

Rehabilitation of Penstock in Kameng HEP using combination of CFRP and GFRP	 	Annexure 1 of Corrigendum VIII Responses to Bidders Queries on Technical Matters NIB No. NEEPCO/PEN/IND/001 Date: 20/04/2019
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Annexure 1 of Corrigendum VIII

Responses to Bidder Queries on Technical Matters				
Sl. No.	Part Name	Clause No.	Queries	Responses
1	Part 5	Clause 1.1.1	Section 1.1.1 SOW: There are only details given for Penstock #2 in this RFP, however, Penstock #1 is referenced multiple times. Will any work be taking place in Penstock #1 and can the Owner provide details as to where these repairs are taking place so that all bidders can account for this in the price proposals?	Pre Bid Meeting queries No. 17 shall stand. The same is available in website of IndSTT
2	Part 5	Clause 1.2	Are areas of leakage known? Profuse leakage under high pressure could have affected concrete and surrounding soil/rock. This could affect thrust restraint. Are there any reports or drawings showing where leakage occurred? Has repair grouting been completed?	Repair grouting is in advanced stage of completion.
3			Section 1.2 Project Details: There are several items in this section mentioned which push the design more to a fully structural design in lieu of an internal pressure only design. Will a fully structural design be required or only a design for internal pressure?	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
4	Part 5	1.3	Section 1.3 Project Challenges: This section states 2 vertical shafts in Penstock #2 but the drawing on Page 9 shows 3 vertical shafts for Penstock #2. Should 2, 3 or 5 vertical shafts be anticipated if work may also take place in Penstock #2 and Penstock #1?	Two vertical shafts are included in the scope of work for P-II. Partial Repairing of one vertical shaft (Zone 8) in P-I may be required. This shall be considered as extra item and analysed and paid accordingly.
5	Part 5	Clause 2.4.1	As per discussions in technical meeting with 3rd party designer, we request detailed mapping report of cracks and defective welds with chainage locations for the full length of penstock to come out with the most effective and efficient design. Further also requested kindly share with us the common design inputs for recommending the strengthening scheme.	Summary of pre rectification UT included in Part 5 of Bid Document may be referred to "Additional Scope of Work" may be referred to for common design input.
6			Section 2.4.1 - General Description: There are several items in this section mentioned which push the design more to a fully structural design in lieu of an internal pressure only design. Will a fully structural design be required or only a design for internal pressure?	Summary of pre rectification UT included in Part 5 of Bid Document may be referred to "Additional Scope of Work" may be referred to for common design input.
7	Part 5	Clause 2.4.2.2	Delete ISO as a standard option. It is not recognized or used for CFRP design of pipe repairs.	ISO option shall be deleted

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8	Part 5	Clause 2.4.2.4	Section 2.4.2.4: There are several items in this section mentioned which push the design more to a fully structural design in lieu of an internal pressure only design. Will a fully structural design be required or only a design for internal pressure?	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
9	Part 5	Clause 2.4.2.5	Revise "thickness" to state "number of layers".	Agreed.
10	Part 5	Clause 2.4.2.7	Is this along the entire circumference? Have you considered removal of existing lining? Any bond strength criteria?	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
11	Part 5	Clause 2.5.3	V-Wrap heavy CFRP fabric is 38oz, and it has been utilized on hundreds of pipe projects. Other manufacturers vary as well - please revise specification as it is restrictive.	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
12	Part 5	Clause 2.5.4	Carbon fibers shall be supplied in rolls no less than 50 cm (~19.7 in.) width.	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
13	Part 5	Clause 2.5.6	These Specs of Carbon Laminate tensile properties (Table 4) should allow for a +/- 6% variation of tensile strength and tensile modulus properties as the final design will eventually adjust the final design thickness due to the tensile property variation. By having the properties fixed as such it seems that the Table 4 has been written with one manufacturer's carbon fabric in mind.	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
14	Part 5	Clause 2.6.1	Glass fabric shall be unidirectional or biaxial, white in color in the unidirectional direction, and impregnated using a two-component high strength epoxy resin	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
15	Part 5	Clause 2.6.2	Glass fabric shall be supplied in rolls with a minimum width of 50 cm (19.7 in.).	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
16	Part 5	Clause 2.7.1	Mechanical saturation should be made a requirement on this project.	Mechanical saturation shall be a requirement for this project
17	Part 5	Clause 2.7.4	"fumed silica" to put in place of "silica fume"	Agreed.

