दि फ़र्टिलाईज़र्स एण्ड केमिकल्स
ट्रावनकोर लिमिटेड
FACT
THE FERTILISERS AND CHEMICALS
TRAVANCORE LIMITED
(भारत सरकार का उद्यम) / (A GOVERNMENT OF INDIA ENTERPRISE)
CORPORATE MATERIALS
PD ADMINISTRATIVE BUILDING
UDYOGAMANDAL - 683 501, KOCHI, KERALA, INDIA
GST No : 32AAACT6204C1Z2
Phone : 0484-2546778
2546629 / 2545222
MAT/ESS/RFQ
निर्घ केलिऐ अनुरोध/REQUEST FOR QUOTATION

Detailed Specification

Enquiry:MM/135/G29962
Contact Details
Name: Jayalakshmi M R
Phone: 0484 2568634 , 0484 2568646
Email ID: jaya@factltd.com

Please submit your offer for supply of the following items as per the instructions, technical specifications and other terms and conditions specified herein/ attached.

Note:
1. The delivery period mentioned in the BoQ is our indicative requirement. You may offer your earliest delivery period.
2. Please refer our above referred enquiry number in all correspondence.
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SL No.	Material Code	Detailed Specification/s	Quantity	Unit of Measure	Plant *
1	680000102	Supply of Cooling Water Treatment Chemicals, Equipments, etc for cooling water treatment with Chlorine supporting biocides (OPTION 1) for UD-NAS as per Technical Procurement Specification enclosed.	1	LUMPSUM	1002
2	680000103	Supply of Cooling Water Treatment Chemicals, Equipments, etc. for cooling water treatment with CHLORINE DIOXIDE supporting biocides (OPTION 2) for UD-NAS as per Technical Procurement Specification enclosed.	1	LUMPSUM	1002
3	680000111	Supply of Cooling Water Treatment Chemicals, Equipments, etc. for cooling water treatment with CHLORINE supporting biocides (OPTION 1) for PD-CPP as per Technical Procurement Specification enclosed.	1	LUMPSUM	1005

4	680000112	Supply of Cooling Water Treatment Chemicals, Equipments, etc for cooling water treatment with CHLORINE DIOXIDE supporting biocides (OPTION 2) for PD-CPP as per Technical Procurement Specification enclosed.	1	LUMPSUM	1005
5	680000113	Supply of Cooling Water Treatment Chemicals, Equipments, etc for cooling water treatment with CHLORINE supporting biocides (OPTION 1) for PD-MCT as per Technical Procurement Specification enclosed.	1	LUMPSUM	1005
6	680000114	Supply of Cooling Water Treatment Chemicals, Equipments, etc. for cooling water treatment with CHLORINE DIOXIDE supporting biocides (OPTION 2) for PD-MCT as per Technical Procurement Specification enclosed.	1	LUMPSUM	1005

* Plant: 1002 - Udyogamandal Division Stores, Udyogamandal ;
1005 - Petro Chemical Division Stores, Udyogamandal.

Special Conditions:

1. Bids not accompanied with requisite EMD or relevant documents for exemption of EMD shall be rejected at the sole discretion of FACT.
2. The bidders shall offer either:
   Option 1: Treatment with Chlorine and supporting Biocides (Option 1) OR
   Option 2: Treatment with Chlorine Dioxide and supporting Biocides (Option 2) OR
   Both options (Option 1 & 2) as per TPS. Based on economics among the technically accepted bids, FACT shall select the suitable treatment program (i) with Chlorine and supporting Biocides or (ii) with Chlorine Dioxide and supporting Biocides for all the three cooling towers.
3. The bidders shall fill the BOQ excel sheet uploaded.
4. Evaluation of Bids: Technical evaluation of bids shall be based on bidders meeting prequalification criteria, specification and General evaluation criteria. Price bids of only technically acceptable bids will be opened and Orders will be based on L1 basis.
5. EMD, Security Deposit, Payment terms, LD, Contract period and other commercial terms shall be as per the Special terms and conditions.
6. FACT reserves the right to accept / reject any request for extension of the due date of the tender.
7. FACT reserves the right to accept / reject any or all the bids at any stage without assigning any reason thereof.
8. FRAUD PREVENTION POLICY: Bidders shall comply with Fraud Prevention Policy of FACT 2012 [FPPF 2012). The said policy is available in the FACT Website www.fact.co.in

PRE-QUALIFICATION CRITERIA FOR COOLING WATER TREATMENT IN UC – NAS, PETRO-CPP & PETRO-MCT		
Sl. No.	**Conditions**	**Documents to be submitted by vendor**
1	The bidder shall have successfully completed two years cooling water treatment work in a cooling tower with low hardness (<150mg/l) and low alkalinity (<80 mg/l), as shown below, during the last ten-year period, ending on bid closing date. The work order date, work commencement date and work completion date shall be within the above 10 year period. Two years of successful experience shall be as follows: One work order for continuous cooling water treatment for a period of at least two years during last ten-year period, ending on bid closing date to be submitted. OR Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date to be submitted.	a. Copies of Orders executed b. Documentary proof for experience and Copy of client's letter proving the satisfactory performance of the cooling water treatment with clear mentioning of alkalinity and hardness. c. Bidders providing FACT contracts as their proof shall mention only the PO number.
2	The bidder shall have successfully completed two years cooling water treatment work in a cooling tower with circulation of at least 5000 m^3 / hr in i) Any large ammonia plant or ii) In petrochemical plants with treatment programme for ammonia contamination. during the last ten year period, ending on bid closing date. The work order date, work commencement date and work completion date shall be within the above ten year period. Two years of successful experience shall be as follows: One work order for continuous cooling water treatment for a period of at least two years, during last ten year period, ending on bid closing date to be submitted. Or Two work orders for continuous cooling water treatment for a period of at least one year, during last ten year period, ending on bid closing date to be submitted.	a. Copies of Orders executed b. Documentary proof for experience and Copy of client's letter proving the satisfactory performance of the cooling water treatment with clear mentioning of circulation rate. c. Bidders providing FACT contracts as their proof shall mention only the PO number.
3	Should have adequate own facilities for formulation of chemicals and quality control.	Self-declaration required.
4	Average financial turnover for the last three years ending on 31.3.2023 shall be at least Rs. 49.03 lakhs	Copies of Annual financial statements (Balance Sheet and statement of Profit & Loss) for the last three

		financial years ending 31.3.2023
5	Solvency Certificate IN ORIGINAL from a Nationalised/Scheduled banks worth minimum 15 lakh.	Solvency Certificate in ORIGINAL.

