

INVENTORY OF HYDROPOWER SITES

SCHEME ID : 2-008-03-04-1-2

SCHEME : CHICO-1R

RIVER SYSTEM : CAGAYAN
 STREAM : CHICO
 WATER RESOURCES REGION : 11
 PROVINCE : MT. PROVINCE
 COORDINATES : N17-11-10 E121-03-53
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 806.8 (MAIN : 807. INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-
 AVER. BASIN RAINFALL (MM/YR) : 3372. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.
 AVERAGE DISCHARGE (M3/S) : 51.0 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.85

PONDAGE FULL SUPPLY LEVEL (EL.M) : 623.0 PONDAGE STORAGE VOL. (1000M3) : 332.2
 AVERAGE OPERATING LEVEL (EL.M) : 623.0 ACTIVE STORAGE VOL. (1000M3) : 0.
 MINIMUM OPERATING LEVEL (EL.M) : 623.0
 DRAWDOWN DEPTH (M) : 0.

MAIN DAM CREST ELEVATION (EL.M) : 623.0 CREST LENGTH (M) : 110.0
 (WEIR) WEIR HEIGHT (M) : 9.0 WEIR CONCRETE VOL. (1000 M3) : 18.4

WATERWAY HEADRACE : LENGTH (M) : 2950.0 DIAMETER (WIDTH) (M) : 4.7 NOS. : 1
 PENSTOCK : HORIZONTAL (M) : 135.0 DIAMETER (M) : 3.6 NOS. : 1
 EXCAVATION VOL TOTAL (1000 M3) : 53.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 51.0 AVERAGE NET HEAD (M) : 62.9
 /HEAD FIRM DISCHARGE (M3/S) : 40.0 TAILWATER LEVEL (EL.M) : 555.0

POWER INSTALLED CAPACITY (MW) : 26.4 ANNUAL TOTAL ENERGY (GWH) : 198.0
 /ENERGY FIRM POWER (MW) : 20.7 FIRM ENERGY (GWH) : 181.2
 MIN. GUARANTEED POWER (MW) : 18.6 SECONDARY ENERGY (GWH) : 16.8

TRANSMISSION LINE LENGTH (KW) : 20.5 TO : BATONG BUHAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1
 ACCESS ROAD LENGTH (KW) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 33.8 POWER COST (MIL USD) : 32.8
 TOTAL COST/KW (USD/KW) : 1280.2 TRANSMISSION COST (MIL USD) : 1.0
 TOTAL COST/KWH (USD/KWH) : 0.181 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION
 SUBMERGED ROAD : NONE
 MAP USED (1:50,000 SCALE) : 3271-IV 1979
 TECHNICAL COMMENT : SERIES DEVELOPMENT PLAN WITH SADANGA (2-008-03-05-1-1)
 - REGULATION EFFECT BY SADANGA IS CONSIDERED

INVENTORY OF HYDROPOWER SITES

SCHEME ID : 2-008-03-05-0-1

SCHEME : SADANGA

RIVER SYSTEM : CAGAYAN
STREAM : CHICO

WATER RESOURCES REGION : 11
PROVINCE : MT. PROVINCE

COORDINATES : N17-08-59 E121-03-08
STUDY LEVEL : UNSCALED
(PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 725.0 (MAIN : 725.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-
AVER. BASIN RAINFALL (MM/YR) : 3413. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.
AVERAGE DISCHARGE (M3/S) : 46.8 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 890.0
AVERAGE OPERATING LEVEL (EL.M) : 866.7
MINIMUM OPERATING LEVEL (EL.M) : 820.2
DRAWDOWN DEPTH (M) : 69.8

GROSS STORAGE VOL. (MIL M3) : 1471.7
ACTIVE STORAGE VOL. (MIL M3) : 958.8
DEAD STORAGE VOL. (MIL M3) : 512.9
SEDIMENT VOL. (MIL M3) : 50.7

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 896.0
DAM HEIGHT (M) : 220.0

CREST LENGTH (M) : 615.6
EMBANKMENT VOL. (MIL M3) : 23.10

WATERWAY HEADRACE : LENGTH (M) : 1270.0
PENSTOCK : HORIZONTAL L (M) : 190.0
DIVERSION : LENGTH (M) : 1600.0
EXCAVATION VOL TOTAL (1000 M3) : 224.4

DIAMETER (WIDTH) (M) : 5.7
DIAMETER (M) : 4.3
DIAMETER (M) : 7.8
NOS. : 2
NOS. : 2
NOS. : 2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 155.5
/HEAD FIRM DISCHARGE (M3/S) : 38.9

AVERAGE NET HEAD (M) : 186.1
TAILWATER LEVEL (EL.M) : 676.0

POWER INSATLLED CAPACITY (MW) : 238.2
/ENERGY FIRM POWER (MW) : 59.6
MIN.GUARANTEED POWER (MW) : 170.2

ANNUAL TOTAL ENERGY (GWH) : 611.3
FIRM ENERGY (GWH) : 521.7
SECONDARY ENERGY (GWH) : 89.6

TRANSMISSION LINE LENGTH (KM) : 28.1 TO : BATONG BUHAY 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1
ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 463.0 POWER COST (MIL USD) : 453.7
TOTAL COST/KW (USD/KWH) : 1943.4 TRANSMISSION COST (MIL USD) : 9.2
TOTAL COST/KWH (USD/KWH) : 0.844 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION
SUBMERGED ROAD : PROVINCIAL ROAD 8.5 KMS.
MAP USED (1:50,000 SCALE) : 3271-111 1979
TECHNICAL COMMENT : - SERIES DEVELOPMENT PLAN WITH EITHER BASAO OR CHICO-1R

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME : SADANGA
 RIVER SYSTEM : CAGAYAN
 STREAM : CHICO
 WATER RESOURCES REGION : II
 PROVINCE : MT. PROVINCE
 COORDINATES : N17-08-53 E121-03-08
 STUDY LEVEL : UNSCALED
 (PRE-F/S.RECONNAISSANCE)

SCHEME ID : 2-008-03-05-1-1

HYDRO/TOPO. INFORMATION
 CATCHMENT AREA (KM2) : 725.0 (MAIN : 725.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-
 AVER. BASIN RAINFALL (MM/YR) : 3413. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.
 AVERAGE DISCHARGE (M3/S) : 46.8 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN
 TYPE OF DEVELOPMENT : RESERVOIR
 RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR
 FULL SUPPLY LEVEL (EL.M) : 890.0
 AVERAGE OPERATING LEVEL (EL.M) : 863.9
 MINIMUM OPERATING LEVEL (EL.M) : 811.6
 DRAWDOWN DEPTH (M) : 78.4
 GROSS STORAGE VOL. (MIL M3) : 1471.7
 ACTIVE STORAGE VOL. (MIL M3) : 1032.6
 DEAD STORAGE VOL. (MIL M3) : 439.1
 SEDIMENT VOL. (MIL M3) : 50.7
 CREST ELEVATION (EL.M) : 896.0
 DAM HEIGHT (M) : 220.0
 HEADRACE : LENGTH (M) : 2200.0
 PENSTOCK : HORIZONTAL L (M) : 280.0
 DIVERSION : LENGTH (M) : 1600.0
 EXCAVATION VOL TOTAL (1000 M3) : 277.0

DISCHARGE / HEAD
 PLANT MAX. DISCHARGE (M3/S) : 157.8
 FIRM DISCHARGE (M3/S) : 39.5
 POWER / ENERGY
 UNSATLLED CAPACITY (MW) : 301.4
 FIRM POWER (MW) : 75.3
 MIN. GUARANTEED POWER (MW) : 222.3
 AVERAGE NET HEAD (M) : 232.0
 TAILWATER LEVEL (EL.M) : 629.0
 ANNUAL TOTAL ENERGY (GWH) : 762.2
 FIRM ENERGY (GWH) : 660.0
 SECONDARY ENERGY (GWH) : 102.1

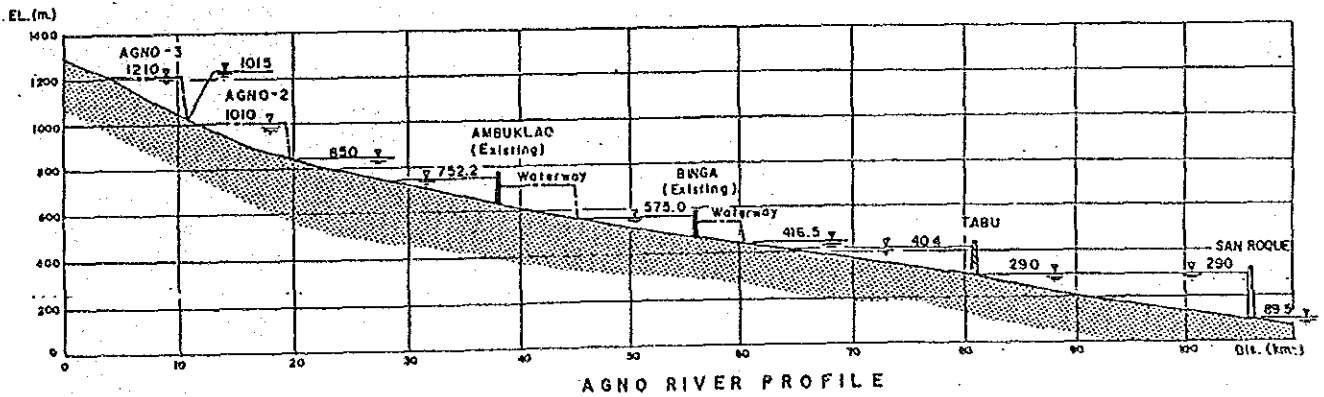
TRANSMISSION LINE
 LENGTH (KM) : 28.1 TO : BATONG BUHAY
 FROM : NATIONAL ROAD BESIDE DAMSITE
 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1

CONSTRUCTION COST
 TOTAL COST (MIL USD) : 493.4
 TOTAL COST/KW (USD/KW) : 1637.1
 TOTAL COST/KWH (USD/KWH) : 0.714
 POWER COST (MIL USD) : 464.1
 TRANSMISSION COST (MIL USD) : 9.2
 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION
 LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION
 SUBMERGED ROAD : PROVINCIAL ROAD 8.5 KMS.
 MAP USED (1:50,000 SCALE) : 3271-111 1979
 TECHNICAL COMMENT : - SERIES DEVELOPMENT PLAN WITH CHICO-IR

AGNO RIVER BASIN

Case No.	Scheme	ID No.	FSL(m)	TWL(m)
5-1	- Binga (existing)	3-077-00-81-0-1	575.0	416.5
	- Tabu	3-077-00-04-1-1	404.0	290.0
5-2	- Binga (existing)	3-077-00-81-0-1	575.0	416.5
	- Tabu (low dam Alt.)	3-077-00-04-2-1	348.5	290.0



FSL (Full supply level)
 TWL (Tall water level)

 **5-1-4 AGNO

REGION NO. : 3 BASIN NO. : 77

NUMBER OF PROJECTS : 2

LIST OF PROJECTS

NO.	PROJECT ID	PROJECT NAME	CA (SQ.KM)	RAIN (MM)	STREAM GAGE ID
1	3-077-00-81-0-1	BINGA	936.0	2825.0	4-3-093
2	3-077-00-04-1-1	TABU	1070.0	2838.0	4-3-093

CONNECTION MATRIX

1	2
1	0
2	1

1/ C(I,J)=1 : PROJECT-J IS DIRECTLY UPSTREAM OF PROJECT-I
 - C(I,J)=0 : " IS NOT "

SEQ ID(S) OF
 NO. PROJECT ID NUP U/S PROJECT(S)

1	3-077-00-81-0-1	0	
2	3-077-00-04-1-1	1	3-077-00-81-0-1

PROJECT NAME : BINGA
 PROJECT ID : 3-77-0-81-0-1
 TYPE : RESERVOIR

BASIN NAME : AGNO
 RIVER NAME : AGNO

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR -----
 CASE -----
 ITEMS 1 2 3 4 5 6 7 8 9 10

RESERVOIR DEVELOP. COEF : 0.24 0.15 0.16 0.16 0.12 0.12 0.12 0.08 0.08 0.08
 FULL SUPPLY LEVEL (M) : 575.0 562.3 568.5 575.0 558.4 566.3 575.0 553.7 564.1 575.0
 MIN. OPERATING LEVEL (M) : 556.7 545.9 554.8 563.7 545.2 556.0 566.8 544.4 557.2 570.0

POWER -----
 FIRM DISCHARGE (M3/S) : 23.2 18.3 18.1 18.0 15.0 14.8 14.6 11.8 11.6 11.3
 PLANT PEAK DIS. (M3/S) : 46.4 36.5 36.3 35.9 30.0 29.7 29.3 23.5 23.1 22.6
 AVERAGE NET HEAD (M) : 151.9 139.7 146.7 153.9 136.7 145.5 154.7 133.1 144.1 155.4
 INSTALLED CAPACITY (MW) : 58.0 42.0 43.8 45.5 33.8 35.6 37.3 25.7 27.4 28.9
 GUARANTEED POWER (MW) : 50.8 36.9 39.1 41.2 30.1 32.3 34.2 23.4 25.3 26.9
 AVERAGE FIRM POWER (MW) : 29.0 21.0 21.9 22.8 16.9 17.8 18.6 12.9 13.7 14.4
 FIRM ENERGY (MIL KWH/Y) : 254. 184. 192. 199. 148. 156. 163. 113. 120. 127.
 SECONDARY ENERGY (") : 181. 184. 192. 199. 148. 156. 163. 113. 120. 127.
 ANNUAL AVERAGE E-GY (") : 435. 368. 384. 399. 296. 312. 326. 226. 240. 253.

D A M -----
 DAM HEIGHT (M) : 92.4 79.7 85.9 92.4 75.8 83.7 92.4 71.1 81.5 92.4
 EMBANKMENT VOL. (MIL M3) : 2.011 1.384 1.568 2.011 1.224 1.566 2.011 1.050 1.464 2.011

EVALUATION INDECEES -----
 CH/V : 57475. 60447. 51907. 44418. 54539. 44518. 36112. 48042. 36457. 27813.
 C/V : 364. 416. 343. 282. 387. 299. 229. 353. 249. 177.
 P/(20VT+VD) : 18.9 17.6 16.4 15.1 15.4 14.0 12.5 13.0 11.4 9.8
 E(FIRM)/(20VT+VD) : 82.9 77.1 71.9 66.2 67.5 61.5 54.8 56.8 50.1 43.0
 E(F+SEC*0.3)/(20VT+VD) : 100.6 100.3 93.5 86.1 87.7 79.9 71.3 73.9 65.2 55.9

PROJECT NAME : BINGA
 PROJECT ID : 3-077-00-81-0
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E									
	1	2	3	4	5	6	7	8	9	10
POWER DEVELOPMENT (INST. CAP(MW))	(58.0)	(42.0)	(43.8)	(45.5)	(33.8)	(35.6)	(37.3)	(25.7)	(27.4)	(28.9)
STORAGE DAM	22.42	16.17	19.03	22.42	14.53	18.02	22.42	12.71	16.98	22.42
SPILLWAY	16.65	14.74	15.67	16.65	14.15	15.34	16.65	13.45	15.01	16.65
DIVERSION TUNNEL	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45
INTAKE (PRESSURE TYPE)	1.19	0.94	0.89	0.85	0.75	0.70	0.65	0.55	0.51	0.47
HEADRACE TUNNEL (PRESSURE)	2.51	2.11	2.10	2.09	1.84	1.82	1.80	1.54	1.52	1.50
SURGE TANK	0.96	0.76	0.76	0.75	0.63	0.62	0.61	0.50	0.49	0.48
PENSTOCK	0.60	0.44	0.49	0.53	0.38	0.43	0.47	0.32	0.37	0.41
(PRESSURE SHAFT)	(0.17)	(0.15)	(0.16)	(0.17)	(0.14)	(0.15)	(0.16)	(0.13)	(0.14)	(0.15)
(STEEL LINER)	(0.43)	(0.30)	(0.33)	(0.36)	(0.25)	(0.28)	(0.31)	(0.19)	(0.23)	(0.26)
POWERHOUSE BUILDING	2.65	1.98	2.03	2.07	1.60	1.65	1.69	1.23	1.28	1.31
(SUPER STRUCTURE)	(1.18)	(0.88)	(0.90)	(0.92)	(0.71)	(0.73)	(0.75)	(0.55)	(0.57)	(0.58)
(SUB STRUCTURE)	(1.47)	(1.10)	(1.13)	(1.15)	(0.89)	(0.92)	(0.94)	(0.68)	(0.71)	(0.73)
MISCELLANEOUS CIVIL WORK	2.67	2.18	2.37	2.59	2.02	2.25	2.54	1.84	2.13	2.48
CONSTRUCTION FACILITIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
POWER EQUIPMENT	13.14	10.20	10.36	10.50	8.46	8.62	8.75	6.71	6.85	6.94
ENGINEERING/ADMINISTRATION	8.65	7.00	7.52	8.11	6.35	6.99	7.75	5.66	6.45	7.39
CONTINGENCIES	15.58	12.60	13.53	14.60	11.43	12.58	13.96	10.19	11.61	13.30
S U B T O T A L	93.46	75.58	81.21	87.59	68.58	75.47	83.74	61.16	69.64	79.79

ACCESS ROAD (ROAD LENGTH 0. KM)

CONSTRUCTION COST	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENGINEERING ADMINISTRATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CONTINGENCIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S U B T O T A L	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TRANSMISSION LINE SYSTEM (T/L LENGTH 35.0 KM)

TRANSMISSION LINE	2.38	2.38	2.38	2.38	1.61	1.61	1.61	0.80	0.60	0.80
SWITCHYARD AND SUBSTATION	0.62	0.62	0.62	0.62	0.54	0.54	0.54	0.27	0.27	0.27
ENGINEERING/ADMINISTRATION	0.37	0.37	0.37	0.37	0.27	0.27	0.27	0.13	0.13	0.13
CONTINGENCIES	0.51	0.51	0.51	0.51	0.26	0.26	0.26	0.18	0.18	0.18
S U B T O T A L	3.88	3.88	3.88	3.88	2.78	2.78	2.78	1.39	1.39	1.39

T O T A L : 97.34 79.46 85.09 91.47 71.37 78.25 86.53 62.55 71.03 81.18

EVALUATION INDICES

U S D / K W	1677.8	1890.2	1941.6	2009.3	2112.9	2200.3	2322.0	2429.6	2590.5	2809.6
U S D / K W H	0.316	0.332	0.341	0.353	0.371	0.386	0.408	0.427	0.455	0.493

PROJECT NAME : TABU
 PROJECT ID : 3-77-0-4-1-1
 TYPE : RESERVOIR

BASIN NAME : AGNO
 RIVER NAME : AGNO

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR	CASE									
	1	2	3	4	5	6	7	8	9	10
RESERVOIR DEVELOP. COEF :	0.07	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03
FULL SUPPLY LEVEL (M) :	404.0	392.7	397.8	404.0	387.1	394.6	404.0	380.6	391.1	404.0
MIN. OPERATING LEVEL (M) :	349.9	349.6	363.0	376.4	349.5	366.6	383.7	349.4	369.7	390.1
POWER										
FIRM DISCHARGE (M3/S) :	28.8	27.5	27.5	27.5	27.0	27.0	27.0	26.5	26.5	26.4
PLANT PEAK DIS. (M3/S) :	172.4	164.9	164.8	164.6	161.9	161.8	161.5	158.9	158.7	158.4
AVERAGE NET HEAD (M) :	91.2	83.6	91.3	99.8	79.8	90.3	102.1	75.4	89.1	104.2
INSTALLED CAPACITY (MW) :	129.4	113.5	123.9	135.2	106.3	120.3	135.8	98.7	116.4	135.8
GUARANTEED POWER (MW) :	74.4	70.9	88.0	105.0	69.5	90.9	112.1	68.1	98.1	117.8
AVERAGE FIRM POWER (MW) :	21.6	18.9	20.7	22.6	17.8	20.1	22.7	16.5	19.4	22.7
FIRM ENERGY (MIL KWH/Y) :	189.	166.	181.	198.	156.	176.	199.	144.	170.	199.
SECONDARY ENERGY (") :	226.	210.	221.	234.	201.	217.	237.	189.	212.	241.
ANNUAL AVERAGE E-GY (") :	416.	376.	402.	432.	356.	393.	436.	334.	383.	439.

D A M	CASE									
	1	2	3	4	5	6	7	8	9	10
DAM HEIGHT (M) :	98.0	86.7	91.8	98.0	81.1	88.6	98.0	74.6	85.1	98.0
EMBANKMENT VOL. (MIL M3) :	2.414	1.780	2.051	2.414	1.509	1.875	2.414	1.238	1.705	2.414

EVALUATION INDECS	CASE									
	1	2	3	4	5	6	7	8	9	10
CH/V :	41071.	47806.	43568.	39137.	52159.	45295.	38363.	58030.	47173.	37594.
C/V :	376.	488.	423.	359.	565.	455.	352.	676.	490.	345.
P/(20VT+VD) :	15.6	15.2	16.0	16.7	14.9	16.0	16.9	14.5	16.0	17.0
E(FIRM)/(20VT+VD) :	22.9	22.2	23.4	24.4	21.7	23.4	24.7	21.2	23.4	24.9
E(F+SEC*0.3)/(20VT+VD) :	31.1	30.6	31.9	33.0	30.2	32.1	33.5	29.5	32.1	33.9

PROJECT NAME : TABU
 PROJECT ID : 3-077-00-04-1
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E									
	1	2	3	4	5	6	7	8	9	10
POWER DEVELOPMENT (INST. CAP(MW))	(129.4)	(113.5)	(123.9)	(135.2)	(106.3)	(120.3)	(135.8)	(98.7)	(116.4)	(135.8)
STORAGE DAM	26.29	20.14	22.80	25.29	17.44	21.08	26.29	14.67	19.40	26.29
SPILLWAY	18.18	16.42	17.21	18.18	15.54	16.71	18.18	14.54	16.18	18.18
DIVERSION TUNNEL	18.01	18.01	18.01	18.01	18.01	18.01	18.01	18.01	18.01	18.01
INTAKE (PRESSURE TYPE)	4.92	4.44	4.20	3.97	4.22	3.92	3.64	3.96	3.63	3.32
HEADRACE TUNNEL (PRESSURE)	30.87	29.91	29.89	29.86	29.52	29.50	29.40	29.12	29.10	29.05
SURGE TANK	4.83	4.63	4.62	4.61	4.54	4.54	4.53	4.46	4.45	4.44
PENSTOCK	4.11	3.80	4.12	4.46	3.66	4.08	4.54	3.52	4.02	4.59
(PRESSURE SHAFT)	(1.17)	(1.16)	(1.20)	(1.24)	(1.16)	(1.21)	(1.26)	(1.16)	(1.21)	(1.27)
(STEEL LINER)	(2.93)	(2.64)	(2.91)	(3.22)	(2.50)	(2.87)	(3.28)	(2.36)	(2.81)	(3.32)
POWERHOUSE BUILDING	9.91	8.55	9.49	10.05	8.52	9.24	10.01	8.05	8.99	9.95
(SUPER STRUCTURE)	(4.40)	(3.98)	(4.22)	(4.47)	(3.79)	(4.11)	(4.45)	(3.58)	(3.99)	(4.42)
(SUB STRUCTURE)	(5.51)	(4.97)	(5.27)	(5.58)	(4.73)	(5.14)	(5.56)	(4.47)	(4.99)	(5.53)
MISCELLANEOUS CIVIL WORK	5.86	5.32	5.52	5.77	5.07	5.35	5.73	4.82	5.19	5.69
CONSTRUCTION FACILITIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
POWER EQUIPMENT	34.01	31.43	32.69	33.98	30.28	31.99	33.75	29.03	31.25	33.46
ENGINEERING/ADMINISTRATION	19.62	17.88	18.57	19.40	17.10	18.05	19.27	16.27	17.53	19.12
CONTINGENCIES	35.32	32.19	33.42	34.92	30.78	32.49	34.68	29.29	31.55	34.42
S U B T O T A L	211.93	193.12	200.55	209.51	184.69	194.97	208.00	175.74	189.29	206.53

ACCESS ROAD (ROAD LENGTH 12.0 KM)

CONSTRUCTION COST	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64
ENGINEERING ADMINISTRATION	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
CONTINGENCIES	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
S U B T O T A L	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42

TRANSMISSION LINE SYSTEM (T/L LENGTH 24.0 KM)

TRANSMISSION LINE	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.66
SWITCHYARD AND SUBSTATION	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
ENGINEERING/ADMINISTRATION	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
CONTINGENCIES	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
S U B T O T A L	4.69	4.69	4.69	4.69	4.69	4.69	4.69	4.69	4.69	4.69

T O T A L : 220.04 201.23 208.66 217.62 192.80 203.08 216.20 183.85 197.40 214.64

EVALUATION INDICES

U S D / K W	1700.7	1779.6	1684.1	1609.5	1813.1	1688.2	1592.5	1863.2	1696.3	1580.3
U S D / K W H	0.855	0.879	0.843	0.812	0.893	0.842	0.801	0.914	0.844	0.792

 **5-2-1 AGNO

REGION NO. : 3 BASIN NO. : 77

NUMBER OF PROJECTS : 2

L I S T O F P R O J E C T S
 - - - - -

NO.	PROJECT ID	PROJECT NAME	CA (SQ.KM)	RAIN (MM)	STREAM GAGE ID
1	3-077-00-81-0-1	BINGA	936.0	2825.0	4-3-093
2	3-077-00-04-2-1	TABU (LOW DAM ALT.)	1070.0	2838.0	4-3-093

CONNECTION MATRIX
 - - - - -

1	2
1	0
2	1

1/ C(I,J)=1 : PROJECT-J IS DIRECTLY UPSTREAM OF PROJECT-I
 - C(I,J)=0 : " IS NOT "

SEQ NO.	PROJECT ID	NUP	ID(S) OF U/S PROJECT(S)
1	3-077-00-81-0-1	0	
2	3-077-00-04-2-1	1	3-077-00-81-0-1

PROJECT NAME : BINGA
 PROJECT ID : 3-77-0-81-0-1
 TYPE : RESERVOIR

BASIN NAME : AGNO
 RIVER NAME : AGNO

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR	ITEMS	CASE												
		1	2	3	4	5	6	7	8	9	10			
RESERVOIR	RESERVOIR DEVELOP. COEF :	0.24	0.16	0.16	0.16	0.12	0.12	0.12	0.08	0.08	0.08	0.08	0.08	0.08
	FULL SUPPLY LEVEL (M) :	575.0	562.3	568.5	575.0	558.4	566.3	575.0	553.7	564.1	575.0	575.0	575.0	575.0
	MIN. OPERATING LEVEL (M) :	556.7	545.9	554.8	563.7	545.2	556.0	566.8	544.4	557.2	566.8	557.2	570.0	570.0
POWER	FIRM DISCHARGE (M ³ /S) :	23.2	18.3	18.1	18.0	15.0	14.8	14.6	11.8	11.6	11.3	11.3	11.3	11.3
	PLANT PEAK DIS. (M ³ /S) :	46.4	36.5	36.3	35.9	30.0	29.7	29.3	23.5	23.1	22.6	22.6	22.6	22.6
	AVERAGE NET HEAD (M) :	151.9	139.7	146.7	153.9	136.7	145.5	154.7	133.1	144.1	155.4	144.1	155.4	155.4
	INSTALLED CAPACITY (MW) :	58.0	42.0	43.8	45.5	33.8	35.6	37.3	25.7	27.4	28.9	27.4	28.9	28.9
	GUARANTEED POWER (MW) :	50.8	36.9	39.1	41.2	30.1	32.3	34.2	23.4	25.3	26.9	25.3	26.9	26.9
	AVERAGE FIRM POWER (MW) :	29.0	21.0	21.9	22.8	16.9	17.8	18.6	12.9	13.7	14.4	13.7	14.4	14.4
	FIRM ENERGY (MIL KWH/Y) :	254.	184.	192.	199.	148.	156.	163.	113.	120.	127.	120.	127.	127.
	SECONDARY ENERGY (") :	181.	184.	192.	199.	148.	156.	163.	113.	120.	127.	120.	127.	127.
	ANNUAL AVERAGE E-GY (") :	495.	368.	384.	399.	296.	312.	326.	226.	240.	253.	240.	253.	253.

