Clarifications No. 01 Dated 07.02.2020 to Bid Queries

NIB No. 347 Dated 27.01.2020.

Name of work: **Limited Tender for undertaking "Industrial All Risk (IAR) Insurance Policy for the Assets of Ranganadi Hydro Electric Plant (405 MW), Yazali, Arunachal Pradesh for a period of 1(one) year w.e.f. 00:00:00 Hours of 26.02.2020".**

Sl. No.	Bidders Queries	NEEPCO's Response
1	Section V point no 3.1 (i) sl. no 11, you have mentioned that additional insurance cover for Inland transit of Equipment is required and S.I. is 15 Crs. (Single Carrying Limit). Kindly let us know that whether 15 Crs. is the total sum insured or only Single Carrying Limit.	The Sub-limit for Inland Transit of Equipment indicated at Sl. No. 11 under Clause 3.1(i), Section-IV, Scope of Insurance Coverage has been modified through corrigendum (Ref.: Corrigendum No. 1 Dtd. 07/02/2020).
2	Past Claim details for last three years.	Clause 23, Section-III, Instruction to Bidders of the Bid document may be referred.
3	Refer Point 3.1, Pg 19, based on the same the following changes needs to be incorporated a. All add-ons sublimit to be cited as INR 5 Crs. Any add-on above that will be having premium loading to the full sub-limit. b. Escalation – 5% of SI. Stock SI (if it is there) needs to be excluded in this cover. c. Prevention of access – Actuals. This should be as per treaty limits i.e. maximum limit of 30 days (over & above the policy time excess) and with maximum radius of 5 kilometers from insured premises & only inland. This needs to be incorporated. d. Denial of access: Kindly exclude this since the same is an exclusion in the treaty.	a) The Sub-limit for Inland Transit of Equipment indicated at Sl. No. 11 under Clause 3.1(i), Section-IV, Scope of Insurance Coverage has been modified to Rs. 5 Crore through corrigendum (Ref.: Corrigendum No. 1 Dtd. 07/02/2020). Bid stipulation shall prevail for the remaining Sub-limits. b) No Raw material is included in the Asset list under Section-VI of Bid document. However, equipment and plant items are maintained as spares for immediate replacement to minimize restoration time, in case of machinery breakdown. c) The Sub-limit for Prevention of Access indicated at Sl. No. 20 under Clause 3.1(i), Section-IV, Scope of Insurance Coverage has been modified through corrigendum (Ref.: Corrigendum No. 1 Dtd. 07/02/2020). d) The additional clause on "*Denial of Access due to any reason including the orders of civil, public and local authority*" indicated at Clause 3.1(ii)(g), Section-IV, Scope of Insurance Coverage has been deleted through corrigendum (Ref.: Corrigendum No. 1 Dtd. 07/02/2020).
4	Claim details: Given for last 3yrs in the tender. Kindly confirm the claim details reported and/or paid in last 5 yrs along with cause of loss, claim amount, post loss	Claim History for the last 5 years is Nil.

<table>
<tr><th>Sl. No.</th><th>Bidders Queries</th><th>NEEPCO's Response</th></tr>
<tr><td></td><td>measures undertaken, and root cause for such loss (if any).</td><td></td></tr>
<tr><td>5</td><td>Risk inspection (done within last 3 years) report of the plant.</td><td>Risk Report is attached at Annexure-I.</td></tr>
<tr><td>6</td><td>Construction features of the plant.</td><td>Salient features of the plant is attached at Annexure-II. May also refer to NEEPCO website at www.neepco.co.in.</td></tr>
<tr><td>7</td><td>Critical Plant & Machinery details in the below format.
<table>
<tr><th>Sl No.</th><th>Make</th><th>Model</th><th>Year of Mfg</th><th>Capacity</th><th>Value in INR</th><th>Any AMC going on (if Yes, name of the vendor</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>Details of Critical Plant & Machinery is attached at Annexure-III.</td></tr>
<tr><td>8</td><td>Confirm the limit of indemnity for Terrorism cover if it is less than the given SI.</td><td>The Sum Insured for Terrorism Cover has been considered the sum of Property Damage & BI, which amounts to Rs. 3336,83,16,000.00.</td></tr>
<tr><td>9</td><td>Terrorism Policy draft wording (if available).</td><td>The Terrorism Policy wording shall be provided by the Insurer as per IRDAI.</td></tr>
<tr><td>10</td><td>Expiring policy (SFSP) copy for the same plant.</td><td>The IAR Policy intended for the Plant shall be provided by the Insurer covering the risks, perils & insurance clauses, as indicated in the bid document.</td></tr>
<tr><td>11</td><td>Refer Point 14.0, Pg 24 (Under Insurance).