Note:

1. FACT shall have liberty to verify the above data with the clients of the bidder.
2. Price bids of bidders meeting the Pre-Qualification Criteria as above and technically and commercially acceptable alone will be considered for opening.
3. In case of FACT orders, Bidders need to mention only the PO number, submission of documents is not compulsory.

ANNEXURE- I

PRE-QUALIFICATION DETAILS OF VENDORS FOR NON-CHROMATE TREATMENT OF CIRCULATING COOLING WATER IN COOLING TOWER OF AMMONIUM SULPHATE PLANT FACT IN UDYOGAMANDAL COMPLEX

FACT reserves the right to verify the information given as per the format and enclosures. It is the responsibility of the applicant to give the full details asked for as per the format. Any misrepresentation of facts and withholding of information may result in disqualification.

A0 ADDRESS OF BIDDER :

A1 Email :
A2 Telephone & Mobile :
A3 Fax :
A4 Contact person :

B0 KOCHI ADDRESS, IF ANY :

B1 Email :
B2 Telephone & Mobile :
B3 Fax :
B4 Contact person :

C0 CONSTITUTION

C1 Proprietary ( ) Partnership ( ) Pvt. Ltd ( )

Pub.Ltd ( ) Pub.Sector ( )

C2 Registration No :
C3 Relevant Act :
C4 Relevant proof for the above attached : Yes ( )

D0	NAME AND ADDRESS OF CHIEF EXECUTIVE	:
D1	E-mail	:
D2	Telephone and Mobile	:
D3	Fax	:
E0	ADDRESS OF YOUR BANKERS	:
E1	Email	:
E2	Telephone & Mobile	:
F0	FINANCIAL DATA Description (as per latest audited accounts)	
F1	Paid up capital	:
F2	Free Reserves & Surplus	:
F3	Accumulated loss	:
F4	Long term debts	:
F5	Total current assets	:
F6	Current liabilities (including provisions)	:
F7	Fixed asset (Gross)	:
F8	Depreciation	:
F9	Turnover	:
F10	PAT (Profit After Tax)	:
F11	Turnover for the last three years (Provide true copies of Balance Sheet & P/L for the last three years)	:
G0	FACILITIES	
G1	Factory address	:
G2	Whether own factory	: Yes ( ) No ( )
G3	No. of skilled workers	:
G4	No. of unskilled workers of Managerial staff:	
G5	Production capacity (MT per day)	:
G6	Whether adequate facilities available for formulation and quality control (Provide proof)	:

H0 EXPERIENCE

H1 Whether cooling water treatment carried out for at least two years during the last ten years in cooling tower of any large Ammonia Plant or any Petrochemical plant capable of handling ammonia contamination with a circulation of at least 5000 m^3 per hour:
Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during the last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The circulation rate should be clearly mentioned in the documentary proof attached.

H2 If so, details of such contracts executed by the bidder and performance are to be indicated as below

Sl no	Contract No. & date	Contract Period & Value	Client	Circulation Rate (m^3/h)	Period of Treatment	Whether treatment covers a Turnaround of the plant	Performance report of cooling water treatment certified by clients etc
1							
2							
3							
4							

Note: To provide true copies in support of the above.

H3 Whether treated cooling water with low hardness (< 150 mg/l) and low alkalinity (< 80 mg/l) for at least two years during last ten years on bid closing date:
Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The values of hardness and alkalinity should be clearly mentioned in the documentary proof attached.

H4 If so, details of such contracts executed by the bidders are to be indicated as below.

Sl No	Contract No. & date	Contract Period & Value	Client	Hardness of water	Alkalinity of water	Remarks if any
1						
2						
3						
4						

NB: To provide certificates in support of the above. For FACT contracts, PO number is sufficient.

I0 OTHER DETAILS

I1 Whether there is any serious labour unrest at present : Yes ( ) No ( )

I2 When does the current long term contract with workers expire : Yes ( ) No ( )

I3 Have you been blacklisted by Govt Dept, Pulic Sector, Quasi Govt undertaking : Yes ( ) No ( )

I4 Any criminal cases pending against you/firm: Yes ( ) No ( )

J0 MOBILISATION TIME : ..... days from receipt of PO

K0 LEAD TIME (Time required for supply of subsequent lot of chemicals from the date of receipt of intimation via e-mail) : ..... weeks from receipt of e-mail

L0 FOLLOWING DOCUMENTS ARE TO BE ENCLOSED

L1 Audited BALANCE SHEET and statement of PROFIT & LOSS for the past 3 years : Yes ( ) No ( )

L2 Copies of INCOME TAX RETURNS for last 3 years : Yes ( ) No ( )

L3	SOLVENCY CERTIFICATE (ORIGINAL) : FROM NATIONALISED/SCHEDULED BANKS WORTH MINIMUM RS.15 LAKHS		Yes ( )	No ( )
L4	Proof of CONSTITUTION OF YOUR FIRM	:	Yes ( )	No ( )
L5	Previous EXPERIENCE/COMPLETION CERTIFICATE FROM THE CLIENT in support of clauses H2 and H4 above	:	Yes ( )	No ( )
L6	Copies of CONTRACTS UNDERTAKEN in fulfilment of clauses H2 and H4 above	:	Yes ( )	No ( )

DECLARATION

I/We hereby declare that the particulars furnished above are true to the best of my/our knowledge and belief. I/We hereby agree that FACT shall have the right to visit my/our office/works to satisfy themselves that the particulars furnished above are correct and I/We shall furnish any additional information/documents that may be required by FACT. I/We understand that suppression of any facts/furnishing false information shall render us liable for removal from the list of vendors.

Authorised Signatory
Name :
Designation :

Date :
Place : (STAMP)

ANNEXURE-II

Technical Specification for Non-Chromate treatment of circulating cooling water in Cooling Tower of Ammonium Sulphate Plant in FACT Udyogamandal Complex

1.0 Introduction

1.1 This technical specification gives the requirements of the cooling water treatment program for the cooling tower of Ammonium Sulphate Plant in FACT UC – Fertiliser plants, identified as UC-NAS.

