

Annex-III



भारत सरकार
Government of India

विद्युत मंत्रालय
Ministry of Power
केंद्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II

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Power System Planning & Appraisal Division-II

सेवा भवन, रा. कृ.पुरम, नयी दिल्ली -110066

Sewa Bhawan, R. K. Puram, New Delhi-110066



No. CEA/PS/PSPA-2/81/16/2017/215-218

Dated 15.03.2017

To

1. COO(CTU-Planning),
Power Grid Corporation of India Ltd.,
"Saudamini" Plot no-2, Sector-29,
Gurgoan- 122001, Haryana
Fax-11-265600039

2. Shri Bhupender Gupta, Addl. CEO,
REC Transmission Projects Company Limited,
12-21, Upper Ground Floor,
Antriksh Bhawan, 22 KG Marg,
New Delhi-110001
Fax-11-24360644

Subject: Report on Site Visit to Gongri H. E. Project (2x72 = 144 MW) in Arunachal Pradesh being executed by M/s Dirang Energy Pvt. Ltd. (DEPL)

Sir,

Please find enclosed herewith the report on site visit to Gongri H. E. Project (2x72 = 144 MW) in Arunachal Pradesh being executed by M/s Dirang Energy Pvt. Ltd. (DEPL) by a team comprising of CEA, CTU, POWERGRID and RECPTCL on 1st & 2nd March, 2017.

Encl: As above

Yours faithfully,

Satyendra
15.03.17
(Satyendra Kr. Dotan)
Dy. Director (PSPA-2)

Copy to:

1. Chief Engineer (PSPA-I)
2. Chief Engineer (HPM)

Report on Site Visit to Gongri H. E. Project (2x72 = 144 MW) in Arunachal Pradesh being executed by M/s Dirang Energy Pvt. Ltd. (DEPL)

Based on the meeting dated 21.11.2016 in CEA, a team comprising of followings members visited the Gongri H.E. Project (2x72 = 144 MW), Arunachal Pradesh, being executed by M/s Dirang Energy Pvt Ltd, on 1st & 2nd March, 2017 to review the progress of works.

1. Shri Biman Bora, DGM, PGCIL
2. Shri Rajeev Varshney, Dy. Director (HPM Div.), CEA
3. Shri Satyendra Kr. Dotan, Dy. Director (PSPA-2 Div.), CEA
4. Shri Vivek Agarwal, Manager, RECPTCL
5. Shri Ajay Dahiya, Sr. Engineer, CTU

It is to mention that the project was also visited earlier on 13/01/2016 to review the progress of the work. The report in reference to visit on 13/01/2016 at Gongri H.E. Project is being enclosed as **Annexure**.

The present status of works being executed at Gongri H.E. Project is as given below:

1. Time schedule for commissioning of Units:

The project is in the initial stage of construction. As per concurrence letter, the completion of the project is envisaged in 45 months. Considering the current pace of works, it is expected that project may be completed in 3 ½ years after re-start of works subject to concerted efforts by the developer and subject to the following: -

- i) That there is no financial constraints, debt as well as equity;
- ii) That there is no major geological surprise like poor rock quality during tunneling, water ingress etc.

2. Current Status of Works:

Presently, all the works of project are stalled due to funds constraints with developer. There was no deployment of men and machinery at any project site. It was intimated by Liaison Officer that works are under stalled condition for the last five months. At barrage site cumulative excavation of 23,400 cum has been achieved against 20,200 cum achieved earlier (Total approximate quantity is 1.85 Lakh cum). Adit 1 has been excavated 103 m against 30 m excavated earlier (Total approximate length is 115m). At powerhouse, 68,500 cum excavation has been achieved against 50,000cum achieved earlier (Total approximate quantity is 3.40 Lakh cum). 2 nos. Bailey Bridges have been commissioned and 3rd Bailey Bridge is under construction. The works on rest of the project components is yet to start.

