipated along this route is presented in feasibility ***Attachment XVI.***

For SUMMER GAH the following data were given:

Total length, inclusive an adit of 80 m.	1680 m
Mean cross-sectional area	10.40 m^2

According to the geographical study the classification of rock for the alignment of the tunnel (including adit) as follows:

Type of Rock	Length (m)	%
A/B	840	50
C	515	31
D	240	14
E	68	4
F	17	1
Total	1680	100

This rock classification profile has been used in costing excavation for tunnel. The modality and rates for the rock excavation proposed at this stage will be re-determined at the EPC stage and will be subject to adjustment and escalation based on actual type of rock encountered during excavation of work and the escalation of input cost over time.

14.16. CIVIL WORKS COST ESCALATION

Price adjustment formula in accordance with PEC Standard Documents (Currently being used in Pakistan by different Departments including NHA) shall be used for Civil Works cost escalation. The cost of Civil Works will be subject to adjustment from time to time during construction for any variation in the base price of the above inputs i.e. Steel, Cement, Labour (both skilled and unskilled), Steel Rebar/Iron Bars, Bitumen and Fuel (HSD) etc. The revised prices of the input cost items subject to escalation shall be as notified. The escalation shall be, however, be subject to agreement with the EPC Contractor.

Price adjustment formula in accordance with PEC Standard Documents is as follows:

1. $A = \frac{C \times VOW\ (Current\ price - Basic\ Price)}{(Basic\ Price)}$

Where:

- A = Adjustment in Contract Price for the period of price change
- C = Proportion of cost element of Specified Material in works. (Weightage)
- VOW = Value of permanent Works executed during the period of change in price
- The Above mentioned formula is applicable for High Speed Diesel, Labour (Skilled & Unskilled only)

2. $A = \frac{Quantity\ Of\ Material\ Consumed \times (Current\ price - Basic\ Price)}{}$

Where:

- A = Adjustment in Contract Price for the period of price change
- The Above mentioned formula is applicable for Cement, Steel & Bitumen

3. Source Of Indices and Weightages:

Sources and weightages are listed below;-

Sr. No.	Description	Unit	"C" Factor	Applicable index/ Source
1	2	3	4	5
(i)	High speed Diesel	Litter	0.18	Monthly Bulletin Of Statistics Government of Pakistan (GP) Federal Bureau of Statistics (FBS),Table 11.11, for Abbotabad
(ii)	Labour (Skilled)	Day	.078	Monthly Bulletin Of Statistics Government of Pakistan (GP) Federal Bureau of Statistics (FBS),Table 11.12, for Abbotabad
(iii)	Labour (Un-Skilled)	Day	.052	" " "
(iv)	Iron Bars*	Tonne	Actual Consumption	" " "
(v)	Cement	Bag		" " "
(vi)	Bitumen 60/70	Tonne		National Refinery- Karachi

Notes:

1) Indices for "(i)" to "(v)" are taken from the Government of Pakistan Federal Bureau of Statistics, Monthly Statistical Bulletin & for (vi) National Refinery–Karachi will be used as source. The base cost indices or prices shall be those applying 28 days prior to the latest day for submission of bids. Current indices or prices shall be those applying 28 days prior to the last day of the billing period.
2) "Mason" is considered as representative for all Skilled labor
3) "Iron Bar" is considered as representative of All steel reinforcement, structural steel shapes like sheets, angle & others related to steel gates / structures

14.17. COST VARIATION IN HYDRAULIC STEEL STRUCTURE AND M & E WORKS

These costs shall be subject to adjustment based on the actual price in the EPC stage or alternatively at COD provided no adjustment in sought at EPC stage. SGHJV will submit necessary details along with documents in support to NEPRA for adjustment/ enhancement of the Feasibility Stage Reference Tariff or alternatively EPC Stage Reference Tariff.

14.18. COST VARIATION DUE TO RESETTLEMENT COSTS

An amount of Rs. 20 million for environmental /ecology and social costs is included in the cost estimate. It includes the compensation cost for land, trees, houses etc. Similarly, it includes the cost for mitigation programme, monitoring programme, recreational facilities etc. it includes the cost for maintaining and improving the environmental status of the project area during and after construction, additional plantation etc. item-wise detail is given ***Attachment VIII***. The compensation costs for land, trees, houses, resettlement, etc shall be incurred through the provincial administration. Any additional cost incurred by SGHJV shall require proportionate enhancement of the Reference Tariff. SGHJV will submit necessary details along with documentation-in-support to NEPRA for adjustment/ enhancement of the Feasibility / EPC Stage Reference Tariff.

14.19. VIABILITY OF THE PROJECT

Major advantages of hydropower plants are as under;

Hydropower plants are economical on long-term basis. No fossil fuel is required; hence, operation cost is low. These advantages grow with the passage of time due to escalation of fuel cost and degradation of heat rate of thermal plants existing in the system. Tariff is thus sustainable on long term basis. These can be quickly synchronized and brought on full load within a few minutes. These are capable of responding to rapid variations in load without loss of efficiency. The plant and associated civil structures have a long life. Maintenance requirements are lesser as compared to thermal and nuclear power plants. Un-foreseen outages are less frequent. Run-of-river hydropower plants are better suited for base-load duty. By taking fluctuation of all kinds, the hydropower plants improve the overall operational stability and reliability of the system.

They reduce energy-related CO_2 and other gaseous emissions and mitigate climate change/global warming.

A few disadvantages of the hydropower plants include high capital cost, long gestation period and higher risks during construction besides environmental and resettlement issues. However, this project involves exceptionally minor resettlement. The operating capacity of the hydropower plants, being dependent on available water, varies throughout the year and considerably reduces during dry year. Nevertheless the benefits of hydropower plants outweigh their disadvantages. In fact, the hydroelectric energy is the most viable mode of renewable energy available for utilization.

28 MW Hydropower Project at SummarGah has all the advantages enumerated above. The tariff being sought by the SGHJV is much lower than the present tariffs of various technology thermal power plants with their emissions adversely impacting the environment. The tariffs of thermal power plants are based on 60% plant capacity utilization factor and in case plant utilization is less than 60% the actual tariff would be higher. Further, these tariffs would keep on increasing over time due to efficiency degradation and increasing price of the fuels. The proposed Levellized Reference Tariff of US Cents 12.791/kWh (Rs. 10.936/kWh) for 28 MW Hydropower Project at SummarGah will become cheaper than those of the thermal power plants with the passage of time as it will not be affected by any increase in the fuel price. It is also environmental friendly. The project with the proposed Reference Tariff will provide an IRR based 17% return to investors during the operating period. This is a fairly reasonable return when compared to other ventures of similar magnitude and risks available in the market. All the stakeholders including the Power Purchaser the provincial government and the electricity consumers will indeed reap benefits on completion of this project. The 28 MW Hydropower Project at SummarGah is, therefore, viable for implementation.

14.20. DETERMINATION SOUGHT

The Petitioner requests the National Electric Power Regulatory Authority (NEPRA) to kindly approve/determine the following:

1) Feasibility Stage Reference Tariff for the 28 MW Hydropower Project at SummarGah for a period of fifty (50) Agreement Years from the Commercial Operations Date;

2) Provisions for adjustment of Reference Tariff for EPC Cost as contracted and for the Cost Reopeners specific to hydropower project; and

3) Adjustment / indexation of the Reference Tariff components over the period of fifty (50) Agreement Years and approval of other salient terms and conditions of the Power Purchase Agreement.

Attachments

I. NOC/Approval Notification SHYDO
II. Cost of Feasibility Incurred by SHYDO
III. Location Plan
IV. Hydrological Data
V. Implementation Schedule
VI. Abstract of Project Cost
VII. Detailed Component Wise Project Cost
VIII. Estimated Cost of Environmental Program
IX. Draw Down/ Cost Disbursement Schedule
X. Proposed Reference Tariff
XI. Debt Servicing Schedule
XII. Additional Supporting Data [IDC, ROEDC, ROE, Land Lease Cost, Cash Flows]
XIII. Project Economic Analysis
XIV. Financial Flow feasibility
XV. SHYDO Approved Proposal
XVI. Feasibility Report

ATTACHMENT NO-XVII

- INITIAL ENVIRONMENTAL REPORT
- **(ATTACHED SEPARATELY)**

- Volume-1 of 1:
  - Initial Environmental Examination Report

Annex 7.3

TABLE 1

INDUS CATCHMENT
LOW FLOW MEASUREMENTS ON VARIOUS TRIBUTARIES

MEASUREMENT SITE	DATE	DISCHARGE (m^3/s)	SPECIFIC DISCHARGE ($m^3/(s\text{-}km^2)$)
Thor Nallah at Katobut A = 440 km^2	10/12/73 02/01/74 24/01/74 05/03/74	1.14 0.79 0.96 0.67	0.0026 0.0018 0.0022 0.0015
Khanbari Nallah u/s of Mouth A = 853 km^2	07/02/74 05/03/74	1.60 1.39	0.0019 0.0016
Darel Nallah near Gomari A = 482 km^2	19/11/73 03/01/74 24/01/74 05/03/74	3.17 2.15 2.57 1.72	0.0066 0.0045 0.0053 0.0036
Tangir river at Jaglot A = 798 km^2	19/11/73 03/01/74 24/01/74 05/03/74	5.47 3.45 4.05 4.02	0.0069 0.0043 0.0051 0.0050
Kandiah river at Thauti A = 2042 km^2	28/12/75	11.33	0.0055