1.2 The treatment schemes for the tower shall be non-chromate based treatment programme with chlorination and supporting biocides or chlorine dioxide with supporting biocides.

1.3 The treatment scheme shall be comprehensive and guarantee linked.

2.0 Details of Cooling Tower

The details of the cooling tower can be seen in APPENDIX – I.

3.0 Heat Exchanger Metallurgy

The materials of construction of heat exchangers with respect to each cooling tower system can be seen in APPENDIX-1.

4.0 Make-up Water

The source of make-up water is from the water treatment plant of FACT-UC, which draws raw water from River. The typical analysis of make-up water (Raw Water) is furnished in APPENDIX-II. The vendors are free to verify these values using their facilities at their cost. The Free Residual Chlorine (FRC) indicated in the make-up water is typical.

5.0 Treatment Required

On-line changeover of the cooling water treatment program is envisaged to begin with. In subsequent years, pre-cleaning and passivation is required before the commencement of the regular treatment program. Vendors are required to acquaint themselves with the present systems and devise suitable programs for each of the cooling water systems.

5.1 The broad outline of the scheme of treatment shall consist of:

i. Change over from the present treatment program of cooling water systems.
ii. Subsequent commissioning of the treatment programs and continuous operation of the cooling water systems.

5.2 Type of chemicals required for treatment.

a) Corrosion Inhibitor – Organophosphate and Zinc Based (1 No. Min).

b) Dispersant / Anti-flocculent / Anti-scalant – Polymer based (1 No. Min).

c) Bio-dispersant - 1 No. Min.
(Dispersant/Bio-dispersant level should be prescribed so that the turbidity of cooling water is not greater than 25 NTU preferably).

Note: Dispersant and Bio-dispersant should be independent and not combined.

d) Non-oxidizing biocides – 2 Nos. Min. The programme should take care of immunity effects also. The frequency of dosage shall be once in 15 days.

e) Chlorine Activator - 1 No. (Compulsory for Chlorine based treatment. Optional for Chlorine dioxide based treatment)

f) Chemicals/Biocides required in the absence of chlorination – 1 No. Min. (see clause 5.7).

g) Chemicals required for chlorine- di oxide preparation. (1 No. Min for Chlorine dioxide treatment, Not applicable for Chlorine based treatment).

h) Acid corrosion inhibitor for pre-cleaning – 1 No. Min.

i) Contingency Chemicals – Additional quantity of chemicals/any additional new formulations required for handling the following contingency situation may also be included in the program.

• Nitrate as NO_3	–	2000	ppm (Max)
• Ammoniacal Nitrogen as NH_3	–	200	ppm (Max)
• Oil and Grease	–	10	ppm (Max)
• Salinity as Chloride		500	ppm (Max)
• Sulphate as Ammonium Sulphate		150	ppm (Max)

Vendor shall furnish the details of conditions under which the formulation has to be used, quantity to be used for various ranges of contaminants, technical details of the product offered and the quantity to be stocked. In case the formulation is not required to be used during the period of contract/the shelf-life of the product expires, it shall be taken back/replaced by the vendor at his cost.

5.3 The dosage of chemicals is to be clearly indicated in the offer. All the above chemicals should be biodegradable and non-hazardous. All chemicals must be free flowing and should be added by means of dozing pumps, except for the slug-dosed chemicals. The chlorine activator should be dozed in to the chlorinated water leaving the chlorinator.

5.4 The chemicals requirement for regular treatment for the systems shall be based on typical cooling range and the rates of evaporation loss and blow down rates for the tower is calculated for 5 cycles of concentration and tabulated below: The blow down rates indicated are inclusive of drift losses.

Sl No	Parameter	Tower UC-NAS
1	Range °C	8
2	Evaporation m^3/h	20
3	Blow down m^3/h	5

5.5 The following contaminants are expected in cooling water.

(a) Oil (Lube oil / grease), (b) Ammonia, (c) SO_2 and NO_x (from atmosphere), (d) Salinity as Chloride, (e) Ammonium sulphate. The profile of contaminants with respect to cooling water system is given in APPENDIX – III.

The upper limits of contaminants in the cooling tower sump, expected to be treated under normal treatment programme, is given below and the guarantees should hold good for the same.

- Nitrate as NO_3 – 500 ppm (Max)
- Ammoniacal Nitrogen as NH_3 – 50 ppm (Max)
- Oil and Grease – 15 ppm (Max)
- Salinity as Chloride – 250 ppm (Max)
- Sulphate as Ammonium sulphate – 150 ppm (Max)

5.6 Bio-control shall be through chlorination and use of supporting biocides or through ClO_2 treatment along with supporting biocides.

5.7 Chlorination for the cooling tower UC-NAS will be continuous. Facility for continuous chlorination is available at UC-NAS.
The vendors are free to opt for converting part of chlorine to-chlorine-di-oxide for optimization of chlorine and caustic consumption if they desire so for better performance and control for UC-NAS. However whenever there is continuous interruption to chlorination (Four days or more in a month), the Vendor shall use chemicals/biocides. Dosage of these chemicals shall be specified separately. All guarantees shall be valid during this period also.

5.8 The Acid (Hydrochloric Acid - HCl) required for pre-cleaning, Caustic Soda and Chlorine required for the regular treatment will be supplied by FACT. Vendor shall specify the quantities of HCl, Caustic Soda and Chlorine in the format as per APPENDIX-IV – UC-NAS for the treatment program. The indicated quantity of HCl, Caustic Soda and Chlorine will be considered for evaluation purpose. For chemicals implied in price evaluation, the cost of chemicals consumed in excess of the specified dosages shall be to the Vendor's account at the prevailing rates. Please refer Sl. No. 5.13 also.

5.9 The control limits and parameters including level of Phosphate and Zinc to be maintained in circulating cooling water for satisfactory performance of their recommended treatment and the smooth operation of the cooling water system shall be specified by the Vendor. The pH shall be maintained between 7.0 - 7.5. However, vendor may indicate their preferred minimum operating pH. At the lower limit, Free Residual Chlorine (FRC) shall be maintained at 0.1 ppm for UC-NAS cooling tower. The higher limit for FRC shall be 0.25 ppm. The ClO_2 level shall be positive minimum and shall be indicated by the vendor.