D A M	CASE												
	1	2	3	4	5	6	7	8	9	10			
DAM HEIGHT (M) :	92.4	79.7	85.9	92.4	75.8	83.7	92.4	71.1	81.5	92.4	92.4	92.4	92.4
EMBANKMENT VOL. (MIL M3) :	2.011	1.384	1.660	2.011	1.224	1.556	2.011	1.050	1.464	2.011	1.050	2.011	2.011

EVALUATION INDEICES	CASE												
	1	2	3	4	5	6	7	8	9	10			
CH/V :	57475.	60447.	51907.	44418.	54539.	44518.	36112.	48042.	36457.	27813.	36457.	27813.	27813.
C/V :	364.	416.	343.	282.	387.	299.	229.	353.	249.	177.	249.	177.	177.
P/(20VT+VD) :	18.9	17.6	16.4	15.1	15.4	14.0	12.5	13.0	11.4	9.8	11.4	9.8	9.8
E(FIRM)/(20VT+VD) :	82.9	77.1	71.9	66.2	67.5	61.5	54.8	56.8	50.1	43.0	50.1	43.0	43.0
E(F+SEC*0.3)/(20VT+VD) :	100.6	100.3	93.5	86.1	87.7	79.9	71.3	73.9	65.2	55.9	65.2	55.9	55.9

PROJECT NAME : BINCA
 PROJECT ID : 3-077-00-81-0
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E									
	1	2	3	4	5	6	7	8	9	10
POWER DEVELOPMENT (INST. CAP. (MW))	(58.0)	(42.0)	(43.8)	(45.5)	(33.8)	(35.6)	(37.3)	(25.7)	(27.4)	(28.9)
STORAGE DAM	22.42	16.17	19.03	22.42	14.53	16.02	22.42	12.71	16.98	22.42
SPILLWAY	16.65	14.74	15.67	16.65	14.15	15.34	16.65	13.45	15.01	16.65
DIVERSION TUNNEL	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45
INTAKE (PRESSURE TYPE)	1.19	0.94	0.89	0.85	0.75	0.70	0.65	0.55	0.51	0.47
HEADRACE TUNNEL (PRESSURE)	2.51	2.11	2.10	2.09	1.84	1.82	1.80	1.54	1.52	1.50
SURGE TANK	0.96	0.76	0.76	0.75	0.63	0.62	0.61	0.50	0.49	0.48
PENSTOCK	0.60	0.44	0.49	0.53	0.38	0.43	0.47	0.32	0.37	0.41
(PRESSURE SHAFT)	(0.17)	(0.15)	(0.16)	(0.17)	(0.14)	(0.15)	(0.16)	(0.13)	(0.14)	(0.15)
(STEEL LINER)	(0.43)	(0.30)	(0.33)	(0.36)	(0.25)	(0.28)	(0.31)	(0.19)	(0.23)	(0.26)
POWERHOUSE BUILDING	2.65	1.98	2.03	2.07	1.60	1.65	1.69	1.23	1.28	1.31
(SUPER STRUCTURE)	(1.18)	(0.88)	(0.90)	(0.92)	(0.71)	(0.73)	(0.75)	(0.55)	(0.57)	(0.58)
(SUB STRUCTURE)	(1.47)	(1.10)	(1.13)	(1.15)	(0.89)	(0.92)	(0.94)	(0.68)	(0.71)	(0.73)
MISCELLANEOUS CIVIL WORK	2.67	2.18	2.37	2.59	2.02	2.25	2.54	1.84	2.13	2.48
CONSTRUCTION FACILITIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
POWER EQUIPMENT	13.14	10.20	10.35	10.50	8.46	8.62	8.75	6.71	6.85	6.94
ENGINEERING/ADMINISTRATION	8.65	7.00	7.52	8.11	6.35	6.99	7.75	5.66	6.45	7.39
CONTINGENCIES	15.58	12.60	13.53	14.60	11.43	12.58	13.96	10.19	11.61	13.30
S U B T O T A L	93.46	75.58	81.21	87.59	68.58	75.47	83.74	61.16	69.64	79.79

ACCESS ROAD (ROAD LENGTH 0. KM)

CONSTRUCTION COST	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ENGINEERING ADMINISTRATION	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CONTINGENCIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
S U B T O T A L	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TRANSMISSION LINE SYSTEM (T/L LENGTH 35.0 KM)

TRANSMISSION LINE	2.38	2.38	2.38	2.38	1.61	1.61	1.61	0.80	0.80	0.80
SWITCHYARD AND SUBSTATION	0.62	0.62	0.62	0.62	0.54	0.54	0.54	0.27	0.27	0.27
ENGINEERING/ADMINISTRATION	0.37	0.37	0.37	0.37	0.27	0.27	0.27	0.13	0.13	0.13
CONTINGENCIES	0.51	0.51	0.51	0.51	0.36	0.36	0.36	0.18	0.18	0.18
S U B T O T A L	3.88	3.88	3.88	3.88	2.78	2.78	2.78	1.39	1.39	1.39

T O T A L : 97.34 79.46 85.09 91.47 71.37 78.25 86.53 62.55 71.03 81.18

EVALUATION INDICES

U S D / K W	1677.8	1890.2	1941.6	2009.3	2112.9	2200.3	2322.0	2429.6	2590.5	2809.6
U S D / K W H	0.316	0.332	0.341	0.353	0.371	0.386	0.408	0.427	0.455	0.493

PROJECT NAME : TABU (LOW DAM ALT.)
 PROJECT ID : 3-77-0-4-2-1
 TYPE : RESERVOIR

BASIN NAME : AGNO
 RIVER NAME : AGNO

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR

ITEMS	CASE					
	1	2	3	4	5	6
RESERVOIR DEVELOP. COEF :	0.00	0.00	0.00	0.00	0.00	0.00
FULL SUPPLY LEVEL (M) :	348.5	348.5	348.5	348.5	348.5	348.5
MIN. OPERATING LEVEL(M) :	348.7	346.8	347.0	347.1	347.2	347.3

POWER

FIRM DISCHARGE (MG/S) :	23.7	23.7	23.7	23.7	23.7	23.5
PLANT PEAK DIS. (MG/S) :	47.4	47.5	47.4	47.4	47.3	47.3
AVERAGE NET HEAD (M) :	52.1	52.1	52.1	52.2	52.2	52.2
INSTALLED CAPACITY (MW) :	20.3	20.4	20.4	20.3	20.3	20.3
GUARANTEED POWER (MW) :	19.9	19.0	19.0	19.0	19.0	19.1
AVERAGE FIRM POWER (MW) :	10.1	10.2	10.2	10.2	10.2	10.2
FIRM ENERGY (MIL KWH/Y) :	89.	89.	89.	89.	89.	89.
SECONDARY ENERGY (") :	75.	75.	75.	75.	75.	75.
ANNUAL AVERAGE E-GY (") :	164.	164.	164.	164.	164.	164.

D A M

DAM HEIGHT (M) :	42.5	42.5	42.5	42.5	42.5	42.5
EMBANKMENT VOL. (MIL M3) :	0.362	0.362	0.362	0.362	0.362	0.362

EVALUATION INDECES

CH/V :	108571.	108820.	108686.	108552.	108419.	108285.
C/V :	2062.	2066.	2064.	2062.	2059.	2057.
P/(20VT+VD) :	5.6	5.6	5.6	5.6	5.6	5.6
E(FIRM)/(20VT+VD) :	24.4	24.5	24.5	24.5	24.5	24.5
E(F+SEC*0.3)/(20VT+VD) :	30.6	30.7	30.7	30.7	30.7	30.7

PROJECT NAME : TABU (LOW DAM ALT.)
 PROJECT ID : 3-077-00-04-2
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E					
	1	2	3	4	5	6
POWER DEVELOPMENT (INST. CAP (MW))	(20.3)	(20.4)	(20.4)	(20.3)	(20.3)	(20.3)
STORAGE DAM	5.02	5.02	5.02	5.02	5.02	5.02
SPILLWAY	9.56	9.56	9.56	9.56	9.56	9.56
DIVERSION TUNNEL	18.01	18.01	18.01	18.01	18.01	18.01
INTAKE (PRESSURE TYPE)	0.85	0.85	0.84	0.84	0.83	0.83
HEADRACE TUNNEL (PRESSURE)	10.05	10.07	10.06	10.05	10.04	10.03
SURGE TANK	1.35	1.36	1.35	1.35	1.35	1.35
PENSTOCK	1.08	1.08	1.08	1.08	1.08	1.08
(PRESSURE SHAFT)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
(STEEL LINER)	(0.58)	(0.58)	(0.58)	(0.58)	(0.58)	(0.58)
POWERHOUSE BUILDING	1.33	1.33	1.33	1.33	1.33	1.33
(SUPER STRUCTURE)	(0.59)	(0.59)	(0.59)	(0.59)	(0.59)	(0.59)
(SUB STRUCTURE)	(0.74)	(0.74)	(0.74)	(0.74)	(0.74)	(0.74)
MISCELLANEOUS CIVIL WORK	2.36	2.36	2.36	2.36	2.36	2.36
CONSTRUCTION FACILITIES	0.	0.	0.	0.	0.	0.
POWER EQUIPMENT	8.26	8.28	8.28	8.27	8.27	8.26
ENGINEERING/ADMINISTRATION	7.23	7.24	7.24	7.23	7.23	7.23
CONTINGENCIES	13.02	13.03	13.03	13.02	13.02	13.01
S U B T O T A L	78.12	78.18	78.15	78.12	78.09	78.06

ACCESS ROAD (ROAD LENGTH 6.0 KM)	
CONSTRUCTION COST	1.32
ENGINEERING ADMINISTRATION	0.11
CONTINGENCIES	0.29
S U B T O T A L	1.71

TRANSMISSION LINE SYSTEM (T/L LENGTH 27.0 KM)	
TRANSMISSION LINE	0.62
SWITCHYARD AND SUBSTATION	0.27
ENGINEERING/ADMINISTRATION	0.11
CONTINGENCIES	0.15
S U B T O T A L	1.15

T O T A L	80.99	81.05	81.02	80.98	80.95	80.92
EVALUATION INDICES						
U S D / K W	3990.0	3980.5	3980.9	3981.2	3981.6	3982.0
U S D / K W H	0.727	0.726	0.725	0.725	0.725	0.725

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 3-077-00-04-1-1
 COORDINATES : N16-16-43 E120-44-33
 STUDY LEVEL : UNSCALED
 (PRE-F/S, RECONNAISSANCE)

SCHEME : TABU
 RIVER SYSTEM : AGNO
 STREAM : AGNO
 WATER RESOURCES REGION : III
 PROVINCE : BENGUET

HYDRO/TOPO. INFORMATION
 CATCHMENT AREA (KM2) : 1070.0 (MAIN : 1070.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-3-093-NP-
 AVER. BASIN RAINFALL (MM/YR) : 2835 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 690.
 AVERAGE DISCHARGE (M3/S) : 63.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 42.7

SELECTED PLAN
 TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.03

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 404.0 GROSS STORAGE VOL. (MIL M3) : 169.6
 AVERAGE OPERATING LEVEL (EL.M) : 399.4 ACTIVE STORAGE VOL. (MIL M3) : 59.9
 MINIMUM OPERATING LEVEL (EL.M) : 390.1 DEAD STORAGE VOL. (MIL M3) : 109.7
 DRAWDOWN DEPTH (M) : 13.9 SEDIMENT VOL. (MIL M3) : 9.4
 MAIN DAM CREST ELEVATION (EL.M) : 410.0 CREST LENGTH (M) : 226.4
 (WEIR) DAM HEIGHT (M) : 98.0 EMBANKMENT VOL. (MIL M3) : 2.41

WATERWAY HEADRACE : LENGTH (M) : 3000.0 DIAMETER (WIDTH) (M) : 5.8 NOS. : 2
 PENSTOCK : HORIZONTAL LENGTH (M) : 160.0 DIAMETER (M) : 4.5 NOS. : 2
 DIVERSION : LENGTH (M) : 1250.0 DIAMETER (M) : 7.6 NOS. : 2
 EXCAVATION VOL TOTAL (1000 M3) : 279.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 158.4 AVERAGE NET HEAD (M) : 104.2
 /HEAD FIRM DISCHARGE (M3/S) : 26.4 TAILWATER LEVEL (EL.M) : 290.0
 POWER UNSATLLED CAPACITY (MW) : 135.8 ANNUAL TOTAL ENERGY (GWH) : 439.4
 /ENERGY FIRM POWER (MW) : 22.7 FIRM ENERGY (GWH) : 198.7
 MIN. GUARANTEED POWER (MW) : 117.8 SECONDARY ENERGY (GWH) : 240.7

TRANSMISSION LINE LENGTH (KM) : 24.0 TO : SAN MANUEL 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1
 ACCESS ROAD LENGTH (KM) : 12.0 FROM : NEARES PROVINCIAL ROAD

CONSTRUCTION COST
 TOTAL COST (MIL USD) : 214.6 POWER COST (MIL USD) : 206.5
 TOTAL COST/KW (USD/KW) : 1580.3 TRANSMISSION COST (MIL USD) : 4.7
 TOTAL COST/KWH (USD/KWH) : 0.792 ACCESS ROAD COST (MIL USD) : 3.4

OTHER INFORMATION
 LAND USE IN RESERVOIR AREA : MIXED - DENSE POPULATION
 SUBMERGED ROAD : NONE
 MAP USED (1:50,000 SCALE) : 3168-IV 1978
 TECHNICAL COMMENT : - REGULATION EFFECT BY EXISTING BINGA RESERVOIR IS CONSIDERED
 - CONSTRAINED FSL (MAX=404 M) DUE TO TWL OF BINGA

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME : TABU (LOW DAM ALT.) SCHEME ID : 3-077-00-04-2-1

RIVER SYSTEM : AGNO WATER RESOURCES REGION : III COORDINATES : N16-16-43 E120-44-33
 STREAM : AGNO PROVINCE : BENGUET STUDY LEVEL : UNSCALED
 (PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 1070.0 (MAIN : 1070.0, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-3-093-NP-
 AVER. BASIN RAINFALL (MM/YR) : 2838. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 690.
 AVERAGE DISCHARGE (M3/S) : 63.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER.DJ.SCHARGE (M3/S) : 42.7

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.00

RESERVOIR

FULL SUPPLY LEVEL (EL.M) : 348.5 GROSS STORAGE VOL. (MIL M3) : 19.5
 AVERAGE OPERATING LEVEL (EL.M) : 347.9 ACTIVE STORAGE VOL. (MIL M3) : 1.7
 MINIMUM OPERATING LEVEL (EL.M) : 346.8 DEAD STORAGE VOL. (MIL M3) : 17.8
 DRAWDOWN DEPTH (M) : 1.7 SEDIMENT VOL. (MIL M3) : 9.4

MAIN DAM (WEIR)

CREST ELEVATION (EL.M) : 354.5 CREST LENGTH (M) : 104.9
 DAM HEIGHT (M) : 42.5 EMBANKMENT VOL. (MIL M3) : 0.36

WATERWAY

HEADRACE : LENGTH (M) : 3000.0 DIAMETER (WIDTH) (M) : 4.5 NOS. : 1
 PENSTOCK : HORIZONT. L (M) : 160.0 DIAMETER (M) : 3.8 NOS. : 1
 DIVERSION : LENGTH (M) : 1250.0 DIAMETER (M) : 7.6 NOS. : 2
 EXCAVATION VOL TOTAL (1000 M3) : 164.1

DISCHARGE /HEAD

PLANT MAX. DISCHARGE (M3/S) : 47.5 AVERAGE NET HEAD (M) : 52.1
 FIRM DISCHARGE (M3/S) : 23.7 TAILWATER LEVEL (EL.M) : 290.0

POWER /ENERGY

INSTALLED CAPACITY (MW) : 20.4 ANNUAL TOTAL ENERGY (GWH) : 164.2
 FIRM POWER (MW) : 10.2 FIRM ENERGY (GWH) : 89.2
 MIN. GUARANTEED POWER (MW) : 19.0 SECONDARY ENERGY (GWH) : 75.1

TRANSMISSION LINE

LENGTH (KM) : 27.0 TO : SAN MANUEL 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1
 ACCESS ROAD LENGTH (KM) : 6.0 FROM : DALUPIRIP

CONSTRUCTION COST

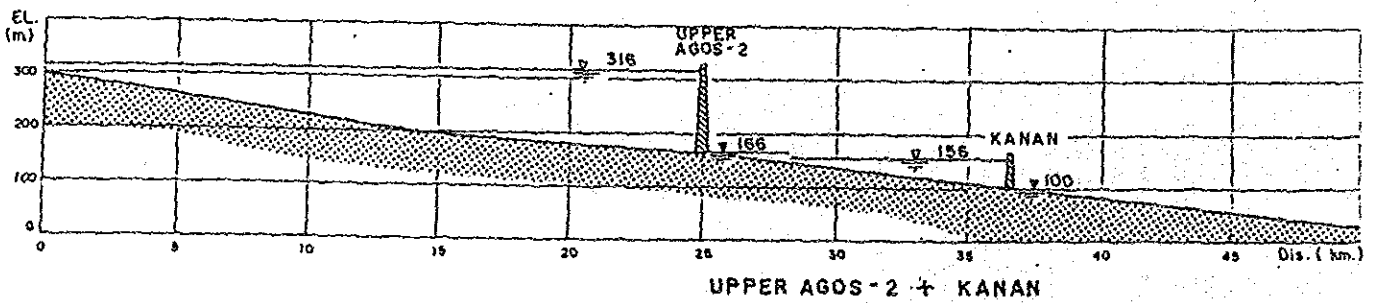
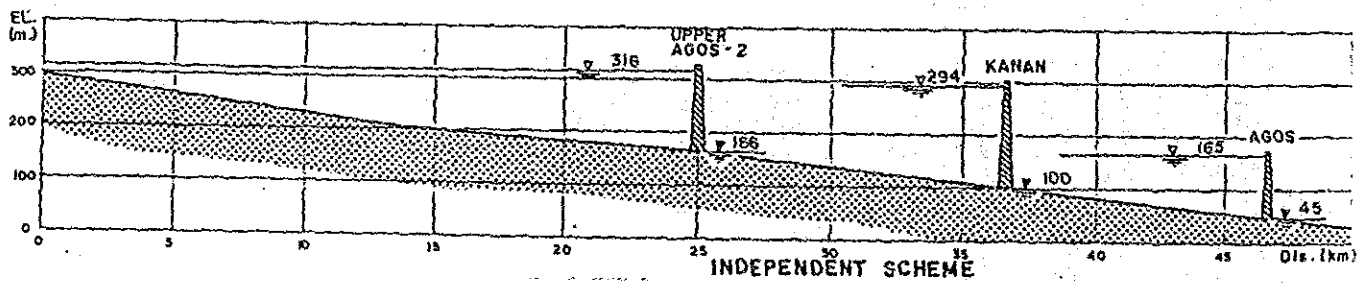
TOTAL COST (MIL USD) : 81.0 POWER COST (MIL USD) : 78.2
 TOTAL COST/KW (USD/KW) : 3980.5 TRANSMISSION COST (MIL USD) : 1.2
 TOTAL COST/KWH (USD/KWH) : 0.726 ACCESS ROAD COST (MIL USD) : 1.7



OTHER INFORMATION

LAND USE IN RESERVOIR AREA :
 SUBMERGED ROAD :
 MAP USED (1:50,000 SCALE) : 3168-IV
 TECHNICAL COMMENT :

AGOS RIVER BASIN

Case No.	Scheme	ID No.	FSL(m)	TWL(m)
6-1	- Upper Agos 2	4-007-00-05-0-1	316.0	166.0
	- Kanan	4-007-00-01-0-1	156.0	100.0



 FSL (Full supply level) or Inter Elev.
 TWL (Tall water level)

PROJECT NAME : UPPER AGOS-2
 PROJECT ID : 4- 7- 0- 5-0-1
 TYPE : RESERVOIR

BASIN NAME : AGOS
 RIVER NAME : KANAN

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR	CASE									
	1	2	3	4	5	6	7	8	9	10
RESERVOIR DEVELOP. COEF :	0.98	0.85	0.85	0.85	0.80	0.80	0.80	0.75	0.75	0.75
FULL SUPPLY LEVEL (M) :	316.0	310.5	312.5	316.0	308.1	311.0	316.0	305.6	309.2	316.0
MIN. OPERATING LEVEL (M) :	295.7	295.0	227.9	250.7	205.0	232.6	260.2	204.9	236.1	267.3
POWER										
FIRM DISCHARGE (M3/S) :	44.1	43.3	43.2	42.9	43.0	42.8	42.5	42.4	42.2	41.8
PLANT PEAK DIS. (M3/S) :	132.5	130.1	129.6	128.9	129.2	128.6	127.6	127.4	126.7	125.6
AVERAGE NET HEAD (M) :	110.8	106.9	115.7	125.5	105.3	116.2	128.6	103.6	116.2	130.9
INSTALLED CAPACITY (MW) :	120.8	114.5	123.4	133.2	111.9	123.0	135.1	108.7	121.3	135.3
GUARANTEED POWER (MW) :	38.7	37.3	60.2	62.8	37.0	64.5	91.4	36.4	67.1	96.9
AVERAGE FIRM POWER (MW) :	40.2	38.1	41.1	44.3	37.3	41.0	45.0	36.2	40.4	45.1
FIRM ENERGY (MIL KWH/Y) :	352.	334.	360.	388.	327.	359.	394.	317.	354.	395.
SECONDARY ENERGY (%) :	28.	33.	34.	37.	34.	36.	40.	37.	40.	44.
ANNUAL AVERAGE E-GY (%) :	381.	366.	394.	425.	361.	395.	434.	354.	394.	439.

D A M	
DAM HEIGHT (M) :	156.0
EMBANKMENT VOL. (MIL MS) :	10.708

EVALUATION INDECS	
CH/V :	19170.
C/V :	130.
P/(20VT+VD) :	9.6
E(FIRM)/(20VT+VD) :	28.0
E(F+SEC*0.3)/(20VT+VD) :	28.7

PROJECT NAME : UPPER AGOS-2
 PROJECT ID : 4-007-00-05-0
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E									
	1	2	3	4	5	6	7	8	9	10
POWER DEVELOPMENT (INST. CAP(MW))	(120.8)	(114.5)	(123.4)	(133.2)	(111.9)	(123.0)	(135.1)	(108.7)	(121.3)	(135.3)
STORAGE DAM	96.57	89.35	91.92	96.57	86.31	90.00	96.57	83.15	87.80	96.57
SPILLWAY	18.11	17.51	17.73	18.11	17.26	17.57	18.11	16.99	17.38	18.11
DIVERSION TUNNEL	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28
INTAKE (PRESSURE TYPE)	4.95	4.80	4.44	4.06	4.73	4.30	3.63	4.64	4.15	3.63
HEADTACE TUNNEL (PRESSURE)	3.24	3.20	3.19	3.17	3.18	3.17	3.15	3.15	3.14	3.12
SURGE TANK	2.42	2.37	2.34	2.30	2.35	2.31	2.27	2.32	2.27	2.22
PENSTOCK	4.03	3.90	4.29	4.71	3.85	4.32	4.84	3.78	4.31	4.90
(PRESSURE SHAFT)	(1.16)	(1.16)	(1.22)	(1.28)	(1.15)	(1.23)	(1.30)	(1.15)	(1.23)	(1.32)
(STEEL LINER)	(2.87)	(2.74)	(3.07)	(3.43)	(2.69)	(3.09)	(3.54)	(2.63)	(3.08)	(3.59)
POWERHOUSE BUILDING	8.67	8.32	8.73	9.17	8.17	8.69	9.23	7.98	8.57	9.19
(SUPER STRUCTURE)	(3.86)	(3.70)	(3.88)	(4.08)	(3.63)	(3.86)	(4.10)	(3.55)	(3.81)	(4.08)
(SUB STRUCTURE)	(4.82)	(4.62)	(4.85)	(5.09)	(4.54)	(4.83)	(5.13)	(4.43)	(4.76)	(5.11)
MISCELLANEOUS CIVIL WORK	7.46	7.04	7.20	7.47	6.86	7.08	7.46	6.66	6.94	7.45
CONSTRUCTION FACILITIES	0	0	0	0	0	0	0	0	0	0
POWER EQUIPMENT	29.30	28.86	29.29	30.23	27.99	29.14	30.29	27.45	28.77	30.10
ENGINEERING/ADMINISTRATION	23.25	22.02	22.55	23.38	21.50	22.23	23.38	20.92	21.83	23.32
CONTINGENCIES	41.86	39.63	40.59	42.09	38.70	40.02	42.08	37.66	39.29	41.98
S U B T O T A L	251.15	237.77	243.53	252.55	232.17	240.11	252.49	225.98	235.72	251.87

ACCESS ROAD (ROAD LENGTH 18.6 KM)

CONSTRUCTION COST	4.09	4.09	4.09	4.09	4.09	4.09	4.09	4.09	4.09	4.09
ENGINEERING ADMINISTRATION	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
CONTINGENCIES	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
S U B T O T A L	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30

TRANSMISSION LINE SYSTEM (T/L LENGTH 21.0 KM)

TRANSMISSION LINE	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
SWITCHYARD AND SUBSTATION	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
ENGINEERING/ADMINISTRATION	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
CONTINGENCIES	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
S U B T O T A L	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26

T O T A L : 260.71 247.33 253.09 262.11 241.73 249.67 262.05 235.54 245.28 261.43

EVALUATION INDICES

U S D / K W	2157.9	2160.9	2050.6	1968.4	2159.5	2029.6	1940.0	2167.4	2022.6	1931.9
U S D / K W H	0.722	0.720	0.684	0.656	0.718	0.675	0.646	0.718	0.671	0.641

PROJECT NAME : KANAN
 PROJECT ID : 4- 7- 0- 1-1-1
 TYPE : RESERVOIR

BASIN NAME : AGOS
 RIVER NAME : KANAN

 * SUMMARY TABLE OF OUTPUTS *

RESERVOIR	CASE									
	1	2	3	4	5	6	7	8	9	10
RESERVOIR DEVELOP. COEF :	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
FULL SUPPLY LEVEL (M) :	156.0	150.2	156.0	145.5	148.0	150.8	153.4	156.0	147.9	156.0
MIN. OPERATING LEVEL (M) :	132.0	134.3	144.5	134.1	137.9	141.7	145.5	149.3	134.2	145.9
POWER										
FIRM DISCHARGE (M3/S) :	47.1	46.8	46.8	45.5	45.5	45.5	45.5	45.5	45.1	46.1
PLANT PEAK DIS. (M3/S) :	188.5	187.1	187.0	182.0	182.0	181.9	181.9	181.9	184.5	184.5
AVERAGE NET HEAD (M) :	45.9	42.8	50.0	39.6	42.6	45.6	48.6	51.5	41.3	50.8
INSTALLED CAPACITY (MW) :	71.2	66.0	77.0	59.4	63.7	68.3	72.7	77.1	62.7	77.1
GUARANTEED POWER (MW) :	44.2	47.2	62.1	45.7	51.1	56.4	61.7	67.1	46.5	64.6
AVERAGE FIRM POWER (MW) :	17.6	16.5	19.2	14.8	15.9	17.1	18.2	19.3	15.7	19.3
FIRM ENERGY (MIL KWH/Y) :	156.	144.	169.	130.	140.	150.	159.	169.	137.	169.
SECONDARY ENERGY (") :	33.	31.	34.	31.	32.	34.	36.	38.	31.	36.
ANNUAL AVERAGE E-GY (") :	189.	175.	203.	161.	172.	184.	195.	207.	168.	205.