Annex 7.3

TABLE 2

SUMMAR GAH AT GOSAK
FLOW MEASUREMENTS

SrNr	Date	G. Reading (m)	Discharge (m^3/s)	Area (m^2)	Velocity (m/s)
1	05/04/90	0.83	2.91	2.50	1.16
2	05/12/90	0.47	0.61	1.51	0.40
3	05/02/91	0.40	0.96	1.45	0.67
4	29/04/91	1.00	5.45	3.83	1.42
5	05/11/91	0.67	0.95	1.01	0.94
6	13/12/91	0.65	0.95	1.03	0.92
7	20/02/92	0.59	0.68	1.21	0.56
8	17/03/92	0.79	1.62	2.71	0.60
9	20/03/92	0.82	2.02	3.04	0.67
10	28/04/92	1.03	5.52	3.88	1.43
11	25/01/93	0.62	0.88	1.09	0.81
12	25/02/93	0.76	1.45	1.48	0.98
13	03/08/93	1.35	9.81	4.22	2.33
14	29/09/93	0.87	2.55	3.78	0.68
15	01/11/93	0.78	1.04	1.50	0.70
16	12/12/93	0.75	0.93	1.59	0.58
17	19/01/94	0.68	0.94	2.21	0.43
18	11/02/94	0.70	0.82	1.45	0.57
19	23/03/94	0.92	2.80	2.15	1.30
20	06/04/94	1.01	3.41	2.58	1.32
21	18/05/94	1.28	8.32	4.68	1.78
22	27/05/94	1.36	10.44	5.73	1.82
23	10/06/94	1.35	9.97	5.72	1.74
24	17/06/94	1.43	11.81	4.82	2.45
25	21/08/94	1.03	6.10	3.36	1.82

Annex 7.3

TABLE 3

SUMMAR GAH AT GOSAK
SUMMARY OF DAILY, MONTHLY AND ANNUAL FLOWS (MAY 1990 - MAY 1994)

PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ
SURFACE WATER HYDROLOGY PROJECT

STREAMFLOW DATA (m^3/s)
YEAR : 1990

CODE : 35734301
STATION : GOSAK
RIVER : SUMMAR GAH
BASIN : INDUS

LATITUDE : 35 29 30
LONGITUDE : 73 23 55
ELEVATION : 1320 masl
CATCHMENT AREA : 147 km2

AGENCY : SHYDO
PROVINCE : NWFP
INSTALLED : 17/ 5/1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-1.000	-1.000	-1.000	-1.000	-1.000	9.799	12.62	3.731	3.671	1.364	.692	.648
2	-1.000	-1.000	-1.000	-1.000	-1.000	10.88	12.62	3.731	3.983	1.364	.692	.648
3	-1.000	-1.000	-1.000	-1.000	-1.000	10.32	12.62	3.731	2.132	1.234	.692	.648
4	-1.000	-1.000	-1.000	-1.000	-1.000	11.47	12.03	3.671	2.132	1.234	.692	.648
5	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	10.88	3.671	2.046	1.234	.692	.648
6	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	10.88	3.671	2.046	1.202	.692	.605*
7	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	9.901	3.671	2.046	1.171	.692	.605
8	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	8.782	3.438	2.046	1.004	.692	.605
9	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	8.483	3.438	2.046	1.052	.692	.605
10	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	7.830	3.438	1.881	1.052	.692	.605
11	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	6.939	3.438	1.881	1.052	.692	.605
12	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	6.939	3.382	1.881	1.052	.692	.564
13	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	6.111	3.105	1.881	1.052	.692	.564
14	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	5.343	3.105	1.723	.940	.692	.564
15	-1.000	-1.000	-1.000	-1.000	-1.000	12.03	5.636	3.105	1.723	.940	.692	.564
16	-1.000	-1.000	-1.000	-1.000	-1.000	12.62	6.111	3.105	1.723	.940	.648	.564
17	-1.000	-1.000	-1.000	-1.000	3.983	12.14	5.343	3.105	1.723	.940	.648	.564
18	-1.000	-1.000	-1.000	-1.000	4.634	12.03	4.634	2.893	1.723	.940	.648	.564
19	-1.000	-1.000	-1.000	-1.000	4.634	10.32	4.294	2.893	1.723	.887	.648	.564
20	-1.000	-1.000	-1.000	-1.000	4.634	10.88	3.983	2.893	1.723	.887	.648	.564
21	-1.000	-1.000	-1.000	-1.000	3.983	12.03	3.671	2.690	1.723	.887	.648	.564
22	-1.000	-1.000	-1.000	-1.000	3.983	12.62	3.388	2.690	1.723	.862	.648	.564
23	-1.000	-1.000	-1.000	-1.000	4.634	12.62	3.388	2.690	1.574	.836	.648	.564
24	-1.000	-1.000	-1.000	-1.000	4.634	12.62	3.983	2.690	1.538	.836	.648	.564
25	-1.000	-1.000	-1.000	-1.000	5.343	12.62	3.983	2.690	1.502	.786	.648	.564
26	-1.000	-1.000	-1.000	-1.000	6.111	14.13	4.294	2.402	1.467	.786	.648	.564
27	-1.000	-1.000	-1.000	-1.000	6.939	15.46	3.793	2.402	1.467	.786	.648	.564
28	-1.000	-1.000	-1.000	-1.000	6.939	13.36	3.793	2.310	1.432	.786	.648	.564
29	-1.000	-1.000	-1.000	-1.000	7.830	12.62	3.793	2.132	1.467	.738	.648	.564
30	-1.000	-1.000	-1.000	-1.000	8.782	12.62	3.671	2.132	1.467	.692	.648	.564
31	-1.000	-1.000	-1.000	-1.000	9.901	-1.000	3.671	2.132	-1.000	.692	-1.000	.564

MONTHLY SUMMARY

Mean	:	-1.000	-1.000	-1.000	-1.000	-1.000	12.31	6.561	3.038	1.903	.975	.670	.58
Spec D	:	-1.000	-1.000	-1.000	-1.000	-1.000	83.76	44.64	20.67	12.95	6.633	4.558	3.98
Run-off	:	-1.000	-1.000	-1.000	-1.000	-1.000	217.1	119.6	55.35	33.56	17.77	11.81	10.6
Vol(1)	:	-1.000	-1.000	-1.000	-1.000	-1.000	31.91	17.57	8.137	4.933	2.612	1.737	1.56
Vol(2)	:	-1.000	-1.000	-1.000	-1.000	-1.000	.026	.014	.007	.004	.002	.001	.00

ANNUAL SUMMARY

Mean : -1.000 m3/s Spec D: -1.000 lt/(s-km2) Run-off: -1.000 mm
Vol(1): -1.000 m3*10**6 Vol(2): -1.000 maf
Daily Max: -1.00 m3/s on Daily Min: -1.000 m3/s on
Max. Inst. Flow: -1.000 m3/s on

Note: * Discharge measurement made on this day.

Annex 7.3

TABLE 3 (CONT.)

SUMMAR GAH AT GOSAK
SUMMARY OF DAILY, MONTHLY AND ANNUAL FLOWS (MAY 1990 - MAY 1994)

PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ
SURFACE WATER HYDROLOGY PROJECT

STREAMFLOW DATA (m^3/s)
YEAR : 1991

CODE : 35734301
STATION : GOSAK
RIVER : SUMMAR GAH
BASIN : INDUS

LATITUDE : 35 29 30
LONGITUDE : 73 23 55
ELEVATION : 1320 masl
CATCHMENT AREA : 147 km2

AGENCY : SHYDO
PROVINCE : NWFP
INSTALLED : 17/ 5/1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	.564	.525	1.111	3.105	6.026	9.799	19.70	10.36	7.016	2.181	1.110	.995
2	.564	.525	1.111	3.105	6.265	10.22	19.70	10.36	7.016	2.181	1.110	.995
3	.564	.564	1.141	3.105	6.267	9.799	22.84	10.36	6.182	1.962	1.110	.995
4	.564	.564	1.202	3.105	5.946	9.598	24.63	10.36	6.182	1.962	1.052	.940
5	.564	.564*	1.266	3.105	6.107	10.36	24.63	10.36	5.408	1.962	1.052*	.940
6	.564	.564	1.331	3.105	6.511	9.799	24.63	10.36	5.408	1.962	1.052	.940
7	.564	.605	1.398	3.160	6.677	9.274	24.63	10.36	5.408	1.962	1.052	.887
8	.564	.605	1.432	3.214	6.677	9.799	24.63	9.799	5.408	1.962	1.052	.940
9	.564	.605	1.502	3.214	6.688	10.36	26.41	9.799	5.408	1.962	1.052	.940
10	.564	.605	1.538	3.326	6.688	10.36	16.57	9.274	5.051	1.962	1.052	.887
11	.564	.648	1.610	3.438	6.601	11.57	15.22	9.274	4.694	1.962	1.052	.940
12	.564	.648	1.685	3.438	6.521	11.57	15.22	9.274	4.694	1.881	1.052	.940
13	.564	.648	1.762	3.438	6.521	13.31	15.22	9.274	4.694	1.761	.995	.940*
14	.564	.692	1.841	3.671	6.435	14.01	16.57	9.274	4.694	1.722	.995	.940
15	.564	.692	1.921	3.671	6.932	15.22	16.57	9.274	4.365	1.573	.995	.887
16	.564	.692	1.962	3.671	7.105	18.07	16.57	9.274	4.037	1.573	.995	.835
17	.525	.738	2.004	3.731	7.105	18.07	18.07	9.274	4.694	1.573	.940	.835
18	.525	.738	2.265	4.043	7.280	18.87	19.56	9.274	4.365	1.501	.940	.786
19	.525	.738	2.592	4.294	7.280	20.36	21.54	9.274	4.037	1.431	.940	.786
20	.525	.762	2.592	4.294	7.107	19.70	21.20	10.36	4.037	1.363	.940	.786
21	.525	.787	2.690	4.294	7.288	20.93	21.20	9.799	4.037	1.233	.940	.738
22	.525	.811	2.740	4.294	7.549	16.80	18.07	9.274	4.037	1.233	.940	.738
23	.525	.862	2.842	4.294	7.731	10.36	18.07	9.274	4.037	1.233	.995	.786
24	.525	.887	3.105	4.974	7.822	10.36	18.07	9.274	4.037	1.233	.995	.786
25	.525	.914	3.325	4.974	7.915	10.36	18.07	9.274	4.037	1.233	.940	.835
26	.525	.940	3.671	4.974	7.915	10.36	18.07	9.274	4.037	1.233	.940	.835
27	.525	1.023	3.671	5.118	8.394	10.36	16.71	9.274	3.614	1.233	.940	.835
28	.525	1.082	3.671	5.262	8.394	10.36	15.50	9.274	2.892	1.233	.995	.647
29	.525	-1.000	4.294	5.712*	8.782	10.36	14.01	9.274	2.647	1.110	.995	.647
30	.525	-1.000	4.425	5.867	8.290	10.36	12.92	9.274	2.181	1.110	.995	.647
31	.525	-1.000	4.974	-1.000	10.32	-1.000	10.36	9.274	-1.000	1.110	-1.000	.647

MONTHLY SUMMARY

Mean :	.545	.715	2.344	3.967	7.198	12.68	18.88	9.604	4.612	1.600	1.007	.84
Spec D :	3.708	4.866	15.95	26.98	48.97	86.23	128.4	65.33	31.37	10.88	6.851	5.76
Run-off :	9.932	11.77	42.71	69.94	131.2	223.5	343.9	175.0	81.32	29.15	17.76	15.4
Vol(1) :	1.460	1.730	6.279	10.28	19.28	32.86	50.56	25.72	11.95	4.285	2.610	2.27
Vol(2) :	.001	.001	.005	.008	.016	.027	.041	.021	.010	.003	.002	.00

ANNUAL SUMMARY

Mean : 5.368 m3/s Spec D: 36.52 lt/(s-km2) Run-off: 1152. mm
Vol(1): 169.3 m3*10**6 Vol(2): .137 maf
Daily Max: 26.41 m3/s on 9/ 7 Daily Min: .525 m3/s on 17/ 1
Max. Inst. Flow: 26.412 m3/s on 09/07

Note: * Discharge measurement made on this day.