5.10 Determining the quantity and frequency of dosage of chemicals required for normal treatment shall be based on 5 cycles of concentration. The parameter for assessing cycles of concentration of the system shall be Silica concentration in circulation water.

5.11 The dosage, the daily quantities of chemicals and monthly quantities required for normal treatment program, based on 31 days per month, should be furnished by the vendor along with technical offer as in APPENDIX-IV – UC-NAS. Since the addition of non-oxidising biocides is followed by blow-down, the quantities of chemicals required for making up this loss should also be considered while estimating the quantities of chemicals for regular/normal treatment.

For UC-NAS cooling tower, price bid format without price shall be filled for either (1) program with chlorination and supporting biocides Or (2) program with chlorine dioxide and supporting biocides or both.

5.12 The offer should be accompanied with a brief description of the chemicals, their

functions and advantages/limitations. Details of chemicals as per clause 6.8 are to be submitted by the Vendor with the offer.

5.13 Chemicals consumed in excess of specified quantities (as given in 5.11) in order to achieve performance guarantees under normal treatment program will be to the Vendor's account. The excess consumption, if any, shall be ascertained and recovery shall be made on a monthly basis. However, excess consumption of chemical will be based on the actual number of treatment days in the month.

In the case of caustic soda and chlorine, the quantities shall be ascertained on yearly basis and accordingly, recovery shall be made.

Refer APPENDIX-VII regarding consumption and other details for sample cooling water treatment program for a month.

In case the excess consumption of Chemicals (inclusive of Caustic Soda) is by virtue of a new contaminant introduced in the cooling water due to system leaks attributed to FACT and not specified in this TPS, this shall be assessed by FACT and the excess chemical consumption in such a case shall be to FACT's account. However, such a situation should be reported to FACT immediately in writing by the vendor, failing which any future claims by the vendor may not be entertained later. Decision of FACT in this regard will be final.

5.14 If the actual Cycles of Concentration (COC) achieved is less than 5, and the lower COC is due to system leaks, then the excess chemical consumption shall be borne by FACT.

Extra chemicals consumed (regular chemicals, biocides, dispersants and caustic soda) through additional blow down and makeup required for controlling the effects of contaminants when they are above the upper limits specified in 5.5, will be borne by FACT. However all guarantees will be applicable during the contingencies specified in 5.2(i). These situations should be reported to FACT in writing immediately by the vendor.

5.15 During the course of treatment, all efforts shall be made by Vendor jointly with FACT to optimize chemical consumption and to enhance cycles of concentration without affecting performance.

6.0 Scope of Work of Vendor

The scope of work shall cover the following aspects.

6.1 To devise scheme of treatment, supply and meet the complete requirements as per this enquiry but not limited to the following:

i. Initial Pre-cleaning and passivation. Typical procedure is given in APPENDIX-V. Vendor shall furnish detailed procedure for the above.
ii. Subsequent Pre-cleaning and Passivation immediately after the annual turnarounds for two years. Normally annual turnaround is taken during April/May every year. Vendor shall furnish detailed procedure for the above.
iii. Regular treatment program for control of corrosion, scale and deposits and microbiological control.
iv. Any passivation required after bringing on line cleaned heat exchangers and if cleaning/changing of heat exchangers is found necessary and is contemplated during the tenure of the contract.
v. Technical Services as detailed under Sl No 7.0 below.

6.2 Uninterrupted supply of chemicals –

The vendor shall ensure uninterrupted supply of chemicals for the treatment. The material received shall be stocked at FACT –UD stores.

6.3 The following items shall be made available by the vendor free of cost to the cooling water system under consideration and the Vendor shall maintain these items and can take back the items after completing the treatment program.

1. At least two Corrosion racks as per ASTM Standards. The racks shall have facility to lock and shall be kept under lock and key.
2. Bio fouling monitors, if any.
3. Deposit monitors, if any.
4. Chemical dosing system for all Chemicals, except for the slug-dosed chemicals, comprising the necessary metering devices, dosing pumps etc.
5. Dosing tanks.
6. Corrosion Scanning Instruments, if any.
7. Dip Slides (minimum 24 Nos. per annum).
8. Trend corrosion coupons & Corrosion rack for the same.
9. Any other latest instruments/gadgets for better performance.
10. ClO_2 generators for Chlorine dioxide treatment programme.

6.4 M.S standard coupons as per ASTM-SA 283 Grade C, with certificate of metallurgy of coupons, will be supplied / used by FACT. These coupons will be

treated as official coupons for evaluation purpose, as per ASTM 2688 – 94, test method A (re-approved 1999). The vendor shall put standard coupons in the Trend rack to know the performance trend of the treatment program continuously.

6.5 Erection and commissioning of dosing equipments such as dosing tanks, metering pumps, corrosion measuring equipments like corrosion coupon rack with locking facility, flow meters, fouling monitors, deposit monitors etc. as in 6.3 above shall be under the scope of vendor. Necessary power and water points for the above shall be made available by FACT.

6.6 The vendor as per the dosage levels given in APPENDIX-IV- UC-NAS shall carry out dosing of chemicals. Sample collection and analysis will be done by FACT and may be counter checked by the vendor, if required, using the facilities available.

6.7 Continuous dosing chemicals shall be added using metering pumps supplied by vendor.

6.8 Data to be submitted.

Following data has to be submitted by the vendor along with the offer:

a) Nature of chemicals and material safety data sheet and procedure for safe handling and first aid requirement in case of accident.
b) A letter of warranty that the chemicals are not hazardous, as specified by Department of Environment and Chemicals, and are bio-degradable in nature.
c) BOD at 27 °C and COD values of all chemicals.
d) Analytical procedure / method to determine the active ingredients of all chemicals used for the treatment, procedure to determine the activity / effectiveness of the biocides and analytical methods for estimation of various chemicals in the re-circulation water.
e) The functions of each formulation separately like corrosion inhibition, scale / deposit inhibition, dispersion, chlorine activation, biocide etc.
f) Shelf life, packing details and safe handling methods of all formulations.

7.0 <u>Technical Services</u>

7.1 Vendor shall provide services in areas pertaining to startup, program monitoring, optimization, testing, troubleshooting and training during the complete tenure of contract.