Kindly clarify the clause for BI losses as it is kept open ended. Ideally it should be 15% in line with the material damage part.</td><td>Clause 14: Under Insurance Provision, Section-V of bid document has been modified through corrigendum (Ref.: Corrigendum No. 1 Dtd. 07/02/2020).</td></tr>
<tr><td>12</td><td>If there was/ were any repair works carried out to the structures like tunnels, penstock, dam etc. Detailed description, if any, may be clarified.</td><td>Periodic repair and maintenance works are taken up to maintain operating efficiency of the Plant. During the tariff period 2009-14 & 2014-19, the Normative Annual Plant Availability Factor (NAPAF) of Ranganadi H. E. Plant (RHEP) was fixed by CERC as 85%. The same has been revised as 88% for the period 2019-2024 considering consistent higher Annual Plant Availability Factor (APAF) achieved by the Plant during the last 2 tariff periods.</td></tr>
<tr><td>13</td><td>The annual and shutdown maintenance schedule details.</td><td>The tentative schedule for maintenance works of Dikrong Power House of the Plant is given as below:</td></tr>
</table>

Sl. No.	Bidders Queries	NEEPCO's Response
		(i) March 2020 – Annual Planned Maintenance (APM) works and Capital Maintenance works of Unit # 3 for a period of 25 Days. (ii) December 2020 to February 2021- APM works of Each Unit in a single month for 21 days.
14	If there are any losses since commissioning of the plant. Description may be obtained, if any.	There is no history of claim settlement since project commissioning.
15	Underinsurance shall be applicable to the BI portion.	Clause 14: Under Insurance Provision, Section-V of bid document has been modified through corrigendum (Ref.: Corrigendum No. 1).
16	Valuation of property may be carried out at the cost of NEEPCO.	Bid stipulation shall prevail.

07/02/2020 07/02/2020

Quarterly Status Report (QSR) on Risk Register of RHEP
Quarter ending December, 2019

Annex-I

Sl. No.	Risk Description	Risk Exposure	Mitigation Plan	Target Mitigation Date	Status of Mitigation Measures	Comments from CRO	Remarks from Site
1	2	3	4	5	6	7	8
1	Mal operation/ non operation of submersible pumps for drainage and dewatering from PH	Low	To ensure that pumps are operational.		It has already been conveyed that the pumps are run on manual mode. The reason for doing so is that pumps are run on alternate basis and also on the quantity of leakage water to be dispersed. Moreover, there are personnel deployed round the clock for operation of the pumps.	Auto mode is felt necessary for operation of pumps for drainage & dewatering of Power House.	Reason for manual operation already mentioned. Also the operators are present 24X7 for which chances of mal-operation is minimal. Further stand-by by pumps of the same capacity are present to address any exigencies of non-operation of pumps
2	Flooding of Power House	Low	Submersible pumps of required specification to be made available with arrangement for throw of the discharge beyond the power house building.		Pumps have been installed for dewatering the excess water to the tail pool.	Healthiness of the pumps to be ensured.	Complied
3	Fire in Transformer Yard	Medium	Fire fighting system in Transformer and switch yard should function in auto mode.	31st March, 2020	Proposal for automation of Fire Fighting system is being finalized through tender.		The Tender is under process.
4	Leakage through Radial gates of diversion dam	Medium	Periodical operation and seal check of all the hydro mechanical Gates to be done at least once in a year.		Periodical operation and seal check of all the hydro mechanical Gates is being done from concerned wing on an annual basis.	• Healthiness of hydraulic system/hoisting mechanism for operation & functionality of the all gates (Radial gates, Emergency and service gates at Intake, Surge shaft gate, Draft tube gates etc.) is to be ensured. • Proper record for operation & maintenance of the gates shall be maintained.	• The replacement of rubber seals is done periodically to address any problems of seal leakage. Also during the APM works the healthiness of the gates are checked by the concerned wing. • Maintenance records of activities carried out by the contractor engaged for the same are submitted periodically to the concerned wing for subsequent verification and record keeping.