3. Based on the above status, Gongri H. E. Project (2x72 = 144 MW) is uncertain due to non-availability of fund.

4. **Power Evacuation:**

- 4.1 Power from Gongri HEP will be transmitted to Dinchang pooling station (Pooling Station to be implemented under TBCB) through a 220 kV D/C line (20 km approx.) to be constructed by M/s DEPL. Presently, levelling of proposed Switchyard area has been stopped due to fund constraint.
- 4.2 The off-take and transmission line route would be in steep hillslopes. Considering the topography and steep hills, difficulty of approach, etc. routing of all the lines to the common pooling station would be critical and therefore the approach corridors of all the connecting lines may be identified in advance by generator.
- 4.3 Further, the team also visited the Dinchang Substation site proposed by BPC and it was observed that the approach to proposed site is not feasible as one has to walk about 3 km from Bichum (nearest town upto which there is road connectivity) to reach the site. The road condition upto Bichum is also not good and needs renovation and strengthening of the en- route bridges.
- 4.4 In this condition, it seems very difficult to go ahead for following scope of works to be implemented through TBCB route under **"Transmission System for Phase- I generation projects in Arunachal Pradesh"** -
- (i) Dinchang- Rangia/ Rowta Pooling Point 400 kV D/C (Quad).
 - (ii) LILO of both ckts of Balipara- Bongaigaon 400 kV D/C (Twin Moose) line at Rangia/ Rowta (2x D/C)
 - (iii) Establishment of 7x166 MVA 400/166 MVA 400/220 kV Pooling station (GIS) at Dinchang
 - (iv) Establishment of 2x500 MVA 400/220 kV Pooling station at Rangia/ Rowta in Upper Assam

5. **Recommendations :**

In view of above, it is understood that presently construction work has been started only in one project i.e. Gongri H. E. Project and no development has been observed on rest of other three projects i.e. Sew Nafra Power Corporation Ltd. (120 MW), Adishankar Khuitam Power Pvt. Ltd. (66 MW) and KSK Dibbin Hydro Power Pvt. Ltd. (120 MW). The commissioning of Gongri HEP is also uncertain as explained above.

Therefore, it is recommended that scope and implementation of above scheme under **"Transmission System for Phase- I generation projects in Arunachal Pradesh"** may be reviewed.

Satyendra
14/03/17
Satyendra Kr. Dotan
Dy. Director (PSPA-II)

Director (PSPA-II)

Chief Engineer (PSPA-II)

[Signature]
14/03/2017

[Signature]
14/03/2017

Site Visit to Gongri H. E. Project (2x72 = 144 MW) in Arunachal Pradesh being executed by M/s Dirang Energy Pvt. Ltd. (DEPL)

Shri P. S. Stafford, AGM PGCIL, Shri Vivek Agarwal, Manager REC Transmission Projects Company Ltd and undersigned visited Gongri H.E. Project (2x72 = 144 MW) in Arunachal Pradesh being executed by M/s Dirang Energy Pvt Ltd. on 13.01.2016 to review the progress of works. The status of the project, critical areas / issues and commissioning schedule is as under

1.0 Introduction:-

Gongri H.E. Project is located on Gongri (Gang River) in west Kameng Distt of Arunachal Pradesh. The concurrence of the project was issued by CEA on 04.02.2013 at an estimated completed cost of Rs.1436.27 crores.

The Project is presently being executed by M/s Dirang Energy pvt. Ltd. in private sector. The project comprise of 29m high Barrage; 2 nos. Power Intake partly circular and partly Horse shoe(4.5m dia for circular & 4.4 m dia for Horse shoe portion) ; 2 nos. Desilting chambers; 1 no, HRT of 5.8m dia & 7137 m long; Surge shaft of 13 m dia, 92m high; Pressure shaft 647.26 m long, 4.40 m dia and after bifurcation 3.10m dia, 28.51m & 34.50m long; Surface power house consisting of 2 nos. vertical axis Francis Turbine to generate 623.19 MU at net head of 184.41 m ; Tail Race channel 136.62m long & 23m wide.

The EPC contract for civil & HM works was awarded to M/s Patel Engg. Ltd on 22.12.2011 and E&M works to M/s Andritz hydro Pvt. Ltd on 13.12.2013. The Layout plan and Salient features of the Project are enclosed at **Annex-I & Annex-II** respectively.

2.0 Commissioning Programme:

The Project was originally programmed to be completed within 45 months from January, 2013, i.e. by September, 2016. But project works could not be started as per schedule due to non availability of State Pollution Central board clearance which was obtained in May, 2014. The Commencement of main works stated in September, 2015 and project is now scheduled to be completed by September, 2018.

3.0 Present Status of Works :

The Present status of works is as under:-

3.1 Infrastructure works

All the project components are on the left side of the river and highway is on the right side of the river. To approach the left side, 3 nos. bailey bridges are proposed on the river; one each at Barrage complex, HRT complex and Power house complex. Construction of these bridges are in progress.

3.2 Barrage Area:

Approximately 20,200 cum excavation in barrage area out of estimated 1,18,500 cum completed. Developer has envisaged the construction of barrage by two stage diversion of the river. 1st stage river diversion from left side is scheduled to be completed by October, 2016 and 2nd stage river diversion from right side is scheduled to be completed by October, 2017. Excavation of barrage is scheduled to be completed by November, 2017. Concreting is scheduled to be completed by May, 2018. Thereafter installation of Gates in barrage and intake are scheduled to be completed by August, 2018.