7.2 Vendor's competent representative shall be available at site every day during the treatment period to ensure maintaining of all recommended parameters with respect to cooling water. The Vendor should maintain the necessary supporting documents.

The Vendor shall maintain a daily log of activities carried out at site and submit daily report and monthly report to the concerned Plant Manager in triplicate about the running of the cooling water system including the cooling water inlet and outlet temperatures, blow down, re-circulation rate, chemical and microbiological analysis of water, chemical consumption, excess consumption if any, stock of chemicals, corrosion rate and other guaranteed parameters of cooling tower and performance of selected critical and vital exchangers. The monthly report should be submitted to the Plant Manager within 10th day of the succeeding month. However any abnormality noticed should be brought to the notice of FACT in writing within 24 hours of the occurrence of such abnormalities.

7.3 The treatment program shall be stabilized within 15 days of commencement of regular treatment and a note to confirm this stabilization shall be furnished by the vendor to the concerned Plant Manager. First coupon, Bio-fouling monitor and Deposit monitor shall be put in line within one week of stabilization.

7.4 Vendor's Site Representative shall be conversant with analytical methods, microbiological tests and shall be equipped to advise FACT for immediate corrective action in case of system upset conditions due to ingress of contaminants such as Nitrates, Ammonia, Oil/grease, salinity, sulphate etc., in cooling water.

7.5 Vendor has to provide 3 copies of the procedure of treatment program before implementation of the program.

7.6 The treatment program shall be reviewed and recorded jointly by the vendor and FACT once in thirty days

7.7 The typical ranges of control parameters for cooling water are indicated below. However vendors shall indicate the range of parameters recommended for their treatment program and the maximum/minimum limits applicable. The limits specified by the vendor shall be consistent with the requirement of operating the cooling tower at five cycles of concentration. The vendor shall ensure that the control parameters are maintained within the ranges recommended for their treatment program.

TYPICAL RANGES OF COOLING WATER CONTROL PARAMETERS

Sl. No	Parameter	Units	Range
1	Total Hardness (as $CaCO_3$)	mg/l	150 (Max)
2	Calcium Hardness (as $CaCO_3$)	mg/l	100 (Max)
3	Magnesium Hardness (as $CaCO_3$)	mg/l	50 (Max)
4	Inorganic Phosphate	mg/l	10-12

5	Zinc	mg/l	1.5-3.0
6	Total Iron as Fe	mg/l	3.0 (Max)
7	Copper as Cu	mg/l	0.15 (Max)
8	Total Silica	mg/l	100 (Max)
9	pH		7.0-7.5
10	Free Residual Chlorine	mg/l	0.1 - 0.25
11	M. Alkalinity	mg/l	80 (Max)
12	Chloride as Cl	mg/l	250 (Max)
13	Total Dissolved Solids	mg/l	1000 (Max)
14	Total Suspended Solids	mg/l	20 (Max)
15	Turbidity	NTU	25 (Max)
16	Ammoniacal Nitrogen as NH_3	ppm	50 (Max)
17	Nitrate as NO_3	ppm	500 (Max)
18	Oil / grease	ppm	15 (Max)
19	Sulphate as Ammonium sulphate	ppm	150 (Max)
20	ClO_2	ppm	By Vendor

Vendor should specify the limit of ClO_2 to be maintained for the ClO_2 program.

8.0 Performance Guarantee

The criteria for performance evaluation and the guarantees required are explained under clause 9.0 of Special Terms and Conditions (Annexure-III). The guarantees should also hold good in the presence of contaminants under conditions outlined in clauses 5.2(i) and 5.5.

ANNEXURE-III

Special Terms and Conditions

1.0 Scope of work

1.1 The scope of work shall be as specified under clause 6.0 of technical specifications. (Annexure-II)

1.2 The supply of chemicals shall be done by the vendor on staggered basis, in such a way that the stock of required chemicals for treatment of the cooling water systems under consideration is essentially maintained in Stores (FACT-UD) based on the Annual schedule for the delivery of the chemicals, which is to be furnished by the vendor. Any deviation or delays in delivery shall attract Liquidated Damage (LD) as per clause 8.0. The annual schedule of delivery of chemicals shall be revised as and when required by the vendor depending upon the site requirement and treatment conditions, subject to approval of FACT.

2.0 Duration of Contract

The contract is envisaged for a period of two (24 months) years, from the date of commencement of treatment. FACT also reserves the right to terminate / cancel the order due to unsatisfactory performance as detailed in clause 10.0 and 11.0 below.

3.0 Acceptance

Vendor shall acknowledge receipt of Purchase Order within 15 days of the date of its issue by returning a copy thereof duly signed by an authorized officer in confirmation that the vendor accepts all terms and conditions contained therein and is proceeding accordingly. If this is not furnished within 15 days of receipt of Purchase Order, it will be presumed that the vender has accepted the Purchase Order in toto.

4.0 Price

4.1 Price shall be firm without any escalation throughout the duration of the contract as defined in 2.0 above.

4.2 Price quoted shall be for delivery to our Stores inclusive of packing and forwarding charges, octroi, transit insurance and any other charges. Freight charges payable shall be shown separately.

4.3 Taxes and duties on the supplied goods shall be paid extra at actuals. GST will be paid against documentary evidence. Documents enabling FACT to avail INPUT

TAX CREDIT benefit shall be furnished by the vendor on request by FACT. Present rate of taxes and duties also are to be indicated separately. Unless otherwise specified, all Central, State or Municipal taxes, duties and levies payable shall be deemed to have been included in the price.

4.4 In case the rate of duties and taxes on the finished goods are revised by the Government by Statutory Orders, during the delivery period stipulated in the order, the extra cost so incurred shall be reimbursed by FACT based on documentary evidence. Any reduction on such duties and taxes shall be passed on to FACT. If delivery is delayed beyond the time stipulated in the order and the rates go up, during this period of delay, the extra cost so incurred shall be borne by the seller. However, any reduction in this case shall be passed on to FACT. All such variations shall be supported by documentary evidence and proof of payment.

4.5 In the absence of specific mention of all the applicable taxes/duties/levies with applicable percentages thereof in the price specified, no claim for extra payments on account of these shall be entertained by FACT.

4.6 All taxes, duties and levies payable by the vender on his purchases from his suppliers are deemed to be included in the price and any variations therein shall not affect the price payable by FACT as per order in any manner.