D A M	1	2	3	4	5	6	7	8	9	10
DAM HEIGHT (M) :	62.0	56.2	62.0	51.5	54.0	56.8	59.4	62.0	53.9	62.0
EMBANKMENT VOL. (MIL M3) :	1.110	0.888	1.110	0.706	0.804	0.910	1.010	1.110	0.799	1.110

EVALUATION INDEICES	1	2	3	4	5	6	7	8	9	10
CH/V	72117.	79947.	71466.	88240.	81933.	76677.	72706.	69450.	83453.	70458.
C/V	1338.	1561.	1328.	2033.	1784.	1576.	1420.	1292.	1822.	1310.
P/(20VT+VD)	14.1	13.7	15.2	12.9	13.5	14.2	14.8	15.4	13.3	15.3
E(FIRM)/(20VT+VD)	30.8	29.9	33.4	28.2	29.6	31.0	32.4	33.7	29.1	33.5
E(F+SEC*0.3)/(20VT+VD)	32.8	31.8	35.4	30.2	31.7	33.2	34.6	35.9	31.0	35.7

PROJECT NAME : KANAN
 PROJECT ID : 4-00T-00-01-1
 TYPE : RESERVOIR

 * SUMMARY TABLE OF COST ESTIMATE *

(UNIT : MILLION USD)

I T E M	C A S E									
	1	2	3	4	5	6	7	8	9	10
POWER DEVELOPMENT (INST. CAP. (MW))	(71.2)	(66.0)	(77.0)	(59.4)	(63.7)	(68.3)	(72.7)	(77.1)	(62.7)	(77.1)
STORAGE DAM	13.34	10.98	13.34	8.98	10.07	11.21	12.28	13.34	10.01	13.34
SPILLWAY	8.77	8.11	8.77	7.56	7.86	8.17	8.47	8.77	7.84	8.77
DIVERSION TUNNEL	20.12	20.12	20.12	20.12	20.12	20.12	20.12	20.12	20.12	20.12
INTAKE (PRESSURE TYPE)	4.34	3.98	3.76	3.66	3.59	3.54	3.47	3.40	3.82	3.59
HEADRACE TUNNEL (PRESSURE)	9.65	9.60	9.60	9.41	9.41	9.41	9.41	9.41	9.51	9.50
SURGE TANK	3.93	3.89	3.89	3.79	3.78	3.78	3.78	3.78	3.84	3.83
PENSTOCK	4.10	4.00	4.93	3.82	3.95	4.08	4.21	4.34	3.91	4.33
(PRESSURE SHAFT)	(1.57)	(1.58)	(1.61)	(1.57)	(1.58)	(1.59)	(1.60)	(1.61)	(1.58)	(1.61)
(STEEL LINER)	(2.53)	(2.42)	(2.72)	(2.25)	(2.36)	(2.49)	(2.60)	(2.73)	(2.33)	(2.72)
POWERHOUSE BUILDING	6.86	6.50	7.20	6.00	6.30	6.59	6.87	7.15	6.25	7.18
(SUPER STRUCTURE)	(3.05)	(2.89)	(3.20)	(2.67)	(2.80)	(2.93)	(3.05)	(3.18)	(2.78)	(3.19)
(SUB STRUCTURE)	(3.81)	(3.61)	(4.00)	(3.34)	(3.50)	(3.66)	(3.82)	(3.97)	(3.47)	(3.99)
MISCELLANEOUS CIVIL WORK	3.56	3.36	3.55	3.17	3.25	3.35	3.43	3.52	3.26	3.53
CONSTRUCTION FACILITIES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
POWER EQUIPMENT	27.06	26.06	27.33	24.55	25.34	26.14	26.89	27.61	25.31	27.77
ENGINEERING/ADMINISTRATION	12.72	12.07	12.81	11.38	11.71	12.05	12.37	12.68	11.73	12.75
CONTINGENCIES	22.89	21.73	23.06	20.49	21.08	21.69	22.26	22.82	21.12	22.94
S U B T O T A L	137.34	130.39	138.36	122.92	126.45	130.14	133.57	136.94	126.73	137.66

ACCESS ROAD (ROAD LENGTH 29.0 KM)

CONSTRUCTION COST	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38
ENGINEERING ADMINISTRATION	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
CONTINGENCIES	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
S U B T O T A L	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27	8.27

TRANSMISSION LINE SYSTEM (T/L LENGTH 9.0 KM)

TRANSMISSION LINE	1.00	0.61	1.00	0.61	0.61	0.61	1.00	1.00	0.61	1.00
SWITCHYARD AND SUBSTATION	0.96	0.62	0.96	0.62	0.62	0.62	0.96	0.96	0.62	0.96
ENGINEERING/ADMINISTRATION	0.24	0.15	0.24	0.15	0.15	0.15	0.24	0.24	0.15	0.24
CONTINGENCIES	0.33	0.21	0.33	0.21	0.21	0.21	0.33	0.33	0.21	0.33
S U B T O T A L	2.53	1.59	2.53	1.59	1.59	1.59	2.53	2.53	1.59	2.53

T O T A L : 148.14 140.26 149.16 132.78 136.32 140.00 144.37 147.75 136.59 148.47

EVALUATION INDICES

U S D / K W	2080.7	2126.6	1938.1	2237.1	2138.6	2049.4	1985.1	1915.1	2179.5	1926.4
U S O / K W H	0.893	0.913	0.834	0.954	0.913	0.876	0.849	0.819	0.933	0.827

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME : KANAN
 RIVER SYSTEM : AGOS
 STREAM : KANAN
 WATER RESOURCES REGION : IV
 PROVINCE : QUEZON
 SCHEME ID : 4-007-00-01-1-1
 COORDINATES : N14-44-30 E121-31-54
 STUDY LEVEL : UNSCALED
 (PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION
 CATCHMENT AREA (KM2) : 364.3 (MAIN : 364. , INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-4-003-NW-430
 AVER. BASIN RAINFALL (MM/YR) : 5569. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 879.
 AVERAGE DISCHARGE (M3/S) : 58.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 116.1

SELECTED PLAN
 TYPE OF DEVELOPMENT : RESERVOIR
 RESERVOIR DEVELOPMENT RATIO : 0.01

RESERVOIR
 FULL SUPPLY LEVEL (EL.M) : 156.0 GROSS STORAGE VOL. (MIL M3) : 39.7
 AVERAGE OPERATING LEVEL (EL.M) : 153.8 ACTIVE STORAGE VOL. (MIL M3) : 11.0
 MINIMUM OPERATING LEVEL (EL.M) : 149.3 DEAD STORAGE VOL. (MIL M3) : 28.8
 DRAWDOWN DEPTH (M) : 6.7 SEDIMENT VOL. (MIL M3) : 5.5
 CREST ELEVATION (EL.M) : 162.0 CREST LENGTH (M) : 243.2
 DAM HEIGHT (M) : 62.0 EMBANKMENT VOL. (MIL M3) : 1.11
 WATERWAY
 HEADRAGE : LENGTH (M) : 880.0 DIAMETER (WIDTH) (M) : 6.2 NOS. : 2
 PENSTOCK : HORIZONT. L (M) : 220.0 DIAMETER (M) : 4.3 NOS. : 2
 DIVERSION : LENGTH (M) : 1260.0 DIAMETER (M) : 8.2 NOS. : 2
 EXCAVATION VOL TOTAL (1000 M3) : 195.5

DISCHARGE
 PLANT MAX. DISCHARGE (M3/S) : 181.9 AVERAGE NET HEAD (M) : 51.5
 FIRM DISCHARGE (M3/S) : 45.5 TAILWATER LEVEL (EL.M) : 100.0
 POWER
 INSTALLED CAPACITY (MW) : 77.1 ANNUAL TOTAL ENERGY (GWH) : 206.9
 FIRM POWER (MW) : 19.3 FIRM ENERGY (GWH) : 168.9
 MIN. GUARANTEED POWER (MW) : 67.1 SECONDARY ENERGY (GWH) : 37.9

TRANSMISSION
 LINE LENGTH (KM) : 9.0 TO : KANAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1
 ACCESS ROAD LENGTH (KM) : 29.0 FROM : INFANTA

CONSTRUCTION COST
 TOTAL COST (MIL USD) : 147.7 POWER COST (MIL USD) : 136.9
 TOTAL COST/KW (USD/KWH) : 1915.1 TRANSMISSION COST (MIL USD) : 2.5
 TOTAL COST/KWH (USD/KWH) : 0.819 ACCESS ROAD COST (MIL USD) : 8.3

OTHER INFORMATION
 LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION
 SUBMERGED ROAD : NONE
 MAP USED (1:50,000 SCALE) : 3364-111 1970
 TECHNICAL COMMENT :
 - SERIES DEVELOPMENT PLAN WITH UPPER AGOS-2
 - CONSTRAINED FSL (MAX=156 M) DUE TO TWL OF UPPER AGOS-2
 - REGULATION EFFECT BY UPPER AGOS-2 IS CONSIDERED

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 4-007-00-05-0-1

SCHEME : UPPER AGOS-2

RIVER SYSTEM : AGOS
 STREAM : KANAN

WATER RESOURCES REGION : IV
 PROVINCE : QUEZON

COORDINATES : N14-48-40 E121-30-42
 STUDY LEVEL : NEWLY IDENTIFIED
 THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 286.4 (MAIN : 286.4 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-4-003-NW-430
 AVER. BASIN RAINFALL (MM/YR) : 579.8 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 879.
 AVERAGE DISCHARGE (M3/S) : 48.1 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 116.1

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR : RESERVOIR
 FULL SUPPLY LEVEL (EL.M) : 316.0
 AVERAGE OPERATING LEVEL (EL.M) : 299.8
 MINIMUM OPERATING LEVEL (EL.M) : 257.3
 DRAWDOWN DEPTH (M) : 48.7

GROSS STORAGE VOL. (MIL M3) : 1526.3
 ACTIVE STORAGE VOL. (MIL M3) : 1137.3
 DEAD STORAGE VOL. (MIL M3) : 389.1
 SEDIMENT VOL. (MIL M3) : 20.0

MAIN DAM (WEIR)
 CREST ELEVATION (EL.M) : 322.0
 DAM HEIGHT (M) : 156.0

CREST LENGTH (M) : 430.0
 EMBANKMENT VOL. (MIL M3) : 10.71

WATERWAY
 HEADRACE : LENGTH (M) : 380.0
 PENSTOCK : HORIZONT. L (M) : 100.0
 DIVERSION : LENGTH (M) : 800.0
 EXCAVATION VOL TOTAL (1000 M3) : 92.8

DIAMETER (WIDTH) (M) : 5.2 NOS. : 2
 DIAMETER (M) : 4.0 NOS. : 2
 DIAMETER (M) : 7.5 NOS. : 2

DISCHARGE /HEAD
 PLANT MAX. DISCHARGE (M3/S) : 125.6
 FIRM DISCHARGE (M3/S) : 41.8

AVERAGE NET HEAD (M) : 130.9
 TAILWATER LEVEL (EL.M) : 166.0

POWER /ENERGY
 INSTALLED CAPACITY (MW) : 135.3
 FIRM POWER (MW) : 45.1
 MIN. GUARANTEED POWER (MW) : 95.9

ANNUAL TOTAL ENERGY (GWH) : 439.1
 FIRM ENERGY (GWH) : 394.8
 SECONDARY ENERGY (GWH) : 44.4

TRANSMISSION LINE
 LENGTH (KM) : 21.0 TO : INFANTA

230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 18.6 FROM : NEAREST PROVINCIAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 261.4
 TOTAL COST/KW (USD/KW) : 1931.9
 TOTAL COST/KWH (USD/KWH) : 0.641

POWER COST (MIL USD) : 251.9
 TRANSMISSION COST (MIL USD) : 4.3
 ACCESS ROAD COST (MIL USD) : 5.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION
 SUBMERGED ROAD : NONE
 MAP USED (1:50,000 SCALE) : 3364-111 1970
 TECHNICAL COMMENT : SERIES DEVELOPMENT PLAN WITH KANAN

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STANDARD UNIT PRICES (US \$)

PRICE LEVEL : LATE 1985

WORK ITEM UNIT OF Q-TY UNIT PRICE

GENERAL	UNIT OF Q-TY	UNIT PRICE
REINFORCEMENT STEEL	TON	1100.0
GATES	TON	7500.0
TRASHRACKS	TON	3600.0
STORAGE DAM		
DAM EMBANKMENT		
- ROCKFILL DAM	M3	12.0
- EARTHFILL DAM	M3	8.0
EXCAVATION		
- FILL DAM	M3	6.0
- TRENCH	M3	12.0
- CONCRETE DAM	M3	8.0
CONCRETE		
- INSPECTION GALLERY	M3	100.0
- CONCRETE DAM	M3	-1.0
CURTAIN GROUTING	M	75.0
BLANKET/CONSOLI. GROUTING	M	75.0
DRAINAGE HOLE	M	75.0
MISCELLANEOUS (FILL TYPE)	%	5.
- DO - (CONCRETE TYPE)	%	5.
SPILLWAY		
EXCAVATION		
- CHUTEWAY	M3	6.0
- ENERGY DISSIPATOR	M3	8.0
CONCRETE		
- CHUTEWAY	M3	90.0
- ENERGY DISSIPATOR	M3	100.0
GROUTING	M	75.0
MISCELLANEOUS (FILL TYPE DAM)	%	5.
- DO - (INTEGRATED)	%	5.

W O R K I T E M U N I T O F Q - T Y U N I T P R I C E

RIVER DIVERSION WORKS

TUNNEL EXCAVATION	M3	-1.0
COFFERDAM EMBANKMENT	M3	3.0
LINING CONCRETE	M3	-1.0
SLOPE PROTECTION	M3	90.0
PLUG CONCRETE	M3	90.0
FILL GROUTING	M3	-1.0
COURTAIN GROUTING	M	75.0
DRAINAGE HOLE	M	75.0
CONDUIT PIPE	M	3000.0
MISCELLANEOUS (DIV. TUNNEL)	%	5.
- DO - (COFF. DAM)	%	5.
- DO - (GROUTING)	%	5.
- DO - (RIV. OUTLET)	%	5.
- DO - (PLUG. GATE)	%	5.

DIVERSION DAM/WEIR

FOUNDATION EXCAVATION	M3	6.0
DIVERSION WEIR CONCRETE	M3	80.0
SHEET-PILE WALLING	M2	300.0
FOUNDATION FILLING	M	200.0
MISCELLANEOUS (NON GATED WEIR)	%	5.
- DO - (GATED WEIR)	%	5.
DIVERSION WORKS	%	20.

INTAKE

EXCAVATION IN INTAKE	M3	6.0
EXCAVATION IN SAND TRAP	M3	6.0
CONCRETE	M3	100.0
MISCELLANEOUS (PRESSURE TYPE)	%	5.
- DO - (NON-PRESSURE)	%	5.
- DO - (SAND TRAP BASIN)	%	5.

HEADRACE

TUNNEL EXCAVATION	M3	-1.0
OPEN CHANNEL EXCAVATION	M3	6.0
TUNNEL LINING CONCRETE	M3	-1.0
CHANNEL LINING CONCRETE	M3	90.0
FILL GROUTING	M	-1.0
COURTAIN GROUTING	M	75.0
MISCELLANEOUS (PRESSURE TUNNEL)	%	5.
- DO - (NON-PRESS. T.)	%	5.
- DO - (CHANNEL)	%	5.

W O R K I T E M U N I T O F Q - T Y U N I T P R I C E

W O R K I T E M	U N I T O F Q - T Y	U N I T P R I C E
SURGE/HEAD TANK		
SHAFT EXCAVATION	M3	70.0
EXCAVATION IN HEAD TANK	M3	6.0
SHAFT LINING CONCRETE	M3	90.0
CONCRETE IN HEAD TANK	M3	90.0
STEEL CONDUIT PIPE	TON	3000.0
MISCELLANEOUS (SURGE TANK)	%	5.
- DO - (HEAD TANK)	%	5.
- DO - (SPILLOUT COND.)	%	5.
PENSTOCK		
PRESSURE SHAFT EXCAVATION	M3	-1.0
OPEN EXCAVATION	M3	6.0
BACKFILL CONCRETE	M3	75.0
CONC. IN OPEN-AIR PENSTOCK	M3	90.0
STEEL LINERS	TON	4000.0
MISCELLANEOUS (PRESSURE)	%	5.
- DO - (OPEN-AIR)	%	5.
POWERHOUSE BUILDING		
BUILDING SUPER STRUCTURE	M3	180.0
EXCAVATION	M3	12.0
CONCRETE	M3	-1.0
MISCELLANEOUS (SUB-STRUCTURE)	%	5.
SWITCH YARD CIVIL WORK (OPEN)	%	30.
(OF SWITCHYARD EQUIP. COST)		
TAILRACE		
TUNNEL EXCAVATION	M3	-1.0
OPEN EXCAVATION	M3	6.0
CONCRETE (TUNNEL)	M3	-1.0
CONCRETE (OPEN)	M3	160.0
FILL GROUTING	M	-1.0
SURGE TANK EXCAVATION	M3	80.0
SURGE TANK CONCRETE	M3	180.0
MISCELLANEOUS (NO-PRESS. TUNNEL)	%	5.
- DO - (CONDUIT)	%	5.
- DO - (TAILRACE BAY)	%	5.
- DO - (PRESS. TUNNEL)	%	5.
- DO - (SURGE TANK)	%	5.
TAILRACE OUTLET		
EXCAVATION	M3	6.0
CONCRETE	M3	160.0
MISCELLANEOUS	%	5.

W O R K I T E M	UNIT OF Q-TY	UNIT PRICE
WATER TRANSFER FACILITIES		
INCLINED SHAFT EXCAVATION	M3	-1.0
SHAFT LINING CONCRETE	M3	-1.0
FILL GROUTING	M	400.0
CONSOLIDATION GROUTING	M	800.0
MISCELLANEOUS	%	5.
MISCELLANEOUS CIVIL WORKS		
FOR TOTAL COST OF CIVIL WORK WITHOUT ACCESS ROAD	%	5.
POWER EQUIPMENT		
EQUIPMENT COST	-	6500.0
ACCESS ROAD		
FLAT LAND	KM	220000.0
SWAMPY LAND	KM	220000.0
ROLLING TERRAIN	KM	200000.0
HILLY LAND	KM	250000.0
IMPROV. OF EXISTING ROAD BRIDGE	KM M	90000.0 5000.0
TRANSMISSION LINE		
69KV SINGLE	KM	23000.0
115KV SINGLE	KM	34000.0
230KV DOUBLE	KM	111000.0
230KV DOUBLE	KM	220000.0
230KV DOUBLE	KM	459000.0
500KV DOUBLE	KM	678000.0
SWITCHYARD AND SUBSTATION		
69KV	LINE	270000.0
115KV	LINE	310000.0
230KV	LINE	480000.0
500KV	LINE	1850000.0
LAND PROCUREMENT AND RESETTLEMENT		
CULTIVATED LAND (INCL. PADDY F)	HA	700.0
SWAMP	HA	500.0
BUSHES AND SHRUBS	HA	150.0
FOREST	HA	50.0
RESETTLEMENT (HOUSING)	HA	0.
RESETTLEMENT (PUBLIC FACILITY)	%	0.
OF HOUSING		
TRANSMISSION LINE (69 KV)	KM	0.
TRANSMISSION LINE (115 KV)	KM	0.
TRANSMISSION LINE (230 KV)	KM	0.
TRANSMISSION LINE (500 KV)	KM	0.

C-10 第二次建設費計算

PROJECT NAME : MACUILLIAN
 PROJECT ID : 1-003-00-02-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (36.9)

RIVER INTAKE WEIR (GATED)	2.22
INTAKE (NON-PRESSURE)	0.32
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	10.71
HEADTANK	1.20
PENSTOCK (OPEN AIR)	4.49
POWER HOUSE (OPEN-AIR)	4.47
TAILRACE (OPEN CHANNEL)	0.87
MISCELLANEOUS CIVIL WORKS	1.21
POWER EQUIPMENT	8.05
ENGINEERING AND ADMINISTRATION	4.19
CONTINGENCIES	5.66
SUB TOTAL	43.38

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 12.4 KM)	2.74
ENGINEERING AND ADMINISTRATION	0.22
CONTINGENCIES	0.44
SUB TOTAL	3.41

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 17.4 KM)	0.80
SUBSTATION (LA TRINIDAD)	0.54
ENGINEERING AND ADMINISTRATION	0.17
CONTINGENCIES	0.23
SUB TOTAL	1.74

LAND PROCUREMENT/RESETTLEMENT

	0.01
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TOTAL -----

	48.53
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FOREIGN CURRENCY PORTION

	29.41
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LOCAL CURRENCY PORTION

	19.12
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EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	1314.42
CONSTRUCTION COST (USD)/ K W H	0.432

K W H COST (USD/KWH)	0.072
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PROJECT NAME : LUYA
 PROJECT ID : T-010-00-01-1-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(40.8)
RIVER INTAKE WEIR (GATED)	4.67
INTAKE (NON-PRESSURE)	0.85
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	14.06
HEADTANK	1.25
PENSTOCK (OPEN AIR)	1.10
POWER HOUSE (OPEN-AIR)	5.43
TAILRACE (OPEN CHANNEL)	0.78
MISCELLANEOUS CIVIL WORKS	1.41
POWER EQUIPMENT	10.91
ENGINEERING AND ADMINISTRATION	5.06
CONTINGENCIES	6.83
SUB TOTAL	52.35

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 15.0 KM)	3.30
ENGINEERING AND ADMINISTRATION	0.26
CONTINGENCIES	0.53
SUB TOTAL	4.10

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 35.0 KM)	2.36
SUBSTATION (LA TRINIDAD)	0.62
ENGINEERING AND ADMINISTRATION	0.37
CONTINGENCIES	0.51
SUB TOTAL	3.88

LAND PROCUREMENT/RESETTLEMENT

	0.01
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TOTAL

	60.34
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FOREIGN CURRENCY PORTION

	36.69
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LOCAL CURRENCY PORTION

	23.65
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EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	1478.85
CONSTRUCTION COST (USD)/ K W H	0.455
K W H COST (USD/KWH)	0.081

PROJECT NAME : BAKUM
 PROJECT ID : I-010-00-02-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(33.0)
RIVER INTAKE WEIR (GATED)	4.57
INTAKE (NON-PRESSURE)	0.22
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	4.38
HEADTANK	1.01
PENSTOCK (OPEN AIR)	2.68
POWER HOUSE (OPEN-AIR)	4.07
TAILRACE (OPEN CHANNEL)	0.31
MISCELLANEOUS CIVIL WORKS	0.66
POWER EQUIPMENT	6.37
ENGINEERING AND ADMINISTRATION	3.06
CONTINGENCIES	4.13
SUB TOTAL	31.57

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 7.0 KM)	1.54
ENGINEERING AND ADMINISTRATION	0.12
CONTINGENCIES	0.25
SUB TOTAL	1.91

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 18.2 KM)	0.84
SUBSTATION (BALACAN)	0.54
ENGINEERING AND ADMINISTRATION	0.17
CONTINGENCIES	0.23
SUB TOTAL	1.78

LAND PROCUREMENT/RESETTLEMENT

TOTAL	35.38
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FOREIGN CURRENCY PORTION
 LOCAL CURRENCY PORTION

FOREIGN CURRENCY PORTION	21.60
LOCAL CURRENCY PORTION	13.77

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1073.28
CONSTRUCTION COST (USD) / K W H	0.352
K W H COST (USD/KWH)	0.059

PROJECT NAME : AMBURAYAN
 PROJECT ID : 1-010-01-04-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY .MW)	(64.0)
RIVER INTAKE WEIR (GATED)	4.86
INTAKE (NON-PRESSURE)	0.73
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	19.89
HEADTANK	0.89
PENSTOCK (OPEN AIR)	1.01
POWER HOUSE (OPEN-AIR)	5.86
TAILRACE (OPEN CHANNEL)	0.34
WATER TRANSFER FACILITIES	4.25
MISCELLANEOUS CIVIL WORKS	1.89
POWER EQUIPMENT	12.47
ENGINEERING AND ADMINISTRATION	6.52
CONTINGENCIES	8.31
SUB TOTAL	67.53

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 15.4 KM)	3.39
ENGINEERING AND ADMINISTRATION	0.27
CONTINGENCIES	0.55
SUB TOTAL	4.21

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 32.8 KM)	2.23
SUBSTATION (LA TRINIDAD)	0.62
ENGINEERING AND ADMINISTRATION	0.36
CONTINGENCIES	0.48
SUB TOTAL	3.68

LAND PROCUREMENT/RESETTLEMENT

	0.01
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TOTAL

	75.44
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FOREIGN CURRENCY PORTION

	45.91
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LOCAL CURRENCY PORTION

	29.53
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EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	1178.68
CONSTRUCTION COST (USD)/ K W H	0.390
K W H COST (USD/KWH)	0.065

PROJECT NAME : SUPO
 PROJECT ID : 1-022-00-05-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (141.8)

STORAGE DAM	: 77.58
SPILLWAY	: 19.85
RIVER DIVERSION WORK	: 32.38
INTAKE (PRESSURE)	: 3.80
HEADRACE (PRESSURE TUNNEL)	: 3.05
SURGE TANK	: 2.83
PENSTOCK (OPEN AIR)	: 1.53
POWER HOUSE (OPEN-AIR)	: 8.23
TAILRACE (OPEN CHANNEL)	: 0.80
MISCELLANEOUS CIVIL WORKS	: 7.50
POWER EQUIPMENT	: 36.74
ENGINEERING AND ADMINISTRATION	: 24.19
CONTINGENCIES	: 32.77
SUB TOTAL	: 251.24

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 3.0 KM)	: 0.66
ENGINEERING AND ADMINISTRATION	: 0.05
CONTINGENCIES	: 0.11
SUB TOTAL	: 0.82

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 31.7 KM)	: 3.52
SUBSTATION (SAN ESTEBAN)	: 0.96
ENGINEERING AND ADMINISTRATION	: 0.56
CONTINGENCIES	: 0.76
SUB TOTAL	: 5.79

LAND PROCUREMENT/RESETTLEMENT

	: 0.15
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TOTAL

	: 258.00
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FOREIGN CURRENCY PORTION	: 158.78
LOCAL CURRENCY PORTION	: 99.22

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	: 1819.47
CONSTRUCTION COST (USD)/ K W H	: 0.645
K W H COST (USD/KWH)	: 0.116

PROJECT NAME : SUPO (D+W ALT., +ETEB)
 PROJECT ID : 1-022-00-05-4-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM ----- CONSTRUCTION COST -----

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (99.4)