Annex-I

5	Trash Rack blockage	High	1. Regular cleaning of Trash Rack to be done to maintain free passage of water through it. 2. TRCM to be installed.	Installation of TRCM is likely to be completed by March, 2020.	1. Regular cleaning of trash rack is being done to maintain free passage of water through it. 2. Installation of TRCM for cleaning of debris in Trash Rack is going on.	Record shall be maintained.	Manual Cleaning of the Trash Rack is being done periodically, records of which are maintained by the concerned wing, HSM
6	Failure of Dam	Low	The existing normal instrumentation is to be examined and is to be replaced / repaired wherever necessary and their integration with the new dam safety monitoring system will be explored.		New system for Dam Safety Monitoring has been installed and commissioned. The relevant data of Dam is now made available in the Control Room at RHEP wherein monitoring of the necessary parameters of Dam is being done.	Record shall be maintained	Information of the parameters/ data of Dam is being obtained in the Localised Control Room at Site. The records are being maintained in the server, which are retrieved as per requirement.
7	Siltation of reservoir	Medium	Periodic de-siltation by means of dredging, flushing out by opening of gates etc. To maintain the required live storage and also to enable to operate the reservoir at MDDL level during monsoon period.		De-siltation of the Reservoir was done through the natural flow of river being released through the Radial gates during the S/D period which caused the removal of silt from the Reservoir.	Reservoir survey may be carried out time to time to know the status of siltation. Accordingly, planning for desilting the reservoir may be made as per necessity in consultation with D&E Wing, Guwahati.	Reservoir survey is carried out on a yearly basis. The survey carried out after the Shutdown, where flushing out of silt was done naturally by the inflow of Ranga River, showed the increase in live storage capacity from 3.84 mcum (Nov 2017) to 4.43 mcum (April 2019) Also during monsoon period natural flushing of the silt is carried out through the Radial gates during spilling of water from Dam.

09/01/2020
Manager (Safety)
RHEP

9/1/2020
Dy. General Manager (E/M), C&P
RHEP

9/1/20
Head of Plant
RHEP

Annexure-II

Salient Features of Ranganadi Hydro Electric Plant

Turbine

Type	: Francis, Vertical Shaft
Output (MW) at Max Net Head	: 145.4
Output (MW) at Rated Net Head	: 138.5
Design Head (m)	: 304
Net max / min head (m)	: 322 / 290
Efficiency at full load	: 93.11 %
Make	: BHEL
Specific speed (rpm)	: 44.75
Rated speed (rpm)	: 300
Runway speed (rpm)	: 500

Direction of Rotation (From Generator section): Anti-clockwise Rated Discharge : 49.7 Cumec

Guide Apparatus

Centre Lines of Guide Vanes	: EL 241.15 m
PCD of Guide Vanes	: 4357 mm
Height of Guide Vanes	: 346.5 mm
No. of Guide Vanes	: 20
Max Guide Vane Opening	: 21 degrees
G.V. Opening (% of 21 deg)	
At 138.5MW & 304m Head	: 92.5%
At 145.4MW & 322m Head	: 87%
At 133.7MW & 290m Head	: 100%
G.V. Clearance	
Top & Bottom	: 0.2 – 0.35 mm
Bedding	: 0.0 – 0.1 mm

Runner

Exit Diameter : 2600 mm
No of Blades : 15
Max Width of Foreign Matter that can pass through blades : 90 mm

Spiral Casing and Stay Ring

Shape : Circular cross-section
Inlet Diameter : 2354 mm
Velocity at Inlet of Spiral Casing : 11.4 m/s

Guide Vanes and Servomotors

No of Servomotors	: 2
Diameter	: 550 mm
Full Stroke	: 255 + 1 mm

Shaft

Length (Flange to Flange)	: 3400 mm
External Diameter	: 840 mm
Internal Hole Diameter	: 150 mm
Elevation of Turbine-Generator Coupling	: EL 244.95 m

Shaft Seal

Sealing Diameter : 900 mm

Main Inlet Valve (MIV)

Type : Spherical

Spherical Valve

Diameter	: 2400 mm
Max Working (Design) Pressure	: 44 kg/cm2

Opening Time	: 90 sec (Range 60-120 sec)
Closing Time	: 90 sec (Range 60-120 sec)

Servomotor

No of Servomotor	: 2
Cylinder Diameter	: 700 mm
Piston Stroke	: 1414.2 +0.5 mm
Oil Operating Pressure	: 40 kg/cm2

Guide Bearing

No of Turbine Guide Bearings	: 8
Central Line of Guide Bearing	: EL 242.75 m
Bearing Clearance (Radial)	: 0.15 – 0.2 mm
Bearing Temperature	
Normal	: Less than 65OC
Max Permissible	: 70OC
Quantity of Turbine Oil	: 600 Litres (approx)
No of Oil coolers	: 10

Generator Specification

Type	: Semi Umbrella
Rated Output	: 135 MW
Rated Voltage	: 11KV
Rated Current	: 7800 A
Rated Power factor	: 0.9 lag
Efficiency at full load	: 98%
Rated speed	: 300rpm
Rated frequency	: 50Hz
No. Poles	: 20
Air gap at pole centre	: 22 mm
Stator resistance/ phase@75 OC	: 0.00124 Ω
Stator winding connection	: Star