Annex 7.3

TABLE 3 (CONT.)

SUMMAR GAH AT GOSAK
SUMMARY OF DAILY, MONTHLY AND ANNUAL FLOWS (MAY 1990 - MAY 1994)

PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ
SURFACE WATER HYDROLOGY PROJECT

STREAMFLOW DATA (m^3/s)
YEAR : 1992

CODE : 3573430
STATION : GOSAK
RIVER : SUMMAR GAH
BASIN : INDUS

LATITUDE : 35 29 30
LONGITUDE : 73 23 55
ELEVATION : 1320 masl
CATCHMENT AREA : 147 km2

AGENCY : SHYDO
PROVINCE : NWFP
INSTALLED : 17/ 5/1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	.692	.786	.940	1.962	4.251	7.193	22.25	5.408	3.033	5.865	4.694	3.1
2	.692	.786	.995	1.962	4.251	7.098	22.25	5.408	2.927	5.710	4.694	3.1
3	.692	.738	.995	2.255	4.208	7.802	25.12	4.932	2.892	5.710	4.694	3.103
4	.692	.738	.940	2.444	4.340	9.429	26.34	4.694	2.824	5.710	4.694	2.997
5	.647	.692	.940	2.464	4.340	9.748	21.08	4.256	2.757	5.710	4.694	2.997
6	.647	.692	.887	2.724	4.211	10.52	21.66	4.037	2.862	5.710	4.558	2.892
7	.647	.692	1.110	2.724	3.997	12.66	21.08	4.037	3.255	5.813	4.558	2.892
8	.647	.647	1.111	2.659	3.915	12.81	21.98	3.790	4.037	7.250	4.558	2.892
9	.647	.647	1.151	2.691	3.756	13.60	19.03	3.790	29.49	7.074	4.424	2.892
10	.647	.647	1.298	2.690	3.753	13.60	18.48	3.437	29.49	6.619	4.424	2.892
11	.605	.647	1.386	2.790	3.673	15.65	16.53	3.033	30.56	6.565	4.424	2.789
12	.605	.647	1.502	2.790	3.713	18.28	13.45	3.144	23.55	6.344	4.293	2.689
13	.605	.692	1.647	2.756	3.881	19.40	12.57	2.962	25.32	6.182	4.293	2.591
14	.605	.692	1.801	3.071	4.452	19.40	11.00	2.757	22.16	5.866	4.293	2.591
15	.564	.692	1.800	3.671	4.574	20.68	9.916	2.757	17.63	5.559	4.164	2.495
16	.564	.738	1.722	3.482	5.214	22.38	9.916	2.592	11.86	5.458	4.164	2.495
17	.564	.738	1.672*	3.480	5.214	18.06	9.846	5.408	7.912	5.408	4.037	2.401
18	.524	.692	1.881	4.251	5.263	14.24	9.212	5.408	7.729	7.373	4.037	2.401
19	.526	.692	1.907	3.913	5.360	11.77	9.012	5.408	7.369	8.937	4.037	2.401
20	.526	.647*	2.045*	3.258	5.461	10.33	16.30	4.694	7.016	8.871	3.912	2.309
21	.524	.647	1.990	4.708	5.559	9.575	9.427	4.037	7.016	8.037	3.790	2.309
22	.524	.647	1.962	3.793	5.765	13.45	8.610	3.755	6.675	7.016	3.670	2.219
23	.524	.647	1.962	3.793	6.087	17.17	8.871	3.180	6.675	6.182	3.552	2.219
24	.564	.605	1.990	3.878	6.298	18.63	7.613	3.144	6.508	5.710	3.437	2.131
25	.564	.605	2.017	4.296	6.455	19.61	6.792	2.964	6.182	5.558	3.324	2.131
26	.564	.647	2.045	4.296	6.735	20.60	6.236	4.037	6.182	5.508	3.324	2.131
27	.564	.692	1.990	5.475	6.735	21.11	6.236	4.037	6.182	5.408	3.212	2.045
28	.647	.835	1.990	4.841*	7.019	22.88	6.182	3.672	5.917	5.408	3.212	2.045
29	.647	.835	1.962	4.568	7.019	25.77	5.767	3.326	5.762	5.408	3.103	2.045
30	.647	-1.000	1.907	4.568	7.191	30.16	5.713	3.290	5.865	5.115	3.103	1.962
31	.647	-1.000	1.907	-1.000	7.191	-1.000	5.509	2.892	-1.000	5.115	-1.000	1.962

MONTHLY SUMMARY

Mean	.605	.693	1.595	3.408	5.157	15.79	13.35	3.880	10.25	6.200	4.046	2.52
Spec D	4.114	4.715	10.85	23.19	35.08	107.4	90.85	26.40	69.76	42.18	27.52	17.1
Vol(1)	11.02	11.82	29.07	60.10	93.97	278.4	243.3	70.70	180.8	113.0	71.34	45.9
Vol(2)	.620	1.737	4.273	8.835	13.81	40.92	35.77	10.39	26.58	16.61	10.49	6.75
Vol(2)	.001	.001	.003	.007	.011	.033	.029	.008	.022	.013	.009	.00

ANNUAL SUMMARY

Mean Q: 5.622 m3/s Spec D: 38.24 lt/(s-km2) Run-off: 1209. mm
Vol(1): 177.8 m3*10**6 Vol(2): .144 maf
Daily Maxs: 30.56 m3/s on 11/ 9 Daily Min: .524 m3/s on 18/ 1
Inst. Flow: 31.511 m3/s on 11/09

Notes: * Discharge measurement made on this day.

Annex 7.3

TABLE 3 (CONT.)

SUMMAR GAH AT GOSAK
SUMMARY OF DAILY, MONTHLY AND ANNUAL FLOWS (MAY 1990 - MAY 1994)

PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ
SURFACE WATER HYDROLOGY PROJECT

STREAMFLOW DATA (m^3/s)
YEAR : 1993

CODE : 35734301
STATION : GOSAK
RIVER : SUMMAR GAH
BASIN : INDUS

LATITUDE : 35 29 30
LONGITUDE : 73 23 55
ELEVATION : 1320 masl
CATCHMENT AREA : 147 km2

AGENCY : SHYDO
PROVINCE : NWFP
INSTALLED : 17/ 5/1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	1.962	.835	1.386	1.276	7.851	8.871	10.83	8.164	4.682	2.300	1.042*	1.139
2	1.907	.835	1.297	1.341	7.851	8.871	12.40	8.482	4.636	2.301	1.162	1.081
3	1.800	.786	1.341	1.654	6.845	7.974	13.20	9.810*	6.114	2.016	1.163	1.025
4	1.697	.738	1.297	1.654	6.619	7.016	15.37	9.810	5.296	2.096	1.164	1.007
5	1.598	.738	1.297	1.478	6.959	6.621	16.86	9.602	4.959	2.068	1.086	.989
6	1.574	.738	1.363	1.622	7.308	7.933	19.26	8.532	4.545	2.126	1.875	.991
7	1.574	.738	1.297	1.853	9.824	9.212	20.95	7.962	4.456	2.156	1.719	.992
8	1.478	.770	1.171	1.935	10.03	10.04	26.05	7.838	4.237	2.141	2.406	.975
9	1.478	.770	1.233	1.853	7.851	12.16	29.49	7.534	4.152	2.430	1.722	.939
10	1.574	.786	1.196	1.827	6.959	12.16	29.89	7.120	4.194	2.493	1.342	.940
11	1.549	.786	1.297	1.962	6.959	12.71	28.70	7.535	4.590	2.462	1.322	.942
12	1.478	.835	1.233	1.962	4.649	12.86	22.95	6.832	4.411	2.278	1.258	.925*
13	1.386	.887	1.233	2.046	4.513	12.73	21.38	6.063	4.280	1.787	1.197	.900
14	1.298	.887	1.363	2.075	4.250	11.53	18.23	6.010	4.280	1.762	1.178	.892
15	1.192	.940	1.363	2.075	4.122	10.69	18.23	5.906	4.151	1.835	1.179	.867
16	1.110	1.233	1.297	1.853	3.750	13.68	19.46	5.802	4.024	1.937	1.140	.860
17	1.110	1.265	1.233	1.935	3.750	14.81	15.10	6.116	3.619	1.803	1.141	.835
18	1.151	1.297	1.297	2.017	3.995	12.38	15.28	5.853	3.463	1.700	1.332	.828
19	1.111	1.363	1.233	2.018	4.380	9.278	12.70	5.648	3.312	1.601	1.268	.838
20	.958	1.397	1.171	2.344	5.559	9.212	14.39	5.547	3.350	1.553	1.248	.814
21	.996	1.431	1.171	2.344	5.762	12.95	16.48	5.249	3.057	1.482	1.187	.807
22	.887	1.466	1.212	2.825	7.132	13.53	24.11	5.249	3.021	1.413	1.148	.817
23	.870	1.549	1.233	3.140	9.553	18.99	28.31	5.056	2.915	1.347	1.129	.826
24	.819	1.647	1.297	3.362	12.30	29.49	28.71	5.056	2.915	1.239	1.130	.836
25	.786*	1.647*	1.363	3.711	13.53	23.33	26.56	6.009	2.778	1.219	1.072	.846
26	.786	1.573	1.233	4.650	15.73	18.94	20.83	5.748	2.846	1.219	1.073	.822
27	.770	1.371	1.341	4.879	16.38	16.10	15.19	5.395	2.581	1.178	1.036	.815
28	.819	1.431	1.233	6.788	13.70	14.67	8.253	5.200	2.581	1.138	1.018	.824
29	.786	-1.000	1.171	6.619	12.95	11.85	8.482	5.102	2.484*	1.138	1.020	.833
30	.786	-1.000	1.171	6.675	9.212	10.62	8.805	4.866	2.454	1.099	1.021	.843
31	.786	-1.000	1.110	-1.000	8.871	-1.000	9.005	4.820	-1.000	1.061	-1.000	.853