STORAGE DAM	: 20.79
SPILLWAY	: 38.63
RIVER DIVERSION WORK	: 24.01
INTAKE (PRESSURE)	: 2.73
HEADRACE (PRESSURE TUNNEL)	: 7.87
SURGE TANK	: 1.75
PENSTOCK (OPEN AIR)	: 1.32
POWER HOUSE (OPEN-AIR)	: 7.36
TAILRACE (OPEN CHANNEL)	: 1.17
MISCELLANEOUS CIVIL WORKS	: 5.28
POWER EQUIPMENT	: 29.80
ENGINEERING AND ADMINISTRATION	: 17.59
CONTINGENCIES	: 23.74
SUB TOTAL	: 182.03

ACCESS ROAD -----

CONSTRUCTION COST (LENGTH= 3.0 KM)	: 0.66
ENGINEERING AND ADMINISTRATION	: 0.05
CONTINGENCIES	: 0.11
SUB TOTAL	: 0.82

TRANSMISSION LINE SYSTEM -----

TRANSMISSION LINE (LENGTH= 31.7 KM)	: 3.52
SUBSTATION (SAN ESTEBAN)	: 0.56
ENGINEERING AND ADMINISTRATION	: 0.56
CONTINGENCIES	: 0.76
SUB TOTAL	: 5.79

LAND PROCUREMENT/RESETTLEMENT -----

	: 0.03
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TOTAL : 188.68 -----

FOREIGN CURRENCY PORTION

	: 116.45
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LOCAL CURRENCY PORTION

	: 72.21
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EVALUATION INDICES -----

CONSTRUCTION COST (USD) / K W	: 1890.15
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CONSTRUCTION COST (USD) / K W H	: 0.583
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K W H COST (USD/KWH)	: 0.104
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PROJECT NAME : ETEB
 PROJECT ID : 1-022-00-06-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(107.2)
STORAGE DAM	
SPILLWAY	72.60
RIVER DIVERSION WORK	23.16
INTAKE (PRESSURE)	15.14
HEADRACE (PRESSURE TUNNEL)	3.48
SURGE TANK	3.11
PENSTOCK (OPEN AIR)	3.21
POWER HOUSE (OPEN-AIR)	1.77
TAILRACE (OPEN CHANNEL)	7.50
MISCELLANEOUS CIVIL WORKS	1.68
POWER EQUIPMENT	6.58
ENGINEERING AND ADMINISTRATION	31.09
CONTINGENCIES	21.17
SUB TOTAL	28.57
	219.06

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0.2 KM)	0.05
ENGINEERING AND ADMINISTRATION	0.00
CONTINGENCIES	0.01
SUB TOTAL	0.07

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 36.5 KM)	4.05
SUBSTATION (SAN ESTEBAN)	0.96
ENGINEERING AND ADMINISTRATION	0.63
CONTINGENCIES	0.85
SUB TOTAL	6.48

LAND PROCUREMENT/RESETTLEMENT

	0.16
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TOTAL

	225.77
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FOREIGN CURRENCY PORTION

	138.93
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LOCAL CURRENCY PORTION

	86.84
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EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	2106.07
CONSTRUCTION COST (USD) / K W H	0.811
K W H COST (USD/KWH)	0.145

PROJECT NAME : ABRA
 PROJECT ID : 1-022-00-10-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(10.9)
RIVER INTAKE WEIR (GATED)	2.07
INTAKE (NON-PRESSURE)	0.16
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	4.57
HEADTANK	0.47
PENSTOCK (OPEN AIR)	0.51
POWER HOUSE (OPEN-AIR)	2.37
TAILRACE (OPEN CHANNEL)	0.12
MISCELLANEOUS CIVIL WORKS	0.51
POWER EQUIPMENT	3.26
ENGINEERING AND ADMINISTRATION	1.78
CONTINGENCIES	2.37
SUB TOTAL	18.16

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 10.0 KM)	2.20
ENGINEERING AND ADMINISTRATION	0.18
CONTINGENCIES	0.36
SUB TOTAL	2.73

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 8.0 KM)	0.18
SUBSTATION (QUINAANG)	0.27
ENGINEERING AND ADMINISTRATION	0.06
CONTINGENCIES	0.03
SUB TOTAL	0.53

LAND PROCUREMENT/RESETTLEMENT

0.01

TOTAL

21.49

FOREIGN CURRENCY PORTION

12.76

LOCAL CURRENCY PORTION

8.73

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W

1971.67

CONSTRUCTION COST (USD)/ K W H

0.548

K W H COST (USD/KWH)

0.092

PROJECT NAME : SISIRITAN
 PROJECT ID : 2-006-00-01-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (417.6)

STORAGE DAM	218.35
SPILLWAY	32.05
RIVER DIVERSION WORK	20.86
INTAKE (PRESSURE)	13.14
HEADRACE (PRESSURE TUNNEL)	16.68
SURGE TANK	11.77
PENSTOCK (OPEN AIR)	9.31
POWER HOUSE (OPEN-AIR)	25.92
TAILRACE (OPEN CHANNEL)	3.94
MISCELLANEOUS CIVIL WORKS	17.60
POWER EQUIPMENT	109.85
ENGINEERING AND ADMINISTRATION	39.02
CONTINGENCIES	77.77
SUB TOTAL	596.27

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 44.4 KM)	9.77
SUBSTATION (CAMALANIGAN)	0.96
ENGINEERING AND ADMINISTRATION	1.34
CONTINGENCIES	1.81
SUB TOTAL	13.88

LAND PROCUREMENT/RESETTLEMENT

	0.38
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TOTAL

	610.53
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FOREIGN CURRENCY PORTION
 LOCAL CURRENCY PORTION

	373.72
	231.81

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1461.99
CONSTRUCTION COST (USD) / K W H	0.648
K W H COST (USD/KWH)	0.116

PROJECT NAME : SISIRITAN (+ AGBULU)
 PROJECT ID : 2-006-00-01-1-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(389.4)
STORAGE DAM	218.35
SPILLWAY	32.05
RIVER DIVERSION WORK	20.86
INTAKE (PRESSURE)	12.06
HEADRACE (PRESSURE TUNNEL)	14.08
SURGE TANK	10.19
PENSTOCK (OPEN AIR)	8.24
POWER HOUSE (OPEN-AIR)	22.57
TAILRACE (OPEN CHANNEL)	3.79
MISCELLANEOUS CIVIL WORKS	17.11
POWER EQUIPMENT	103.09
ENGINEERING AND ADMINISTRATION	38.28
CONTINGENCIES	75.10
SUB TOTAL	575.77

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 44.4 KM)	9.77
SUBSTATION (CAMALANLUGAN)	0.96
ENGINEERING AND ADMINISTRATION	1.34
CONTINGENCIES	1.51
SUB TOTAL	13.88

LAND PROCUREMENT/RESETTLEMENT

0.35

TOTAL

590.04

FOREIGN CURRENCY PORTION

365.65

LOCAL CURRENCY PORTION

224.39

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W

1515.24

CONSTRUCTION COST (USD)/ K W H

0.588

K W H COST (USD/KWH)

0.105

PROJECT NAME : SISIRITAN (+BULU+AGBULU)
 PROJECT ID : 2-006-00-01-2-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY: MW)	(201.0)
STORAGE DAM	93.71
SPILLWAY	29.47
RIVER DIVERSION WORK	19.17
INTAKE (PRESSURE)	8.41
HEADRACE (PRESSURE TUNNEL)	8.56
SURGE TANK	6.97
PENSTOCK (OPEN AIR)	4.94
POWER HOUSE (OPEN-AIR)	15.29
TAILRACE (OPEN CHANNEL)	4.01
MISCELLANEOUS CIVIL WORKS	9.53
POWER EQUIPMENT	67.92
ENGINEERING AND ADMINISTRATION	28.68
CONTINGENCIES	44.50
SUB TOTAL	341.15

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 44.4 KM)	4.93
SUBSTATION (CAMALANIUGAN)	0.96
ENGINEERING AND ADMINISTRATION	0.74
CONTINGENCIES	0.99
SUB TOTAL	7.62

LAND PROCUREMENT/RESETTLEMENT

0.21

TOTAL

348.98

FOREIGN CURRENCY PORTION

217.07

LOCAL CURRENCY PORTION

131.91

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1736.23
CONSTRUCTION COST (USD) / K W H	0.523

K W H COST (USD/KWH)

0.094

PROJECT NAME : BULU
 PROJECT ID : 2-005-00-03-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(406.8)
STORAGE DAM	220.33
SPILLWAY	30.22
RIVER DIVERSION WORK	37.55
INTAKE (PRESSURE)	9.13
HEADRACE (PRESSURE TUNNEL)	6.83
SURGE TANK	9.44
PENSTOCK (INCLINED PRESSURE SHAFT)	5.58
POWER HOUSE (OPEN-AIR)	17.87
TAILRACE (OPEN CHANNEL)	3.78
MISCELLANEOUS CIVIL WORKS	17.04
POWER EQUIPMENT	87.94
ENGINEERING AND ADMINISTRATION	37.54
CONTINGENCIES	72.49
SUB TOTAL	555.75

ACCESS ROAD	CONSTRUCTION COST (LENGTH= 4.0 KM)
ENGINEERING AND ADMINISTRATION	0.88
CONTINGENCIES	0.07
SUB TOTAL	0.14
	1.09

TRANSMISSION LINE SYSTEM	CONSTRUCTION COST (LENGTH= 65.5 KM)
TRANSMISSION LINE (LENGTH= 65.5 KM)	14.41
SUBSTATION (CAMALANJUGAN)	0.96
ENGINEERING AND ADMINISTRATION	1.92
CONTINGENCIES	2.59
SUB TOTAL	19.88

LAND PROCUREMENT/RESETTLEMENT	CONSTRUCTION COST
	0.53
TOTAL	577.26

FOREIGN CURRENCY PORTION	CONSTRUCTION COST
	355.95
LOCAL CURRENCY PORTION	CONSTRUCTION COST
	221.31

EVALUATION INDICES	CONSTRUCTION COST (USD)/ KWH
	1419.02
CONSTRUCTION COST (USD)/ KWH	CONSTRUCTION COST (USD)/ KWH
	0.441
KWH COST (USD/KWH)	KWH COST (USD/KWH)
	0.079

PROJECT NAME : BULU (+AGBULU) (PRICE LEVEL : LATE 1985)
 PROJECT ID : 2-006-00-03-1-1 (UNIT : MILLION USD)
 TYPE : RESERVOIR

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (356.4)

STORAGE DAM	106.65
SPILLWAY	32.49
RIVER DIVERSION WORK	35.38
INTAKE (PRESSURE)	10.36
HEADRACE (PRESSURE TUNNEL)	9.23
SURGE TANK	10.80
PENSTOCK (OPEN AIR)	5.25
POWER HOUSE (OPEN-AIR)	19.95
TAILRACE (OPEN CHANNEL)	2.00
MISCELLANEOUS CIVIL WORKS	11.60
POWER EQUIPMENT	91.53
ENGINEERING AND ADMINISTRATION	32.29
CONTINGENCIES	55.13
SUB TOTAL	422.64

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 4.0 KM)	0.88
ENGINEERING AND ADMINISTRATION	0.07
CONTINGENCIES	0.14
SUB TOTAL	1.09

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 65.5 KM)	14.41
SUBSTATION (CAMALANJUGAN)	0.96
ENGINEERING AND ADMINISTRATION	1.92
CONTINGENCIES	2.59
SUB TOTAL	19.88

LAND PROCUREMENT/RESETTLEMENT

	0.29
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TOTAL

	443.91
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FOREIGN CURRENCY PORTION	276.50
LOCAL CURRENCY PORTION	167.41

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1245.53
CONSTRUCTION COST (USD) / K W H	0.489
K W H COST (USD/KWH)	0.088

PROJECT NAME : NABAJALAYAN
 PROJECT ID : 2-005-01-04-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

I T E M	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(302.8)
STORAGE DAM	209.89
SPILLWAY	27.32
RIVER DIVERSION WORK	36.61
INTAKE (PRESSURE)	7.03
HEADRACE (PRESSURE TUNNEL)	5.07
SURGE TANK	8.19
PENSTOCK (INCLINED PRESSURE SHAFT)	5.50
POWER HOUSE (OPEN-AIR)	14.14
TAILRACE (OPEN CHANNEL)	1.91
MISCELLANEOUS CIVIL WORKS	15.80
POWER EQUIPMENT	67.33
ENGINEERING AND ADMINISTRATION	35.41
CONTINGENCIES	65.19
S U B T O T A L	499.78

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 6.0 KM)	1.32
ENGINEERING AND ADMINISTRATION	0.11
CONTINGENCIES	0.21
S U B T O T A L	1.64

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 75.0 KM)	16.50
SUBSTATION (CAMALANIUGAN)	0.96
ENGINEERING AND ADMINISTRATION	2.18
CONTINGENCIES	2.95
S U B T O T A L	22.59

LAND PROCUREMENT/RESETTLEMENT

	0.22
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T O T A L

	524.23
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FOREIGN CURRENCY PORTION

	321.84
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LOCAL CURRENCY PORTION

	202.38
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EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1731.26
CONSTRUCTION COST (USD) / K W H	0.630
K W H COST (USD/KWH)	0.113

PROJECT NAME : DIBASAT (PRICE LEVEL : LATE 1985)
 PROJECT ID : 2-005-01-05-0-1 (UNIT : MILLION USD)
 TYPE : RESERVOIR

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(299.6)
STORAGE DAM	249.83
SPILLWAY	20.35
RIVER DIVERSION WORK	43.75
INTAKE (PRESSURE)	6.16
HEADRACE (PRESSURE TUNNEL)	7.29
SURGE TANK	9.25
PENSTOCK (INCLINED PRESSURE SHAFT)	4.92
POWER HOUSE (OPEN-AIR)	13.08
TAILRACE (OPEN CHANNEL)	1.00
MISCELLANEOUS CIVIL WORKS	17.78
POWER EQUIPMENT	59.00
ENGINEERING AND ADMINISTRATION	36.94
CONTINGENCIES	70.40
SUB TOTAL	539.74

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 3.6 KM)	0.79
ENGINEERING AND ADMINISTRATION	0.06
CONTINGENCIES	0.13
SUB TOTAL	0.98

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 75.6 KM)	16.63
SUBSTATION (CAMALANIUGAN)	0.96
ENGINEERING AND ADMINISTRATION	2.20
CONTINGENCIES	2.97
SUB TOTAL	22.76

LAND PROCUREMENT/RESETTLEMENT

0.22

TOTAL

563.70

FOREIGN CURRENCY PORTION : 344.69
 LOCAL CURRENCY PORTION : 219.01

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W : 1861.51
 CONSTRUCTION COST (USD) / K W H : 0.598
 K W H COST (USD/KWH) : 0.107

PROJECT NAME : AGBULU
 PROJECT ID : 2-006-01-06-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(216.2)
STORAGE DAM	198.17
SPILLWAY	20.94
RIVER DIVERSION WORK	10.74
INTAKE (PRESSURE)	3.21
HEADRACE (NO HEADRACE)	0.
NO TANK	0.
PENSTOCK (EMBEDDED IN CONCRETE DAM)	2.86
POWER HOUSE (OPEN-AIR)	10.15
TAILRACE (OPEN CHANNEL)	1.81
MISCELLANEOUS CIVIL WORKS	12.39
POWER EQUIPMENT	46.76
ENGINEERING AND ADMINISTRATION	30.82
CONTINGENCIES	50.68
SUB TOTAL	398.53

ACCESS ROAD	
CONSTRUCTION COST (LENGTH= 6.5 KM)	1.43
ENGINEERING AND ADMINISTRATION	0.11
CONTINGENCIES	0.23
SUB TOTAL	1.78

TRANSMISSION LINE SYSTEM	
TRANSMISSION LINE (LENGTH= 78.6 KM)	8.72
SUBSTATION (CAMALANIUGAN)	0.96
ENGINEERING AND ADMINISTRATION	1.21
CONTINGENCIES	1.63
SUB TOTAL	12.53

LAND PROCUREMENT/RESETTLEMENT	
	0.18
TOTAL	403.01

FOREIGN CURRENCY PORTION	248.75
LOCAL CURRENCY PORTION	156.25

EVALUATION INDICES	
CONSTRUCTION COST (USD)/ K W	1864.08
CONSTRUCTION COST (USD)/ K W H	0.586
K W H COST (USD/KWH)	0.105

PROJECT NAME : APAYAO
 PROJECT ID : 2-006-01-08-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN-OF-RIVER (UNIT : MILLION USD)

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (15.8)

RIVER INTAKE WEIR (GATED)	2.30
INTAKE (NON-PRESSURE)	0.30
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	9.78
HEADTANK	0.64
PENSTOCK (OPEN AIR)	0.52
POWER HOUSE (OPEN-AIR)	3.25
TAILRACE (OPEN CHANNEL)	0.32
MISCELLANEOUS CIVIL WORKS	0.86
POWER EQUIPMENT	4.42
ENGINEERING AND ADMINISTRATION	2.80
CONTINGENCIES	3.78
SUB TOTAL	28.97

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 32.4 KM)	7.13
ENGINEERING AND ADMINISTRATION	0.57
CONTINGENCIES	1.15
SUB TOTAL	8.85

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 39.4 KM)	0.91
SUBSTATION (PIDDIG)	0.27
ENGINEERING AND ADMINISTRATION	0.15
CONTINGENCIES	0.20
SUB TOTAL	1.52

LAND PROCUREMENT/RESETTLEMENT

	0.02
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TOTAL

	39.37
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FOREIGN CURRENCY PORTION	22.47
LOCAL CURRENCY PORTION	16.89

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	2485.17
CONSTRUCTION COST (USD)/ K W H	0.613
K W H COST (USD/KWH)	0.102

PROJECT NAME : BASAO (+SADANGA)
 PROJECT ID : 2-008-03-03-1-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY,MW)	(154.0)
STORAGE DAM	353.41
SPILLWAY	29.99
RIVER DIVERSION WORK	20.10
INTAKE (PRESSURE)	2.28
HEADRACE (PRESSURE TUNNEL)	3.19
SURGE TANK	1.20
PENSTOCK (OPEN AIR)	4.93
POWER HOUSE (OPEN-AIR)	6.10
TAILRACE (OPEN CHANNEL)	0.52
MISCELLANEOUS CIVIL WORKS	21.19
POWER EQUIPMENT	34.93
ENGINEERING AND ADMINISTRATION	39.03
CONTINGENCIES	77.83
SUB TOTAL	596.68

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 2.5 KM)	0.55
ENGINEERING AND ADMINISTRATION	0.04
CONTINGENCIES	0.09
SUB TOTAL	0.68

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 15.6 KM)	1.73
SUBSTATION (BATONG BUHAY)	0.96
ENGINEERING AND ADMINISTRATION	0.34
CONTINGENCIES	0.45
SUB TOTAL	3.48

LAND PROCUREMENT/RESETTLEMENT

TOTAL	600.28
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FOREIGN CURRENCY PORTION : 364.40
 LOCAL CURRENCY PORTION : 236.48

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	3563.90
CONSTRUCTION COST (USD)/ K W H	1.118
K W H COST (USD/KWH)	0.200

PROJECT NAME : CHICO-1R
 PROJECT ID : 2-008-03-04-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

I T E M ----- CONSTRUCTION COST -----

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (27.3)

RIVER INTAKE WEIR (GATED) : 6.99
 INTAKE (NON-PRESSURE) : 1.07
 HEADRACE (NON-PRESSURE TUNNEL/CHANNEL) : 5.47
 HEADTANK : 1.14
 PENSTOCK (OPEN AIR) : 0.48
 POWER HOUSE (OPEN-AIR) : 4.29
 TAILRACE (OPEN CHANNEL) : 0.22
 MISCELLANEOUS CIVIL WORKS : 0.98
 POWER EQUIPMENT : 10.10
 ENGINEERING AND ADMINISTRATION : 3.84
 CONTINGENCIES : 5.19
 S U B T O T A L : 39.77

ACCESS ROAD -----

CONSTRUCTION COST (LENGTH= 0. KM) : 0.
 ENGINEERING AND ADMINISTRATION : 0.
 CONTINGENCIES : 0.
 S U B T O T A L : 0.

TRANSMISSION LINE SYSTEM -----

TRANSMISSION LINE (LENGTH= 20.5 KM) : 0.47
 SUBSTATION (BATONG BUHAY) : 0.27
 ENGINEERING AND ADMINISTRATION : 0.09
 CONTINGENCIES : 0.13
 S U B T O T A L : 0.96

LAND PROCUREMENT/RESETTLEMENT -----

: 0.

T O T A L -----

: 40.73

FOREIGN CURRENCY PORTION : 25.60
 LOCAL CURRENCY PORTION : 15.13

EVALUATION INDICES -----

CONSTRUCTION COST (USD) / K W : 1490.34
 CONSTRUCTION COST (USD) / K W H : 0.369
 K W H COST (USD/KWH) : 0.062

PROJECT NAME : CHICO 1R (+ SADANGA) (PRICE LEVEL : LATE 1985)
 PROJECT ID : 2-008-03-04-1-2 (UNIT : MILLION USD)
 TYPE : RUN OF RIVER

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(27.2)
RIVER INTAKE WEIR (GATED)	5.71
INTAKE (NON-PRESSURE)	1.07
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	5.48
HEADTANK	1.14
PENSTOCK (OPEN AIR)	0.48
POWER HOUSE (OPEN-AIR)	4.20
TAILRACE (OPEN CHANNEL)	0.22
MISCELLANEOUS CIVIL WORKS	0.92
POWER EQUIPMENT	10.07
ENGINEERING AND ADMINISTRATION	3.66
CONTINGENCIES	4.94
SUB TOTAL	37.88

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 20.5 KM)	0.47
SUBSTATION (BATONG BURAY)	0.27
ENGINEERING AND ADMINISTRATION	0.09
CONTINGENCIES	0.13
SUB TOTAL	0.96

LAND PROCUREMENT/RESETTLEMENT

TOTAL	38.84
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FOREIGN CURRENCY PORTION

LOCAL CURRENCY PORTION	24.46
	14.38

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1428.05
CONSTRUCTION COST (USD) / K W H	0.208
K W H COST (USD/KWH)	0.035

PROJECT NAME : SADANGA
 PROJECT ID : 2-008-03-05-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (237.0)

STORAGE DAM	:	319.77
SPILLWAY	:	30.10
RIVER DIVERSION WORK	:	15.19
INTAKE (PRESSURE)	:	3.92
HEADRACE (PRESSURE TUNNEL)	:	5.13
SURGE TANK	:	5.36
PENSTOCK (INCLINED PRESSURE SHAFT)	:	3.69
POWER HOUSE (OPEN-AIR)	:	10.22
TAILRACE (OPEN CHANNEL)	:	0.72
MISCELLANEOUS CIVIL WORKS	:	19.70
POWER EQUIPMENT	:	44.13
ENGINEERING AND ADMINISTRATION	:	38.08
CONTINGENCIES	:	74.40
SUB TOTAL	:	570.41

ACCESS ROAD -----

CONSTRUCTION COST (LENGTH= 0. KM)	:	0.
ENGINEERING AND ADMINISTRATION	:	0.
CONTINGENCIES	:	0.
SUB TOTAL	:	0.

TRANSMISSION LINE SYSTEM -----

TRANSMISSION LINE (LENGTH= 28.1 KM)	:	6.18
SUBSTATION (BATONG BUHAY)	:	0.96
ENGINEERING AND ADMINISTRATION	:	0.89
CONTINGENCIES	:	1.21
SUB TOTAL	:	9.24

LAND PROCUREMENT/RESETTLEMENT -----

	:	0.07
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TOTAL -----

	:	579.72
FOREIGN CURRENCY PORTION	:	352.87
LOCAL CURRENCY PORTION	:	226.86

EVALUATION INDICES -----

CONSTRUCTION COST (USD)/ K W	:	2446.09
CONSTRUCTION COST (USD)/ K W H	:	0.997
K W H COST (USD/KWH)	:	0.178

PROJECT NAME : SADANGA (ALTERNATIVE)
 PROJECT ID : 2-008-03-05-1-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(299.4)
STORAGE DAM	319.77
SPILLWAY	30.10
RIVER DIVERSION WORK	15.19
INTAKE (PRESSURE)	4.09
HEADRACE (PRESSURE TUNNEL)	7.56
SURGE TANK	5.47
PENSTOCK (OPEN AIR)	10.90
POWER HOUSE (OPEN-AIR)	11.62
TAILRACE (OPEN CHANNEL)	0.59
MISCELLANEOUS CIVIL WORKS	20.26
POWER EQUIPMENT	49.34
ENGINEERING AND ADMINISTRATION	38.82
CONTINGENCIES	77.06
SUBTOTAL	590.78

ACCESS ROAD	CONSTRUCTION COST (LENGTH= 0. KM)
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUBTOTAL	0.

TRANSMISSION LINE SYSTEM	CONSTRUCTION COST (LENGTH= 28.1 KM)
TRANSMISSION LINE (LENGTH= 28.1 KM)	6.18
SUBSTATION (BATONG BUHAY)	0.96
ENGINEERING AND ADMINISTRATION	0.89
CONTINGENCIES	1.21
SUBTOTAL	9.24

LAND PROCUREMENT/RESETTLEMENT	CONSTRUCTION COST
LAND PROCUREMENT/RESETTLEMENT	0.07
TOTAL	600.09

FOREIGN CURRENCY PORTION	365.69
LOCAL CURRENCY PORTION	234.40

EVALUATION INDICES	CONSTRUCTION COST (USD)/ K W	CONSTRUCTION COST (USD)/ K W H	K W H COST (USD/KWH)
CONSTRUCTION COST (USD)/ K W	2004.31		
CONSTRUCTION COST (USD)/ K W H	0.026		
K W H COST (USD/KWH)			0.148

PROJECT NAME : CHICO-2R
 PROJECT ID : 2-008-03-06-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (34.5)

RIVER INTAKE WEIR (GATED)	3.13
INTAKE (NON-PRESSURE)	0.78
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	11.58
HEADTANK	0.94
PENSTOCK (OPEN-AIR)	0.65
POWER HOUSE (OPEN-AIR)	4.28
TAILRACE (OPEN CHANNEL)	0.18
MISCELLANEOUS CIVIL WORKS	1.08
POWER EQUIPMENT	9.77
ENGINEERING AND ADMINISTRATION	4.05
CONTINGENCIES	5.46
SUB TOTAL	41.90

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 12.6 KM)	0.58
SUBSTATION (BONTOC)	0.54
ENGINEERING AND ADMINISTRATION	0.14
CONTINGENCIES	0.19
SUB TOTAL	1.45

LAND PROCUREMENT/RESETTLEMENT

	0.
TOTAL	43.34

FOREIGN CURRENCY PORTION	27.13
LOCAL CURRENCY PORTION	16.21

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1256.35
CONSTRUCTION COST (USD) / K W H	0.314
K W H COST (USD/KWH)	0.052

PROJECT NAME : CHICO-3R
 PROJECT ID : 2-003-03-07-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY.MW)	(18.1)
RIVER INTAKE WEIR (GATED)	3.85
INTAKE (NON-PRESSURE)	0.56
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	6.19
HEADTANK	0.90
PENSTOCK (OPEN AIR)	0.54
POWER HOUSE (OPEN-AIR)	3.44
TAILRACE (OPEN CHANNEL)	0.21
MISCELLANEOUS CIVIL WORKS	0.78
POWER EQUIPMENT	6.25
ENGINEERING AND ADMINISTRATION	2.84
CONTINGENCIES	3.84
SUB TOTAL	29.41

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 6.6 KM)	0.15
SUBSTATION (BONTOC)	0.27
ENGINEERING AND ADMINISTRATION	0.05
CONTINGENCIES	0.07
SUB TOTAL	0.55

LAND PROCUREMENT/RESETTLEMENT

0.