4.7 Prices shall be quoted as per APPENDIX-IV- UC-NAS in the price bid. Prices for pre-cleaning and passivation etc. shall be quoted separately in the above formats. Technical Service charges, if any, should be quoted separately against the appropriate columns. Service tax, in case, to be paid extra shall be indicated separately.

5.0 Payment

5.1 100% payment within 30 days of receipt and acceptance of chemicals at FACT stores as per this specification and delivery schedule issued by FACT.

The technical service charges quoted, if any, shall be paid on monthly basis. Proportionate deduction in payment shall be made if the treatment is discontinued for more than seven days continuously due to unforeseen shut downs.

5.2 Cost of extra chemicals as per clause 5.8 and 5.13 of Annexure-II and deductions as per clause 7.0, 8.0 and 10.0 herein shall be recovered at the prevailing cost to the company from any payment due to the vendor or from the security deposit / performance bank guarantee amounts.

5.3 The payment towards contingency chemicals would be made based on the actual consumption as per the certification by the Plant Manager

6.0 Delivery

6.1 First supply of chemicals consisting of 3 months requirement of regular chemicals, contingency chemicals required and the quantities of chemicals required for one pre-cleaning and passivation should be delivered at Stores (at FACT-UD) within 21 calendar days from the date of Purchase Order. The date of commencement of treatment will be intimated by the Plant Manager as 'Work To Proceed' notice. The contract period will be two years from the commencement date. Subsequent supplies of regular chemicals and chemicals required for two pre-cleaning and passivation shall be made within the lead-time agreed by the Vendor as per the delivery schedule issued by FACT. Vendor shall advise FACT for necessary modifications in delivery schedule. It shall be the responsibility of the vendor to monitor the actual requirements of chemicals in the plant and make available the materials to ensure continuous treatment without any interruption.

6.2 Date of delivery of chemicals at our Stores will be considered as the Delivery date.

6.3 Stock of chemicals required to meet contingency situation may be indicated separately and stocked at the time of commencement of the program.

7.0 Surplus Chemicals

7.1 The chemicals remaining at site and other items brought by the vendor shall be taken back by the vendor ex-FACT UD Stores after the contract period and subject to satisfactory completion and other formalities as per PO terms. Packing, freight and other charges for the return of the chemicals shall be in the vendor's scope. However FACT shall have the option to retain such stock for their use.

7.2 Payment made towards the surplus chemicals if any will be recovered by FACT.

8.0 Liquidated damages for delay in delivery

8.1 In the case of delay in commencement of the treatment, LD shall be applicable at the rate of 0.5% of the total order value per week of delay or part there of subject to a maximum of 7.5% of the total order value.

8.2 For delay in supply of chemicals during the treatment period LD shall be applicable at the rate of 0.5% of the total value of chemical of the respective delivery schedule per week of delay or part there of subject to a maximum of 7.5% of the total value of chemicals of the respective delivery schedule.

8.3 Vendor has to take care that there is no stock out situation. Stock out situation will be viewed very seriously and FACT has the option to terminate the contract without notice and without prejudice to FACT's rights otherwise as per contract.

UC-NAS CWT PROGRAMME

9.0 Performance Evaluation and Guarantee

The treatment program would be assessed from the following aspects.

9.1 Corrosion Coupons

Corrosion evaluation shall be done every month. For UC-NAS Cooling Tower, the corrosion rate of coupons inserted in the racks shall not exceed 3 MPY for MS coupons, monitored on a monthly basis.

In addition to this, the coupons should be free from inorganic or biological fouling, localized under deposit corrosion or pitting corrosion.

The installation and evaluation of corrosion coupon results shall be done jointly in the presence of concerned FACT personnel and vendor, in accordance with the procedure laid down in ASTM D-2688-94, test method A (re-approved 1999).

9.2 Microbiological Analysis

The program should limit microbiological levels as given below:

i)	TVC	-	1×10^5 Col/ml	(Max)
ii)	SRB	-	60 org/100 ml	(Max)
iii)	Nitrifying bacteria	-	20 org/100 ml	(Max)
iv)	Iron Bacteria	-	5 org/100 ml	(Max)

The above analysis will be done on a fortnightly basis.

9.3 Open inspection of exchangers and Scale and Deposit Control

FACT will periodically open process-heat exchangers or test heat exchangers put in line for control purposes and assess the condition of heat exchangers with respect to corrosion, scaling and bio-fouling. The treatment program should avoid heat transfer limitations arising out of fouling. Also there shall not be any tube leakage in heat exchangers due to inadequacy in cooling water treatment.

9.4 The party has to achieve the guarantee figures mentioned in 9.1 and 9.2 above during the treatment period. Conditions which do not permit achieving any of the above guarantees and which cannot be controlled by the vendor must be intimated to the concerned Plant Manager in writing, who will verify the genuineness of the contention in consultation with Technical Services. Decision by FACT shall be final.

9.5 The treatment program should not give limitation to heat transfer rate. For the purpose of evaluation of heat exchanger performance the Cold End temperature difference of heat exchangers shall be taken as base.

Cold End Temperature difference of heat exchangers shall be calculated as follows:
Cold End Temperature Difference of the heat exchanger = $T_2 - T_{w1}$ ^{0}C

Where,
T_2 is the process fluid outlet temperature of heat exchanger in ^{0}C
T_{w1} is the cooling water inlet temperature of heat exchanger in ^{0}C

For a fixed plant load and constant cooling water pressure, the 'Cold end temperature difference' should not increase more than 20% of the reference value recorded during the start-up of the program after stabilization of treatment.

For evaluation, the choice of critical heat exchangers can be fixed on implementation of the treatment program and after mutual discussion between the vendor and the concerned Plant Manager.

9.6 Failure on the part of the vendor in complying with any of the conditions 9.1 to 9.5 will be treated as performance failure.

10.0 Penalty for Shortfall in Performance

10.1 If the corrosion rate exceeds the guaranteed rate of 3 MPY on MS coupons, the penalty shall be paid by the vendor at the following rates subject to a maximum of 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered during the corresponding period.

1.5% (One and a half percentage) of the cost of chemicals consumed including taxes, duties, freight and cost of service charges during the corresponding treatment period for every increase of 0.1 MPY (One tenth (1/10) MPY) or part thereof on MS coupons.