MONTHLY SUMMARY

Mean :	1.228	1.098	1.262	2.726	8.037	12.71	18.56	6.578	3.813	1.754	1.259	.90
Spec D :	8.355	7.468	8.587	18.54	54.67	86.43	126.3	44.75	25.94	11.93	8.566	6.12
Run-off :	22.38	18.07	23.00	48.06	146.4	224.0	338.2	119.9	67.23	31.96	22.20	16.4
Vol(1) :	3.290	2.656	3.381	7.065	21.53	32.93	49.72	17.62	9.883	4.698	3.264	2.41
Vol(2) :	.003	.002	.003	.006	.017	.027	.040	.014	.008	.004	.003	.00

ANNUAL SUMMARY

Mean : 5.024 m3/s Spec D: 34.18 lt/(s-km2) Run-off: 1078. mm
Vol(1): 158.4 m3*10**6 Vol(2): .128 maf
Daily Max: 29.89 m3/s on 10/ 7 Daily Min: .738 m3/s on 4/ 2
Max. Inst. Flow: 29.589 m3/s on 10/07

Note: * Discharge measurement made on this day.

Annex 7.3

TABLE 3 (CONT.)

SUMMAR GAH AT GOSAK
SUMMARY OF DAILY, MONTHLY AND ANNUAL FLOWS (MAY 1990 - MAY 1994)

PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ
SURFACE WATER HYDROLOGY PROJECT

STREAMFLOW DATA (m^3/s)
YEAR : 1994

CODE : 35734301
STATION : GOSAK
RIVER : SUMMAR GAH
BASIN : INDUS

LATITUDE : 35 29 30
LONGITUDE : 73 23 55
ELEVATION : 1320 masl
CATCHMENT AREA : 147 km2

AGENCY : SHYDO
PROVINCE : NWFP
INSTALLED : 17/ 5/1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	.812	.866	1.094	3.223	4.665	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
2	.822	.856	1.202	3.017	4.397	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
3	.831	.847	1.316	3.187	4.900	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
4	.841	.837	1.505	3.461	6.256	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
5	.851	.897	1.513	3.264	6.699	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
6	.861	.819	1.544	3.127*	6.373	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
7	.923	.810	1.666	3.008	6.004	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
8	.934	.801	1.839	2.890	10.60	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
9	.891	.792	1.970	2.852	7.595	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
10	.901	.783	1.958	2.763	5.909	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
11	.911	.774*	1.926	2.628	5.656	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
12	.921	.779	1.997	2.495	5.165	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
13	.931	.785	2.076	2.460	4.810	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
14	.941	.790	2.415	2.520	4.517	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
15	.952	.795	2.410	2.679	5.016	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
16	.909	.851	2.626	2.741	6.443	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
17	.919	.856	2.785	2.839	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
18	.929	.862	2.954	2.922	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
19	.939*	.868	2.911	2.883	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
20	.929	.873	2.870	3.108	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
21	.920	.932	2.775	3.343*	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
22	.910	.885	3.000	3.472	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
23	.900	.890	2.944*	3.573	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
24	.890	.896	3.006	3.648	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
25	.881	.902	3.112	3.693	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
26	.924	.961	2.778	3.567	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
27	.914	1.004	2.856	3.843	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
28	.904	1.030	2.882	4.511	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
29	.895	-1.000	2.892	5.133	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
30	.885	-1.000	3.604	5.402	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
31	.875	-1.000	3.426	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000

MONTHLY SUMMARY

Mean	: .898	.859	2.382	3.275	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Spec Q	: 6.110	5.841	16.21	22.28	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Run-off	: 16.36	14.13	43.41	57.75	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Vol(1)	: 2.406	2.077	6.381	8.489	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Vol(2)	: .002	.002	.005	.007	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000

ANNUAL SUMMARY

Mean : -1.000 m3/s Spec Q: -1.000 lt/(s-km2) Run-off: -1.000 mm
Vol(1): -1.000 m3*10**6 Vol(2): -1.000 maf
Daily Max: -1.00 m3/s on Daily Min: -1.000 m3/s on
Max. Inst. Flow: -1.000 m3/s on

Note: * Discharge measurement made on this day.

TABLE 4

SUMMAR GAH AT GOSAK
MEAN MONTHLY FLOWS (MAY 1990 - MAY 1994)

MONTH	MEAN MONTHLY FLOW (m^3/s)	SPECIFIC DISCHARGE (A = 147 km^2) (lts/(s-km^2))
JANUARY	0.82	5.57
FEBRUARY	0.84	5.72
MARCH	1.90	12.90
APRIL	3.34	22.75
MAY	6.57	44.66
JUNE	13.37	90.97
JULY	14.34	97.54
AUGUST	5.78	39.29
SEPTEMBER	5.14	35.00
OCTOBER	2.63	17.91
NOVEMBER	1.75	11.87
DECEMBER	1.21	8.23
ANNUAL	4.81	32.70

TABLE 5

SUMMAR GAH AT GOSAK
FLOW DURATION CURVE (MAY 1990 - MAY 1994)

TIME (%)	FLOW DURATION CURVE (m^3/s)	SPECIFIC DISCHARGE (A = 147 km^2) (lts/(s-km^2))
100	0.52	3.54
95	0.60	4.08
90	0.69	4.69
80	0.90	6.12
70	1.20	8.16
60	1.87	12.72
50	2.82	19.18
40	3.85	26.19
30	5.30	36.05
20	7.61	51.77
10	12.33	88.88
5	17.79	121.02
0	30.56	207.89

Annex 7.3

TABLE 8

NORTHERN AREAS OF PAKISTAN
ESTIMATION OF FLOODS BY EMPIRICAL FORMULAE FOR SOME CATCHMENTS

FORMULA	SUMMAR GAH AT GOSAK (A = 147 km²)	SWAT RIVER AT KALAM (A = 2024 km²)	PUNCH RIVER AT KOTLI (A = 3177 km²)
CREAGER: $Q = 46 * C * A^{0.894 * A^{-0.048}}$			
C = 100 (1)	2,560	9,900	12,000
C = 23 (2)	590	2,300	2,800
DICKEN: $Q = C * A^{3/4}$			
C = 1.67 (low given by Dicken)	71	510	710
C = 10,5 (high given by Dicken)	450	3,200	4,500
C = 35 (highest observed)	1,480	11,000	14,900
RYVE: $Q = C * A^{2/3}$			
C = 8.3 (80-2,400 km from coast)	240	1,400	1,900
C = 40 (highest observed)	1,140	6,600	8,900
INGLIS: (fan shaped catchments) $Q = \frac{124 * A}{\sqrt{A + 10.4}}$	1,460	5,600	7,000
MYER: $Q = 175 * \sqrt{A}$	2,130	7,900	9,900
ALI N. J. BAHADUR: (HYDERABAD) $Q = C * (0.386 * A)^{0.993 - \frac{1}{14 * LOG A}}$			
C = 48 (lowest observed)	2,320	31,000	49,000
C = 60 (highest observed)	2,900	39,000	61,000
SUB-HIMALAYAN REGION:(3) $Q_{2.33} = 5.89 * A^{0.75}$	250	1,800	2,500
$Q_{50} = 15.84 * A^{0.75}$	670	4,800	6,700
ILLWERKE:(3) $Q_{100} = 5.5 * A^{5/6}$	360	3,200	4,600

(1) C = 100 covers almost all major floods in the United States
(2) C = 23 largest estimated value for the upper Jhelum catchment. Floods of 9-10/9/1992 Kunhar river at Garhi Habib Ullah.
(3) $Q_{2.33}$, Q_{50} Q_{100} = floods with return periods of 2.33 (mean annual flood), 50 and 100 years.