Thrust Bearing

Type	: Spring mattress
No. of Pads	: 12
No. of Springs/Pad	: 46 (Total 552)
Max. Operating Temperature	: 70 OC

Guide Bearing

Type of bearing	: Segmental pad
Location of Bearing	:Upper, Lower
No. of pads	: 8, 24
Max. Operating Temperature	: 70 OC

Brake/Jack Unit

No. of units	: 8
Brake operating pressure	: 3 to 4 Kg/Cm2
Jacking oil pressure requires	: 100 Kg/Cm2

Slip ring

No. of Brushes per Ring	: 10 (Total 20)
Brush Size	: 25.4mm X 38.1mm
Brush Spring Load	: 1.8 Kgf

Anti - Condensation Heater

No. of Heaters	: 6
Total Heater Capacity	: 18KW
Voltage Supply	: 415VAC, 3 Phase, 50 Hz

Air Coolers

No. of Coolers	: 6

Heat Dissipation per Cooler : 294 KW
Quantity of Air Flow in each Cooler : 582.5 m3/min
Quantity of Circulating Water : 775 LPM

Plug-in Type Oil Coolers for Top Bearings

No. of Coolers : 2
Heat Dissipation per Cooler : 5 KW
Quantity of Circulating Water : 40 LPM

External Oil Coolers for Bottom Bracket

No. of Coolers : Main-2 + Standby-1
Heat Dissipation : 230 KW
Quantity of Circulating Water : 1545 LPM

Excitation System

Type : Static Excitation

Governor System

Type : G40F Electro Hydraulic Governor

Annexure - III

1. SEGREGATION OF THE MAIN PLANT & MACHINERY OF THE RANGANADI H.E. PLANT

A/C CODE	DESCRIPTION	GB:OPN BAL DEPR:OPN BAL	TOTAL ADD TOTAL ADD	TOTAL ADJUST TOTAL ADJUST	TOTAL TOTAL	NET BLOCK
511801	Reservoir & Dam	40459,99,525.19 21147,45,899.00	214,66,953.00 482,31,381.00	0.00 0.00	40674,66,478.19 21629,77,280.00	19044,89,198.19
511802	Tunnels	43570,54,320.71 22776,29,178.00	110,74,241.00 516,44,482.00	0.00 0.00	43681,28,561.71 23292,73,660.00	20388,54,901.71
511807	Steel-liner & Pensto ck	9486,29,196.00 5441,63,224.00	0.00 96,75,095.00	0.00 0.00	9486,29,196.00 5538,38,319.00	3947,90,877.00
512108	Control & Instrument ation Equipment.	52,510.00 5,496.00	0.00 1,305.00	0.00 0.00	52,510.00 6,801.00	45,709.00
512109	Service & General St ation Equipments.	34,726.00 4,663.00	0.00 831.00	0.00 0.00	34,726.00 5,494.00	29,232.00
512110	Electrical & Axullia ry equipment.	73,43,963.00 9,30,286.00	1,47,671.00 1,78,023.00	0.00 0.00	74,91,634.00 11,08,309.00	63,83,325.00
512113	Switchgear including cable connections.	7122,66,767.96 4166,69,770.58	0.00 70,11,573.00	0.00 0.00	7122,66,767.96 4236,81,343.58	2885,85,424.38
512119	Fire Fighting System .	7,59,871.00 69,384.00	0.00 23,284.00	0.00 0.00	7,59,871.00 92,668.00	6,67,203.00
512120	Workshop Equipments	25,60,701.23 11,98,013.93	91,010.00 37,141.00	0.00 0.00	26,51,711.23 12,35,154.93	14,16,556.30
512124	Fire-fighting Equipm ents.	28,13,398.00 4,80,024.00	21,19,447.00 1,31,078.00	-3,74,166.00 -3,36,749.40	45,58,679.00 2,74,352.60	42,84,326.40
512133	Diesel Generating St ation	209,77,543.51 188,79,789.51	15,00,000.00 0.00	-15,00,000.00 -13,50,000.00	209,77,543.51 175,29,789.51	34,47,754.00
512155	Sub-Station Equipmen ts	50,41,494.00 13,96,856.00	0.00 98,141.00	-2,91,742.00 -2,62,568.00	47,49,752.00 12,32,429.00	35,17,323.00

