Annexure-1

2x660MW TANGEDCO UDANGUDI TPS-I

SCOPE OF WORK

CW Pump SUMP MODEL STUDIES

1. The scope of work involves the construction of models of the sump intake system to a scale not lesser than 1:12. The sides and the bottom of the portion of the Pump chamber model downstream of stop log gate shall be transparent to enable flow visualisation. It would be necessary to view the model Pump chamber from beneath the sump floor.

2. The suction bell and pump column pipe shall be modelled as per BHEL drawings from perspex material. Intake screens, Stop Log Gates and other similar devices in the intake structure are also to be suitably modelled as per drawings supplied by BHEL.

3. Study of flow conditions in modelled sumps i.e. intake channel, forebay and pump chambers for different water levels and combinations of pump operation is to be done. The configurations of sumps, forebay and intake channels are shown in the Pump house GA drawing (No. PE-DG-435-165-N004) and Layout of duct from Cooling tower to Feed pool (PE-DG-435-651-C006). The flows through all pumps are to be suitably simulated. Studies to be conducted for all the combinations of CW & ACW Pumps. Variations in water levels shall also be considered. The details of pumps and their flows are given below.

   CW Pumps: Number: 6 (4 Working + 2 Standby)
   Flow per pump: 44800 cu.m/hr

   ACW Pumps: Number: 4 (2 Working + 2 Standby)
   Flow per pump: 4150 cu.m/hr

   BD Pumps: Number: 3 (2 Working + 1 Standby)
   Flow per pump: 5000 cu.m/hr

4. After order placement, a detailed procedure/methodology of testing of the Sump model for various pump combinations, test layout, details of instruments used for testing shall be submitted to BHEL, Hyderabad. The test shall be conducted in accordance with HIS/BHRA standards. However additional tests shall be done by the Organisation/Institute at no extra cost, if found necessary during the course of testing. It is the Organisation/Institute's responsibility to determine the worst operating case/worst combination of pumps.
5. The model shall be studied to ascertain the absence of surface and sub-surface vortices.
   A Vortimeter shall be located in the bellmouth at the Impeller level, to measure swirl angle.
   The swirl angle shall be limited to plus or minus 3 degrees under normal (Froude) operating condition.

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CW Pump SUMP MODEL STUDIES

6. Tests shall be conducted for:
    i. Normal Froude condition
    ii. 1.5 times Froude condition
7. Particular attention is to be paid to prevent mass circulation of water in the sump, so as to prevent the pump from being subjected to unbalanced forces. Detailed drawings shall be submitted to BHEL by the Organisation/Institute for the appurtenances recommended and modifications proposed to ensure good flow conditions in the intake system.
8. The model studies, with modifications proposed and recommended appurtenances in position, shall be witnessed by BHEL, Customer and Consultants of the customer. Initially 6 copies of "draft" report shall be submitted to BHEL, detailing modifications proposed. These shall be forwarded by BHEL to the customer /consultants for confirming feasibility of implementation of modifications proposed. Comments of the customer shall be incorporated by the Organisation/Institute and the model shall be re-run if necessary. After final approval is given by BHEL, 10 copies of final report shall be submitted.
9. Photographs of important events are to be enclosed.
10. The Organisation/Institute shall prepare a video CD spanning the complete course of the model studies. This (CD) shall be submitted to BHEL. The video CD shall have a suitable audio commentary explaining the sequence of events.
11. **The time period for completion of the above scope of work is 10 weeks including submission of Final Report, from the date of forwarding approved Sump model studies procedure.**
12. Notwithstanding what may be contained in the Organisation/Institute's offer, all clauses listed above shall be held valid unless a written deviation is taken by the Organisation/Institute.