Annex 7.3

TABLE 9

SWAT RIVER AT KALAM-PUNCH RIVER AT KOTLI
FLOOD FREQUENCY ANALYSIS (GUMBEL)

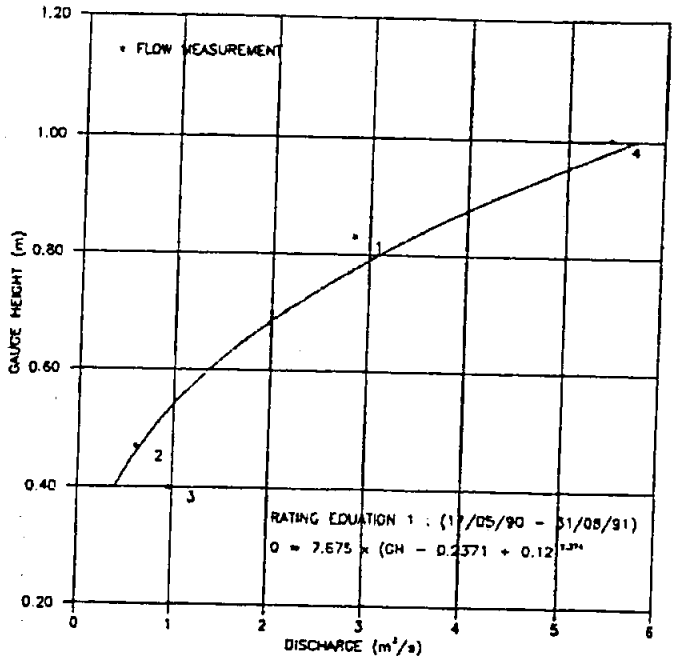
RETURN PERIOD (years)	SWAT RIVER AT KALAM (1973-85) (m^3/s)	PUNCH RIVER AT KOTLI (1961-90) (m^3/s)
2	390	4,120
5	490	6,410
10	550	7,920
20	620	9,380
50	700	11,260
100	760	12,670
1,000	960	17,320
10,000	1,160	21,970

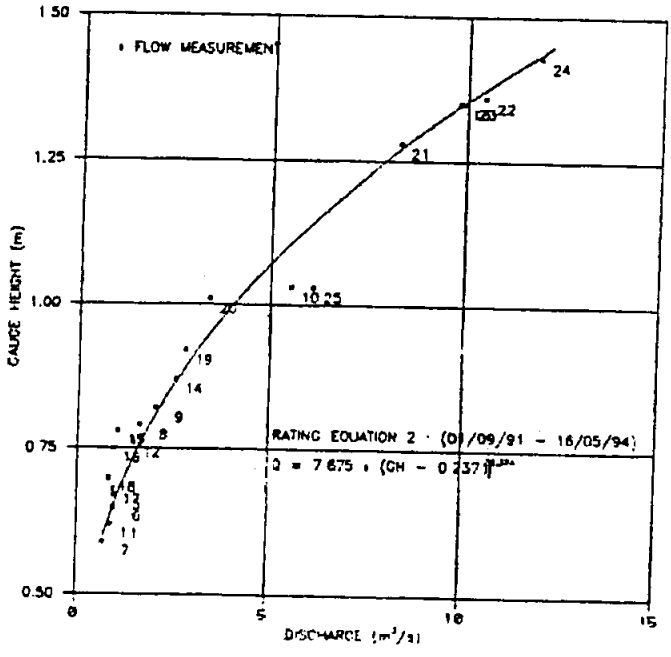
Annex 7.3

TABLE 10

NORTHERN AREAS OF PAKISTAN
ESTIMATED 100, 1,000 and 10,000-YEAR FLOODS (GUMBEL)

STATION	CATCHMENT AREA (km^2)	Q_{100} (m^3/s)	$Q_{1,000}$ (m^3/s)	$Q_{10,000}$ (m^3/s)
Shyok at Yugo(78-83)	65,025	3,570	4,275	4,980
Indus At Kachura(73-83)	146,100	8,220	9,970	11,710
Hunza at Dainyor Br.(74-83)	13,925	3,750	4,670	5,580
Gilgit at Gilgit(80-85)	12,800	4,370	5,150	5,930
Gilgit at Alam Br.(73-83)	27,525	4,360	5,150	5,930
Indus at Partab Br.(73-83)	176,775	12,340	14,680	17,020
Astore at Doyian(74-87)	3,750	1,370	1,770	2,200
Gorband at Karora(75-84)	625	980	1,330	1,670
Indus at Besham Qila(73-83)	196,425	15,950	18,890	21,820
Brandu at Daggar(70-86)	598	640	990	1,260
Siran at Phulra(73-83)	1,057	1,170	1,530	1,880
Chitral at Chitral(73-84)	12,425	1,880	2,320	2,760
Swat at Kalam(73-85)	2,024	760	960	1,160
Swat at Chakdara(73-85)	5,400	1,980	2,570	3,170
Bara at Jhansi Post(73-83)	1,846	1,160	1,660	2,150
Kabul at Nowshera(73-88)	88,540	7,180	9,320	11,450
Haro at Khanpur(73-83)	777	2,050	2,890	3,720
Jhelum at Chinari(70-90)	13,735	2,340	3,080	3,830
Jhelum at Domel(80-90)	14,490	2,410	3,120	3,820
Neelum at Muzaffarabad(63-90)	7,275	2,490	3,050	3,600
Kunhar at Naran(60-90)	1,036	680	900	1,120
Kunhar at Garhi Habib U(60-88)	2,382	1,570	2,080	2,590
Jhelum at Kohala(65-90)	24,769	5,870	7,530	9,170
Jhelum at Azad Patan(79-90)	26,289	5,830	7,320	8,820
Kanshi at Palote(70-90)	1,111	2,700	3,600	4,600
Punch at Kotli(61-90)	3,177	12,700	17,400	22,000





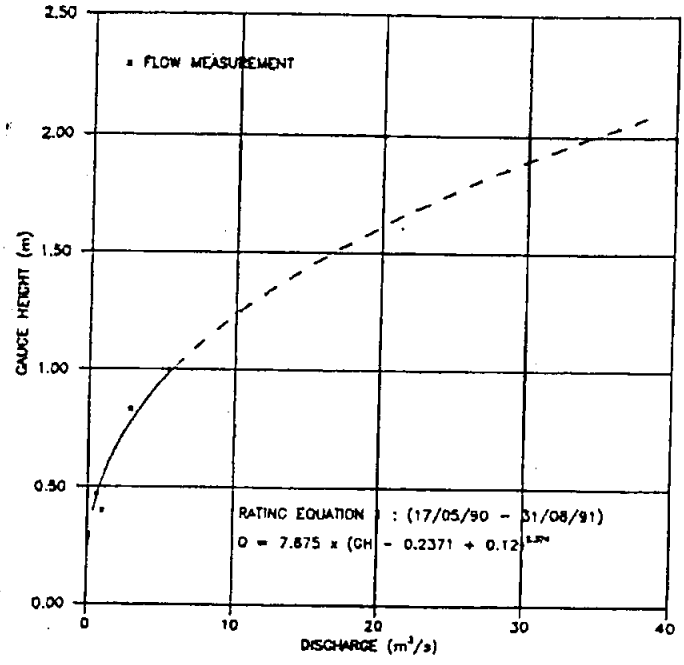
PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