512156	Transformer Having R ating of 100 KVA & A	3561,44,978.00 2208,44,498.00	0.00 30,48,149.00	-23,83,542.00 -14,60,301.11	3537,61,436.00 2224,32,345.89	1313,29,090.11
512157	Ordinary Tools & Pla nts	45,94,751.56 11,94,533.00	0.00 1,34,914.00	0.00 0.00	45,94,751.56 13,29,447.00	32,65,304.56
512158	400/220/132 KV Switc h-yards at NEEPCO Si	987,33,451.00 45,47,179.00	14,36,532.00 26,90,145.00	0.00 0.00	1001,69,983.00 72,37,324.00	929,32,659.00
512166	Plant and mach. in G en.station(plant).	33749,87,838.69 17550,66,776.19	553,76,633.00 414,71,603.00	0.00 0.00	34303,64,471.69 17965,38,379.19	16338,26,092.50
512208	Special Tools & Plan ts	1275,38,402.08 940,15,067.14	26,00,514.00 8,23,268.00	0.00 0.00	1301,38,916.08 948,38,335.14	353,00,580.94
512309	Other Electrical Ins tallations	3,41,982.00 26,178.00	0.00 8,799.00	0.00 0.00	3,41,982.00 34,977.00	3,07,005.00
512310	Permanent Power Supp ly System	11,53,291.00 1,38,132.00	0.00 28,120.00	0.00 0.00	11,53,291.00 1,66,252.00	9,87,039.00

2. Details of the major AMC Contracts awarded from Ranganadi H.E. Plant.

Sl. No.	Description of Item	W.O. Reference	Value	Executed by	Remarks
1.	Day to Day maintenance & Annual Planned Maintenance of 3 x 135 MW Vertical Francis Turbine and Generator, Bus duct, Associated 132 KV & 400 KV Switchyard including Step-up Generator Transformers, 400 KV Auto Transformers, Reactors, Station Service Transformers and all other auxiliary equipments of Ranganadi Hydro Electric Plant.	NEEPCO/RHEP/HOP/ T – 44/2018-192549/ dtd 25.1.2019.	Rs 743.85 lacs @ Rs 27.55 lacs per month.	M/s PES ENGINEERS PVT., LTD., Hyderabad	Equipment details covered under the AMC is enclosed in Annexure - B
2.	Maintenance of Radial & Stop Log Gates, HRT Intake Gates, Gantry Crane installed in Ranganadi H.E. Plant.	NEEPCO/RHEP/HOP/ T – 35/2018-19/ 1135 dtd 21.9.2019	Rs 26,04,000.00 @ Rs 4,34,000.00 per month.	M/s SIGMA ENGINEERING PVT. LTD., Bhubaneswar	Equipment details covered under the AMC is enclosed in Annexure - B

Annex-III

Annexure – III

1. Details of the Equipments covered under the maintenance contract of Dikrong P.H.

Sl. No.	Description	Unit/No.	Make
i)	135 MW Francis type Hydraulic Turbine consisting mainly of but not limited to		
a)	Draft tube Liner, draft tube cone and pier nose etc.		
b)	Spiral Casing, stay ring, discharge ring, Pivot ring, pit-liner.		
c)	Runner, top cover, guide apparatus, turbine sealing valve for air inlet under the runner etc.		
d)	Guide bearing, turbine shaft etc.		
e)	Platform for runner inspection, drainage arrangement for spiral casing.		
f)	Selsyn water level transmitter etc	3(three) sets.	BHEL
f)	Central grease lubrication system complete with all accessories.		
g)	Turbine metering instruments Board complete with Marshalling Box.		
h)	Oil, air, water piping, cabling, hatch covers, chequered plates, railings etc.		
i)	Automatic control of turbine automation equipment etc.		
j)	Pipes and valves embedded or otherwise.		
k)	Air admission system.		
l)	Inter connection of O.P.U. pressures receiver & Servo meter of guide apparatus and Spherical Valve.		
m)	All other items that are not mentioned but are existing & required		
2.	Turbine Governing equipment consisting mainly of and not limited to :-		
a)	2 Nos. oil screw pumps with drive motors.		
b)	Pressure vessel for turbine & valve.		
c)	Sump tank.		
d)	Electro Hydraulic Governor with actuator.	3(three) sets.	BHEL.
e)	1 No. Electrical Cabinet of Governor.		
f)	1 No. Hydro Mechanical Cabinet.		
g)	Slide valves, oil leakage unit, Oil cooling Equipment, Automation and Protection Equipment etc.		
h)	Master controller, return motion gear, rope, pulley etc.		
i)	Magnetic pick-up.		
j)	Oil and water piping, valves, fittings, oil coolers etc.		
k)	2 Nos. servomotors of guide apparatus etc.		
l)	Control panel for motors etc.		
m)	All other items that are not mentioned but are existing and required.		
3.	Main inlet valve 2400 dia each consisting of but not limited to :-		
a)	2400 mm dia spherical valve with sealing arrangements. .		
b)	Inlet pipe.		
c)	Outlet pipe with compensator.		