TOTAL

29.95

FOREIGN CURRENCY PORTION

18.69

LOCAL CURRENCY PORTION

11.26

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1658.41
CONSTRUCTION COST (USD) / K W H	0.414
K W H COST (USD/KWH)	0.069

PROJECT NAME : CHICO-4R
 PROJECT ID : 2-008-03-09-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(11.9)
RIVER INTAKE WEIR (GATED)	7.05
INTAKE (NON-PRESSURE)	0.27
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	7.70
HEADTANK	0.54
PENSTOCK (OPEN AIR)	0.33
POWER HOUSE (OPEN-AIR)	2.68
TAILRACE (OPEN CHANNEL)	0.18
MISCELLANEOUS CIVIL WORKS	0.94
POWER EQUIPMENT	3.73
ENGINEERING AND ADMINISTRATION	2.93
CONTINGENCIES	3.95
SUBTOTAL	30.31

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUBTOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 1.2 KM)	0.03
SUBSTATION (BORTOC)	0.27
ENGINEERING AND ADMINISTRATION	0.04
CONTINGENCIES	0.05
SUBTOTAL	0.39

LAND PROCUREMENT/RESETTLEMENT

	0.
TOTAL	30.69

FOREIGN CURRENCY PORTION

LOCAL CURRENCY PORTION	18.84
	11.85

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	2570.37
CONSTRUCTION COST (USD)/ K W H	0.636
K W H COST (USD/KWH)	0.106

PROJECT NAME : SALTAN
 PROJECT ID : 2-008-05-15-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(12.6)
RIVER INTAKE WEIR (GATED)	2.70
INTAKE (NON-PRESSURE)	0.17
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	5.57
HEADTANK	0.52
PENSTOCK (OPEN AIR)	0.73
POWER HOUSE (OPEN-AIR)	2.46
TAILRACE (OPEN CHANNEL)	0.13
WATER TRANSFER FACILITIES	1.06
MISCELLANEOUS CIVIL WORKS	0.67
POWER EQUIPMENT	3.57
ENGINEERING AND ADMINISTRATION	2.20
CONTINGENCIES	2.97
SUB TOTAL	22.75

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 2.0 KM)	0.44
ENGINEERING AND ADMINISTRATION	0.04
CONTINGENCIES	0.07
SUB TOTAL	0.55

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 51.6 KM)	1.19
SUBSTATION (SATONG BUHAY)	0.27
ENGINEERING AND ADMINISTRATION	0.18
CONTINGENCIES	0.25
SUB TOTAL	1.89

LAND PROCUREMENT/RESETTLEMENT

	0.00
TOTAL	25.19

FOREIGN CURRENCY PORTION : 15.42
 LOCAL CURRENCY PORTION : 9.77

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1988.91
CONSTRUCTION COST (USD) / K W H	0.498
K W H COST (USD/KWH)	0.083

PROJECT NAME : PASIL
 PROJECT ID : 2-008-06-22-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM

CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (20.2)

RIVER INTAKE WEIR (GATED)	2.56
INTAKE (NON-PRESSURE)	0.17
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	7.61
HEADTANK	0.63
PENSTOCK (OPEN AIR)	1.12
POWER HOUSE (OPEN-AIR)	2.80
TAILRACE (OPEN CHANNEL)	0.25
WATER TRANSFER FACILITIES	1.61
MISCELLANEOUS CIVIL WORKS	0.85
POWER EQUIPMENT	4.44
ENGINEERING AND ADMINISTRATION	2.78
CONTINGENCIES	3.75
SUB TOTAL	28.77

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 2.0 KM)	0.44
ENGINEERING AND ADMINISTRATION	0.04
CONTINGENCIES	0.07
SUB TOTAL	0.55

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 9.6 KM)	0.22
SUBSTATION (BATONG BUHAY)	0.27
ENGINEERING AND ADMINISTRATION	0.06
CONTINGENCIES	0.08
SUB TOTAL	0.63

LAND PROCUREMENT/RESETTLEMENT

0.00

TOTAL

29.95

FOREIGN CURRENCY PORTION

18.38

LOCAL CURRENCY PORTION

11.57

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W 1482.84

CONSTRUCTION COST (USD) / K W H 0.371

K W H COST (USD/KWH) 0.062

PROJECT NAME : TANUDAN
 PROJECT ID : 2-008-06-23-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

I T E M ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (24.8)

RIVER INTAKE WEIR (GATED) : 2.79
 INTAKE (NON-PRESSURE) : 0.26
 HEADRACE (NON-PRESSURE TUNNEL/CHANNEL) : 8.34
 HEADTANK : 0.62
 PENSTOCK (OPEN AIR) : 1.28
 POWER HOUSE (OPEN-AIR) : 3.19
 TAILRACE (OPEN CHANNEL) : 0.27
 MISCELLANEOUS CIVIL WORKS : 0.84
 POWER EQUIPMENT : 5.03
 ENGINEERING AND ADMINISTRATION : 2.83
 CONTINGENCIES : 3.82
 S U B T O T A L : 29.28

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 13.0 KM) : 2.66
 ENGINEERING AND ADMINISTRATION : 0.23
 CONTINGENCIES : 0.46
 S U B T O T A L : 3.55

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 25.6 KM) : 0.59
 SUBSTATION (BATONG BUHAY) : 0.27
 ENGINEERING AND ADMINISTRATION : 0.11
 CONTINGENCIES : 0.15
 S U B T O T A L : 1.12

LAND PROCUREMENT/RESETTLEMENT

: 0.01

T O T A L

: 33.96

FOREIGN CURRENCY PORTION

: 20.29

LOCAL CURRENCY PORTION

: 13.67

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W : 1369.46

CONSTRUCTION COST (USD)/ K W H : 0.341

K W H COST (USD/KWH) : 0.057

PROJECT NAME : BANTAY
 PROJECT ID : 2-008-07-24-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (40.2)

 STORAGE DAM : 28.46
 SPILLWAY : 23.77
 RIVER DIVERSION WORK : 0.51
 INTAKE (PRESSURE) : 2.82
 HEADRACE (NO HEADRACE) : 0.
 NO TANK : 0.
 PENSTOCK (INCLINED PRESSURE SHAFT) : 4.91
 POWER HOUSE (OPEN-AIR) : 5.70
 TAILRACE (OPEN CHANNEL) : 2.56
 MISCELLANEOUS CIVIL WORKS : 3.44
 POWER EQUIPMENT : 20.38
 ENGINEERING AND ADMINISTRATION : 11.57
 CONTINGENCIES : 15.62
 SUB TOTAL : 119.74

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM) : 0.
 ENGINEERING AND ADMINISTRATION : 0.
 CONTINGENCIES : 0.
 SUB TOTAL : 0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 50.4 KM) : 3.43
 SUBSTATION (CAMALANIUGAN) : 0.62
 ENGINEERING AND ADMINISTRATION : 0.51
 CONTINGENCIES : 0.68
 SUB TOTAL : 5.24

LAND PROCUREMENT/RESETTLEMENT

TOTAL : 133.35

FOREIGN CURRENCY PORTION : 77.33
 LOCAL CURRENCY PORTION : 56.02

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W : 3317.16
 CONSTRUCTION COST (USD) / K W H : 1.179
 K W H COST (USD/KWH) : 0.211

PROJECT NAME : MALIANO
 PROJECT ID : 2-008-14-34-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM ----- CONSTRUCTION COST -----

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (175.2)

 STORAGE DAM : 250.42
 SPILLWAY : 28.58
 RIVER DIVERSION WORK : 17.00
 INTAKE (PRESSURE) : 4.09
 HEADRACE (PRESSURE TUNNEL) : 3.69
 SURGE TANK : 5.20
 PENSTOCK (INCLINED PRESSURE SHAFT) : 3.00
 POWER HOUSE (OPEN-AIR) : 8.67
 TAILRACE (OPEN CHANNEL) : 2.31
 MISCELLANEOUS CIVIL WORKS : 16.15
 POWER EQUIPMENT : 40.29
 ENGINEERING AND ADMINISTRATION : 34.47
 CONTINGENCIES : 62.08
 S U B T O T A L : 475.96

ACCESS ROAD -----

 CONSTRUCTION COST (LENGTH= 34.0 KM) : 7.48
 ENGINEERING AND ADMINISTRATION : 0.60
 CONTINGENCIES : 1.21
 S U B T O T A L : 9.29

TRANSMISSION LINE SYSTEM -----

 TRANSMISSION LINE (LENGTH= 70.0 KM) : 7.77
 SUBSTATION (SANTIAGO) : 0.96
 ENGINEERING AND ADMINISTRATION : 1.09
 CONTINGENCIES : 1.47
 S U B T O T A L : 11.29

LAND PROCUREMENT/RESETTLEMENT : 1.48

T O T A L : 498.02

FOREIGN CURRENCY PORTION : 300.84
 LOCAL CURRENCY PORTION : 197.19

EVALUATION INDICES -----

 CONSTRUCTION COST (USD)/ K W H : 2842.60
 CONSTRUCTION COST (USD)/ K W H : 1.009
 K W H COST (USD/KWH) : 0.181

PROJECT NAME : 1BULAD
 PROJECT ID : 2-008-20-46-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (16.5)

RIVER INTAKE WEIR (GATED)	1.75
INTAKE (NON-PRESSURE)	0.18
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	6.33
HEADTANK	0.60
PENSTOCK (OPEN AIR)	0.78
POWER HOUSE (OPEN-AIR)	2.98
TAILRACE (OPEN CHANNEL)	0.18
WATER TRANSFER FACILITIES	0.74
MISCELLANEOUS CIVIL WORKS	0.68
POWER EQUIPMENT	4.15
ENGINEERING AND ADMINISTRATION	2.30
CONTINGENCIES	3.10
S U B T O T A L	23.78

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 14.2 KM)	3.12
ENGINEERING AND ADMINISTRATION	0.25
CONTINGENCIES	0.51
S U B T O T A L	3.88

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 42.0 KM)	0.97
SUBSTATION (SOLANO)	0.27
ENGINEERING AND ADMINISTRATION	0.15
CONTINGENCIES	0.21
S U B T O T A L	1.60

LAND PROCUREMENT/RESETTLEMENT

LAND PROCUREMENT/RESETTLEMENT	0.01
T O T A L	29.27

FOREIGN CURRENCY PORTION	17.31
LOCAL CURRENCY PORTION	11.95

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	1777.02
CONSTRUCTION COST (USD) / K W H	0.461
K W H COST (USD/KWH)	0.077

PROJECT NAME : CASECNAN
 PROJECT ID : 2-008-29-58-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(11.5)
RIVER INTAKE WEIR (GATED)	2.18
INTAKE (NON-PRESSURE)	0.33
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	6.52
HEADTANK	0.56
PENSTOCK (OPEN AIR)	0.30
POWER HOUSE (OPEN-AIR)	3.04
TAILRACE (OPEN CHANNEL)	0.26
MISCELLANEOUS CIVIL WORKS	0.66
POWER EQUIPMENT	3.98
ENGINEERING AND ADMINISTRATION	2.23
CONTINGENCIES	3.01
S U B T O T A L	23.06

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 10.0 KM)	2.20
ENGINEERING AND ADMINISTRATION	0.18
CONTINGENCIES	0.36
S U B T O T A L	2.73

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 66.0 KM)	1.52
SUBSTATION (SOLANO)	0.27
ENGINEERING AND ADMINISTRATION	0.22
CONTINGENCIES	0.30
S U B T O T A L	2.31

LAND PROCUREMENT/RESETTLEMENT

	0.01
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T O T A L

	28.12
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FOREIGN CURRENCY PORTION

	16.82
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LOCAL CURRENCY PORTION

	11.30
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EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	2434.37
CONSTRUCTION COST (USD) / K W H	0.611
K W H COST (USD/KWH)	0.102

PROJECT NAME : UPPER CASEGNAN (PRICE LEVEL : LATE 1985)
 PROJECT ID : 2-008-29-59-0-2 (UNIT : MILLION USD)
 TYPE : RUN OF RIVER

I T E M ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY.MW) (12.4)

 RIVER INTAKE WEIR (GATED) : 2.92
 INTAKE (NON-PRESSURE) : 0.28
 HEADRACE (NON-PRESSURE TUNNEL/CHANNEL) : 7.34
 HEADTANK : 0.49
 PENSTOCK (OPEN AIR) : 0.31
 POWER HOUSE (OPEN-AIR) : 3.03
 TAILRACE (OPEN CHANNEL) : 0.26
 MISCELLANEOUS CIVIL WORKS : 0.73
 POWER EQUIPMENT : 3.64
 ENGINEERING AND ADMINISTRATION : 2.40
 CONTINGENCIES : 3.24
 S U B T O T A L : 24.85

ACCESS ROAD

 CONSTRUCTION COST (LENGTH= 17.0 KM) : 3.74
 ENGINEERING AND ADMINISTRATION : 0.30
 CONTINGENCIES : 0.61
 S U B T O T A L : 4.65

TRANSMISSION LINE SYSTEM

 TRANSMISSION LINE (LENGTH= 57.6 KM) : 1.32
 SUBSTATION (SOLANO) : 0.27
 ENGINEERING AND ADMINISTRATION : 0.20
 CONTINGENCIES : 0.27
 S U B T O T A L : 2.06

LAND PROCUREMENT/RESETTLEMENT

 : 0.01

T O T A L

 : 31.57

FOREIGN CURRENCY PORTION

 : 18.52

LOCAL CURRENCY PORTION

 : 13.05

EVALUATION INDICES

 CONSTRUCTION COST (USD)/ K W : 2541.74
 CONSTRUCTION COST (USD)/ K W H : 0.638

K W H COST (USD/KWH)

 : 0.107

PROJECT NAME : TABU (+BINGA)
 PROJECT ID : 3-077-00-04-1-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(138.6)
STORAGE DAM	
SPILLWAY	85.49
RIVER DIVERSION WORK	42.87
INTAKE (PRESSURE)	43.69
HEADRACE (PRESSURE TUNNEL)	2.87
SURGE TANK	2.96
PENSTOCK (OPEN AIR)	2.26
POWER HOUSE (OPEN-AIR)	3.29
TAILRACE (OPEN CHANNEL)	7.96
MISCELLANEOUS CIVIL WORKS	0.59
POWER EQUIPMENT	9.65
ENGINEERING AND ADMINISTRATION	34.95
CONTINGENCIES	26.91
SUB TOTAL	39.67
	304.16

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 12.0 KM)	2.64
ENGINEERING AND ADMINISTRATION	0.21
CONTINGENCIES	0.43
SUB TOTAL	3.28

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 24.0 KM)	2.66
SUBSTATION (SAN MANUEL)	0.96
ENGINEERING AND ADMINISTRATION	0.45
CONTINGENCIES	0.61
SUB TOTAL	4.69

LAND PROCUREMENT/RESETTLEMENT

0.04

TOTAL

312.17

FOREIGN CURRENCY PORTION

150.69

LOCAL CURRENCY PORTION

121.48

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W H : 2252.30

CONSTRUCTION COST (USD) / K W H : 0.831

K W H COST (USD/KWH) : 0.149

PROJECT NAME : AGNO-2
 PROJECT ID : 3-077-00-06-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(10.9)
RIVER INTAKE WEIR (GATED)	2.11
INTAKE (NON-PRESSURE)	0.19
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	5.09
HEADTANK	0.49
PENSTOCK (OPEN AIR)	0.40
POWER HOUSE (OPEN-AIR)	2.95
TAILRACE (OPEN CHANNEL)	0.31
WATER TRANSFER FACILITIES	1.30
MISCELLANEOUS CIVIL WORKS	0.64
POWER EQUIPMENT	3.60
ENGINEERING AND ADMINISTRATION	2.14
CONTINGENCIES	2.88
S U B T O T A L	22.10

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 4.3 KM)	0.95
ENGINEERING AND ADMINISTRATION	0.08
CONTINGENCIES	0.15
S U B T O T A L	1.17

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 27.6 KM)	0.63
SUBSTATION (LA TRINIDAD)	0.27
ENGINEERING AND ADMINISTRATION	0.11
CONTINGENCIES	0.15
S U B T O T A L	1.17

LAND PROCUREMENT/RESETTLEMENT

0.00

T O T A L

24.45

FOREIGN CURRENCY PORTION	14.86
LOCAL CURRENCY PORTION	9.53

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	2244.87
CONSTRUCTION COST (USD) / K W H	0.541
K W H COST (USD/KWH)	0.090

PROJECT NAME : AGNO-3
 PROJECT ID : 3-077-00-07-0-2 (PRICE LEVEL : LATE 1985)
 TYPE : RUN OF RIVER (UNIT : MILLION USD)
 WATER TRANS. SCHEME

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (9.5)

RIVER INTAKE WEIR (GATED)	3.08
INTAKE (NON-PRESSURE)	0.14
HEADRACE (NON-PRESSURE TUNNEL/CHANNEL)	3.86
HEADTANK	0.49
PENSTOCK (OPEN AIR)	0.80
POWER HOUSE (OPEN-AIR)	2.71
TAILRACE (OPEN CHANNEL)	0.22
WATER TRANSFER FACILITIES	1.10
MISCELLANEOUS CIVIL WORKS	0.62
POWER EQUIPMENT	2.92
ENGINEERING AND ADMINISTRATION	1.99
CONTINGENCIES	2.68
SUB TOTAL	20.56

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 32.0 KM)	0.74
SUBSTATION (LA TRINIDAD)	0.27
ENGINEERING AND ADMINISTRATION	0.13
CONTINGENCIES	0.17
SUB TOTAL	1.30

LAND PROCUREMENT/RESETTLEMENT

0.

TOTAL : 21.86

FOREIGN CURRENCY PORTION	13.45
LOCAL CURRENCY PORTION	8.41

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	2298.55
CONSTRUCTION COST (USD) / K W H	0.552
K W H COST (USD/KWH)	0.092

PROJECT NAME : KAVAN
 PROJECT ID : 4-007-00-01-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

I T E M CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (212.7)

STORAGE DAM : 430.85
 SPILLWAY : 23.75
 RIVER DIVERSION WORK : 32.68
 INTAKE (PRESSURE) : 3.79
 HEADRACE (PRESSURE TUNNEL) : 4.65
 SURGE TANK : 4.81
 PENSTOCK (INCLINED PRESSURE SHAFT) : 4.45
 POWER HOUSE (OPEN-AIR) : 9.87
 TAILRACE (OPEN CHANNEL) : 1.42
 MISCELLANEOUS CIVIL WORKS : 25.81
 POWER EQUIPMENT : 41.81
 ENGINEERING AND ADMINISTRATION : 43.31
 CONTINGENCIES : 34.08
 S U B T O T A L : 721.28

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 14.0 KM) : 3.08
 ENGINEERING AND ADMINISTRATION : 0.25
 CONTINGENCIES : 0.50
 S U B T O T A L : 3.83

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 18.6 KM) : 2.06
 SUBSTATION (INFANTA) : 0.96
 ENGINEERING AND ADMINISTRATION : 0.38
 CONTINGENCIES : 0.51
 S U B T O T A L : 3.91

LAND PROCUREMENT/RESETTLEMENT

: 0.59

T O T A L

: 729.60

FOREIGN CURRENCY PORTION

: 441.51

LOCAL CURRENCY PORTION

: 288.10

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W : 3430.20
 CONSTRUCTION COST (USD) / K W H : 1.094

K W H COST (USD/KWH) : 0.196

PROJECT NAME : KANAN (+UPPER AGOS 2)
 PROJECT ID : 4-007-00-01-1-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (78.8)

STORAGE DAM	: 20.48
SPILLWAY	: 38.82
RIVER DIVERSION WORK	: 10.55
INTAKE (PRESSURE)	: 2.95
HEADRACE (NO HEADRACE)	: 0.
NO TANK	: 0.
PENSTOCK (INCLINED PRESSURE SHAFT)	: 3.24
POWER HOUSE (OPEN-AIR)	: 7.29
TAILRACE (OPEN CHANNEL)	: 1.67
MISCELLANEOUS CIVIL WORKS	: 4.25
POWER EQUIPMENT	: 28.35
ENGINEERING AND ADMINISTRATION	: 14.76
CONTINGENCIES	: 10.93
SUB TOTAL	: 152.78

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 14.0 KM)	: 3.08
ENGINEERING AND ADMINISTRATION	: 0.25
CONTINGENCIES	: 0.50
SUB TOTAL	: 3.83

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 18.6 KM)	: 2.06
SUBSTATION (INFANTA)	: 0.96
ENGINEERING AND ADMINISTRATION	: 0.38
CONTINGENCIES	: 0.51
SUB TOTAL	: 3.91

LAND PROCUREMENT/RESETTLEMENT

: 0.04

TOTAL : 160.57

FOREIGN CURRENCY PORTION	: 98.92
LOCAL CURRENCY PORTION	: 61.64

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W	: 2037.66
CONSTRUCTION COST (USD)/ K W H	: 0.804
K W H COST (USD/KWH)	: 0.144

PROJECT NAME : UPPER AGOS-2 (PRICE LEVEL : LATE 1985)
 PROJECT ID : 4-007-00-05-0-1 (UNIT : MILLION USD)
 TYPE : RESERVOIR

ITEM ----- CONSTRUCTION COST

POWER DEVELOPMENT (INSTALLED CAPACITY, MW) (135.4)

STORAGE DAM	: 136.94
SPILLWAY	: 16.92
RIVER DIVERSION WORK	: 7.58
INTAKE (PRESSURE)	: 2.03
HEADRACE (NO HEADRACE)	: 0.
NO TANK	: 0.
PENSTOCK (EMBEDDED IN CONCRETE DAM)	: 1.56
POWER HOUSE (OPEN-AIR)	: 7.59
TAILRACE (OPEN CHANNEL)	: 1.43
MISCELLANEOUS CIVIL WORKS	: 8.70
POWER EQUIPMENT	: 31.15
ENGINEERING AND ADMINISTRATION	: 25.45
CONTINGENCIES	: 35.90
SUB TOTAL	: 275.24

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 18.6 KM)	: 4.09
ENGINEERING AND ADMINISTRATION	: 0.33
CONTINGENCIES	: 0.66
SUB TOTAL	: 5.08

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 21.0 KM)	: 2.33
SUBSTATION (INFANTA)	: 0.98
ENGINEERING AND ADMINISTRATION	: 0.41
CONTINGENCIES	: 0.56
SUB TOTAL	: 4.28

LAND PROCUREMENT/RESETTLEMENT

	: 0.58
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TOTAL

	: 285.17
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FOREIGN CURRENCY PORTION	: 173.39
LOCAL CURRENCY PORTION	: 111.78

EVALUATION INDICES

CONSTRUCTION COST (USD) / K W	: 2106.10
CONSTRUCTION COST (USD) / K W H	: 0.568
K W H COST (USD/KWH)	: 0.120

PROJECT NAME : WAWA
 PROJECT ID : 4-115-01-01-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	61.0
STORAGE DAM	83.18
SPILLWAY	13.46
RIVER DIVERSION WORK	4.56
INTAKE (PRESSURE)	1.11
HEADRACE (NO HEADRACE)	0.
NO TANK	0.
PERSTOCK (EMBEDDED IN CONCRETE DAM)	0.65
POWER HOUSE (OPEN-AIR)	5.45
TAILRACE (OPEN CHANNEL)	1.04
MISCELLANEOUS CIVIL WORKS	5.47
POWER EQUIPMENT	16.44
ENGINEERING AND ADMINISTRATION	16.42
CONTINGENCIES	22.17
SUB TOTAL	169.95

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 3.6 KM)	0.79
ENGINEERING AND ADMINISTRATION	0.06
CONTINGENCIES	0.13
SUB TOTAL	0.98

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 21.0 KM)	1.43
SUBSTATION (DOLORES)	0.52
ENGINEERING AND ADMINISTRATION	0.26
CONTINGENCIES	0.35
SUB TOTAL	2.55

LAND PROCUREMENT/RESETTLEMENT

1.61

TOTAL

175.20

FOREIGN CURRENCY PORTION

105.86

LOCAL CURRENCY PORTION

69.34

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W H	2872.05
CONSTRUCTION COST (USD)/ K W H	0.899
K W H COST (USD/KWH)	0.161

PROJECT NAME : BOSIGON
 PROJECT ID : S-014-01-01-0-1 (PRICE LEVEL : LATE 1985)
 TYPE : RESERVOIR (UNIT : MILLION USD)

ITEM	CONSTRUCTION COST
POWER DEVELOPMENT (INSTALLED CAPACITY, MW)	(44.8)
STORAGE DAM	31.04
SPILLWAY	24.71
RIVER DIVERSION WORK	5.27
INTAKE (PRESSURE)	2.39
HEADRACE (PRESSURE TUNNEL)	2.66
SURGE TANK	1.79
PENSTOCK (OPEN AIR)	0.58
POWER HOUSE (OPEN-AIR)	5.66
TAILRACE (OPEN CHANNEL)	0.74
MISCELLANEOUS CIVIL WORKS	3.74
POWER EQUIPMENT	19.68
ENGINEERING AND ADMINISTRATION	12.28
CONTINGENCIES	16.58
SUB TOTAL	127.12

ACCESS ROAD

CONSTRUCTION COST (LENGTH= 0. KM)	0.
ENGINEERING AND ADMINISTRATION	0.
CONTINGENCIES	0.
SUB TOTAL	0.

