



**BHARAT HEAVY ELECTRICALS LIMITED**  
**RAMACHANDRAPURAM::HYDERABAD::32**  
**FACTORY CIVIL ENGINEERING DEPARTMENT**

SCHEDULE- A

Tender Notice No:

HY/FCD/OT-14/2011-12, Dt: 31.10.2011

**PRICE BID**

Item no : 1

**Name of work: Effluent treatment plant – Operational and Maintenance Contract.**

S No	Description of the item	Qty	Unit	Rate (₹)	Amount (₹)
	<b>PART - A</b>				
1	Operation and maintenance of effluent treatment plants, for a period of 24 months after obtaining the desired results / approval from the statutory authorities. All consumables, treatment chemicals, repair and maintenance for regular running of Effluent Treatment plants shall have to be borne by the contractor. Periodical monitoring of treated effluents from Pollution Control Board approved laboratory and packing and stacking of dried sludge in the ETP vicinity is in the scope of contractor. The operation and maintenance of the ETP plants are to be executed as per procedure mentioned in O & M manuals. Agency should submit all the test reports and log sheet along with bill for the above maintenance contract.				
(i)	Final Effluent Treatment Plant (C-1), Effluent Treatment Plant at 08 Block (C-2) and Effluent Treatment Plant at Motor Transport area (C-4). Detailed Scope of work, design of the plant and testing of effluent plants are enclosed.	24.00	One Operation	26,000.00	624,000.00
(ii)	One Plant Engineer required for operation and maintenance of above three Effluent Treatment Plants, for completing one operation per a day. The Plant Engineer shall be a qualified chemical Engineer, having thorough knowledge in operation and maintenance of Effluent Treatment plant. (24 months x Rs. 25000/- per month /604 operations = Rs. 993.38)	604.00	One month	993.38	600,001.52
(iii)	Two Skilled services required for operation and maintenance of above Effluent Treatment Plants, for completing one operation per a day. (2 SW x Rs. 590.08 = Rs. 1180.16)	604.00	One Operation	1,180.16	712,816.64
(iv)	Four Unskilled services required to assist the above operators for operation and maintenance of above Effluent Treatment Plants, for completing one operation per a day. (4 USW x Rs. 505.75 = Rs. 2023.00)	604.00	One Operation	2,023.00	1,221,892.00
	VAT not applicable for Part-A items				
			<b>PART - A Total :</b>		<b>3,158,710.16</b>

S No	Description of the item	Qty	Unit	Rate (₹)	Amount (₹)
	<b>PART - B</b>				
1	Supply of 2" PVC Ball Valve	10 Nos.	Each	120.00	1,200.00
2	Supply of 1 1/2" PVC Ball Valve	10 Nos.	Each	160.00	1,600.00
3	Supply & fixing of 110 mm PVC Pipe	70 R M	R M	114.00	7,980.00
4	Supply of 75 mm PVC Pipe	70 R M	R M	59.00	4,130.00
5	Supply of 3" dia PVC Flexi Hose	400 R Ft.	R Ft.	50.00	20,000.00
6	Supply of Star / Spider Washers	100 Nos.	Each	1,020.00	102,000.00
				Total:	136,910.00
	Inclusive VAT @ 5% Extra on Item Nos. 1 to 6				6,845.50
				<b>PART - B Total ` :</b>	<b>143,755.50</b>
	<b>Total Value of work (PART - A &amp; B)</b>			<b>Total ` :</b>	<b>3,302,465.66</b>
<b>Total : ` Thirty three lakhs two thousand four hundred sixty six only</b>					

**Note:** Service tax is extra as applicable, which will be reimbursable to the agency on production of Valid documents.

**Note :** The bidders are required to quote the tender value on percentage (%) basis at excess or less or on par with estimate value.

Tender %	In figure	In words
Excess		
Less		
Estimated value		

Name of the Contractor :

Signature of the Contractor

Accounts Representative

Opening officer

**BHARAT HEAVY ELECTRICALS LIMITED**  
**RAMACHANDRA PURAM HYDERABAD-32**  
**FACTORY CIVIL DEPARTMENT**  
**SCHEDULE**

**NAME OF WORK: OPERATION AND MAINTENANCE OF EFFLUENT TREATMENT PLANTS IN FACTORY COMPLEX**

S.No	Description of work	Unit	Quantity	Amount Rs. P.
1	Operation & Maintenance of the following existing Effluent treatment plants in BHEL, HYD-32.		12 months	
1a	Effluent treatment plant for Factory Final Outlet (Annex.-1)	Months		
1b	Effluent treatment plant at Block 08 (Chromium & Cyanide streams-Annex.-2)	Months		
1c	Effluent treatment plant at Motor transport (Annex.-4)	Months		