d)	Reducer.		
e)	2 Nos. Swinging servomotors.		
f)	By-pass valves, Sealing valves, Air valve.		
g)	Control equipment for automatic Operation of spherical valve.		
h)	Oil & grease pipe lines for spherical valves.	3(three) sets.	BHEL
i)	Drain pipes etc.		
j)	All other items that are not mentioned but are existing and required.		
4.	135 MW Vertical Synchronous generator each consisting mainly of but not limited to :-		
a)	Main Machine with instrument and device installed in stator, Air circuit, Bearing, Bearing Oil, CO2 system etc. complete as installed.		
b)	Stator frame, core windings, anti condensation heaters, temperature detectors etc., Sole plate, holding down bolts.		
c)	Rotor-shaft and thrust block, spider, Rim, Poles, Damping windings field Winding, Collector and Brush gear etc.		
d)	Thrust Bearing, guide bearings, H.S. lubrication system		
g)	Top Bracket complete.		
h)	Air cooling equipment, ventilation etc. and Turbine pit air seal.	3(three) Sets.	BHEL
i)	Braking and jacking system.		
j)	Magnetic pick up and over speed Device & Brush gear assy.		
k)	Oil, air and water piping etc.		
l)	All other items that are not mentioned but are existing & required.		
l)	Generator External Lubrication system complete.		
m)	Hydrostatic lubrication system.		
n)	Brake dust collector system.		
5.	**UNIT AND AUXILIARY CONTROL PANEL:**		
	Unit Control & Relay Panels (One per m/c) consisting of:-		
i)	Unit controls & indication panel.		
ii)	Unit relay panel.	Complete	BHEL
iii)	Temperature gauge panel.		
iv)	Unit alarm annunciation panel.		
v)	Unit temperature measure & control.		
6.	**STATIC EXCITATION EQUIPMENT (DIGITAL):**		
	Comprising of:-		
a)	Regulation cubicle.		
b)	Thyristor cubicle.		
c)	Field flashing cubicle.	3 Sets.	BHEL
d)	Field breaker cubicle.		
e)	Excitation transformer cubicle.		

7.	**CONTROL & MONITORING SYSTEM CONSISTING OF :-**		
	a) Microprocessor based auto-sequence controller.		
	b) Fault finding & Data acquisition system.		
	c) Sequence of Event Recorder.		
	d) Electrical Transducer panel	3 Sets.	BHEL
8.	**HMC & EHGC (Governor) System**	3 Sets.	BHEL
9.	**HMI System**	3 Sets.	ABB
	a) ASE Panel	3 Sets	
	b) Relay Panel	3 Sets	
	c) Transducer Panel	3 Sets	
	d) SER Panel	3 Sets	
	e) DAS Panel	3 Sets	
10.	**COMPRESSED AIR SYSTEM** consisting of :		
	a) 2 Nos. Compressor with motor and control panel.	ELGI	
	b) 2 Nos. air receivers for above.		
11.	**COOLING WATER SYSTEM** consisting of		
	a) Equipments for generator and turbine cooling, including cooling for Generator Transformer,	KIRLOSKAR	
	b) Cooling water tapping from tailrace through 4 pump motor sets with pressure filter "Y" strainer along with complete pipings and valves etc. as per suppliers drawing as to complete the job.		
	c) Cooling water system for 400 KV Auto Transformers.		
12.	**GENERATOR FIRE PROTECTION EQUIPMENT** consisting of :-	TECHNO.	
	a) Main bank of CO2 cylinders.		
	b) Reserve Bank of CO2 cylinders.		
	c) Piping, detectors, relays, panels, etc.		
	d) Miscellaneous items so as to complete the job.		
13.	**BATTERY BANK SYSTEM** consisting of :-		
	a) 220 V DC / 24 V DC equipment	EXIDE.	
	b) 2 Nos. 220 Volt Battery Bank of storage cells of suitable capacity with stand / supporting insulators, inter-cell connectors etc.		
	c) 2 Nos. Factory assembled battery chargers.		
	d) 1 No. Factory wired DC distribution board.		
	e) 24 Volt Battery of storage cells of 2 Volt		