TRANSMISSION LINE SYSTEM

TRANSMISSION LINE (LENGTH= 30.0 KM)	2.04
SUBSTATION (LABO)	0.62
ENGINEERING AND ADMINISTRATION	0.33
CONTINGENCIES	0.45
SUB TOTAL	3.45

LAND PROCUREMENT/RESETTLEMENT

1.60

TOTAL

132.16

FOREIGN CURRENCY PORTION : 80.60
 LOCAL CURRENCY PORTION : 51.56

EVALUATION INDICES

CONSTRUCTION COST (USD)/ K W : 2950.03
 CONSTRUCTION COST (USD)/ K W H : 1.248
 K W H COST (USD/KWH) : 0.224

C-11 水力開発候補地点カタログ

SCHEME : MAGUILLIAN WATER RESOURCES REGION : I
 RIVER SYSTEM : MAGUILLIAN PROVINCE : BENGUET
 STREAM : TRINIDAD CATCHMENT AREA (KM2) : 134.3
 COORDINATES : N16-30-37 E120-33-55
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.51
 AVE. OPERATING LEVEL : 484.3
 DEAD : 0.1
 SEDIMENT : -

RESERVOIR LEVELS (EL.M) : FSL : 484.9 MCL : 483.7
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 7.9
 CREST EL (M) : 489.9
 CREST LENGTH (M) : 42.0
 DAM VOL (1000M3) : 4.9
 GEOLOGICAL CLASS : ACCEPTABLE

SPILLWAY TYPE : NON
 DESIGN FLOOD(M3/S) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 GATE DIMENSION(M) : -

WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 9010.0 DIA.(M) : 3.0
 H/R SURGETANK TYPE: HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 610.0 DIA.(M) : 1.7
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 1190.0 DIA.(M) : 1.9

TAILRACE TYPE : BAY/CHANNEL
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 15402.
 NO. OF UNITS : 4 UNIT CAPACITY (MW) : 10.3
 NO. OF CIRCUITS : 2 LENGTH (KM) : 17.4 K V : 69S
 FROM NEAREST PROVINCIAL ROAD FROM BAGUIO

POWER

INSTALLED CAPACITY (MW) : 36.9
 ANNUAL TOTAL ENERGY (GWH) : 151.2
 MAX. DISCHARGE(M3/S) : 15.0
 MAX. STATIC HEAD (M) : 325.9
 MIN. GUARANT(MW) : 2.2
 FIRM ENERGY(GWH) : 21.7
 FIRM DISC.(M3/S) : 1.0
 AVE. NET HEAD(M) : 300.4
 FIRM POWER (MW) : 2.4
 SECOND.ENERGY(GWH) : 129.5
 TAILWATER LEVEL(M) : 159.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 48.53
 TOTAL COST/KW (USD/KW) : 1314.42
 TOTAL COST/KWH(USD/KWH) : 0.43
 POWER DEVELOP. : 43.38
 ACCESS ROAD : 3.41
 TRANSMISSION : 1.74
 LAND/RESETTLEMENT : 0.01

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.072

SCHEME : LUYA
 RIVER SYSTEM : AMBURAYAN
 STREAM : AMBURAYAN
 WATER RESOURCES REGION : 1
 PROVINCE : LOCOS SUR
 CATCHMENT AREA (KM2) : 403.0
 COORDINATES : N16-40-21 E120-34-00
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LIPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.51
 RESERVOIR
 LEVELS (EL.M) : FSL : 273.0 MOL : 268.5 AVE. OPERATING LEVEL : 270.8
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.1 DEAD : 0.1 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED
 DAM HEIGHT (M) : 12.0
 CREST EL (M) : 278.0
 CREST LENGTH (M) : 45.0
 DAM VOL (1000M3) : 8.3
 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : NON
 CREST EL. (M) : -
 OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : -
 GATES (TON) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 8750.0 DIA.(M) : 4.4
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 210.0 DIA.(M) : 2.8
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 230.0 DIA.(M) : 3.3
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 80.0 WIDTH(M) : 50.3
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 18357.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 4 UNIT CAPACITY (MW) : 11.3
 TRANSMISSION
 SUBSTATION : LA TRINIDAD NO. OF CIRCUITS : 2 LENGTH (KM) : 35.0 K V : 115S
 ACCESS ROAD
 LENGTH (KM) : 15.0 FROM NEAREST PROVINCIAL ROAD
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 40.8
 FIRM POWER (MW) : 2.3
 ANNUAL TOTAL ENERGY (GWH) : 167.9
 FIRM ENERGY (GWH) : 23.0
 MAX. DISCHARGE (M3/S) : 40.3
 FIRM DISC. (M3/S) : 2.6
 MAX. STATIC HEAD (M) : 133.0
 AVE. NET HEAD (M) : 122.5
 TAILWATER LEVEL (M) : 140.0
 SECOND. ENERGY (GWH) : 144.9

CONSTRUCTION COST (MIL USD)

TOTAL COST : 50.34
 POWER DEVELOP. : 52.35
 TOTAL COST/KW (USD/KW) : 1478.85
 ACCESS ROAD : 4.10
 TRANSMISSION : 3.88
 TOTAL COST/KWH (USD/KWH) : 0.48
 LAND/RESETTLEMENT : 0.01

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.081

SCHEME : BAKUM
 RIVER SYSTEM : AMBURAYAN
 STREAM : BAKUM
 WATER RESOURCES REGION : I
 PROVINCE : BENGUET
 CATCHMENT AREA (KM2) : 108.3
 COORDINATES : N16-48-49 E120-38-50
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 689.2 MOL : 688.2 AVE. OPERATING LEVEL : 688.7
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.1 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED
 DAM HEIGHT (M) : 8.2
 CREST EL (M) : 694.2 CREST LENGTH (M) : 96.0
 DAM VOL (1000M3) : 7.9 GEOLOGICAL CLASS : VERY GOOD

SPILLWAY
 TYPE : NON : - OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : - GATES (TON) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 4670.0 DIA.(M) : 2.6
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 690.0 DIA.(M) : 1.4
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 1000.0 DIA.(M) : 1.5
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 57.8
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 14241.

POWER EQUIPMENT
 TYPE : PELTON NO. OF UNITS : 4 UNIT CAPACITY (MW) : 9.2
 TRANSMISSION
 SUBSTATION : BALACAN NO. OF CIRCUITS : 2 LENGTH (KM) : 18.2 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 7.0 FROM NEAREST PROVINCIAL ROAD FROM ALILEM
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 33.0 MIN. GUARANT (MW) : 2.0 FIRM POWER (MW) : 2.2
 ANNUAL TOTAL ENERGY (GWH) : 135.0 FIRM ENERGY (GWH) : 20.1 SECOND. ENERGY (GWH) : 114.9
 MAX. DISCHARGE (M3/S) : 10.1 FIRM DISC. (M3/S) : 0.7
 MAX. STATIC HEAD (M) : 422.2 AVE. NET HEAD (M) : 398.2 TAILWATER LEVEL (M) : 267.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 35.38 POWER DEVELOP. : 31.67 TRANSMISSION : 1.78
 TOTAL COST/KW (USD/KW) : 1073.28 ACCESS ROAD : 1.91 LAND/RESETTLEMENT : 0.00
 TOTAL COST/KWH(USD/KWH) : 0.35

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.059

SCHEME : AMBURAYAN
 RIVER SYSTEM : AMBURAYAN
 STREAM : AMBURAYAN
 WATER RESOURCES REGION : I
 PROVINCE : BENGUET
 CATCHMENT AREA (KM2) : 339.6
 COORDINATES : N16-36-53 E120-37-54
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 1 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.51
 RESERVOIR LEVELS (EL.M) : FSL : 517.3 MOL : 515.2 AVE. OPERATING LEVEL : 516.2
 STORAGE (MIL M3) : GROSS : 0.2 ACTIVE : 0.1 DEAD : 0.2 SEDIMENT : -
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 9.3
 CREST EL (M) : 522.3 CREST LENGTH (M) : 81.0
 DAM VOL (1000M3) : 7.7 GEOLOGICAL CLASS : ACCEPTABLE
 SPILLWAY TYPE : NON : CREST EL. (M) : - OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : - GATES (TON) : -
 WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 9330.0 DIA. (M) : 4.1
 H/R SURGETANK TYPE: HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 110.0 DIA. (M) : 2.6
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 220.0 DIA. (M) : 2.9
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 35.0 WIDTH(M) : 50.3
 POWERHOUSE TYPE : OPEN AIR SPACIAL VOL. (M3) : 19809.
 POWER EQUIPMENT TYPE : FRANCIS NO. OF UNITS : 4 UNIT CAPACITY (MW) : 17.8
 TRANSMISSION SUBSTATION : LA TRINIDAD NO. OF CIRCUITS : 2 LENGTH (KM) : 32.6 K V : 1155
 ACCESS ROAD LENGTH (KM) : 15.4 FROM PROVINCIAL ROAD NEAR KIBUNGAN
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 64.0
 ANNUAL TOTAL ENERGY(SWH) : 260.8
 MAX. DISCHARGE(M3/S) : 34.7
 MAX. STATIC HEAD (M) : 237.3
 MIN. GUARANT(MW) : 3.6 FIRM POWER (MW) : 4.0
 FIRM ENERGY(GWH) : 37.1 SECOND. ENERGY (GWH) : 223.7
 FIRM DISC.(M3/S) : 2.3
 AVE. NET HEAD(M) : 223.4 TAILWATER LEVEL (M) : 280.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 75.44
 TOTAL COST/KW (USD/KW) : 1178.68
 TOTAL COST/KWH(USD/KWH) : 0.39
 POWER DEVELOP. : 67.53
 ACCESS ROAD : 4.21
 TRANSMISSION : 3.68
 LAND/RESETTLEMENT : 0.01

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.065

SCHEME : SUPO
 RIVER SYSTEM : ABRA
 STREAM : ABRA
 WATER RESOURCES REGION : 1
 PROVINCE : ILOCOS SUR
 CATCHMENT AREA (KM2) : 1293.0
 COORDINATES : N17-14-42 E120-40-36
 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPMT RATIO : 0.43
 RESERVOIR
 LEVELS (EL.M) : FSL : 320.0 MOL : 278.1 AVE. OPERATING LEVEL : 306.0
 STORAGE (MIL M3) : GROSS : 1131.6 ACTIVE : 873.7 DEAD : 257.9 SEDIMENT : 79.4
 MAIN DAM/WEIR
 TYPE : ROCKFILL
 DAM HEIGHT (M) : 119.4
 CREST EL (M) : 326.4 CREST LENGTH (M) : 440.0
 DAM VOL (MIL M3) : 6.0 GEOLOGICAL CLASS : GOOD
 SPILLWAY
 TYPE : ON ABUT..GATED
 DESIGN FLOOD(M3/S) : 7674.0
 CREST EL. (M) : 302.0 OVERFLOW WIDTH(M) : 35.1
 GATES (TON) : 739.9 GATE DIMENSION(M) : 11.7 X 18.0 X 3
 WATERWAY
 HEADRAGE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : OPEN-AIR
 NUMBER : 1 LENGTH (M) : 537.0 DIA.(M) : 7.4
 NUMBER : 1 HEIGHT (M) : 58.3 DIA.(M) : 29.6
 NUMBER : 1 LENGTH (M) : 108.0 DIA.(M) : 6.3
 STEEL LINER(TON) : 241.
 NUMBER : 1 CONDUIT LENGTH(M) : 45.0 WIDTH(M) : 31.1
 POWERHOUSE
 TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 23588.
 POWER EQUIPMENT
 TYPE : FRANCIS
 NO. OF UNITS : 2 UNIT CAPACITY (MW) : 78.8
 TRANSMISSION
 SUBSTATION
 TYPE : SAN ESTEBAN
 NO. OF CIRCUITS : 1 LENGTH (KM) : 31.7 K V : 2300
 ACCESS ROAD
 LENGTH (KM) : 3.0
 FROM NEAREST TO PROVINCIAL ROAD
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 2950.0
 POWER
 INSTALLED CAPACITY (MW) : 141.8
 FIRM POWER (MW) : 35.5
 ANNUAL TOTAL ENERGY(GWH) : 438.1
 SECOND. ENERGY(GWH) : 127.6
 MAX. DISCHARGE(M3/S) : 173.0
 FIRM DISC.(M3/S) : 43.3
 MAX. STATIC HEAD (M) : 116.0
 AVE. NET HEAD(M) : 100.0
 TAILWATER LEVEL(M) : 204.0
 CONSTRUCTION COST (MIL USD)
 TOTAL COST : 258.00
 POWER DEVELOP. : 251.24 TRANSMISSION : 5.79
 TOTAL COST/KW (USD/KW) : 1819.47
 ACCESS ROAD : 0.82 LAND/RESETTLEMENT : 0.15
 TOTAL COST/KWH(USD/KWH) : 0.65
 ECONOMIC PARAMETER
 KWH COST (USD/KWH) : 0.116

HYDROPOWER PROJECT CATALOGUE

SCHEME ID NO. 1-022-00-05-4-1

SCHEME : SUPO (D+W ALT. +ESTEB)
 RIVER SYSTEM : ABRA
 STREAM : ABRA
 WATER RESOURCES REGION : I
 PROVINCE : ILOCOS SUR
 CATCHMENT AREA (KM2) : 1299.0
 COORDINATES : N17-14-42 E120-40-36
 STUDY LEVEL : UNSCALED
 (PRE F/S. RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPMT RATIO : 0.03
 RESERVOIR LEVELS (EL.M) : FSL : 263.0 MOL : 251.8 AVE. OPERATING LEVEL : 259.3
 STORAGE (MIL M3) : GROSS : 142.6 ACTIVE : 60.6 DEAD : 82.1 SEDIMENT : 26.7
 MAIN DAM/WEIR TYPE : ROCKFILL
 DAM HEIGHT (M) : 71.9
 CREST EL (M) : 273.9 CREST LENGTH (M) : 295.0
 DAM VOL (MIL M3) : 1.4 GEOLOGICAL CLASS : GOOD
 SPILLWAY TYPE : ON ABUT. GATED
 DESIGN FLOOD (M3/S) : 9493.0 OVERFLOW WIDTH (M) : 60.0
 WATERWAY GATES (TON) : 271.2 GATE DIMENSION (M) : 10.0 X 9.0 X 6
 HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : OPEN-AIR
 NUMBER : 1 LENGTH (M) : 1480.0 DIA. (M) : 7.1
 NUMBER : 1 HEIGHT (M) : 34.4 DIA. (M) : 28.4
 NUMBER : 1 LENGTH (M) : 110.0 DIA. (M) : 6.3
 TAILRACE TYPE : BAY/CHANNEL
 NUMBER : 1 CONDUIT LENGTH (M) : 70.0 WIDTH (M) : 30.0
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL. (M3) : 21390.
 POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 2 UNIT CAPACITY (MW) : 55.2
 TRANSMISSION SUBSTATION : SAN ESTEBAN
 NO. OF CIRCUITS : 1 LENGTH (KM) : 31.7 K V. : 2300
 ACCESS ROAD LENGTH (KM) : 3.0
 FROM NEAREST PROVINCIAL ROAD
 LAND/RESETTLEMENT LAND SUBMERGED (HA) : 550.0

POWER

INSTALLED CAPACITY (MW) : 99.4
 ANNUAL TOTAL ENERGY (GWH) : 369.1
 MAX. DISCHARGE (M3/S) : 155.1
 MAX. STATIC HEAD (M) : 85.0
 MIN. GUARANT (MW) : 85.9
 FIRM ENERGY (GWH) : 217.7
 FIRM DISC. (M3/S) : 38.8
 AVE. NET HEAD (M) : 78.2
 FIRM POWER (MW) : 24.9
 SECOND. ENERGY (GWH) : 151.5
 TAILWATER LEVEL (M) : 178.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 188.68
 TOTAL COST/KW (USD/KW) : 1898.15
 TOTAL COST/KWH (USD/KWH) : 0.58
 POWER DEVELOP. : 182.03
 ACCESS ROAD : 0.82
 TRANSMISSION : 5.79
 LAND/RESETTLEMENT : 0.03

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.104

SCHEME : ETEB WATER RESOURCES REGION : 1
 RIVER SYSTEM : ABRA PROVINCE : ILOCOS SUR COORDINATES : N17-10-42 E120-40-22
 STREAM : ABRA CATCHMENT AREA (KM2) : 911.0 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 SADDLE DAM : 0
 DEVELOPMT RATIO : 0.60
 INTAKE : 0
 MOL : 331.4 AVE. OPERATING LEVEL : 357.8
 STORAGE (MIL M3) : GROSS : 1626.2 ACTIVE DEAD : 654.1 SEDIMENT : 63.8
 MAIN DAM/WEIR : ROCKFILL CREST LENGTH (M) : 400.0
 DAM HEIGHT (M) : 124.8 DAM VOL (MIL M3) : 5.8 GEOLOGICAL CLASS : GOOD
 SPILLWAY : ON ABUT., GATED CREST EL. (M) : 374.8 OVERFLOW WIDTH (M) : 33.9
 DESIGN FLOOD (M3/S) : 6232.0 GATES (TON) : 714.6 GATE DIMENSION (M) : 11.3 X 18.0 X 3

RESERVOIR
 LEVELS (EL.M) : FSL : 371.0
 H/R SURGETANK TYPE : SURGE TUNNEL
 PENSTOCK TYPE : OPEN-AIR
 HEADRACE TYPE : PRESSURE TUNNEL
 TAILRACE TYPE : BAY/CHANNEL
 POWERHOUSE TYPE : OPEN AIR
 POWER EQUIPMENT TYPE : FRANCIS
 TRANSMISSION SUBSTATION : SAN ESTEBAN
 ACCESS ROAD LENGTH (KM) : 0.2
 LAND/RESETTLEMENT LAND SUBMERGED (HA) : 3180.0

NO. OF UNITS : 2 UNIT CAPACITY (MW) : 59.6
 NO. OF CIRCUITS : 1 LENGTH (KM) : 36.5 K V : 2300
 FROM NEAREST PROVINCIAL ROAD

POWER
 INSTALLED CAPACITY (MW) : 107.2
 ANNUAL TOTAL ENERGY (GWH) : 297.1
 MAX. DISCHARGE (M3/S) : 157.8
 MAX. STATIC HEAD (M) : 98.0
 MIN. GUARANT (MW) : 69.3
 FIRM ENERGY (GWH) : 234.8
 FIRM DISC. (M3/S) : 39.4
 AVE. NET HEAD (M) : 82.8
 FIRM POWER (MW) : 26.8
 SECOND. ENERGY (GWH) : 62.3
 TAILWATER LEVEL (M) : 273.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 225.77
 TOTAL COST/KW (USD/KW) : 2106.07
 TOTAL COST/KWH (USD/KWH) : 0.91
 POWER DEVELOP. : 219.06
 ACCESS ROAD : 0.07
 TRANSMISSION : 6.48
 LAND/RESETTLEMENT : 0.16

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.145

SCHEME : ABRA WATER RESOURCES REGION : 1
 RIVER SYSTEM : ABRA PROVINCE : BENGUET
 STREAM : ABRA CATCHMENT AREA (KM2) : 107.1
 COORDINATES : N16-50-44 E120-43-52
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LPPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.57
 RESERVOIR
 LEVELS (EL.M) : FSL : 804.3 MOL : 802.9 AVE. OPERATING LEVEL : 803.6
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.1 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED
 DAM HEIGHT (M) : 7.3
 CREST EL (M) : 809.3 CREST LENGTH (M) : 45.0
 DAM VOL (1000M3) : 4.7 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : NON
 DESIGN FLOOD(M3/S) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 GATE DIMENSION(M) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 6150.0 DIA.(M) : 2.2
 H/R SURGETANK TYPE: HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 300.0 DIA.(M) : 1.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 340.0 DIA.(M) : 1.5
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 65. STEEL LINER(TON) : -
 CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 18.2
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 7811.
 POWER EQUIPMENT
 TYPE : PELTON NO. OF UNITS : 2 UNIT CAPACITY (MW) : 6.1
 TRANSMISSION
 SUBSTATION : QUINAANG NO. OF CIRCUITS : 1 LENGTH (KM) : 8.0 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 10.0 FROM NEAREST NATIONAL ROAD
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 10.9
 ANNUAL TOTAL ENERGY(GWH) : 50.7
 MAX. DISCHARGE(M3/S) : 6.9
 MAX. STATIC HEAD (M) : 204.3
 MIN. GUARANT(MW) : 1.3 FIRM POWER (MW) : 1.4
 FIRM ENERGY(GWH) : 12.5 SECOND. ENERGY(GWH) : 39.2
 FIRM DISC.(M3/S) : 0.9
 AVE. NET HEAD(M) : 192.4 TAILWATER LEVEL(M) : 600.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 21.49
 TOTAL COST/KW (USD/KW) : 1971.67
 TOTAL COST/KWH(USD/KWH) : 0.55
 POWER DEVELOP. : 18.16
 ACCESS ROAD : 2.73
 TRANSMISSION : 0.59
 LAND/RESETTLEMENT : 0.01

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.092

SCHEME : SISIRITAN
 RIVER SYSTEM : ABULOG
 STREAM : ABULOG
 WATER RESOURCES REGION : 11
 PROVINCE : KALINGA APAYAO
 CATCHMENT AREA (KM2) : 1870.0
 COORDINATES : N18-09-42 E121-21-00
 STUDY LEVEL : UNSCALED
 (PRE F/S. RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.17
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPMT RATIO : 0.30
 AVE. OPERATING LEVEL : 88.4
 DEAD SEDIMENT : 1540.1
 CREST LENGTH (M) : 805.0
 GEOLOGICAL CLASS : ACCEPTABLE
 OVERFLOW WIDTH(M) : 50.0
 GATE DIMENSION(M) : 12.5 X 18.0 X 4
 LENGTH (M) : 750.0 DIA.(M) : 7.3
 HEIGHT (M) : 53.1 DIA.(M) : 29.2
 LENGTH (M) : 168.0 DIA.(M) : 6.4
 CONDUIT LENGTH(M) : 120.0 WIDTH(M) : 36.7

RESERVOIR LEVELS (EL.M) : FSL : 100.0 MOL : 65.2
 STORAGE (MIL M3) : GROSS : 3443.0 ACTIVE : 1902.9
 MAIN DAM/WEIR TYPE : ROCKFILL
 DAM HEIGHT (M) : 108.7
 SPILLWAY TYPE : ON ABUT.-GATED
 DESIGN FLOOD(M3/S) : 11178.0
 WATERWAY HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : OPEN-AIR

TAILRACE TYPE : SAY/CHANNEL
 POWERHOUSE TYPE : OPEN AIR
 POWER EQUIPMENT TYPE : FRANCIS
 TRANSMISSION SUBSTATION : CAMALANUGAN
 ACCESS ROAD LENGTH (KM) : 0.
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 7640.0

NO. OF UNITS : 8
 NO. OF CIRCUITS : 1
 FROM NATIONAL ROAD IS LOCATED BESIDE DAMSITE
 MIN. GUARANT(MW) : 276.9
 FIRM ENERGY(GWH) : 509.7
 FIRM DISC.(M3/S) : 111.4
 AVE. NET HEAD(M) : 76.2

UNIT CAPACITY (MW) : 58.0
 LENGTH (KM) : 44.4
 K V : 2300
 FIRM POWER (MW) : 69.7
 SECOND. ENERGY(GWH) : 472.3
 TAILWATER LEVEL(M) : 10.0

POWER
 INSTALLED CAPACITY (MW) : 417.6
 ANNUAL TOTAL ENERGY(SWH) : 1082.0
 MAX. DISCHARGE(M3/S) : 668.6
 MAX. STATIC HEAD (M) : 90.0

CONSTRUCTION COST (MIL USD)
 TOTAL COST : 610.53
 TOTAL COST/KW (USD/KW) : 1461.99
 TOTAL COST/KWH(USD/KWH) : 0.65
 POWER DEVELOP. : 596.27
 ACCESS ROAD : 0.
 TRANSMISSION : 13.88
 LAND/RESETTLEMENT : 0.38

ECONOMIC PARAMETER
 KWH COST (USD/KWH) : 0.116

SCHEME : SISIRITAN (+ AGBULU) WATER RESOURCES REGION : 11
 RIVER SYSTEM : ABULOG PROVINCE : KALINGA-APAYAO COORDINATES : N18-09-42 E121-21-00
 STREAM : ABULOG CATCHMENT AREA (KM2) : 1870.0 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25 DEVELOPMT RATIO : 0.30
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 100.0 MOL : 65.2 AVE. OPERATING LEVEL : 88.4
 STORAGE (MIL M3) : GROSS : 3443.0 ACTIVE : 1902.9 DEAD : 1540.1 SEDIMENT : 82.0

MAIN DAM/WEIR
 TYPE : ROCKFILL CREST EL (M) : 106.7 CREST LENGTH (M) : 805.0
 DAM HEIGHT (M) : 108.7 DAM VOL (MIL M3) : 15.4 GEOLOGICAL CLASS : ACCEPTABLE

SPILLWAY
 TYPE : ON ABUT..GATED CREST EL. (M) : 82.0 OVERFLOW WIDTH(M) : 50.0
 DESIGN FLOOD(M3/S) : 11178.0 GATES (TON) : 1054.0 GATE DIMENSION(M) : 12.5 X 18.0 X 4

WATERWAY
 HEADRACE TYPE : PRESSURE TUNNEL NUMBER : 3 LENGTH (M) : 750.0 DIA.(M) : 7.9
 H/R SURGETANK TYPE: SURGE TANK NUMBER : 3 HEIGHT (M) : 54.4 DIA.(M) : 31.7
 PENSTOCK TYPE : OPEN-AIR NUMBER : 3 LENGTH (M) : 168.0 DIA.(M) : 7.1

TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 120.0 WIDTH(M) : 84.4

POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 50345.

POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 6 UNIT CAPACITY (MW) : 72.1

TRANSMISSION
 SUBSTATION : CAMALANUCAN NO. OF CIRCUITS : 1 LENGTH (KM) : 44.4 K V : 2300

ACCESS ROAD
 LENGTH (KM) : 0.

LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 7640.0

FROM NATIONAL ROAD IS LOCATED BESIDE DAMSITE

POWER

INSTALLED CAPACITY (MW) : 389.4 MIN. GUARANT(MW) : 258.0 FIRM POWER (MW) : 97.4
 ANNUAL TOTAL ENERGY(GWH) : 1067.0 FIRM ENERGY(GWH) : 852.8 SECOND. ENERGY(GWH) : 214.3
 MAX. DISCHARGE(M3/S) : 523.2 FIRM DISC.(M3/S) : 155.8
 MAX. STATIC HEAD (M) : 90.0 AVE. NET HEAD(M) : 76.2 TAILWATER LEVEL(M) : 10.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 590.04 POWER DEVELOP. : 575.77 TRANSMISSION : 13.88
 TOTAL COST/KW (USD/KW) : 1515.24 ACCESS ROAD : 0.
 TOTAL COST/KWH(USD/KWH) : 0.59 LAND/RESETTLEMENT : 0.38

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.105

SCHEME : SISIRITAN (+BULU+AGBULU) WATER RESOURCES REGION : II
 RIVER SYSTEM : ABULOG PROVINCE : KALINGA-APAYAO COORDINATES : N18-09-42 E121-21-00
 STREAM : ABULOG CATCHMENT AREA (KM2) : 1870.0 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.33
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.11
 RESERVOIR LEVELS (EL.M) : FSL : 68.3 MOL : 51.9 AVE. OPERATING LEVEL : 62.8
 STORAGE (MIL M3) : GROSS : 1679.7 ACTIVE : 698.3 DEAD : 981.4 SEDIMENT : 82.0
 MAIN DAM/WEIR TYPE : ROCKFILL
 DAM HEIGHT (M) : 72.9
 CREST EL (M) : 74.9 CREST LENGTH (M) : 650.0
 DAM VOL (MIL M3) : 6.2 GEOLOGICAL CLASS : ACCEPTABLE
 SPILLWAY TYPE : ON ABUT..GATED
 CREST EL. (M) : 50.3 OVERFLOW WIDTH(M) : 57.0
 DESIGN FLOOD(M3/S): 12655.0 GATES (TON) : 1201.6 GATE DIMENSION(M) : 11.4 X 18.0 X 5
 WATERWAY HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK NUMBER : 3 LENGTH (M) : 528.0 DIA.(M) : 7.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 3 HEIGHT (M) : 32.3 DIA.(M) : 28.7
 NUMBER : 3 LENGTH (M) : 133.0 DIA.(M) : 6.7
 TAILRACE TYPE : BAY/CHANNEL
 STEEL LINER(TON) : 668.
 NUMBER : 1 CONDUIT LENGTH(M) : 120.0 WIDTH(M) : 46.2
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 47444.
 POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 3 UNIT CAPACITY (MW) : 74.4
 TRANSMISSION SUBSTATION : CAMALANIUGAN
 NO. OF CIRCUITS : 1 LENGTH (KM) : 44.4 K V : 2300
 ACCESS ROAD LENGTH (KM) : 0.
 FROM NATIONAL ROAD BESIDE DAMSITE
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 4280.0

POWER

INSTALLED CAPACITY (MW) : 201.0
 ANNUAL TOTAL ENERGY(GWH) : 701.1
 MAX. DISCHARGE(M3/S) : 477.6
 MIN. GUARANT(MW) : 149.4
 FIRM ENERGY(GWH) : 586.9
 FIRM DISC.(M3/S) : 159.1
 MAX. STATIC HEAD (M) : 58.3
 AVE. NET HEAD(M) : 51.4
 FIRM POWER (MW) : 66.5
 SECOND.ENERGY(GWH) : 114.2
 TAILWATER LEVEL(M) : 10.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 348.98
 TOTAL COST/KW (USD/KW) : 1736.23
 TOTAL COST/KWH(USD/KWH) : 0.52
 POWER DEVELOP. : 341.15
 ACCESS ROAD : 0.
 TRANSMISSION : 7.62
 LAND/RESETTLEMENT : 0.21

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.094

HYDROPOWER PROJECT CATALOGUE

SCHEME ID NO. 2-006-00-03-0-1

SCHEME : BULU
 RIVER SYSTEM : ABULOG
 STREAM : ABULOG
 WATER RESOURCES REGION : 11
 PROVINCE : KALINGA-APAYAO
 COORDINATES : N18-02-30 E121-13-00
 CATCHMENT AREA (KM2) : 1540.0
 STUDY LEVEL : UNSCALED
 (PRE F/S, RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.33
 NO. OF SUB FACILITIES : SUBDAM : 0
 DEVELOPM'T RATIO : 0.70
 INTAKE : 0
 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 218.0 MOL : 161.5 AVE. OPERATING LEVEL : 199.2
 STORAGE (MIL M3) : GROSS : 5227.8 ACTIVE : 3669.3 DEAD : 1558.6 SEDIMENT : 108.1

MAIN DAM/WEIR
 TYPE : ROCKFILL
 DAM HEIGHT (M) : 158.4
 CREST EL (M) : 223.4
 CREST LENGTH (M) : 600.0
 DAM VOL (MIL M3) : 18.0
 GEOLOGICAL CLASS : ACCEPTABLE

SPILLWAY
 TYPE : ON ABUT..GATED
 DESIGN FLOOD(M3/S) : 10224.0
 CREST EL. (M) : 200.0
 OVERFLOW WIDTH(M) : 50.0
 GATES (TON) : 1054.0
 GATE DIMENSION(M) : 12.5 X 18.0 X 4

WATERWAY
 HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 NUMBER : 2
 LENGTH (M) : 540.0
 DIA.(M) : 7.9
 PENSTOCK TYPE : INCLINED
 NUMBER : 2
 HEIGHT (M) : 73.9
 DIA.(M) : 31.8
 LENGTH (M) : 194.0
 DIA.(M) : 6.7
 STEEL LINER(TON) : 1165.