**SCOPE OF WORK**

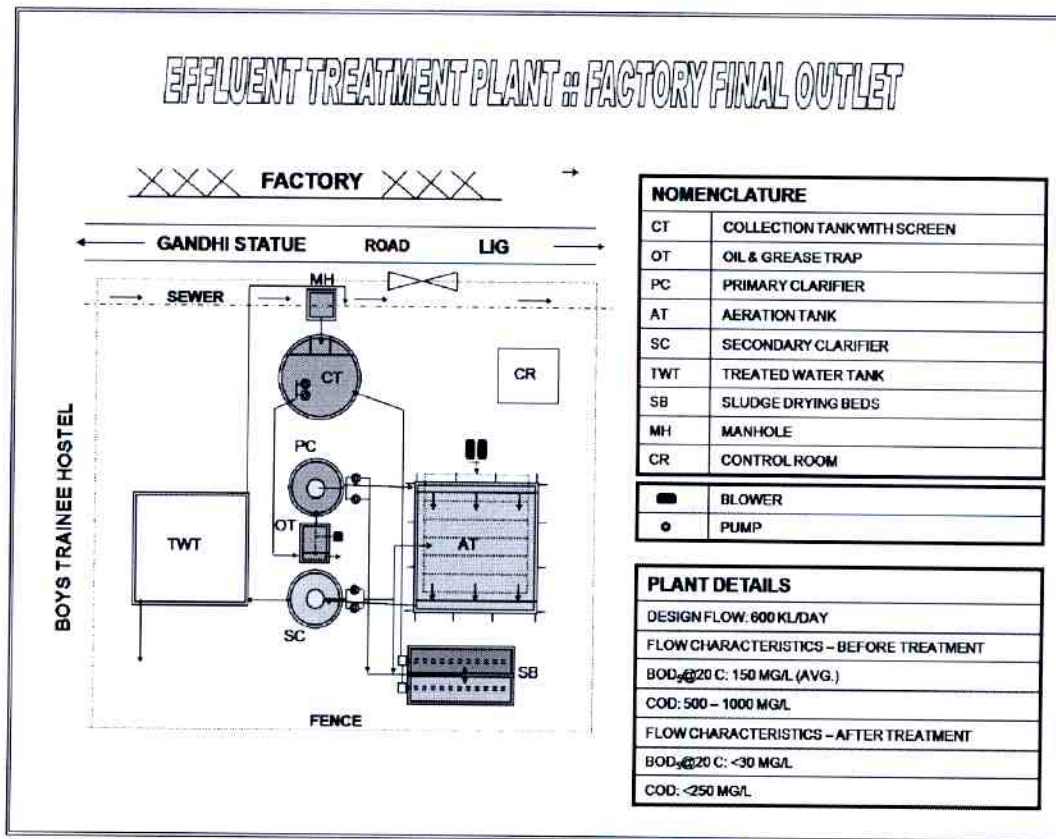
The scope of work covers operation of the above effluent treatment plants in three shifts in a day, as convenient to BHEL on all the days in a year including the following:

- a. Deputing necessary manpower with sound technical knowledge on treatment of effluents and also supporting staff for day to day operation & maintenance of the plants.
- b. Parameters for treated effluents from ETPs should be within the prescribed limits as stated in General Standards for Discharge of Environment pollutants (Ref. Schedule – VI of Environmental Protection Rules, 1986)
- c. Operation & Maintenance of all equipments (Compressors for diffuser assembly, pumps & motors, agitators, clarifier raking units, etc.)
- d. Installation of spares as supplied by BHEL from time to time.
- e. Supply, Mixing and dosing of chemicals required for ETPs at Block 08, Block 03 & Motor Transport
- f. Cleaning of all tanks, chambers, sludge beds and debris in and around ETPs.

- g. Packing and storing of dried sludge from Block 08 & Block 03 ETPs (cyanide & chromium streams) in identified area.
- h. Periodical Testing of effluents (inlet & outlet) from approved laboratory registered with MoEF, GOI. Frequency of testing is highlighted in Annex.5
- i. Periodical testing of dried sludge from all ETPs from approved laboratory registered with MoEF, GOI. Frequency of testing is highlighted in Annex.5.
- j. During this period the Agency should take whole responsibility of Plant operation & maintenance including treatment efficiency.
- k. Maintaining records for operation & maintenance of plants.