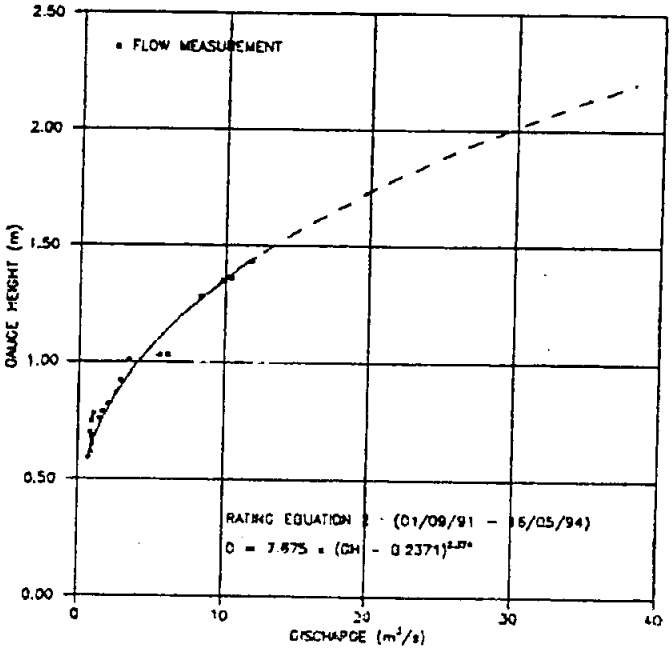
SUMMAR GAH AT GOSAK

RATING CURVES

Figure 1

Annex 7.3



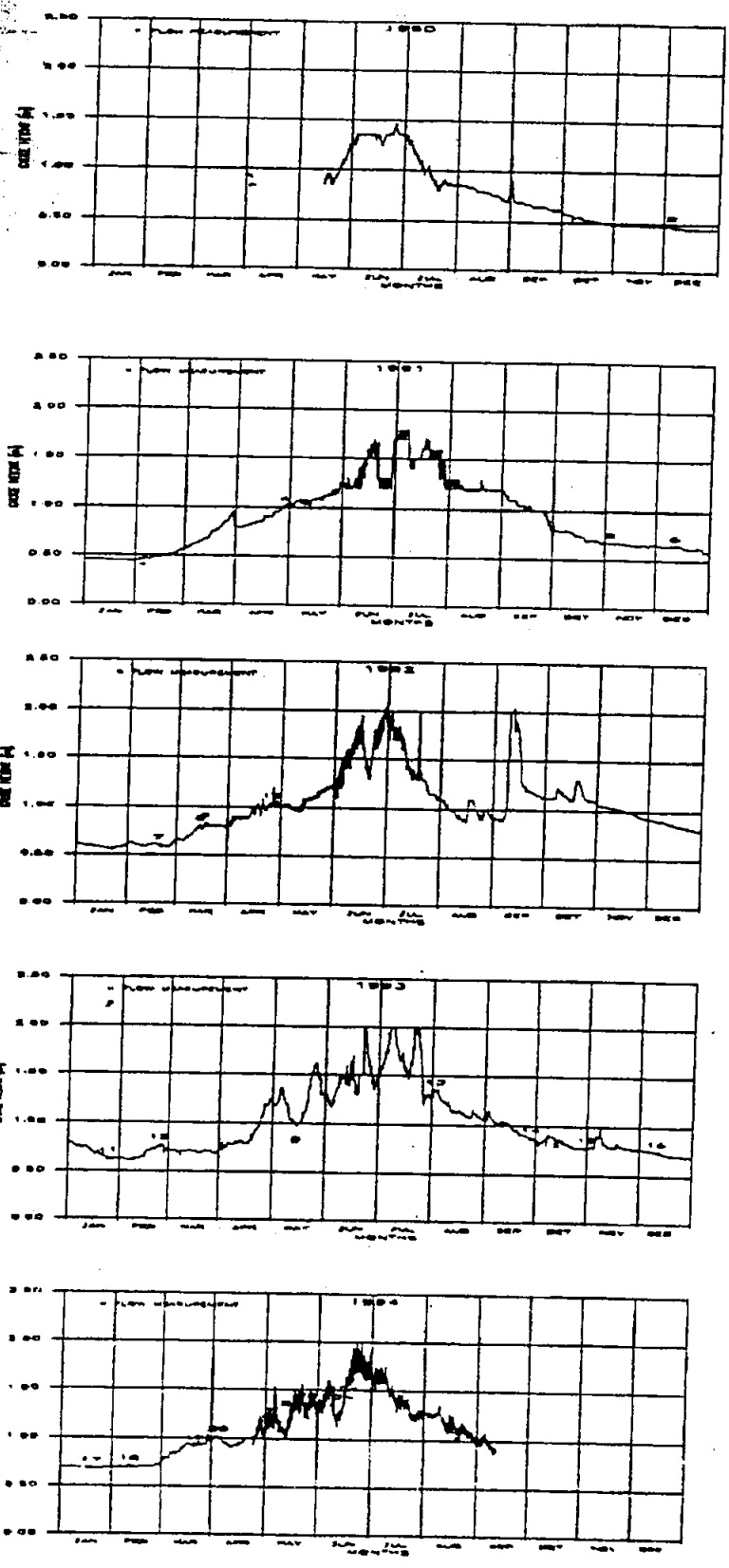


PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

SUMMAR GAH AT GOSAK
EXTRAPOLATED RATING CURVES

Figure 2

Annex 7.3



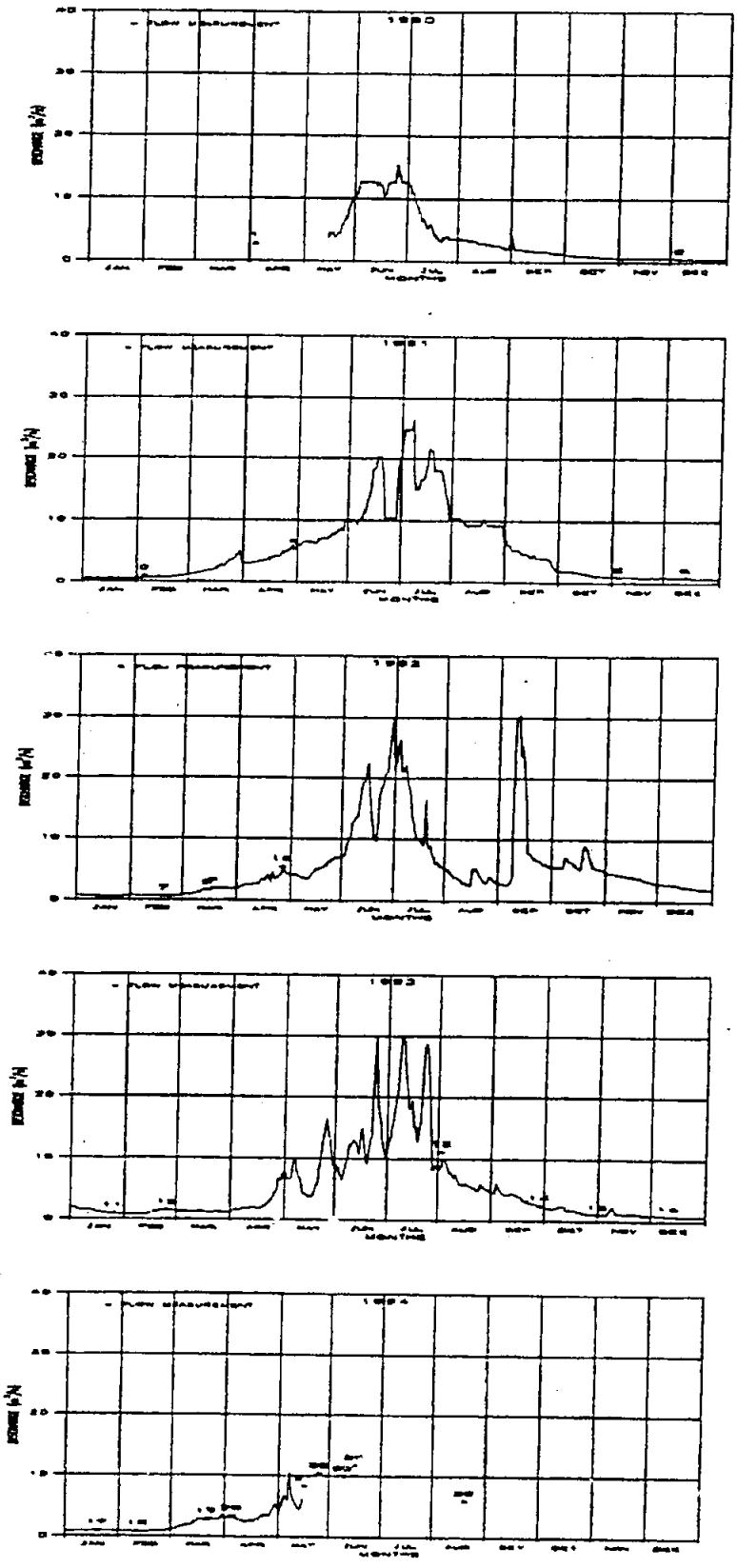
PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

SUMMAR GAH AT GOSAK

WATER LEVEL RECORDS (MAY 1990 - MAY 1994)

Figure 3

Annex 7.3



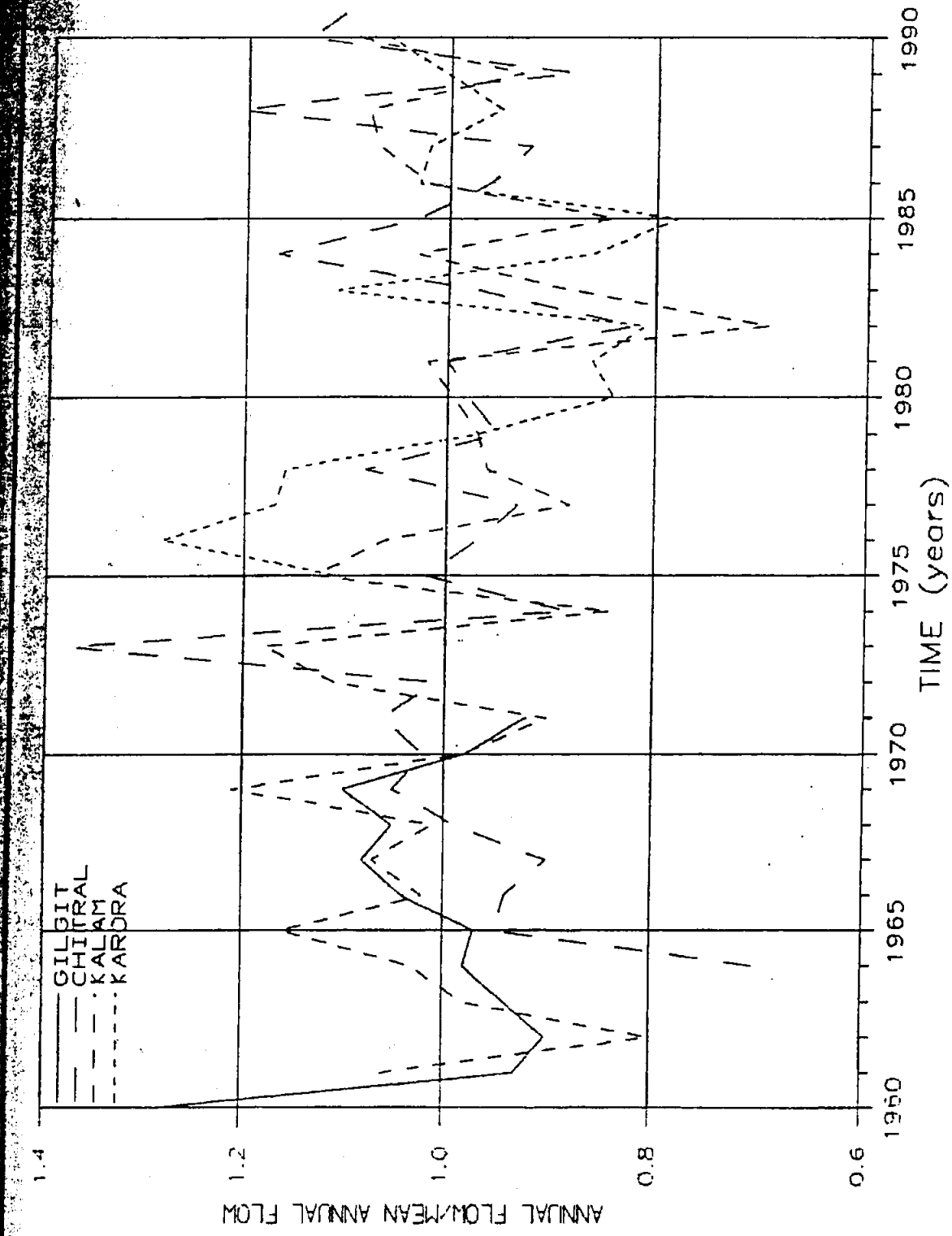
PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

SUMMAR GAH AT GOSAK

DAILY FLOWS (MAY 1990 - MAY 1994)