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18	Part 5	Clause 2.7.5	Flexural Properties of the epoxy system for saturation has no bearing in the design of FRP System and as such need not be an unnecessary requirement in Table 6. Pigmentation of saturating resins should not be a requirement as pure 100% solids epoxy resin Part-A is usually clear to pale clear yellow. Inclusion of these items in Table 6 seem to point to only one specific system.	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
19	Part 5	Clause 3.1	Mechanical saturation should be made a requirement on this project.	Mechanical saturation shall be a requirement for this project
20	Part 5	Clause 3.3.1	"fumed silica" to put in place of "silica fume"	Agreed.
21	Part 5	Clause 3.3.2.1	Note that proper design may include one debonded areas at moving or cracked joint locations.	Please refer to the "Additional Scope of Work". Finer management of stress and strain with the given broader design parameter as per specification is within the scope of the designer
22	Part 5	Clause 3.3.2.3	All kinds of injections, groutings, leakages if any shall be controlled by NEEPCO including fabrication works including cutting and welding of joints as per 4(B), Clause-2	Please refer to reply furnished at Sl. No. 38 of Pre Bid Queries.
23	Part 5	Clause 3.3.2.4	All kinds of injections, groutings, leakages if any shall be controlled by NEEPCO including fabrication works including cutting and welding of joints as per 4(B), Clause-2 Cement Mortar must not be used as it will effect bonding of the FRP to the steel. Only Epoxy Mortar thickened with Fumes Silica should be considered.	Please refer to reply furnished at Sl. No. 38 of Pre Bid Queries.
24	Part 5	Clause 3.3.2.6	The clause contradicts Clause 3.3.1, which states "white metal". SSPC SP-10 / NACE No. 2 near white metal is the appropriate specification.	The mentioned clauses are complementary to each other.
25	Part 5	Clause 3.3.2.7	Abrasive blasting should be permitted. Our company performs abrasive blasting in sensitive areas of nuclear power plants on a regular basis. Installation contractors with appropriate experience will know how to set up the sand blasing to protect adjacent equipment, and we have expertise in spent abrasive removal. Experienced CFRP pipeline repair contractors have an understanding of the requirements of abrasive blasting in sensitive environments.	Bid stipulation shall prevail.
26	Part 5	Clause 3.3.4.6	The re-coat window for the primer should be less than 7 days, please re-check this timing.	Agreed.
27	Part 5	Clause 3.3.4.13	Time and temperature cure testing should be submitted and utilized to manage the curing process, per appropriate QA/QC measures put in place by the FRP manufacturer.	Agreed.

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28	Part 5	Clause 3.3.5.6	Please specify the number of tests to occur for bond and tensile properties confirmation.	Refer Clause No.3.3.5.6 Part 5 and Additional Scope of Work. In addition to this the following also shall prevail: (a) Three samples for every 5000 Sqm. of laminate for tensile strength and lap shear strength. (b) At least one tensile strength and one lap shear strength for each test per zone.
29	Part 5	Clause 3.3.7.1	Please provide detailed requirements. How often will the penstock be shut down so that internal inspection can take place?	In initial one and half year of warranty period, one joint inspection by the Corporation and the PIA shall be carried out. Depending on the outcome of this maiden inspection, frequency of inspection during remaining years of warranty periods shall be decided. Beyond the warranty period there will be one minimum inspection in every 10 years. Suitable provisions/ fixing attachments etc. shall be provided in rehabilitated penstock to facilitate movement of trolley (inclined portion) and lift (vertical portion) for use in future inspection.
30	Part 5	Clause 8.3	Surface preparation approval shall be based upon QA/QC requirements, manufacturer recommendations and results of the ASTM D4541 test results. Consultant / Corporation will sign off on inspection and testing results, as per QA/QC procedures.	Bid stipulation shall prevail.
31	Part 5	Clause 8.4	Please provide requirement of anti-abrasive coating.	Please refer Cl. No. 2.1 Part 5.
32	Part 5	Clause 9.0	Please clarify or remove "alternative materials" requirements. We believe this is a reference which should be removed.	Agreed.
33	Part 5	14.1	With our extensive experience in CFRP pipe repair in multiple types of environments we have never seen this approach for a top coating. Experienced CFRP suppliers/CFRP pipe repair contractors should have the ability to recommend the appropriate top coating.	Bid stipulation shall prevail.
34			Section 3.2 of which Part?	Cl. No. 2.1

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35	Part 5	14.2	With our extensive experience in CFRP pipe repair in multiple types of environments, including safety-related piping in nuclear power plants, we have never seen this approach for confirming CFRP designs. We are confident that given clear design criteria we can design, supply and install the materials to meet performance requirements. We have hundreds of installed projects in place which validate our design, materials and installation techniques. Please consider removing or if not, please provide exact timing, parameters, methodology and process for initiating and completing testing program. Also please provide an estimated cost for bidders to use in their estimate (it should be the same estimated cost for all bidders).	Bid stipulation shall prevail.
36			The Hydraulic test need not be only restricted to CURIE	Please refer to the "Additional Scope of Work on Rehabilitation of Penstock using FRP Lining".
37	Part 5	Drawing	Page 53 Project Plans: The project plans show several manhole access points, however some of them appear to be buried. Will be Owner be able to provide the number, location, and size of currently accessible access points that will be available during construction?	The access manholes, as shown in the drawings are the access points available for construction. None of the manholes are buried. All the manholes are of the same size 550mm in diameter.