TAILRACE TYPE : BAY/CHANNEL
 NUMBER : 1
 CONDUIT LENGTH(M) : 150.0
 WIDTH(M) : 73.0

POWERHOUSE
 TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 46455.

POWER EQUIPMENT
 TYPE : FRANCIS
 NO. OF UNITS : 6
 UNIT CAPACITY (MW) : 75.3

TRANSMISSION
 SUBSTATION : CAMALANIUGAN
 NO. OF CIRCUITS : 1
 LENGTH (KM) : 65.5
 K V : 230D

ACCESS ROAD
 LENGTH (KM) : 4.0
 FROM KABUGAO

LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 10520.0

POWER

INSTALLED CAPACITY (MW) : 406.8
 FIRM POWER (MW) : 136.0
 ANNUAL TOTAL ENERGY(GWH) : 1361.9
 SECOND ENERGY(GWH) : 174.2
 MAX. DISCHARGE(M3/S) : 419.5
 FIRM DISC.(M3/S) : 139.6
 MAX. STATIC HEAD (M) : 139.7
 AVE. NET HEAD(M) : 118.4
 TAILWATER LEVEL(M) : 78.3

CONSTRUCTION COST (MIL USD)

TOTAL COST : 577.26
 POWER DEVELOP. : 565.75
 TOTAL COST/KW (USD/KW) : 1419.02
 ACCESS ROAD : 1.09
 TRANSMISSION : 19.28
 LAND/RESETTLEMENT : 0.53

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.079

HYDROPOWER PROJECT CATALOGUE SCHEME ID NO. 2-006-00-03-1-1

SCHEME : BULU (+AGBULU) WATER RESOURCES REGION : 11
 RIVER SYSTEM : ABULOG PROVINCE : KALINGA-APAYAO
 STREAM : ABULOG COORDINATES : N18-02-30 E121-13-00
CATCHMENT AREA (KM2) : 1540.0
STUDY LEVEL : UNSCALED
(PRE F/S-RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25 DEVELOPMT RATIO : 0.26
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 175.0 MOL : 140.3 AVE. OPERATING LEVEL : 163.4
 STORAGE (MIL.M3) : GROSS : 2198.6 ACTIVE : 1384.5 DEAD : 814.2 SEDIMENT : 58.7
 MAIN DAM/WEIR
 TYPE : ROCKFILL CREST EL (M) : 182.0 CREST LENGTH (M) : 490.0
 DAM HEIGHT (M) : 117.0 DAM VOL (MIL M3) : 8.5 GEOLOGICAL CLASS : ACCEPTABLE
 SPILLWAY
 TYPE : ON ASUT..GATED CREST EL. (M) : 157.3 OVERFLOW WIDTH(M) : 51.2
 DESIGN FLOOD(M3/S) : 11586.0 GATES (TON) : 1079.3 GATE DIMENSION(M) : 12.8 X 18.0 X 4

WATERWAY
 HEADRACE TYPE : PRESSURE TUNNEL NUMBER : 3 LENGTH (M) : 540.0 DIA. (M) : 7.4
 H/R SURGETANK TYPE : SURGE TANK NUMBER : 3 HEIGHT (M) : 51.1 DIA. (M) : 29.6
 PENSTOCK TYPE : OPEN-AIR NUMBER : 3 LENGTH (M) : 125.0 DIA. (M) : 6.5
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 70.0 WIDTH(M) : 79.1
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL. (M3) : 52817.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 6 UNIT CAPACITY (MW) : 66.0
 TRANSMISSION
 SUBSTATION : CAMALANIUGAN NO. OF CIRCUITS : 1 LENGTH (KM) : 65.5 K V : 230D
 ACCESS ROAD
 LENGTH (KM) : 4.0 FROM KABUGAO
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 5700.0

POWER

INSTALLED CAPACITY (MW) : 356.4 MIN. GUARANT (MW) : 244.8 FIRM POWER (MW) : 89.1
 ANNUAL TOTAL ENERGY (GWH) : 963.1 FIRM ENERGY (GWH) : 780.5 SECOND. ENERGY (GWH) : 182.6
 MAX. DISCHARGE (M3/S) : 522.5 FIRM DISC. (M3/S) : 130.6
 MAX. STATIC HEAD (M) : 96.7 AVE. NET HEAD (M) : 83.3 TAILWATER LEVEL (M) : 78.3

CONSTRUCTION COST (MIL USD)

TOTAL COST : 443.91
 TOTAL COST/KW (USD/KW) : 1245.53
 TOTAL COST/KWH (USD/KWH) : 0.49
 POWER DEVELOP. : 422.64
 ACCESS ROAD : 1.09
 TRANSMISSION : 19.88
 LAND/RESETTLEMENT : 0.29

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.088

H Y D R O P O W E R P R O J E C T C A T A L O G U E

SCHEME ID NO. 2-006-01-04-0-1

SCHEME : NABABALAYAN
 RIVER SYSTEM : ABULOG
 STREAM : APAYAO
 WATER RESOURCES REGION : 11
 PROVINCE : KALINGA-APAYAO
 COORDINATES : N18-02-00 E121-08-00
 CATCHMENT AREA (KM2) : 1007.0
 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.45
 RESERVOIR
 LEVELS (EL.M) : FSL : 240.0 MOL : 186.8 AVE. OPERATING LEVEL : 222.3
 STORAGE (MIL M3) : GROSS : 2250.6 ACTIVE : 1571.0 DEAD : 679.6 SEDIMENT : 70.3
 MAIN DAM/WEIR
 TYPE : ROCKFILL
 DAM HEIGHT (M) : 141.7
 CREST EL (M) : 246.7
 CREST LENGTH (M) : 680.0
 DAM VOL (MIL M3) : 17.3
 GEOLOGICAL CLASS : GOOD
 SPILLWAY
 TYPE : ON ABUT..GATED
 DESIGN FLOOD(M3/S): 8044.0
 CREST EL. (M) : 222.0
 OVERFLOW WIDTH(M) : 35.0
 GATES (TON) : 758.9
 GATE DIMENSION(M) : 12.0 X 18.0 X 3
 HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 NUMBER : 2
 LENGTH (M) : 470.0
 DIA.(M) : 7.1
 PENSTOCK TYPE : INCLINED
 NUMBER : 2
 HEIGHT (M) : 68.5
 DIA.(M) : 28.4
 LENGTH (M) : 251.0
 DIA.(M) : 5.9
 TAILRACE TYPE : BAY/CHANNEL
 NUMBER : 1
 CONDUIT LENGTH(M) : 90.0
 WIDTH(M) : 68.7
 POWERHOUSE
 TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 40929.
 POWER EQUIPMENT
 TYPE : FRANCIS
 NO. OF UNITS : 4
 UNIT CAPACITY (MW) : 84.1
 TRANSMISSION
 TYPE : CAMALANIUGAN
 NO. OF CIRCUITS : 1
 LENGTH (KM) : 75.0
 K V : 2300
 ACCESS ROAD
 LENGTH (KM) : 6.0
 FROM KABUGAO
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 4240.0

POWER

INSTALLED CAPACITY (MW) : 302.8
 FIRM POWER (MW) : 76.0
 ANNUAL TOTAL ENERGY(GWH) : 904.4
 SECOND.ENERGY(GWH) : 241.2
 MAX. DISCHARGE(M3/S) : 311.4
 FIRM DISC.(M3/S) : 77.9
 MAX. STATIC HEAD (M) : 139.0
 AVE. NET HEAD(M) : 118.7
 TAILWATER LEVEL (M) : 101.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 524.23
 POWER DEVELOP. : 499.78
 TOTAL COST/KW (USD/KW) : 1731.26
 ACCESS ROAD : 1.64
 LAND/RESETTLEMENT : 0.32
 TOTAL COST/KWH(USD/KWH) : 0.63

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.113

SCHEME : DIBAGAT
 RIVER SYSTEM : ABULOG
 STREAM : APAYAO
 WATER RESOURCES REGION : 11
 PROVINCE : KALINGA-APAYAO
 COORDINATES : N18-05-20 E121-07-17
 CATCHMENT AREA (KM2) : 798.9
 STUDY LEVEL : UNSCALED
 (PRE F/S-RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.33
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.80
 RESERVOIR LEVELS (EL.M) : FSL : 341.0 MOL : 261.8 AVE. OPERATING LEVEL : 314.6
 STORAGE (MIL M3) : GROSS : 2857.7 ACTIVE : 2249.5 DEAD : 608.2 SEDIMENT : 55.0
 MAIN DAM/WEIR TYPE : ROCKFILL
 DAM HEIGHT (M) : 201.5
 CREST EL (M) : 346.5 CREST LENGTH (M) : 567.0
 DAM VOL (MIL M3) : 20.8 GEOLOGICAL CLASS : GOOD
 SPILLWAY TYPE : ON ABUT.,GATED
 DESIGN FLOOD(M3/S) : 6612.0 CREST EL. (M) : 323.0 OVERFLOW WIDTH(M) : 32.1
 GATES (TON) : 676.7 GATE DIMENSION(M) : 10.7 X 18.0 X 3
 WATERWAY HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : INCLINED
 NUMBER : 2 LENGTH (M) : 788.0 DIA. (M) : 6.4
 NUMBER : 2 HEIGHT (M) : 96.0 DIA. (M) : 25.5
 NUMBER : 2 LENGTH (M) : 244.0 DIA. (M) : 5.0
 STEEL LINER(TON) : 1020.
 TAILRACE TYPE : BAY/CHANNEL
 NUMBER : 1 CONDUIT LENGTH(M) : 55.0 WIDTH(M) : 65.9
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 39014.
 POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 4 UNIT CAPACITY (MW) : 83.2
 TRANSMISSION SUBSTATION : CAMALANIUGAN
 NO. OF CIRCUITS : 1 LENGTH (KM) : 75.6 K V : 2300
 ACCESS ROAD LENGTH (KM) : 3.6 FROM NEAREST NATIONAL ROAD
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 4400.0
 POWER
 INSTALLED CAPACITY (MW) : 299.6
 ANNUAL TOTAL ENERGY (GWH) : 972.1
 MAX. DISCHARGE (M3/S) : 234.4
 MAX. STATIC HEAD (M) : 186.0
 MIN. GUARANT (MW) : 190.3 FIRM POWER (MW) : 100.6
 FIRM ENERGY (GWH) : 874.7 SECOND. ENERGY (GWH) : 97.3
 FIRM DISC. (M3/S) : 78.1
 AVE. NET HEAD (M) : 155.9 TAILWATER LEVEL (M) : 155.0
 CONSTRUCTION COST (MIL USD)
 TOTAL COST : 563.70
 TOTAL COST/KW (USD/KW) : 1881.51
 TOTAL COST/KWH(USD/KWH) : 0.60
 ECONOMIC PARAMETER
 POWER DEVELOP. : 539.74
 ACCESS ROAD : 0.98
 TRANSMISSION : 22.76
 LAND/RESETTLEMENT : 0.22
 KWH COST (USD/KWH) : 0.107

SCHEME : AGBULU
 RIVER SYSTEM : ABULOG
 STREAM : APAYAO
 WATER RESOURCES REGION : II
 PROVINCE : KALINGA APAYAO
 COORDINATES : N18-08-20 E121-05-00
 CATCHMENT AREA (KM2) : 706.0
 STUDY LEVEL : UNSCALED
 (PRE F/S.RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.33
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.75
 RESERVOIR LEVELS (EL.M) : FSL : 346.0 MOL : 278.1 AVE. OPERATING LEVEL : 323.4
 STORAGE (MIL M3) : GROSS : 2370.0 ACTIVE : 1780.3 DEAD : 589.3 SEDIMENT : 49.5
 MAIN DAM/WEIR TYPE : CONCRETE
 DAM HEIGHT (M) : 189.7
 CREST EL (M) : 349.7
 DAM VOL (1000M3) : 2833.1
 GEOLOGICAL CLASS : GOOD
 SPILLWAY TYPE : IN DAM.GATED
 CREST EL. (M) : -
 GATES (TON) : 472.8
 OVERFLOW WIDTH(M) : 60.0
 GATE DIMENSION(M) : 10.0 X 12.0 X 6
 WATERWAY HEADRACE TYPE : NON
 H/R SURGETANK TYPE : NON
 PENSTOCK TYPE : IN DAM
 NUMBER : -
 HEIGHT (M) : -
 LENGTH (M) : -
 DIA.(M) : -
 NUMBER : 2
 LENGTH (M) : 216.0
 DIA.(M) : 4.7
 STEEL LINER(TON) : 715.
 NUMBER : 1
 CONDUIT LENGTH(M) : 110.0
 WIDTH(M) : 47.9
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 30859.
 POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 2
 UNIT CAPACITY (MW) : 120.1
 TRANSMISSION SUBSTATION : CAMALANIUGAN
 NO. OF CIRCUITS : 1
 LENGTH (KM) : 78.5
 K V : 230D
 ACCESS ROAD LENGTH (KM) : 6.5
 FROM NEAREST NATIONAL ROAD
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 3480.0

POWER

INSTALLED CAPACITY (MW) : 216.2
 ANNUAL TOTAL ENERGY(GWH) : 712.2
 FIRM ENERGY(GWH) : 137.3
 MIN. GUARANT(MW) : 137.3
 MAX. DISCHARGE(M3/S) : 193.9
 FIRM DISC.(M3/S) : 64.6
 MAX. STATIC HEAD (M) : 161.0
 AVE. NET HEAD(M) : 136.2
 FIRM POWER (MW) : 72.1
 SECOND.ENERGY(GWH) : 80.9
 TAILWATER LEVEL(M) : 185.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 403.01
 POWER DEVELOP. : 388.53
 TOTAL COST/KW (USD/KW) : 1864.08
 ACCESS ROAD : 1.78
 TRANSMISSION : 12.53
 LAND/RESETTLEMENT : 0.18
 TOTAL COST/KWH(USD/KWH) : 0.59

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.105

SCHEME : APAYAO WATER RESOURCES REGION : 11
 RIVER SYSTEM : ABULOG PROVINCE : KALINGA APAYAO COORDINATES : N18-19-18 E120-58-53
 STREAM : APAYAO CATCHMENT AREA (KM2) : 148.9 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50 DEVELOP.M'T RATIO : 0.68
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 455.1 MOL : 453.6 AVE. OPERATING LEVEL : 454.4
 STORAGE (MIL.M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.1 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED CREST EL.(M) : 460.1 CREST LENGTH (M) : 42.0
 DAM HEIGHT (M) : 8.1 DAM VOL (1000M3) : 5.0 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : NON CREST EL. (M) : - OVERFLOW WIDTH(M) : -
 DESIGN FLOOD (M3/S) : - GATES (TON) : - GATE DIMENSION(M) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 8610.0 DIA.(M) : 2.9
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 230.0 DIA.(M) : 1.7
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 230.0 DIA.(M) : 2.1
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 50.0 WIDTH(M) : 32.2
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 11099.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 3 UNIT CAPACITY (MW) : 5.9
 TRANSMISSION
 SUBSTATION : PIDDIG NO. OF CIRCUITS : 1 LENGTH (KM) : 39.4 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 32.4 FROM NEAREST NATIONAL ROAD
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 15.8 MIN. GUARANT(MW) : 1.2 FIRM POWER (MW) : 1.4
 ANNUAL TOTAL ENERGY(GWH) : 86.6 FIRM ENERGY(GWH) : 11.9 SECOND.ENERGY(GWH) : 74.7
 MAX. DISCHARGE (M3/S) : 14.0 FIRM DISC.(M3/S) : 1.2
 MAX. STATIC HEAD (M) : 150.1 AVE. NET HEAD(M) : 138.1 TAILWATER LEVEL(M) : 305.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 39.37 POWER DEVELOP. : 28.97 TRANSMISSION : 1.52
 TOTAL COST/KW (USD/KW) : 2485.17 ACCESS ROAD : 8.85 LAND/RESETTLEMENT : 0.02
 TOTAL COST/KWH(USD/KWH) : 0.61

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.102

SCHEME : BASAO (+SADANGA) WATER RESOURCES REGION : II
 RIVER SYSTEM : CAGAYAN PROVINCE : KALINGA-APAYAO
 STREAM : CHICO CATCHMENT AREA (KM2) : 897.0
 COORDINATES : N17-14-32 E121-07-30
 STUDY LEVEL : UNSCALED
 (PRE F/S, RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.33
 NO. OF SUB FACILITIES : SUSDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 666.0 MOL : 658.3 AVE. OPERATING LEVEL : 663.4
 STORAGE (MIL M3) : GROSS : 391.7 ACTIVE : 50.0 DEAD : 341.8 SEDIMENT : 12.0
 MAIN DAM/WEIR
 TYPE : ROCKFILL CREST EL (M) : 671.1 CREST LENGTH (M) : 856.0
 DAM HEIGHT (M) : 181.1 DAM VOL (MIL M3) : 26.9 GEOLOGICAL CLASS : GOOD
 SPILLWAY
 TYPE : ON ABUT., GATED CREST EL. (M) : 648.0 OVERFLOW WIDTH(M) : 33.9
 DESIGN FLOOD(M3/S) : 6831.0 GATES (TON) : 714.6 GATE DIMENSION(M) : 11.3 X 18.0 X 3

WATERWAY
 HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : OPEN-AIR
 NUMBER : 1 LENGTH (M) : 650.0 DIA.(M) : 6.7
 NUMBER : 1 HEIGHT (M) : 24.0 DIA.(M) : 26.8
 NUMBER : 1 LENGTH (M) : 378.0 DIA.(M) : 5.4
 TAILRACE TYPE : DAY/CHANNEL
 NUMBER : 1 CONDUIT LENGTH(M) : 35.0 WIDTH(M) : 29.4

POWERHOUSE
 TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 23551.
 POWER EQUIPMENT
 TYPE : FRANCIS
 NO. OF UNITS : 2 UNIT CAPACITY (MW) : 91.1
 TRANSMISSION
 SUBSTATION : BATONG BUHAY
 NO. OF CIRCUITS : 1 LENGTH (KM) : 15.6 K V : 2300
 ACCESS ROAD
 LENGTH (KM) : 2.5
 FROM LUPLUPA
 LAND/RESETTLEMENT
 LAND-SUBMERGED(HA) : 630.0

POWER

INSTALLED CAPACITY (MW) : 164.0 FIRM POWER (MW) : 54.3
 ANNUAL TOTAL ENERGY(GWH) : 562.3 FIRM ENERGY(GWH) : 478.8 SECOND ENERGY(GWH) : 83.5
 MAX. DISCHARGE(M3/S) : 133.7 FIRM DISC.(M3/S) : 44.5
 MAX. STATIC HEAD (M) : 156.0 AVE. NET HEAD(M) : 149.7 TAILWATER LEVEL(M) : 510.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 600.88 POWER DEVELOP. : 596.68 TRANSMISSION : 3.48
 TOTAL COST/KW (USD/KW) : 3659.90 ACCESS ROAD : 0.68 LAND/RESETTLEMENT : 0.03
 TOTAL COST/KWH(USD/KWH) : 1.12

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.200

SCHEME : CHICO-1R WATER RESOURCES REGION : II
 RIVER SYSTEM : CAGAYAN PROVINCE : MOUNTAIN PROVINC COORDINATES : N17-11-10 E121-03-53
 STREAM : CHICO CATCHMENT AREA (KM2) : 806.8 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.65
 RESERVOIR LEVELS (EL,M) : FSL : 624.2 MOL : 623.0 AVE. OPERATING LEVEL : 623.6
 STORAGE (MIL M3) : GROSS : 0.5 ACTIVE : 0.2 DEAD : 0.3 SEDIMENT : -
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 10.2
 CREST EL (M) : 629.2 CREST LENGTH (M) : 104.0
 DAM VOL (1000M3) : 10.0 GEOLOGICAL CLASS : GOOD
 SPILLWAY TYPE : NON
 CREST EL (M) : - OVERFLOW WIDTH(M) : -
 GATES (TON) : - GATE DIMENSION(M) : -
 WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 2300.0 DIA.(M) : 4.8
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 100.0 DIA.(M) : 3.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 90.0 DIA.(M) : 4.0
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 22.4
 POWERHOUSE TYPE : OPEN AIR SPACIAL VOL.(M3) : 13073.
 POWER EQUIPMENT TYPE : FRANCIS NO. OF UNITS : 3 UNIT CAPACITY (MW) : 10.1
 TRANSMISSION SUBSTATION : BATONG BUHAY NO. OF CIRCUITS : 1 LENGTH (KM) : 20.5 K V : 69S
 ACCESS ROAD LENGTH (KM) : 0.
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 0.
 FROM NATIONAL ROAD IS LOCATED BESIDE THE SITE

POWER

INSTALLED CAPACITY (MW) : 27.3 MIN. GUARANT (MW) : 2.9 FIRM POWER (MW) : 3.2
 ANNUAL TOTAL ENERGY (GWH) : 144.9 FIRM ENERGY (GWH) : 29.3 SECOND. ENERGY (GWH) : 115.6
 MAX. DISCHARGE (M3/S) : 50.9 FIRM DISC. (M3/S) : 6.2
 MAX. STATIC HEAD (M) : 69.2 AVE. NET HEAD (M) : 65.6 TAILWATER LEVEL (M) : 555.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 40.73 POWER DEVELOP. : 39.77 TRANSMISSION : 0.96
 TOTAL COST/KW (USD/KW) : 1490.34 ACCESS ROAD : 0. LAND/RESETTLEMENT : 0.
 TOTAL COST/KWH(USD/KWH) : 0.37

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.062

SCHEME : CHICO 1R (+ SADANGA) WATER RESOURCES REGION : 11
 RIVER SYSTEM : CAGAYAN PROVINCE : MT. PROVINCE COORDINATES : N17-11-10 E121-03-53
 STREAM : CHICO CATCHMENT AREA (KM2) : 606.6 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LARPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50 DEVELOPMENT RATIO : 0.86
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 RESERVOIR
 LEVELS (EL.M) : FSL : 623.0 MOL : 623.0 AVE. OPERATING LEVEL : 623.0
 STORAGE (MIL M3) : GROSS : 0.3 ACTIVE : 0.3 DEAD : 0.3 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED CREST EL (M) : 628.0 CREST LENGTH (M) : 104.0
 DAM HEIGHT (M) : 9.0 DAM VOL (1000M3) : 8.8 GEOLOGICAL CLASS : GOOD
 SPILLWAY
 TYPE : NON : CREST EL. (M) : - OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : GATES (TON) : - GATE DIMENSION(M) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 2300.0 DIA.(M) : 4.0
 H/R SURGETANK TYPE: HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 100.0 DIA.(M) : 3.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 90.0 DIA.(M) : 4.0
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 57. CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 22.4
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 13073.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 2 UNIT CAPACITY (MW) : 15.1
 TRANSMISSION
 SUBSTATION : BATONG BUHAY NO. OF CIRCUITS : 1 LENGTH (KM) : 20.5 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 0. FROM NATIONAL ROAD LOCATED BESIDE DAMSITE
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 27.2 MIN. GUARANT (MW) : 18.6 FIRM POWER (MW) : 20.7
 ANNUAL TOTAL ENERGY(GWH) : 187.0 FIRM ENERGY(GWH) : 187.0 SECOND ENERGY(GWH) : 0.
 MAX. DISCHARGE(M3/S) : 51.0 FIRM DISC.(M3/S) : 40.0
 MAX. STATIC HEAD (M) : 68.0 AVE. NET HEAD(M) : 64.8 TAILWATER LEVEL(M) : 555.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 38.84 POWER DEVELOP. : 37.88 TRANSMISSION : 0.96
 TOTAL COST/KW (USD/KW) : 1428.05 ACCESS ROAD : 0. LAND/RESETTLEMENT : 0.
 TOTAL COST/KWH(USD/KWH) : 0.21

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.035

HYDROPOWER PROJECT CATALOGUE

SCHEME ID NO. 2-008-03-05-0-1

SCHEME : SADANGA
 RIVER SYSTEM : CAGAYAN
 STREAM : CHICO
 WATER RESOURCES REGION : II
 PROVINCE : MOUNTAIN PROVINC COORDINATES : N17-08-53 E121-03-08
 CATCHMENT AREA (KM2) : 725.0
 STUDY LEVEL : UNSCALED
 (PRE F/S, RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPMT RATIO : 0.65

RESERVOIR
 LEVELS (EL.M) : FSL : 890.0 MOL : 820.2 AVE. OPERATING LEVEL : 866.7
 STORAGE (MIL M3) : GROSS : 1471.7 ACTIVE : 959.3 DEAD : 512.4 SEDIMENT : 50.3
 MAIN DAM/WEIR
 TYPE : ROCKFILL
 DAM HEIGHT (M) : 233.8
 CREST EL (M) : 893.8
 DAM VOL (MIL M3) : 26.0
 CREST LENGTH (M) : 614.0
 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : ON ABUT., GATED
 DESIGN FLOOD (M3/S) : 5492.0
 CREST EL. (M) : 872.0
 GATES (TON) : 632.4
 OVERFLOW WIDTH (M) : 30.0
 GATE DIMENSION (M) : 10.0 X 18.0 X 3

WATERWAY
 HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : INCLINED
 NUMBER : 1
 LENGTH (M) : 1120.0
 DIA. (M) : 7.1
 NUMBER : 1
 HEIGHT (M) : 90.7
 DIA. (M) : 28.4
 NUMBER : 1
 LENGTH (M) : 281.0
 DIA. (M) : 5.5
 STEEL LINER(TON) : 810.
 NUMBER : 1
 CONDUIT LENGTH (M) : 50.0
 WIDTH (M) : 45.9

POWERHOUSE
 TYPE : OPEN AIR
 SPACIAL VOL. (M3) : 30574.
 POWER EQUIPMENT
 TYPE : FRANCIS
 NO. OF UNITS : 3
 UNIT CAPACITY (MW) : 87.3
 TRANSMISSION
 SUBSTATION : BATONG BUHAY
 NO. OF CIRCUITS : 1
 LENGTH (KM) : 28.1
 K V : 2300
 ACCESS ROAD
 LENGTH (KM) : 0.
 FROM NATIONAL ROAD BESIDE DAMSITE
 LAND/RESETTLEMENT
 LAND SUBMERGED (HA) : 1400.0

POWER
 INSTALLED CAPACITY (MW) : 237.0
 ANNUAL TOTAL ENERGY (GWH) : 608.5
 MAX. DISCHARGE (M3/S) : 155.5
 MAX. STATIC HEAD (M) : 214.0
 MIN. GUARANT (MW) : 170.2
 FIRM ENERGY (GWH) : 519.0
 FIRM DISC. (M3/S) : 38.9
 AVE. NET HEAD (M) : 186.1
 FIRM POWER (MW) : 59.6
 SECOND. ENERGY (GWH) : 80.5
 TAILWATER LEVEL (M) : 676.0

CONSTRUCTION COST (MIL USD)
 TOTAL COST : 579.72
 TOTAL COST/KW (USD/KW) : 2446.09
 TOTAL COST/KWH (USD/KWH) : 1.00
 POWER DEVELOP. : 570.41
 ACCESS ROAD : 0.
 TRANSMISSION : 9.24
 LAND/RESETTLEMENT : 0.07

ECONOMIC PARAMETER
 KWH COST (USD/KWH) : 0.178

SCHEME : SADANGA (ALTERNATIVE) WATER RESOURCES REGION : II
 RIVER SYSTEM : CAGAYAN PROVINCE : MT. PROVINCE
 STREAM : CRICO CATCHMENT AREA (KM2) : 725.0 COORDINATES : N17-08-53 E121-03-08
 STUDY LEVEL : UNSCALED (PRE F/S-RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25 DEVELOPM'T RATIO : 0.70
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR LEVELS (EL.M) : FSL : 890.0 MOL : 811.5 AVE. OPERATING LEVEL : 863.9
 STORAGE (MIL M3) : GROSS : 1471.7 ACTIVE : 1032.4 DEAD : 439.3 SEDIMENT : 50.8

MAIN DAM/WEIR TYPE : ROCKFILL CREST EL (M) : 893.8 CREST LENGTH (M) : 614.0
 DAM HEIGHT (M) : 233.8 DAM VOL (MIL M3) : 26.0 GEOLOGICAL CLASS : VERY GOOD

SPILLWAY TYPE : ON ABUT..GATED CREST EL. (M) : 872.0 OVERFLOW WIDTH(M) : 30.0
 DESIGN FLOOD(M3/S) : 5492.0 GATES (TON) : 632.4 GATE DIMENSION(M) : 10.0 X 18.0 X 3

WATERWAY HEADRACE TYPE : PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 1640.0 DIA.(M) : 7.1
 H/R SURGETANK TYPE: SURGE TANK NUMBER : 1 HEIGHT (M) : 102.6 DIA.(M) : 28.6
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 570.0 DIA.(M) : 5.4

TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 40.0 WIDTH(M) : 62.5

POWERHOUSE TYPE : OPEN AIR SPACIAL VOL.(M3) : 36576.