Annex-III

	of suitable capacity Ni-Cd type.		AMARA RAJA
f)	1 No. 24 V Factory wired battery charger alongwith DC distribution board.		CHABI ELECTRICALS.
g)	**DEWATERING AND DRAINAGE SYSTEM** consisting of :- 4 Nos. deep well vertical shaft water lubricated turbine pumps of suitable capacity complete with drive motor, discharged head, complete with		GARDEN REACH
a.	**STATION SUPPLY BOARD PANEL** consisting of:- 415 V AC equipment consisting of Factory wired main distribution LT Panel Auxiliary panels in auxiliary room, Control room and machine hall at all different floor of power station Installation of steel ladders, trench covers, hatch covers, etc Earth connections to various equipment / panels devices etc., risers and junction boxes etc		G.E. Power Controls.
b.	CONTROL & RELAY PANEL consisting of :- Control and protection equipment Complete control and relay panels for power House & Switchyard with control desk and all other local and remote panels Including maintenance of all static & electro-mechanical relay & testing etc.		Assam Electrical.
c.	2 (Two) Nos. electrically operated overhead crane each of 150/30 T capacity suitable to operate in tandem along with collector Assy., DSL Rail etc.	2(Two) Nos.	Alstom
d.	11 KV Isolated phase Bus-duct complete with LAVT & NGR cubicle.	3 (three) sets.	Mukand Ltd.
e.	415 V Bus-ducts connecting Station Service Transformers & L.T.A.C. Panel.	2(two) Sets.	Control & Switchgear Best & Crompton.
15.	**ILLUMINATION SYSTEM** of P.H. including maintenance of Dry type lighting transformers, Feeder panels, Light fittings, connections, etc.		
16.	**P.H. VENTILATION SYSTEM** comprising of 4(four) Nos. of blowers, blower motor, associated ducts, control panel etc.	1(one) No.	Flow Link.

Annex- III

17.	**P.H. AIR CONDITIONING SYSTEM** comprising of a) 8 Nos. 7.5 T ductable split Air Conditioner & 2 Nos. 8 T ductable split Air Conditioner covering P.H. Maintenance offices. (VRF Type) b) 7 Nos Windows Air conditioner installed at various place in Power House Complex.	10 (Ten) Nos.	SAMSUNG
18.	**FIRE PROTECTION SYSTEM** comprising of Power house, Switchyard & transformer yard fire detection & fire fighting equipments comprising of water & chemical type fire extinguishers including Mulsifire, hydrant system including 3 Nos. fire pumps, Air-compressor etc	1 (one) set.	Steelage Industries Ltd.
19.	**DRAFT TUBE GATES** comprising of 6 (Six) Nos. of Draft tube gates including motors, hoisting arrangement. and associated Control Panel etc.	1 (one) set.	
20.	**BACKUP POWER PLANT** comprising of Maintenance of 630 KVA D.G. Set (Kirloskar Cummins Make) including all panels.	2 (Two) Nos.	Kirloskar Cummins
21.	**OUTSIDE DRAINAGE AND DEWATERING SYSTEM** Maintenance of 6 Nos. Vertical turbine pump including all accessories, valves, panels etc. installed in Pump House located on both side of tail race for rain water drainage during high flood etc.	3 Nos. 3 Nos.	Mather & Platt. Jyoti Make
22.	**POWER HOUSE ELEVATOR SYSTEM**	1 (one) No.	
23.	**ONLINE FILTRATION SYSTEM** Consisting of 3(Three) Types of filter machine installed in the bearing Housing of all the units.		
24.	**EPABX & INTERCOM NETWORK** a) Intercom Exchange installed in Blower room. b) Intercom network maintained at Power House Complex and Hoz Colony	1 (one) set.	
25.	**GPS & Mobile Signal booster**		SANDS & Hadwise