HRT :

3.3 30m excavation of Adit 1 to HRT out of 300 m is completed. There are total 5 adits proposed for complete tunneling works including surge shaft and pressure shaft. Presently, open excavation & slope protection works by shotcrete are in progress at Adit-3 and open excavation is in progress at Adit - 4. Development of portal & adit boring at HRT is scheduled to be completed by May, 2016. Excavation & lining of HRT are scheduled to be completed by May, 2017 and Feb, 2018 respectively and installation of adit gates are scheduled to be completed by May, 2018.

3.4 Power House Works :

50,000 Cum excavation in Power House pit out of estimated 2,15,637 Cum completed. Excavation in Power House pit is scheduled to be completed by May, 2016 and concreting by Feb, 2018.

3.5 Other works :

The works on Surge shaft and Pressure shaft are yet to start.

4.0 Power Evacuation:

Power from Gongri HEP will be transmitted to the PGCIL's pooling station at Dinchang through a 220 KV D/C line (20 km approx.) to be constructed by M/s DEPL. Presently, levelling of proposed SY area is under progress and it is observed that it involves considerable quantum of cutting and filling which would necessitate proper consolidation.

The off-take and line route would be in steep hillslopes. The nature of soil (as observed from earth cutting in road side hill slope) appears to be non-cohesive and highly prone to slide. As such appropriate tower foundation designs are to be adopted to take care of these aspects and causing as little changes as possible to the existing topography.

Considering the topography and steep hills, difficulty of approach, etc. routing of all the lines to the common pooling station would be critical and therefore the

approach corridors of all the connecting lines may be identified in advance. There is adequate time for construction of the line considering that the project may come up in about 3 years or so.

5.0 **Critical Areas / Issues:**

Considering the geology of the region, completion of tunneling works may be the most critical activity. During the site visit committee also observed that rock quality at all the sites where excavation is going on is very poor and may hamper progress and result into larger gestation period than planned. Developer should take appropriate measures to overcome these hurdles.

6.0 **Changes in features from that concurred by CEA:**

Project developer has made certain changes in the component's parameters from those concurred by CEA viz., height of surge shaft reduced from 92m to 68m, dia of intake reduced from 4.5m to 4.0m, dia of HRT increased from 5.80m to 6.20m etc. Salient features of the project as being constructed now is enclosed at Annex-III. Developer is advised to get concurrence of the changes from the Authority as per para 4 (vi) of Office Memorandum dated 04.2.2013 conveying concurrence to the project

7.0 **Commissioning of Units:**

The project is in the initial stage of construction. As per concurrence letter, the completion of the project is envisaged in 45 months. Considering the mobilization at project site and current pace of works, it is expected that project may be completed in 3 ½ years subject to concerted efforts by the developer and subject to the following: -

1. There is no financial constraints, debt as well as equity;
2. There is no geological surprise like poor rock quality during tunneling, water ingress etc.
3. No local trouble;
4. No natural calamity like earth quack, heavy rain fall etc.;


(Rajeev Varshney)
Deputy Director
HPM Division (CEA)

Gongri H.E. Project (2x72 = 144 MW) - Arunachal Pradesh

Salient Features

1.	Location	
	State	: Arunachal Pradesh
	District	: West Kameng
	Type of project	: Run-of-River
2.	River	: Gongri (Gang River)
	Barrage Location	
	Barrage site (Latitude / Longitude)	: 27° 20' 22" N / 92° 19' 13" E
3.	Nearest Airport	: Guwahati - 410 km
	Hydrology	
4.	Catchment Area	: 1039 sq. km
	Barrage	
5.	Top of Barrage	: 1460 m
	Height	: 29 m
	Length	: 216.5 m
	FRL	: 1457.50 m
	MDDL	: 1447.00 m
	Gross Storage	: 0.74 MCM
	Live Storage	: 0.59 MCM
	Design Flood	: 4557 cumec (SFF)
	Submergence	: 3.64 Ha
	Number of Spill Bays	: 2
	Bay Width	: 10.50 m
	Type & Size of Gate	: 2 numbers Radial gates of size 10.50 m x 13 m
	Power Intake	
	Invert Level	: 1438 m
No. of Power (Feeder) Tunnel	: 2 Nos.	
Shape of Power (Feeder) Tunnel	: Partly Circular and partly Horse shoe	
Diameter of Feeder Tunnel	: 4.5 m for circular portion & 4.4 m for Horse shoe portion	
Length of Feeder Tunnel	: 380 m & 421.07 m	
Nof. of service gate & Size	: 2 Nos., 4 m x 4 m	
6.	De-silting Chamber	
	No. of Desilting chambers	: 2 Nos.
	Size	: 260.0 m (L) x 13.0 m (W) x 16.0 m (H)
	Particle size to be removed	: < 0.20 mm
	No. of Gates & Size	: 2 Nos., 3.50 m (W) x 4.00 m (H)
7.	Head Race Tunnel	