POWER EQUIPMENT TYPE : FRANCIS NO. OF UNITS : 3 UNIT CAPACITY (MW) : 110.9

TRANSMISSION SUBSTATION : BATONG BUHAY NO. OF CIRCUITS : 1 LENGTH (KM) : 28.1 K V : 2300

ACCESS ROAD LENGTH (KM) : 0. FROM NATIONAL ROAD IS LOCATED BESIDE DAMSITE

LAND/RESETTLEMENT LAND SUBMERGED(HA) : 1390.0

POWER

INSTALLED CAPACITY (MW) : 299.4 MIN. GUARANT (MW) : 222.3 FIRM POWER (MW) : 75.3
 ANNUAL TOTAL ENERGY(GWH) : 757.4 FIRM ENERGY(GWH) : 655.7 SECOND ENERGY(GWH) : 101.7
 MAX. DISCHARGE(M3/S) : 157.8 FIRM DISC.(M3/S) : 39.5
 MAX. STATIC HEAD (M) : 265.0 AVE. NET HEAD(M) : 231.5 TAILWATER LEVEL(M) : 625.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 600.09 POWER DEVELOP. : 590.78 TRANSMISSION : 9.24
 TOTAL COST/KW (USD/KW) : 2094.31 ACCESS ROAD : 0. LAND/RESETTLEMENT : 0.07
 TOTAL COST/KWH(USD/KWH) : 0.83

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.148

SCHEME : CHICO-2R WATER RESOURCES REGION : II
 RIVER SYSTEM : CAGAYAN PROVINCE : MOUNTAIN PROVINC COORDINATES : N17-06-56 E121-01-30
 STREAM : CHICO CATCHMENT AREA (KM2) : 592.0 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LRPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.65
 RESERVOIR
 LEVELS (EL.M) : FSL : 780.4 MOL : 778.9 AVE. OPERATING LEVEL : 779.6
 STORAGE (MIL M3) : GROSS : 0.3 ACTIVE : 0.1 DEAD : 0.2 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED
 DAM HEIGHT (M) : 7.4
 CREST EL (M) : 785.4 CREST LENGTH (M) : 72.0
 DAM VOL (1000M3) : 6.0 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : NON
 DESIGN FLOOD(M3/S) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 GATE DIMENSION(M) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 5220.0 DIA.(M) : 4.2
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 110.0 DIA.(M) : 2.7
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 150.0 DIA.(M) : 3.2
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 22.1
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 13179.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 3 UNIT CAPACITY (MW) : 12.8
 TRANSMISSION
 SUBSTATION : BONTOC NO. OF CIRCUITS : 2 LENGTH (KM) : 12.6 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 0. FROM NATIONAL ROAD IS LOCATED BESIDE THE SITE
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 34.5 MIN. GUARANT(MW) : 3.6 FIRM POWER (MW) : 4.1
 ANNUAL TOTAL ENERGY(GWH) : 181.7 FIRM ENERGY(GWH) : 36.6 SECOND ENERGY(GWH) : 145.1
 MAX. DISCHARGE(M3/S) : 37.2 FIRM DISC.(M3/S) : 4.5
 MAX. STATIC HEAD (M) : 120.4 AVE. NET HEAD(M) : 112.9 TAILWATER LEVEL(M) : 660.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 43.34
 TOTAL COST/KW (USD/KW) : 1256.35
 TOTAL COST/KWH(USD/KWH) : 0.31
 POWER DEVELOP. : 41.90
 ACCESS ROAD : 0.
 TRANSMISSION : 1.45
 LAND/RESETTLEMENT : 0.

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.052

H Y D R O P O W E R P R O J E C T C A T A L O G U E

SCHEME ID NO. 2-008-03-07-0-2

SCHEME : CHICO-3R
 RIVER SYSTEM : CAGAYAN
 STREAM : CHICO

WATER RESOURCES REGION : 11
 PROVINCE : MOUNTAIN PROVINC
 CATCHMENT AREA (KM2) : 449.7
 COORDINATES : N17-06-01 E120-59-27
 STUDY LEVEL : NEWLY IDENTIFIED
 THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER

PLANT FACTOR ASSUMED : 0.50

DEVELOPMENT RATIO : 0.65

NO. OF SUB FACILITIES : 0

INTAKE : 0

SADDLE DAM : 0

AVE. OPERATING LEVEL : 868.4
 DEAD : 0.9
 SEDIMENT : -

RESERVOIR LEVELS (EL.M) : FSL : 868.6 MOL : 868.1
 STORAGE (MIL M3) : GROSS : 1.0 ACTIVE : 0.1
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 6.6
 CREST EL (M) : 873.6
 DAM VOL (1000M3) : 7.0
 CREST LENGTH (M) : 108.0
 GEOLOGICAL CLASS : GOOD

SPILLWAY TYPE : NON
 CREST EL. (M) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 GATE DIMENSION(M) : -

WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL
 H/R SURGETANK TYPE : HEAD TANK
 PENSTOCK TYPE : OPEN-AIR
 NUMBER : 1
 LENGTH (M) : 3770.0
 DIA.(M) : 3.7

TAILRACE TYPE : BAY/CHANNEL
 NUMBER : 1
 LENGTH (M) : 190.0
 DIA.(M) : 2.3
 CONDUIT LENGTH(M) : 160.0
 DIA.(M) : 2.9

POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL.(M3) : 10864.
 CONDUIT LENGTH(M) : 40.0
 WIDTH(M) : 21.0

POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 3
 UNIT CAPACITY (MW) : 6.7

TRANSMISSION SUBSTATION : BONTOC
 NO. OF CIRCUITS : 1
 LENGTH (KM) : 6.6
 KV : 69S

ACCESS ROAD LENGTH (KM) : 0.
 FROM NATIONAL ROAD IS LOCATED BESIDE THE SITE

LAND/RESETTLEMENT LAND SUBMERGED(CHA) : 0.

POWER

INSTALLED CAPACITY (MW) : 18.1
 FIRM POWER (MW) : 2.2
 ANNUAL TOTAL ENERGY(GWH) : 95.2
 SECOND ENERGY(GWH) : 76.0
 MAX. DISCHARGE(M3/S) : 26.5
 FIRM DISC.(M3/S) : 3.2
 MAX. STATIC HEAD (M) : 88.6
 AVE. NET HEAD(M) : 83.2
 TAILWATER LEVEL(M) : 780.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 29.95
 POWER DEVELOP. : 29.41
 ACCESS ROAD : 0.
 TRANSMISSION : 0.55
 LAND/RESETTLEMENT : 0.

TOTAL COST/KW (USD/KW) : 1658.41
 TOTAL COST/KWH(USD/KWH) : 0.41

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.069

SCHEME : CHICO-4R WATER RESOURCES REGION : 11
 RIVER SYSTEM : CAGAYAN PROVINCE : MOUNTAIN PROVINC COORDINATES : N17-01-46 E120-56-23
 STREAM : CHICO CAUGHTMENT AREA (KM2) : 193.2 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50 DEVELOPM'T RATIO : 0.65
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 994.4 MOL : 993.5 AVE. OPERATING LEVEL : 993.9
 STORAGE (MIL M3) : GROSS : 0.2 ACTIVE : 0.0 DEAD : 0.2 SEDIMENT : -

MAIN DAM/WEIR
 TYPE : INTAKE GATED
 DAM HEIGHT (M) : 7.4 CREST EL (M) : 999.4 CREST LENGTH (M) : 180.0
 DAM VOL (1000M3) : 10.5 GEOLOGICAL CLASS : VERY GOOD

SPILLWAY
 TYPE : NON
 DESIGN FLOOD(M3/S) : - CREST EL. (M) : - OVERFLOW WIDTH(M) : -
 WATERWAY : GATES (TON) : - GATE DIMENSION(M) : -

HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 7180.0 DIA.(M) : 2.8
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 180.0 DIA.(M) : 1.6
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 150.0 DIA.(M) : 2.0
 STEEL LINER(TON) : 38.
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 40.0 WIDTH(M) : 19.3

POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 8810.
 POWER EQUIPMENT
 TYPE : FRANCIS NO. OF UNITS : 2 UNIT CAPACITY (MW) : 6.6
 TRANSMISSION
 SUBSTATION : BONTOC NO. OF CIRCUITS : 1 LENGTH (KM) : 1.2 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 0. FROM NATIONAL ROAD IS LOCATED BESIDE THE SITE
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 11.9 MIN. GUARANT (MW) : 1.3 FIRM POWER (MW) : 1.4
 ANNUAL TOTAL ENERGY (GWH) : 63.2 FIRM ENERGY (GWH) : 13.2 SECOND.ENERGY (GWH) : 50.0
 MAX. DISCHARGE (M3/S) : 12.7 FIRM DISC.(M3/S) : 1.6
 MAX. STATIC HEAD (M) : 124.4 AVE. NET HEAD(M) : 114.8 TAILWATER LEVEL(M) : 870.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 30.69 POWER DEVELOP. : 30.31 TRANSMISSION : 0.39
 TOTAL COST/KW (USD/KW) : 2570.37 ACCESS ROAD : 0. LAND/RESETTLEMENT : 0.
 TOTAL COST/KWH(USD/KWH) : 0.64

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.106

SCHEME : SALTAN WATER RESOURCES REGION : II
 RIVER SYSTEM : CAGAYAN PROVINCE : MOUNTAIN PROVINC COORDINATES : N17-30-14 E121-07-50
 STREAM : SALTAN CATCHMENT AREA (KM2) : 205.8 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50 DEVELOPM'T RATIO : 0.65
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 1 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 679.6 MOL : 677.9 AVE. OPERATING LEVEL : 678.8
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.0 SEDIMENT : -
 MAIN DAM/WEIR
 TYPE : INTAKE GATED CREST EL (M) : 684.8 CREST LENGTH (M) : 72.0
 DAM HEIGHT (M) : 6.6 DAM VOL (1000M3) : 5.4 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY
 TYPE : NON : - OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : - GATE DIMENSION(M) : -
 WATERWAY
 HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 7230.0 DIA.(M) : 2.3
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 340.0 DIA.(M) : 1.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 450.0 DIA.(M) : 1.5
 TAILRACE TYPE : BAY/CHANNEL : 1 CONDUIT LENGTH(M) : 30.0 WIDTH(M) : 18.5

POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL. (M3) : 8113.
 POWER EQUIPMENT
 TYPE : PELTON NO. OF UNITS : 2 UNIT CAPACITY (MW) : 7.0
 TRANSMISSION
 SUBSTATION : BATONG BUHAY NO. OF CIRCUITS : 1 LENGTH (KM) : 51.6 K V : 69S
 ACCESS ROAD
 LENGTH (KM) : 2.0 FROM NEAREST PROVINCIAL ROAD
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 12.6 MIN. GUARANT (MW) : 1.3 FIRM POWER (MW) : 1.5
 ANNUAL TOTAL ENERGY (GWH) : 66.4 FIRM ENERGY (GWH) : 13.7 SECOND. ENERGY (GWH) : 52.8
 MAX. DISCHARGE (M3/S) : 7.3 FIRM DISC. (M3/S) : 0.9
 MAX. STATIC HEAD (M) : 225.2 AVE. NET HEAD (M) : 210.6 TAILWATER LEVEL (M) : 454.4

CONSTRUCTION COST (MIL USD)

TOTAL COST : 25.19 POWER DEVELOP. : 22.75 TRANSMISSION : 1.88
 TOTAL COST/KW (USD/KW) : 1998.91 ACCESS ROAD : 0.55 LAND/RESETTLEMENT : 0.00
 TOTAL COST/KWH(USD/KWH) : 0.50

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.083

HYDROPOWER PROJECT CATALOGUE

SCHEME ID NO. 2-008-06-22-0-2

SCHEME : PASIL
 RIVER SYSTEM : CAGAYAN
 STREAM : PASIL
 WATER RESOURCES REGION : 11
 PROVINCE : MOUNTAIN PROVINCE
 COORDINATES : N17-20-28 E121-03-25
 CATCHMENT AREA (KM2) : 208.1
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPTS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 4 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.65
 RESERVOIR LEVELS (EL.M) : FSL : 849.6 MOL : 847.9 AVE. OPERATING LEVEL : 848.3
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.0 SEDIMENT : -
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 7.6
 CREST EL (M) : 854.6 CREST LENGTH (M) : 54.0
 DAM VOL (1000M3) : 5.3 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY TYPE : NON
 CREST EL. (M) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 DESIGN FLOOD(M3/S) : -
 GATE DIMENSION(M) : -
 WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 9800.0 DIA. (M) : 2.3
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 400.0 DIA. (M) : 1.2
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 510.0 DIA. (M) : 1.4
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 60.0 WIDTH(M) : 19.0
 POWERHOUSE TYPE : OPEN AIR SPACIAL VOL.(M3) : 9055.
 POWER EQUIPMENT TYPE : PELTON NO. OF UNITS : 2 UNIT CAPACITY (MW) : 11.2
 TRANSMISSION SUBSTATION : BATONG BURAY NO. OF CIRCUITS : 1 LENGTH (KM) : 9.6 K V : 69S
 ACCESS ROAD LENGTH (KM) : 2.0 FROM NEAREST PROVINCIAL ROAD
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 20.2
 ANNUAL TOTAL ENERGY(GWH) : 106.0
 MAX. DISCHARGE(M3/S) : 7.4
 MAX. STATIC HEAD (M) : 354.6
 MIN. GUARANT(MW) : 2.2
 FIRM ENERGY(GWH) : 21.6
 FIRM DISC.(M3/S) : 0.9
 AVE. NET HEAD(M) : 332.1
 FIRM POWER (MW) : 2.4
 SECOND.ENERGY(GWH) : 84.5
 TAILWATER LEVEL(M) : 495.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 29.95
 TOTAL COST/KW (USD/KW) : 1482.84
 TOTAL COST/KWH(USD/KWH) : 0.37
 POWER DEVELOP. : 28.77
 ACCESS ROAD : 0.55
 TRANSMISSION : 0.63
 LAND/RESETTLEMENT : 0.00

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.062

SCHEME : TANUDAN
 RIVER SYSTEM : CAGAYAN
 STREAM : TANUDAN
 WATER RESOURCES REGION : 11
 PROVINCE : MOUNTAIN PROVINC
 COORDINATES : N17-10-15 E121-12-38
 CATCHMENT AREA (KM2) : 175.6
 STUDY LEVEL : NEWLY IDENTIFIED
 THROUGH LHPPS

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER
 PLANT FACTOR ASSUMED : 0.50
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.65
 RESERVOIR LEVELS (EL.M) : FSL : 790.2 MOL : 787.4 AVE. OPERATING LEVEL : 788.8
 STORAGE (MIL M3) : GROSS : 0.1 ACTIVE : 0.0 DEAD : 0.1 SEDIMENT : -
 MAIN DAM/WEIR TYPE : INTAKE GATED
 DAM HEIGHT (M) : 9.2
 DAM VOL (1000M3) : 5.9 CREST LENGTH (M) : 42.0
 GEOLOGICAL CLASS : GOOD
 SPILLWAY TYPE : NON
 DESIGN FLOOD(M3/S) : -
 GATES (TON) : -
 OVERFLOW WIDTH(M) : -
 GATE DIMENSION(M) : -
 WATERWAY HEADRACE TYPE : NON-PRESSURE TUNNEL NUMBER : 1 LENGTH (M) : 8080.0 DIA.(M) : 2.8
 H/R SURGETANK TYPE : HEAD TANK NUMBER : 1 CONDUIT LENGTH(M) : 270.0 DIA.(M) : 1.5
 PENSTOCK TYPE : OPEN-AIR NUMBER : 1 LENGTH (M) : 530.0 DIA.(M) : 1.8
 TAILRACE TYPE : BAY/CHANNEL NUMBER : 1 CONDUIT LENGTH(M) : 60.0 WIDTH(M) : 19.9
 POWERHOUSE TYPE : OPEN AIR SPACIAL VOL.(M3) : 10234.
 POWER EQUIPMENT TYPE : FRANCIS NO. OF UNITS : 2 UNIT CAPACITY (MW) : 13.8
 TRANSMISSION SUBSTATION : BATONG BUHAY NO. OF CIRCUITS : 1 LENGTH (KM) : 25.8 K V : 69S
 ACCESS ROAD LENGTH (KM) : 13.0 FROM NEAREST NATIONAL ROAD
 LAND/RESETTLEMENT LAND SUBMERGED(HA) : 0.

POWER

INSTALLED CAPACITY (MW) : 24.8 FIRM POWER (MW) : 3.0
 ANNUAL TOTAL ENERGY(GWH) : 130.4 FIRM ENERGY(GWH) : 27.4 SECOND.ENERGY(GWH) : 103.0
 MAX. DISCHARGE(M3/S) : 11.9 FIRM DISC.(M3/S) : 1.5
 MAX. STATIC HEAD (M) : 270.2 AVE. NET HEAD(M) : 253.2 TAILWATER LEVEL(M) : 520.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 33.96 POWER DEVELOP. : 29.28 TRANSMISSION : 1.12
 TOTAL COST/KW (USD/KW) : 1369.46 ACCESS ROAD : 3.55 LAND/RESETTLEMENT : 0.01
 TOTAL COST/KWH(USD/KWH) : 0.34

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.057

SCHEME : BANTAY WATER RESOURCES REGION : 11
 RIVER SYSTEM : CAGAYAN PROVINCE : CAGAYAN COORDINATES : N17-54-52 E121-49-39
 STREAM : PARET CATCHMENT AREA (KM2) : 742.0 STUDY LEVEL : UNSCALED
 (PRE F/S RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25 DEVELOPM'T RATIO : 0.80
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0

RESERVOIR
 LEVELS (EL.M) : FSL : 62.0 MOL : 44.5 AVE. OPERATING LEVEL : 56.2
 STORAGE (MIL M3) : GROSS : 1646.2 ACTIVE : 1278.4 DEAD : 367.8 SEDIMENT : 52.4
 MAIN DAM/WEIR
 TYPE : EARTH/FILL CREST EL (M) : 68.4 CREST LENGTH (M) : 320.0
 DAM HEIGHT (M) : 63.4 DAM VOL (MIL M3) : 2.6 GEOLOGICAL CLASS : ACCEPTABLE
 SPILLWAY
 TYPE : ON ABUT..GATED CREST EL. (M) : 53.0 OVERFLOW WIDTH(M) : 20.1
 DESIGN FLOOD(M3/S) : 2081.0 GATES (TON) : 90.9 GATE DIMENSION(M) : 6.7 X 9.0 X 3
 WATERWAY
 HEADRACE TYPE : NON LENGTH (M) : - DIA.(M) : -
 H/R SURGETANK TYPE : NON NUMBER : - HEIGHT (M) : - DIA.(M) : -
 PENSTOCK TYPE : INCLINED NUMBER : 2 LENGTH (M) : 385.0 DIA.(M) : 4.9
 TAILRACE TYPE : BAY/CHANNEL STEEL LINER(TON) : 862. CONDUIT LENGTH(M) : 165.0 WIDTH(M) : 28.3
 POWERHOUSE
 TYPE : OPEN AIR SPACIAL VOL.(M3) : 16910.
 POWER EQUIPMENT
 TYPE : KAPLAN NO. OF UNITS : 2 UNIT CAPACITY (MW) : 22.3
 TRANSMISSION
 SUBSTATION : CAMALANIUGAN NO. OF CIRCUITS : 2 LENGTH (KM) : 50.4 K V : 115S
 ACCESS ROAD
 LENGTH (KM) : 0. FROM NATIONAL ROAD BESIDE DAMSITE
 LAND/RESETTLEMENT
 LAND SUBMERGED(HA) : 11960.0

POWER

INSTALLED CAPACITY (MW) : 40.2 MIN. GUARANT (MW) : 25.3 FIRM POWER (MW) : 10.0
 ANNUAL TOTAL ENERGY (GWH) : 123.8 FIRM ENERGY (GWH) : 88.0 SECOND. ENERGY (GWH) : 35.8
 MAX. DISCHARGE (M3/S) : 138.5 FIRM DISC. (M3/S) : 34.6 TAILWATER LEVEL (M) : 20.0
 MAX. STATIC HEAD (M) : 42.0 AVE. NET HEAD (M) : 35.2

CONSTRUCTION COST (MIL USD)

TOTAL COST : 133.35 POWER DEVELOP. : 119.74 TRANSMISSION : 5.24
 TOTAL COST/KW (USD/KW) : 3317.16 ACCESS ROAD : 0. LAND/RESETTLEMENT : 8.37
 TOTAL COST/KWH (USD/KWH) : 1.18

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.211

SCHEME : MALIANO
 RIVER SYSTEM : CAGAYAN
 STREAM : PIN. DE ILAGAN
 WATER RESOURCES REGION : 11
 PROVINCE : ISABELA
 CATCHMENT AREA (KM2) : 880.2
 COORDINATES : N16-44-36 E122-04-00
 STUDY LEVEL : UNSCALED
 (PRE F/S, RECONNAISSANCE)

DEVELOPMENT PLAN

TYPE OF DEVELOPMENT : RESERVOIR
 PLANT FACTOR ASSUMED : 0.25
 NO. OF SUB FACILITIES : SUBDAM : 0 INTAKE : 0 SADDLE DAM : 0
 DEVELOPM'T RATIO : 0.70
 RESERVOIR LEVELS (EL.M) : FSL : 292.0 MOL : 292.7 AVE. OPERATING LEVEL : 272.2
 STORAGE (MIL M3) : GROSS : 2003.4 ACTIVE : 1392.7 DEAD : 610.7 SEDIMENT : 61.6
 MAIN DAM/WEIR TYPE : ROCKFILL
 DAM HEIGHT (M) : 149.3
 CREST EL (M) : 294.3 CREST LENGTH (M) : 670.0
 DAM VOL (MIL M3) : 18.8 GEOLOGICAL CLASS : VERY GOOD
 SPILLWAY TYPE : ON ABUT., GATED
 DESIGN FLOOD (M3/S) : 9055.0
 OVERFLOW WIDTH (M) : 55.0
 GATE DIMENSION (M) : 11.0 X 18.0 X 5
 WATERWAY HEADRACE TYPE : PRESSURE TUNNEL
 H/R SURGETANK TYPE : SURGE TANK
 PENSTOCK TYPE : INCLINED
 NUMBER : 1 LENGTH (M) : 650.0 DIA. (M) : 7.4
 NUMBER : 1 HEIGHT (M) : 75.8 DIA. (M) : 29.5
 STEEL LINER (TON) : 624.
 NUMBER : 1 CONDUIT LENGTH (M) : 130.0 WIDTH (M) : 31.2
 TAILRACE TYPE : BAY/CHANNEL
 POWERHOUSE TYPE : OPEN AIR
 SPACIAL VOL. (M3) : 24839.
 POWER EQUIPMENT TYPE : FRANCIS
 NO. OF UNITS : 2 UNIT CAPACITY (MW) : 97.3
 TRANSMISSION SUBSTATION : SANTIAGO
 NO. OF CIRCUITS : 1 LENGTH (KM) : 70.0 K V : 2300
 ACCESS ROAD LENGTH (KM) : 34.0
 FROM SAN MARIANO
 LAND/RESETTLEMENT LAND SUBMERGED (HA) : 29200.0

POWER

INSTALLED CAPACITY (MW) : 175.2 FIRM POWER (MW) : 43.8
 ANNUAL TOTAL ENERGY (GWH) : 540.4 SECOND. ENERGY (GWH) : 155.7
 MAX. DISCHARGE (M3/S) : 171.9 FIRM DISC. (M3/S) : 43.0
 MAX. STATIC HEAD (M) : 147.0 AVE. NET HEAD (M) : 124.4
 TAILWATER LEVEL (M) : 145.0

CONSTRUCTION COST (MIL USD)

TOTAL COST : 498.02
 TOTAL COST/KW (USD/KW) : 2842.50
 TOTAL COST/KWH (USD/KWH) : 1.01
 POWER DEVELOP. : 475.95
 ACCESS ROAD : 9.29
 TRANSMISSION : 11.29
 LAND/RESETTLEMENT : 1.48

ECONOMIC PARAMETER

KWH COST (USD/KWH) : 0.181