## Annexe.-1

### Effluent treatment plant for Factory Final Outlet



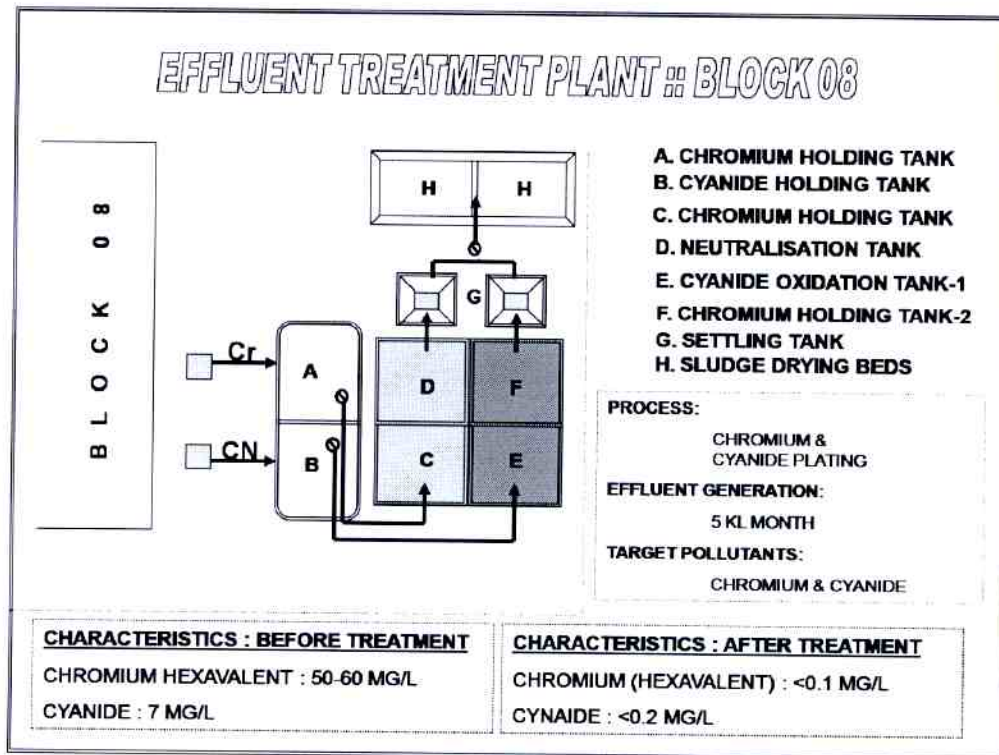
### Process Description

Effluent from Factory Final outlet comprises of waste water from canteens and blocks & buildings. Through underground sewer, effluent is collected in collection tank provided with bar screen. Non-clog submersible pumps are provided in collection tank to pump waste water into Oil trap provided with diffusers. From oil trap effluent is passed into primary clarifier and aeration tank. Aeration tank is provided with diffuser assembly. After treatment, the effluent is collected in secondary clarifier before discharge into treated water tank. Sludge from Primary & secondary clarifiers are collected in sludge beds for drying.

**Note: The plant is designed for 600KL per day.**

## Annexe.-2

### Effluent treatment plant at Block 08 (Chromium & Cyanide streams)



#### Process Description

##### a. Chromium stream

Chromium bearing effluents are collected in holding tank from there it is pumped to the chromium reduction tank. pH adjustment is done by dosing **sulphuric acid** and reduction of hexavalent chromium is done by adding **sodium bisulphite**. The effluent is agitated to ensure proper mixing of chemicals and reduction hexavalent chromium to trivalent form. From reduction tank the effluent is pumped into neutralisation tank and **sodium hydroxide** & polymer will be added to raise the pH and precipitate metal hydroxides. After neutralisation effluent is taken to settling tank for separation of solids. Treated effluent is pumped to solar pond after ensuring the treated water quality. Sludge from settling tank is pumped to sludge beds for drying. Dried sludge, being hazardous in nature is packed and stored at designated place.