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	Shape & Size	: Modified Horse Shoe, 5.80 m diameter,
	Length	: 7137 m
	Design discharge	: 85.14 cumecs
8.	Surge Shaft	
	Number and size	: One, 13 m Dia and 92 m height
9.	Pressure Shaft	
	Type	: Steel lined, Circular
	Diameter	: 4.40 m and length 647.26 m
	Diameter after bifurcation	: 3.10 m
	Length after bifurcation	: 28.51 m & 34.50 m
10.	Power House	
	Type	: Surface
	Size of machine hall cavern	: 63.4 m (L) x 20.50 m (W) x 47.20 m (H)
	MTV	: 2 Nos. Butterfly Valve of 2.30 m dia.
	Rated Head	: 190.47 m
	Net head	: 184.41 m
	Type of turbine	: Francis Turbine (vertical axis)
	Speed of turbine	: 353.33 rpm
	Installed capacity	: 144 MW (2x72 MW)
	Design Energy	: 623.19 CWh
	Annual load factor	: 50.63 %
	Peaking hours during lean period	: 2.76 hours in two blocks
11.	Tail Race Channel	
	Length and width	: 136.62 m, 23 m
	TWL	: 1258 m
12.	Switch Yard	
	Type	: Outdoor
	Dimension	: 180 m (L) x 75 m (W)
13.	Land Requirement	
	Total land	: 48.82 Ha
	Diversion of Forest Land	: 39.26 Ha
14.	Affected Villages/ Families	
	No. of villages affected	: 4
	No. of Families affected	: 16 (All Schedule Tribe)
	No. of Persons affected	: 83 (All Schedule Tribe)
15.	Construction Period	: 45 months from zero date

Note: Transmission Line: Double circuit 220 kV line. Power from the upcoming projects namely Sakang Rong HEP (45 MW), Meyong HEP (38 MW) and Diggin HEP (46 MW) will be pooled at Gongri 132 kV switchyard and stepped upto 220 kV. Power pooled at Gongri would be further evacuated to pooling station in West Kameng District near Dinchang over 220 kV DC line, which is about 30 km from project. The cost of the Transmission Line has been vetted as Rs.44.81 crores however, the same is not included the project cost since it would be recoverable as wheeling charge.



GONGRI H. E. PROJECT (144 MW)

SALIENT FEATURES

Sl. No.	Description	Details			
		Barrage Complex	Power House		
1	Geographical co-ordinates				
	Latitude	92° 04' 10" N	92° 08' 36" N		
	Longitude	27° 20' 24" E	27° 19' 08" E		
	Elevation	EL 1457.50 m	EL 1257.00 m		
	Map references	Survey of India topo-sheets- 83 A/2, 83 A/3, 83 A/6, 83 A/7			
2	Hydrology:	Catchment Area	1039 km ²		
		Design Flood	4557.00 m ³ /s (SPF)		
		Design Discharge	84.33 m ³ /s		
3	Reservoir:	Full Reservoir Level	EL 1457.50 m		
		Maximum water level	EL 1458.50 m		
		Minimum Draw down level	EL 1447.00 m		
		Gross storage at FRL	0.74 Mm ³		
		Live storage	0.59 Mm ³		
		Length of the submergence	1200 m		
		Submergence Area	8.34 Ha		
4	Barrage Spillway:	Under Sluice Bay	Spillway Bay		
		Top of the barrage	EL 1460.00 m	EL 1460.00 m	
		Crest Level	EL 1434.50 m	EL 1436.00 m	
		No. of bays	2 Nos.	2 Nos.	
		Bay width	9.50 m	9.50 m	
		Type of Gate	Radial gate	Radial gate	
		Size of gate	9.5 m x 14.00 m	9.5 m x 14.00 m	
		Max. Barrage	Height 29.00 m		
		Barrage Length	160.00 m		
		Stop-log type	Vertical Lift Wheel Type		
		Size	9.50 m (W) x 14.50 m (H)		
		5	Power Intake:	Invert level	EL 1438.00 m
				Design Discharge	101.20 m ³ /s (84.33 m ³ /s for power generation + 16.87 m ³ /s for silt flushing)
No. of trash rack bays and size	4 Nos. & 3.50 m width				
Sill level of the trash rack	EL 1438.00 m				
Service gate Type	Vertical Lift, Fixed Wheel Type				
No. of Service Gate & size	2 No's, 4.00m (W) x 3.50 m (H)				
Stop-log type	Vertical Lift, Fixed Wheel Type				
No. of emergency Gate & size	1 No, 4.00m (W) x 3.50 m (H)				
No.'s & size of feeder tunnel	2 No.'s, 4.0m Ø shaped				
Length Feeder Tunnel-1	239.23 m				
Feeder Tunnel 2	279.74 m				
Velocity	3.54 m/s				
6	De-silting Chamber:			De-silting Chamber no. & size	2 No.'s, 140.0 m (L) x 12.0 m (W) x 18.5 m (H)
		Size of the particle size to be removed	> 0.20 mm		
		Design discharge for each chamber	46.38 m ³ /s		
		No. of Gates & size	2 No.'s 3.50 m (W) x 4.00 m (H)		
		Gate Type	Vertical Lift, Fixed Wheel Type		