Figure 4

Annex 7.3



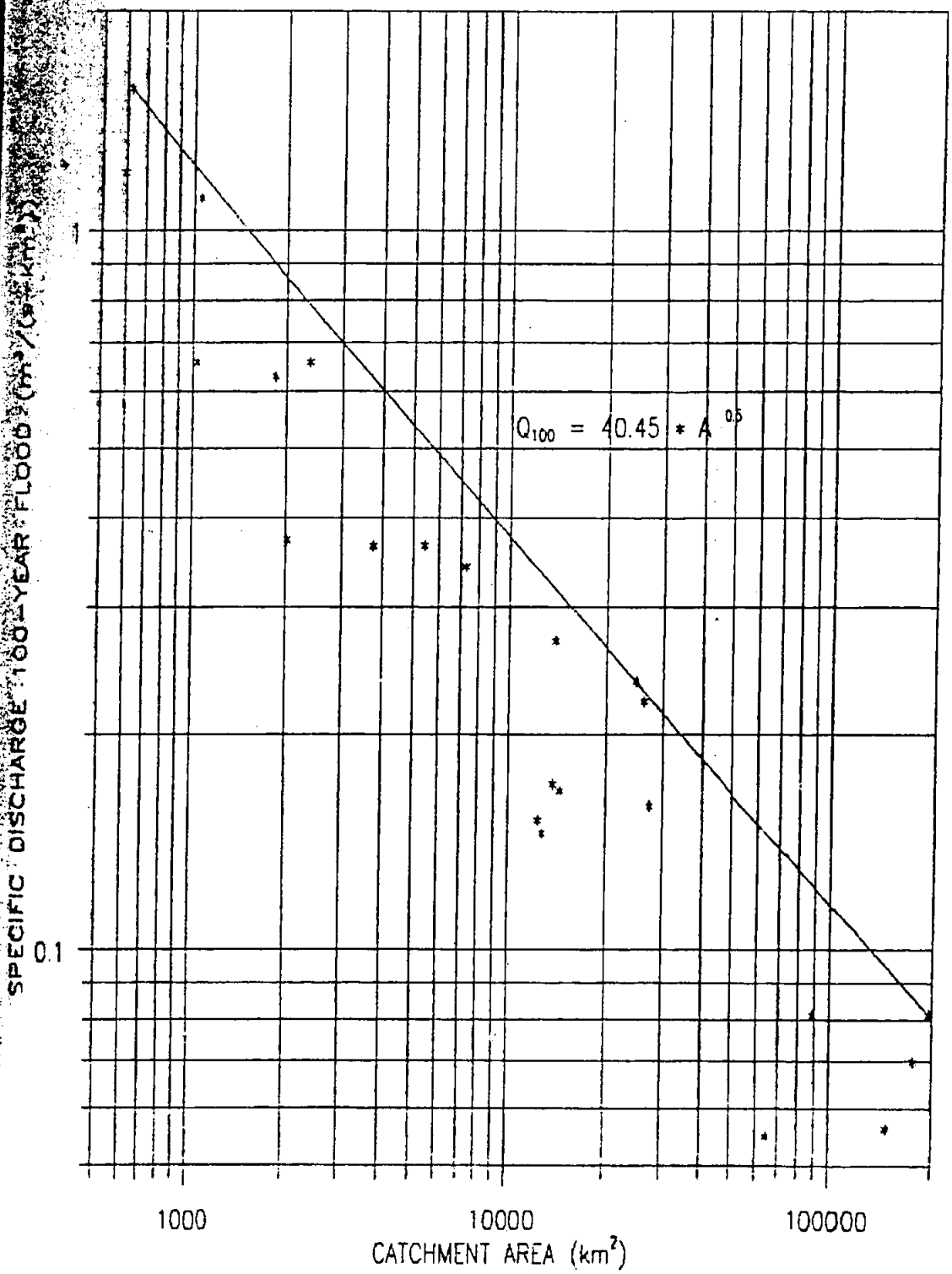
PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

NORTHERN AREAS OF PAKISTAN

LONG TERM PATTERN OF FLOW AT SELECTED STATIONS

Figure 7

Annex 7.3

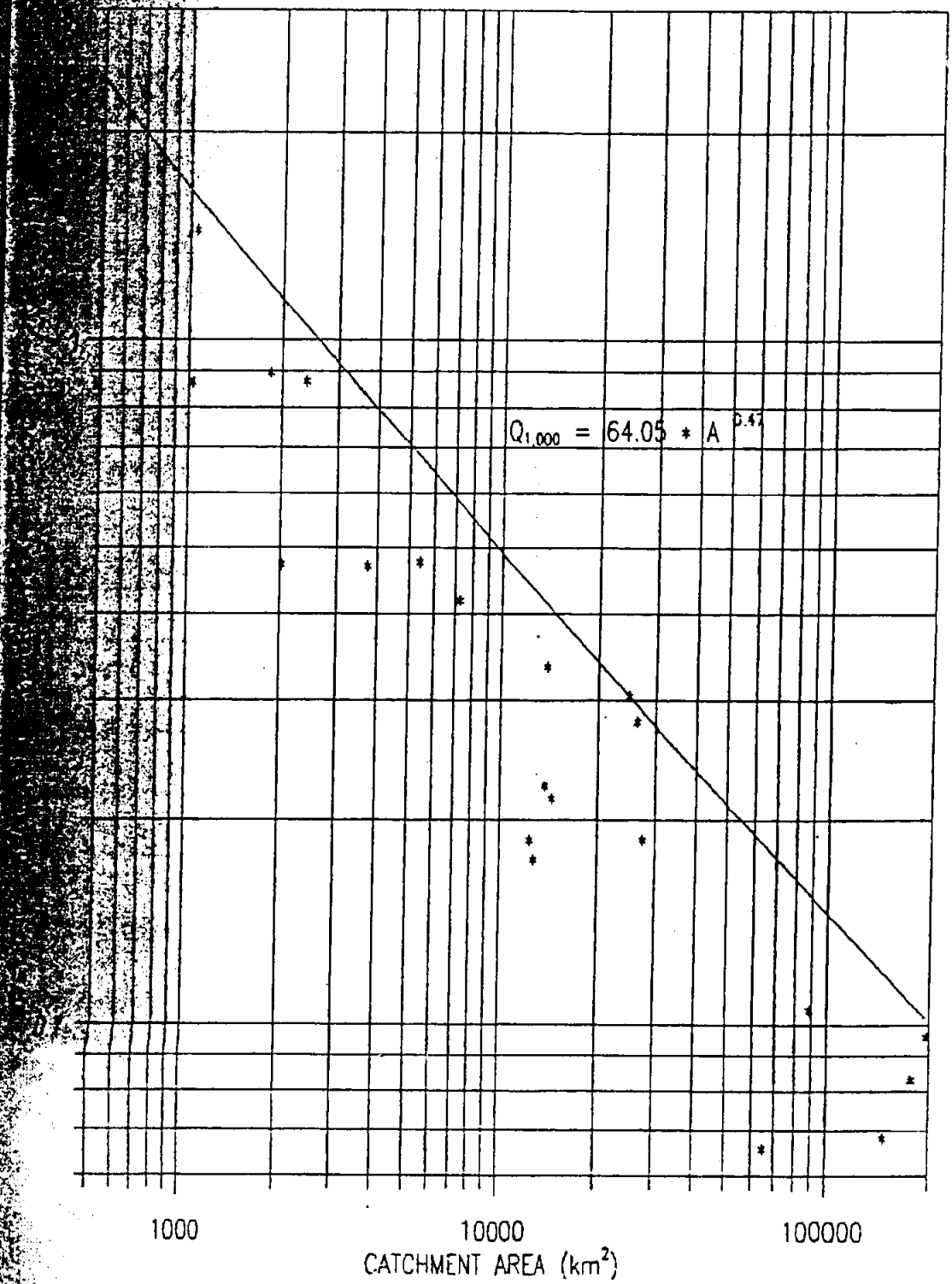


PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

NORTHERN AREAS OF PAKISTAN
ENVELOPING CURVE TO THE 100-YEAR FLOOD

Figure 8

Annex 7.3



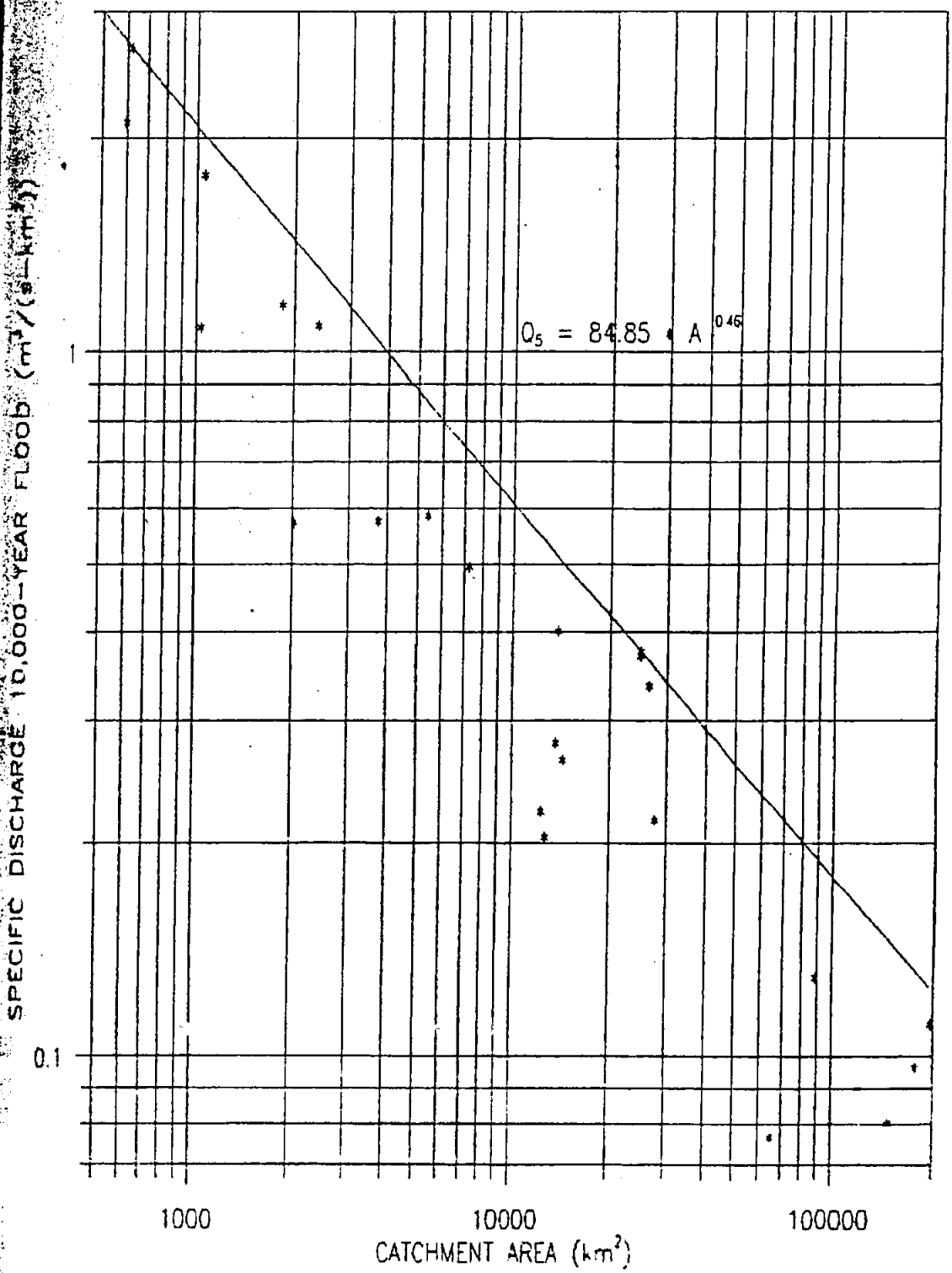
PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