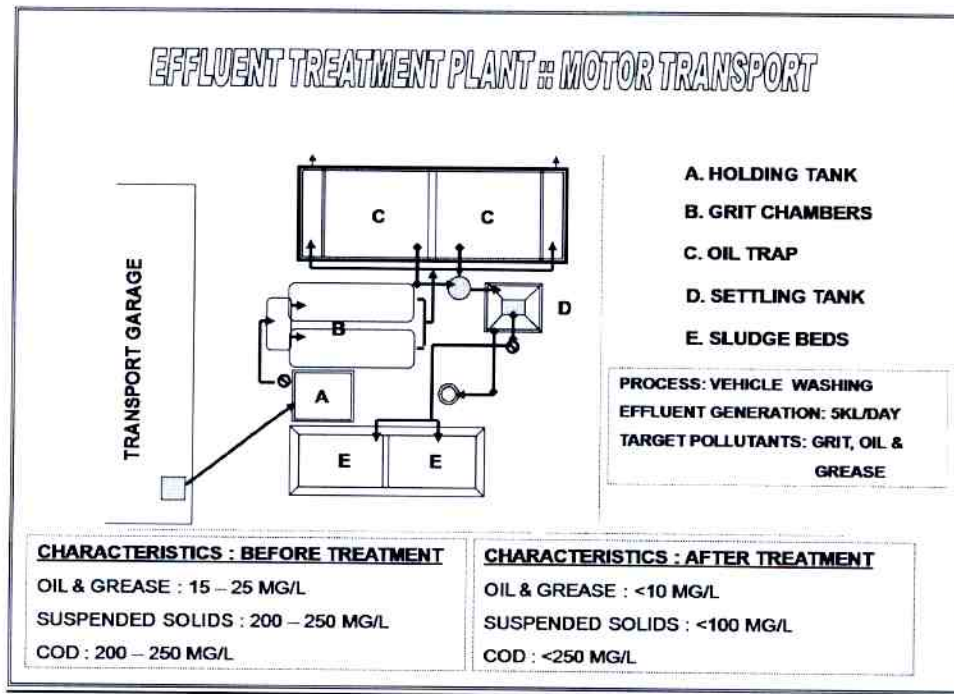
##### b. Cyanide stream

Cyanide bearing effluents will be collected in a holding tank from there it is pumped to cyanide oxidation tank 1. Cyanides will be oxidized to cyanates by adding **Sodium hypochlorite and sodium hydroxide**. In the second stage oxidation, again **Sodium hypochlorite and sodium hydroxide** are added to oxidize cyanates to carbon-dioxide and nitrogen.

**Note: Approximately 3 batches will be there per month for chromium & Cyanide streams.**

### Annexe.-3

#### Effluent treatment plant at Motor transport



#### Process Description

Effluent from Motor Transport area is collected in holding tank and then pumped to distribution chamber. From distribution chamber, effluent is allowed to flow into grit chamber and then to Oil trap. Effluent from oil trap is mixed with Alum and polymer before passing into settling tank. The settled sludge is pumped into sludge beds for drying.

Note: The plant is designed for 5KL per day

**Annexe.-4**

**Testing of Effluents**

S.No	Description of plant	Monthly parameters	Quarterly parameters
1	Effluent treatment plant for Factory Final Outlet  Note: Inlet & Outlet samples	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Oil &amp; grease</li> <li>• BOD@5days</li> <li>• COD</li> </ul>	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Oil &amp; grease</li> <li>• BOD@5days</li> <li>• COD</li> <li>• Chlorides</li> <li>• Sulphates</li> <li>• Nitrates</li> <li>• Ammonical Nitrogen</li> <li>• Total Kjeldahl Nitrogen</li> <li>• Hexavalent chromium</li> <li>• Total chromium</li> <li>• Cyanide</li> <li>• Copper</li> <li>• Lead</li> <li>• Zinc</li> <li>• Nickel</li> <li>• Iron</li> <li>• Manganese</li> </ul>
2	Effluent treatment plant at Block 08 (Chromium & Cyanide streams)  Note: Inlet & outlet for every batch of treatment	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Hexavalent chromium</li> <li>• Total chromium</li> </ul>	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Hexavalent chromium</li> <li>• Total chromium</li> <li>• Cyanide</li> <li>• Copper</li> <li>• Lead</li> <li>• Zinc</li> <li>• Nickel</li> <li>• Iron</li> <li>• Manganese</li> </ul>
3	Effluent treatment plant at Block 03  Note: Inlet & outlet for every batch of treatment	Same as stated in Sl. No. 2	Same as stated in Sl. No. 2

S.No	Description of plant	Monthly parameters	Quarterly parameters
4	Effluent treatment plant at Motor transport  Note: Inlet & Outlet samples	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Oil &amp; grease</li> <li>• BOD@5days</li> <li>• COD</li> </ul>	<ul style="list-style-type: none"> <li>• pH</li> <li>• Total suspended solids</li> <li>• Total dissolved solids</li> <li>• Oil &amp; grease</li> <li>• BOD@5days</li> <li>• COD</li> <li>• Chlorides</li> <li>• Sulphates</li> <li>• Nitrates</li> <li>• Ammonical Nitrogen</li> <li>• Total Kjeldahl Nitrogen</li> <li>• Hexavalent chromium</li> <li>• Total chromium</li> <li>• Cyanide</li> <li>• Copper</li> <li>• Lead</li> <li>• Zinc</li> <li>• Nickel</li> <li>• Iron</li> <li>• Manganese</li> </ul>
5	Sludge analysis at Factory final outlet ETP, Block 08 ETP (Chromium & Cyanide streams), Block 03 ETP & Motor transport ETP	NA	<ul style="list-style-type: none"> <li>• Cyanide</li> <li>• Copper</li> <li>• Lead</li> <li>• Zinc</li> <li>• Nickel</li> <li>• Iron</li> <li>• Manganese</li> <li>• Total chromium</li> </ul>