10.2 If the microbiology analysis for two consecutive results exceeds the guaranteed figures as per 9.2 above, the penalty shall be applicable to the vendor as per the following rates.

1.25% (One and a quarter percentage) of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered for the corresponding treatment period for each one of the four (4) guarantees.

10.3 The maximum penalty under 10.1 and 10.2 above together for a particular month

will however be limited to 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered.

11.0 Termination of contract within the contract period

11.1 In case the vendor is not able to achieve the guaranteed performance figures consecutively for three evaluations with regard to clause 9.1 and 9.2 above or fails to meet the performance evaluation and guarantee requirements under clause 9.3 to 9.5 above due to reasons attributable to the vendor, a show cause notice will be initially served to the vendor giving eight weeks' time for taking corrective action. In spite of the same, if the party is still not able to achieve the performance guarantees as per the above, FACT shall be at liberty to discontinue the treatment and carry out alternate arrangements at the risk and cost of the vendor.

11.2 However, even after discontinuation of contract, the vendor shall be bound to carry out the treatment for a period of 3 months or till finalisation of a new contract, whichever is earlier from the notice date at the same terms and conditions to enable FACT to arrange an alternative contractor.

In case of default by the vendor, FACT shall be at liberty to carry out the treatment using the available chemicals with the vendor and/or carry out alternate arrangements all at the risk and cost of the vendor.

11.3 Any stock out situation, as detailed under Sl No 8.3 above.

12.0 Packing

12.1 The chemicals shall be packed in HDPE containers. The packing shall be preferably in different coloured containers or with coloured stripes marked with brand name for different chemicals. Vendor shall clearly and indelibly indicate the shelf life, manufacturing date and batch number of each chemical on the container. The manufacturing date and batch No. should also be shown in the invoice.

12.2 Packing shall withstand hazards normally encountered during transportation, including loading and unloading operations, both by handling equipments and by pushing off.

13.0 Shelf life

The supply of chemicals should be from fresh stock and shall have a minimum shelf life of 6 months at the time of supply. Items for which shelf life expires while in our storage shall be replaced free of cost by the vendor. It shall be the vendor's responsibility to ensure that chemicals are drawn from Stores after considering the shelf life.

14.0 Security Deposit and Performance Bank Guarantee

Bank Guarantee for 15% of the contract value for supply and services shall be furnished towards security deposit for faithful performance of the contract as per the contractual terms and conditions. The Bank Guarantee shall be furnished from a Nationalised/Scheduled Bank as per our format within 15 days of issue of order and shall be valid till the completion of the contract to the entire satisfaction of FACT with 6 months grace period thereafter.

15.0 General

15.1 The vendor shall faithfully observe the security regulations of FACT and any loss or damage incurred by FACT on account of the failure of the contractor or his employees to observe such security regulations shall be made good by the vendor at his expense.

15.2 Notice Correspondence

All instructions, directions and notices from FACT to the vendor and from the vendor to FACT for the purpose of the contract shall be conveyed in writing.

15.3 FACT's Rights

FACT has the right to make any investigation necessary to satisfy themselves of compliance by the vendor and reject any material or work that does not conform to the specification.

15.4 Statutory Regulations

Vendor shall, in all matters arising out of performance of the order, conform at his own expense with all acts, orders, regulations, rules and bye-laws of Government of India, State Governments, Local bodies and other authorities there under for the time-being in force and applicable to the work. Vendor shall also hold FACT harmless from liability or penalty, which might be imposed by reason of any asserted or established violation of such acts, regulations, rules etc.

Vendor shall indemnify and hold FACT harmless from all claims including patent claims, losses, demands, causes of action or suits arising out of the services, labour, equipment and materials furnished by the vendor under the Order.

15.5 Should any part of the work fail to achieve the performance specified by FACT, the vendor shall at his own cost effect required changes to achieve the required specification of FACT.

15.6 Default

In the event of any default of vendor to comply with any of the provisions of requirement hereof, FACT shall have the right to terminate and cancel the order with or without notice and without prejudice to any other rights, options or remedies FACT may have and FACT shall be relieved from any further obligations to vendor hereunder. In the event of such default by the vendor, FACT shall be entitled to make alternate arrangements for materials and services at the risk and cost of the vendor. The waiver of any initial default shall not be considered an automatic waiver for any future default of the same or any other nature.

15.7 Force Majeure

15.7.1 Neither the vendor nor FACT shall be considered in default in the performance of their obligations as per the contract so long as such performance is prevented or delayed because of strikes, war, hostilities, revolution, civil commotion, epidemics, accidents, fire, cyclone, flood or because of any law and order proclamation, regulation or ordinance of Government or sub division thereof or because of any act of god, provided the party shall be promptly, in any case, not later than 14 days of happening of the event, notify the details of the force majeure and the influence on its activity under contract. The proof of existence of force majeure shall be provided by the party claiming to the satisfaction of the other.

15.7.2 Should either party be prevented from fulfilling the obligations provided for in the contract by the existence of clause(s) of force majeure lasting continuously for a period exceeding 3 months then the parties shall consult immediately with each other with regard to the future implementation of the contract.

15.7.3 In the event of indefinite delay, even if arising out of reasons due to force majeure, FACT shall have the right at their discretion to cancel the order or part of the order without any liability on their part to make any payment to the vendor, while reserving the right to claim refund of any payment if advanced or paid to the vendor.

15.8 Applicable Law And Settlement Of Disputes

This order shall be subject to and shall in all respects be governed by Indian Law.

If any dispute(s) arises out of or in connection with this contract, or in respect of any defined legal relationship associated therewith or derived there from, the parties agree to submit the disputes to arbitration under the ICADR (International Centre for Alternative Dispute Resolution) Arbitration Rules 1996. The authority to

appoint the Arbitrator shall be the International Centre for Alternative Dispute Resolution. The number of Arbitrator shall be one and the language of the arbitration proceedings shall be English. The place of arbitration proceedings shall be Ernakulam in Kerala.

Any legal proceeding relating to this order shall be limited to courts of law under the Jurisdiction of Kerala High Court at Ernakulam.

15.9 Entirety Of Contract

All the terms agreed to between the contractor and FACT are included in the order and no other communication, proposal, understanding, written, oral or implied will be considered to be included in the order or form part of the contract between the vendor and FACT. Unless specifically agreed to in writing by FACT with their acceptance of the contract with all its terms and conditions, vendor waives and considers as void any and all of his general conditions of contract.

