

MEETING THE CHALLENGES OF MAKE-UP WATER REQUIREMENT FOR NTPC/BgTPP

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PREFACE

Bongaigaon Thermal Power Project (3 X 250 MW) - a coal based Thermal Power Plant of NTPC located at Salakati near Bongaigaon in Kokrajhar district of Assam is under construction.

Since 4 X 60 MW Units of Bongaigaon Thermal Power Station under ASEB could not deliver the required level of generation and the maximum PLF of the plant in twenty years of operation was only 24.23%, the station had to be shut down. Subsequently, NTPC is setting up a new 750 MW (3 X 250 MW) Thermal Power Station at the same location. 1st unit of BgTPP (Unit#1) is in continuous operation after COD w.e.f 01.04.2016. Unit #2 is under commissioning and will be in on bar shortly followed by Unit#3 which is under erection.

MAKE-UP WATER PUMP HOUSE

The make-up pump house of 4 X 60 MW units of ASEB is being used for 3 X 250 MW Units of BgTPP after necessary renovation and installation of 3 Nos. pumps along with piping, which is around 3.5 KM from Auxiliary Pond located inside power plant premises.

Make-Up Water Pumps

As per design, requirement of Raw Water for all 3 X 250 MW Units shall be around 4000 Cm/Hr. for which 3 Nos. Make-up Pumps of capacity 2000 CuM/Hr at total head of 25 MWC powered by 200 KW, 6.6. KV motor each is being installed in the pump house. Commissioning of Pump#1 has been completed. Pump No. 2 & 3 are in final stage of commissioning. This pump house is located on the river bed having four openings for entry of river water to two nos. of sump pit. Pump#1 takes water from Pit #1 while Pump#2 & 3 shall take water from Pit# 2.

Make-up Water Source

On the upstream of Make-up Pump House, at a distance of 18 KM, Champamati Irrigation Project (Major) has been constructed having two irrigation canals (Right Bank Canal & Left Bank Canal) with Champamati Small Hydro Project having 2 X 2 MW Units. Design water flow through these canals are 14 Cumec (R) & 19 Cumec (L) with 96 Cumec for Hydel plant full load water requirement (for 2 units of 2 MW each). During the months of March/April, the hydel plant remains closed sometime due to shortage of water.

Due to above there is an acute shortage of river water in the downstream side affecting the water level near Make-up Pump house.

Study on river water level from May 2015 to January 2016

Based on a study of river water level at Make-up Pump House from the period from 01.05.2015 to 27.01.2016, the following observations were made.

- a. Out of 272 days river water did not enter the pump house (suction pit) at all for 111 days.
- b. For 107 days water level was 0 to 500 mm below the bottom of gate entry level.
- c. For 25 days water level was 500 to 800 mm below the bottom of gate entry level.
- d. Water level was above 800 mm up from the bottom of stop log gate for only 29 days, during which water enters to the pump pit.

Contingent arrangement of submersible pumps to meet Unit #1 requirement

Due to non-availability of adequate water in the river Champamati the permanent make up water pumps could not be run, hence alternate contingent arrangement was made to meet the immediate requirement of Unit #1 operation for COD and thereafter continuous operation. As per the contingent scheme, 6 Nos. of 250 CuM/Hr Pumps at total head of 25 MWC powered by 40 HP, 415V motor each were installed on the river bed with their discharge connected to the main make-up pump discharge header. This could provide make-up water requirement of Unit#1.

Problem faced in the submersible pumps installed as contingent arrangement

During last week of July 2016, Pump #3 failed to work. The pump was lifted from position and it was observed that the suction is covered with silt & vegetation. The pump was dismantled and found the impeller cover plate damaged and silt deposition inside the pump impeller & housing. The motor was also burnt. This was mainly due to slurry water during rainy season and carried floating vegetation in the water. The pump was immediately sent to M/s Aqua works at Ahmedabad for repair. The pump after repair was received at site during December 1st week and was put in service.

Seeing the condition of submersible pump#3, all other pumps were removed from position one by one for cleaning of silt & vegetation and also inspection of internals. All the pumps after cleaning and checking of internals put back in position and are in service.

Main Pump #1 was operated for 3 days July'16 with availability of water in the well. As the silt /sand content of water was very high the well had to be de-silted before operating the pump.

Barge mounted pumps for pumping river water to pump pit (Well)

In order to run the main make-up pumps, as an alternate measure, low head high capacity barge mounted pumps are installed for trial in one of the pump pit (well). In this arrangement, for pumping water from river to pump pit, two nos. of barge pump having capacity 700 M3/Hr and 4 Mtr. head powered by 15 KW motor each are installed on each barge. Thus two barges with pumps are installed in the river for supplying water to the Pump Pit #1, so that Pump#1 can be run on full capacity. On 30.12.2016, main pump #1 could be run in association with barge mounted pump successfully.



Fig-1 (Barge Pump under erection)



Fig-2 (Barge Pump under erection)

Challenges / expected problems ahead for make-up water system for BgTPP

- a. Permanent make up water pumps are meant for handling the clean water, accordingly discharge header and make up water pipelines to plant are made.
- b. As site is forced to run the contingency submersible pumps/barge mounted pumps which is handling water slurry, there is continuous deposition of sands/gravels in the pipeline and in due course of time there is every possibility of chokage of pipeline preventing flow of water to the plant. Further, in 8 to 9 places these pipeline are of 'U' shape below ground level, leading to susceptible deposition of sand/gravel.
- c. Single 800 NB underground discharge line from pump discharge header to Auxiliary Pond.
- d. Frequent chocking of submersible pumps/foot valve of barge mounted pumps due to silt & vegetation.
- e. Wear and tear of pump internals due to silt/water slurry.
- f. Proper approach to barge pumps/submersible pumps during all season.
- g. Dredging around submersible and barge pump foot valve to avoid sand deposition.
- h. De-silting of well during rainy season.

Long term solution

- a. During visit of CC Engg team for assessing alternate arrangement of make-up water, they proposed for procurement of 4 nos. of LT submersible pumps having capacity 1000 CuM/Hr with 25 Mtr head powered by 110 KW motor. Action has already been initiated for this procurement and installation.
- b. Above critical issues are apprised to Corporate Team during their visit in September 2016 and it is assured that action plan in this regard will be forwarded by them.

CONCLUSION :

All-out effort has been made to meet various challenges of make-up water requirement for 3 X 250 MW units of BgTPP with the available infrastructure. This could be possible by following various Engineering applications/practices/recommendations as per the prevailing resource (river water) availability. Equipped with these, we hope to meet the requirement of make-up water for plant generation.