Annex- III

EQUIPMENTS OF 132 KV AND 400 KV SWITCHYARD

A.	**132 KV SWITCHYARD:**		
1.	145 KV SF 6 type 3 AR1-EG Circuit Breaker with electro hydraulic operating mechanism, gang operated, complete with SF 6 gas & hydraulic oil pressure gauge monitor, control wiring etc.	10 Sets.	BHEL
3.	132 KV Double break, turn & twist type Isolator with Earth / without Earth switch including mechanism boxes, Control wiring, structures, support insulators etc. complete.	30 Sets.	Mullar & Co.
4.	132 KV Single phase, Current Transformer, Junction boxes, wiring etc. complete.	30 Nos.	Hivoltrans.
5.	132 KV EMVT, Junction boxes, wiring etc. complete.	06 Nos.	BHEL
6.	132 KV Capacitor Voltage Transformer, Junction boxes wiring etc. complete.	06 Nos.	W.S. Industries
7.	132 KV Lightning Arrestor, counter, wiring, Junction boxes etc. complete.	27 Nos.	--- do ---
B.	**400 KV SWITCHYARD ::**		
2.	400 KV SF 6 type 3 AT3 Circuit Breaker with electro hydraulic operating mechanism, complete with SF 6 gas & hydraulic oil pressure gauge monitor, control wiring etc.	05 Sets.	BHEL
3.	400 KV Horizontal Centre Break Isolator with Earth / without Earth switch including mechanism boxes, control wiring, structures, support insulators etc. complete.	08 Sets.	S&S Power Switchgear
4.	400 KV Pantograph Isolator with Earth / without Earth switch including mechanism boxes, control wiring, structures, support insulators etc. complete.	08 Sets.	Elpro International
5.	400 KV Single phase, Current Transformer, Junction boxes, wiring etc. complete.	21 Nos.	C.G.L.
6.	400 KV Capacitor Voltage Transformer, Junction boxes wiring etc. complete.	12 Nos.	BHEL
7.	400 KV Lightning Arrestor, including counter, wiring, Junction boxes etc.	18 Nos.	Elpro International
C.	**TRANSFORMER YARD**		
1.	53 MVA, single phase, 11/132 KV Generator Transformer Type of cooling – OFWF including marshalling kiosk, wiring, complete cooling system & mulcifier system	10 Nos.	C.G.L.

2.	120 MVA, single phase, 400/√3/132√3/33 KV Auto Transformer. Type of cooling – OFWF, including ON Load tap changer mechanism, OLTC panel, marshalling kiosk Common kiosk, complete cooling system etc.	07 Nos.	BHEL
3.	400 KV, 50 MVAR, Shunt Reactor & Neutral Grounding Reactor, Type of cooling – ONAN, including marshalling box, wiring, complete cooling system etc.	02 Nos.	BHEL
4.	7.5 MVA, 132 / 33 KV S/S transformer, type of cooling – ONAN / ONAF, marshalling kiosk, cooling fans, wiring, Cabling etc. complete.	02 Nos	AY & Co.
5.	2.5 MVA, 33 KV / 415 V S/S transformer, type of cooling – ONAN, marshalling kiosk, wiring, cabling etc. complete.	02 Nos.	Alfa.
D.	**33 KV INDOOR SWITCHGEAR, CONTROL & RELAY PANEL:**		
	Type of Circuit Breaker – SF 6, FP 72 D	09 Nos.	
	Nos. of incomer feeder panels	02 Nos.	
	Nos. of out going feeder for 2.5 MVA S/S transformer	02 Nos.	KEC.
	Nos. of out going feeder panels	04 Nos.	
	Bus Coupler panel	01 No.	
	Adapter Panel Including current transformer, potential transformers	01 No.	
	Protection scheme, relays, metering system, wiring etc. complete		

Annex-III

1. Details of the Equipments covered under the maintenance contract of Ranganadi Dam.

a) RADIAL CREST GATES WITH HYDRAULIC HOIST:

Type of Gate	:	Spillway Crest Radial Gate.
Size of Gate	:	10000mm X 12000mm.
No. of Gates	:	6-Nos.
Clear Opening	:	Width=10000mm, Height=12000mm.
Type of Hoist	:	Hydraulic Hoist – 6 Sets.
Hoist Capacity	:	225 MT (112.5Tone/Cylinder) with 9.7 M Stroke.

b) POWER PACKS:

Number	:	6 nos
Type	:	Hydraulically operated
Fluid Media	:	Mineral Oil: ISO VG-46 (Avalon 68 of TWL).

c) STOPLOG GATE:

No. of Opening	:	7-Nos.
No. of Stop Logs Required	:	1-Set.
Clear Width of Opening	:	10.00M
Height of each unit	:	20.20M
Design Head	:	23.532

d) DEWATERING PUMPS:

Make	:	a) Calama Dewatering (polder) submersible pump, Type – Q101 P/II – VP 10-45
	:	b) MBH make Dewatering submersible pump
	:	c) Flowmore make Dewatering submersible pump
No of Stages	:	Two stage
Rated discharge	:	50 LPS
Operating Head	:	33 Mtr.
Speed	:	2900 RPM
Motor H.P.	:	40 HP

e) GANTRY CRANE:

Type	:	GANTRY CRANE
Duty	:	CLASS-II, OUT DOOR GANTRY AS IS: 807 & IS: 3177.
Rated Capacity	:	40 TONNES.
Total Lift	:	31 METERS.

Note: Other equipment also include the Tunnel Intake Gate & Emergency Gate with drive motors for hoisting arrangement, E.M. brakes, etc.