NORTHERN AREAS OF PAKISTAN

ENVELOPING CURVE TO THE 1,000-YEAR FLOOD

Figure 9

Annex 7.3



PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ

NORTHERN AREAS OF PAKISTAN

ENVELOPING CURVE TO THE 10,000-YEAR FLOOD

Figure 10

Annex 7.3

SHYDO

SARHAD HYDEL DEVELOPMENT ORGANIZATION

Government of Khyber Pakhtunkhwa Peshawar

No 204-Dep/SHYDO/DPP/Summar Gah
Dated Peshawar the 04 / 07 /2011

To

Engr. Afzaal Ahmad Warraich
Authorized representative,
Summar Gah Hydro Joint Venture,
15-A/3 Gulberg III Lahore.

Subject: NOC (No Objection Certificate) for Development of Hydropower Project Summar Gah HPP 23 MW in District Kohistan

References: submission of RFP on 7th February 2011.

SHYDO is pleased to communicate that the competent authority has approved your proposal for development of Summar Gah HPP (23 MW) on the following terms and conditions.

(i) Approval of tariff from NEPRA.
(ii) Submission of Bank Guarantee @ Rs. 3000 US$ per MW as prescribed in power policy 2006.
(iii) Payment of cost of feasibility study incurred by SHYDO.
(iv) To obtain the Environmental clearance certificate from the Department of Environment Govt. of Khyber Pakhtunkhwa, Peshawar

2. In accordance with the provisions of the Policy for Power Generation Projects 2006 Govt. of Khyber Pakhtunkhwa, the sponsor is required to approach NEPRA for tariff negotiation and finalize their tariff within sixty (60) days.

3. You are therefore requested to approach NEPRA and file your tariff petition for the subject project within sixty (60) days starting from the date of issuance of this letter.

4. We appreciate your efforts for submission of proposal and expect the same pace and spirit for negotiation and filing the tariff petition with NEPRA.

Director (Private Power)
SHYDO

Copy to:

1. The General Manager (WPPO) 325-WAPDA House, Lahore.
2. The Chairman NEPRA, Islamabad
3. The Secretary Irrigation Department, Govt. of Khyber Pakhtunkhwa, Peshawar
4. The Secretary Energy & Power Department, Govt. of Khyber Pakhtunkhwa Peshawar
5. The Managing Director SHYDO Peshawar

Director (Private Power)
SHYDO

S H Y D O

SARHAD HYDEL DEVELOPMENT ORGANIZATION

Government of Khyber Pakhtunkhwa Peshawar

No.490-91/SHYDO/DPP/Summar Gah
Dated Peshawar the: 20 / 9 /2011

To

Engr. Afzaal Ahmad Warraich
Authorized representative,
10- A/3 Gulberg III Lahore.
Ph. 042-111-777-744, 35751317, 35750181
Fax: 042-35712073

Subject: **SUMMAR GAH 28 MW HYDROPOWER PROJECT**
COST OF FEASIBILITY STUDY INCURRED BY SHYDO

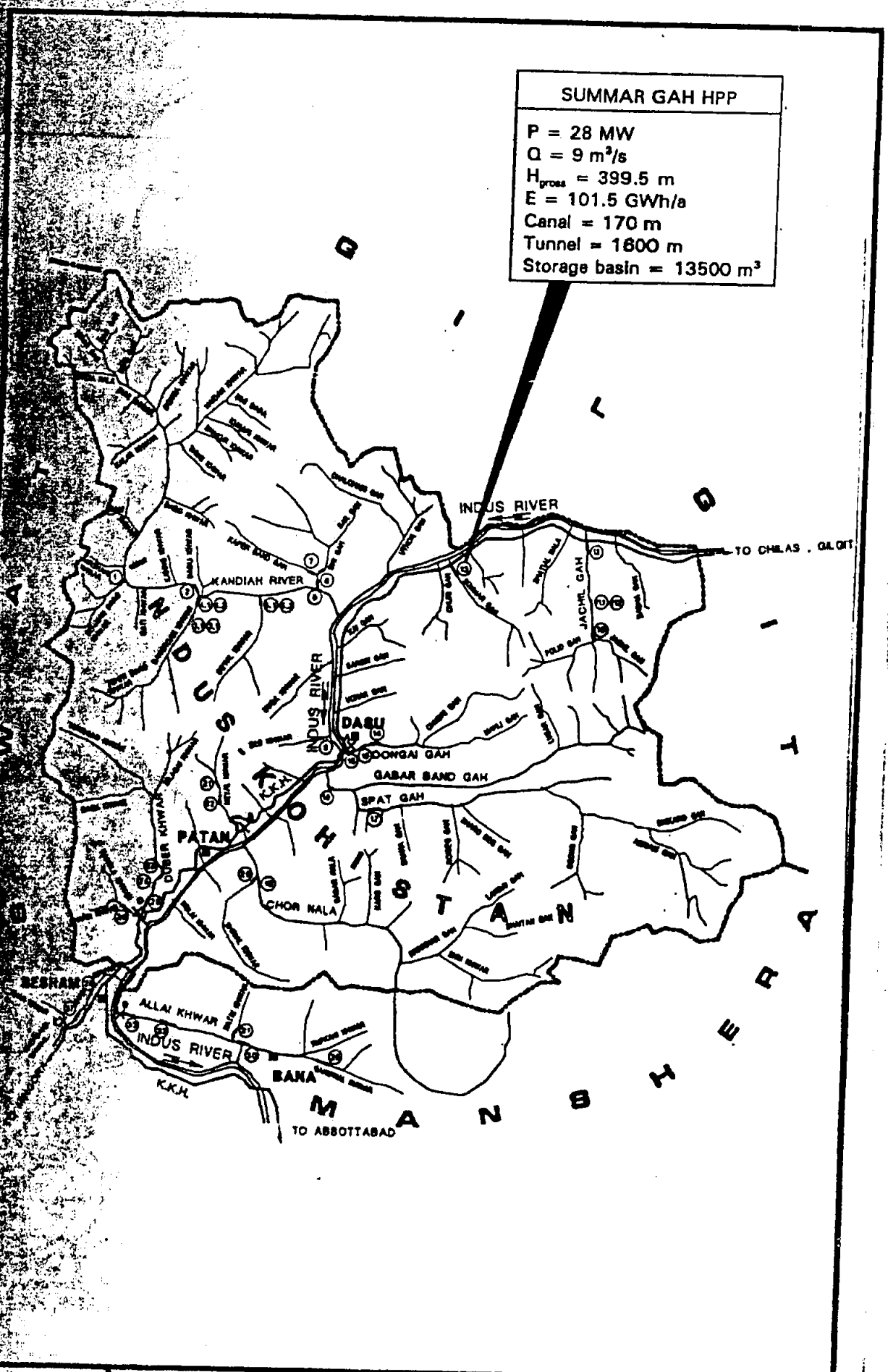
It has reference to your letter dated 13.9.2011 and to state that the subject feasibility study was carried out by SHYDO with technical assistance of GTZ Germany. A sum of Rs. 10633000/- was incurred by SHYDO to complete the feasibility study during 1992-93. The same amount shall be recovered from the project developer.

Director
(Private Power)

Copy to:

- PS to Managing Director SHYDO, Peshawar.

Director
(Private Power)



gtz	PAKISTAN-GERMAN TECHNICAL COOPERATION SHYDO-GTZ	Figure 1
	LOCATION OF KOHISTAN DISTRICT	Annex 7.1

SUMMAR GAH HYDRO JOINT VENTURE
28 MW HYDROPOWER PROJECT

CONSTRUCTION SCHEDULE

S NO	ACTIVITIES	Quarter - 1	Quarter - 2	Quarter - 3	Quarter - 4	Quarter - 5	Quarter - 6	Quarter - 7	Quarter - 8	Quarter - 9	Quarter - 10	Quarter - 11	Quarter - 12	REMARKS
1	Access:													
2	Diversion Works: Weir													
3	Lateral inlet, gravel spilling, overflow, intake..													
4	Connection canal:													
5	Sand trap:													
6	Headrace Canal (Covered), tunnel portal													
7	Headrace tunnel and adit, overflow													
8	Surge tank, pipe tunnel													
9	Penstock and Accessories, KKH bridge													
10	Powerhouse for 3 Pelton units													
11	Tailrace Canal:													
	Others Works													
12-	Electro-mechanical													
13-	Electrical equipment:													
14	Survey and investigation:													
15	Initial works/other works													

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

COMPANY REGISTRATION OFFICE
LAHORE

CERTIFICATE OF INCORPORATION

[Under section 32 of the Companies Ordinance, 1984 (XLVII of 1984)]

Corporate Universal Identification No.**0077871**

I hereby certify that **SAMMAR GAH HYDRO (PRIVATE) LIMITED** is this day incorporated under the Companies Ordinance, 1984 (XLVII of 1984) and that the company is **Limited by Shares**.

Given under my hand at **Lahore** this **Fourteenth** day of **December, Two Thousand** and **Eleven**.

Fee Rs.**179,000/-**

(AHMAD MUZAMMIL)
Additional Registrar

SO-ARL/7793 dt 14/12/11

SAMMAR GAH HYDRO (PVT) LIMITED