	No. of Flushing Tunnel Gate & Size	2 No.'s, 2.00 m (W) x 2.00 m (H)
	Flushing Tunnel Gate type	Radial Gate
	No. of emergency gate & size	2 No.'s, 2.00 m (W) x 2.00 m (H)
	Type of emergency gate	Bonnet Gate
7	Head Race Tunnel:	
	Size & Shape	6.20 m, Modified Horse Shoe
	Length & Slope	7347 m & 1 in 274.00
	Design discharge	84.33 m ³ /s
	Velocity	2.70 m/s
	Lining Type	Concrete
	Lining thickness	300 mm
	No. of Adits	4 Nos.
8	Surge Shaft:	
	Type	Underground, Dome shaped, Restricted Orifice, Vertical Shaft
	Diameter	13.00 m
	Upsurge level	EL 1484.00 m
	Down surge level	EL 1420.00 m
	Height	68.00 m
9	Pressure Shaft:	
	Diameter	4.40 m
	Length	573.39 m
	Thickness	14-22 mm
	Type	SAILMA 550 HI
	Design Discharge	84.33 m ³ /s
	Diameter after bifurcation	3.10 m
	Length	47.50 m & 41.50 m
10	Power House:	
	Type	Surface
	Dimensions	64.00 m (L) x 20.50 m (B) x 47.20 m (H)
	Turbine Type	Vertical Francis
	No. of units	2 Nos.
	Center Line	EL 1250.70 m
	Service Bay	EL 1268.50 m
	Installed capacity	2 x 72 MW
	Maximum Gross Head	200.50 m
	Minimum Gross Head	189.00 m
	Head Loss	11.00 m
	Rated head	191.00 m
	EOT Crane Capacity	1 No., Double Girders, 200/30/10T
	No. of Draft tube gate & size	2 No's, 7.50 m (W) x 3.5 m (H)
	Draft tube gate type	Fixed wheel type
11	Tail Race Channel:	
	Length	152.62 m
	Width	23.00 m
	Minimum TWL	EL 1257.00 m
	Normal TWL	EL 1258.00 m
	Maximum TWL	EL 1268.00 m
12	Switch yard:	
	Type	Outdoor
	Dimension	180.00 m (L) x 75.00 m (W)

13	Electro Mechanical:	
	MIV:	
	Type	Butterfly Valve
	Number	2 Nos.
	Diameter	2.30 m
	Center Line	EL 1250.70 m
	Turbine:	
	No. & Turbine Type	2 No's, Vertical Francis
	Rated Speed	333.33 rpm
	Rated Head	191.00 m
	Generator:	
	Type	Sallent Pole, Vertical Shaft
	Output	72 MW rated output plus 10 % continuous overload
	Power Factor	0.9
	Speed	333.33 rpm
	Voltage/ Frequency	11 kV/ 50 Hz
	Excitation	Digital Static
	Power:	
	Annual generation	630.05 MU for 90% Dependable year at 95% plant availability
	Cost:	
	Hard Cost (PL June 2011)	Rs. 1112.6 Cr
	Total Capitalized Cost	Rs. 1430.8 Cr
	Cost Per MW	Rs. 9.93 Cr/MW
	Financial Aspects:	
	Levellised Tariff	Rs. 4.86 Per Unit (with design energy) Rs. 4.57 per Unit (with overloading energy)