APPENDIX-I

DETAILS OF UC-NAS COOLING TOWER OF FACT

SL NO	PARAMETER	UC-NAS TOWER
1	Circulation rate (m^3/h)	1400
2	Hold up volume (m^3)	600
3	Cooling Range(typical) (^oC)	8
4	Cooling water inlet temperature (typical) (^oC)	42
5	Cooling water outlet temperature (typical) (^oC)	34
6	Side Stream filters	2 Nos available, each with 35 m^3/h throughput. Normally, one in line.
7	Chlorinator	Available; Maximum flow 2 kg/h
8	Heat Exchanger Metallurgy	Mainly CS & SS.

APPENDIX –II

Raw Water Analysis : Typical Range		
Calcium as Ca	(ppm)	4.0 to 10.0
Magnesium as Mg	(ppm)	1.0 to 3.0
Aluminium as Al	(ppm)	< 0.02
Sodium as Na	(ppm)	3.0 to 10.0
M. Alk. as $CaCO_3$	(ppm)	10.0 to 15.0
Chloride as Cl	(ppm)	6.0 to 12.0
Sulphate as SO_4	(ppm)	10.0 to 20.0
Total Iron as Fe	(ppm)	0.1 to 0.3
Colloidal Iron as Fe	(ppm)	0.1 (Max)
Copper as Cu	(ppm)	0.05 (Max)
Total Silica as SiO_2	(ppm)	5.0 to 9.0
Org. Matter as $KMnO_4$	(ppm)	4.0 (Max)
Residual Cl_2 as Cl	(ppm)	0.1 to 0.2
Suspended Solids	(ppm)	3.0 to 10.0
pH		6.5 to 7.2
Total Hardness as $CaCO_3$	(ppm)	12.0 to 30.0
Reactive Silica as SiO_2	(ppm)	4.5 to 9.0

APPENDIX-III

PROFILE OF CONTAMINANTS OF COOLING TOWER

SL NO	CONTAMINANT	UC-NAS TOWER
1	Nitrate as NO_3	From atmosphere and system
2	Ammonia as Ammonical Nitrogen	From atmosphere and system
3	Sulphur dioxide as SO_X	From atmosphere
4	Oil/grease	From system
5	Salinity as Chloride	From raw water ; occasional excursion during summer
6	Ammonium Sulphate	From system

APPENDIX – IV

Dosage of chemicals for cooling water treatment on UC-NAS Cooling Tower

UNPRICED BID FORMAT For Cooling Water Treatment at UC-NAS					
A: PRECLEANING (Quantity and rate for THREE Precleaning)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
5	Acid Inhibitor (Name to be mentioned)			Price in BOQ	Price in BOQ
6	HCl (Qty. required to be quoted)			Supply by FACT	
B: PASSIVATION (Quantity and rate for THREE Passivation)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
C: CONTINGENCY CHEMICALS AND BIOCIDES					
	I. CONTINGENCY CHEMICALS for tackling contaminants.				
Item Sl No	Contingency Situation	CHEMICAL DESCRIPTION		For one time Qty. (Kgs)	Unit Price Rs/Kg
1	Nitrate as NO_3>500 ppm to 2000 ppm				Price in BOQ
					Price in BOQ
2	Ammoniacal Nitrogen as Ammonia > 50 ppm to 200 ppm				Price in BOQ
					Price in BOQ
3	Oil/Grease >15 ppm to 40 ppm				Price in BOQ
					Price in BOQ
4	Salinity as Cl > 250 ppm to 500 ppm				Price in BOQ
					Price in BOQ
5	Sulphate as Ammonium sulphate > 150 ppm				Price in BOQ
					Price in BOQ
	II. CONTINGENCY BIOCIDES (see clause 5.7 of Annexure-II) in absence of Chlorine for 4 days or more in a month.				
6	Absence of chlorine				Price in BOQ
					Price in BOQ

UC-NAS CWT PROGRAMME

APPENDIX – IV

Dosage of chemicals for cooling water treatment on UC-NAS Cooling Tower

UNPRICED BID FORMAT For Cooling Water Treatment at UC-NAS							
D: REGULAR TREATMENT CHEMICALS AND BIOCIDES							
Item Sl No	Description	Dosage (PPM)	Qty.per day (kg)*	Qty.for one month (kg) (31 days)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs/Kg)	Total Price for 730 days (24 months) (Rs)
	I. REGULAR CHEMICALS						
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						TOTAL	
	II: REGULAR BIOCIDES (TO BE QUOTED FOR ONE DOSE) Pl.see note below:						
Item Sl No	Description	Dosage (PPM)	Qty. for one Dose (Kg)*	Unit Price (Rs./Kg)	No.of doses for 2 years**		Total Price for 2 years (Rs.)
1				Price in BOQ	24		Price in BOQ
2				Price in BOQ	24		Price in BOQ
						TOTAL	

E: CHEMICALS SUPPLIED BY FACT (see clause 5.8 of Annexure – II)						
Item Sl No	Description	Qty. for one day (Kg)*	Qty. for one month 31 days (kg)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs./Kg)	Total Price for 730days (24 months) (Rs.)
1	Chlorine				Price not to be indicated (Supply by FACT)	
2	Caustic Soda 100%					

The above rates shall be inclusive of P&F. Octroi. Transit Insurance. etc. but excluding the following, which are to be shown / quoted below:

	GST/TARIFF HEAD – Current Rate to be shown:	Price in BOQ
	INPUT TAX CREDIT – Current Rate/amount to be shown	Price in BOQ
	FREIGHT (Rate in Rs.per kg to be quoted)	Price in BOQ
	TECHNICAL SERVICE CHARGES FOR 2 YEARS including GST to be Quoted	Price in BOQ
	OTHER CHARGES (if any to be specified and quoted)	Price in BOQ
Notes	*Chemical projection to be rounded to 3 decimals.	
	**The regular biocides are used once in 15 days alternatively.	

UC-NAS CWT PROGRAMME

APPENDIX – V

PRECLEANING

1 System is filled with fresh make up water giving maximum blow down during the filling.

2 Recommended dosage of biocide and bio-dispersant is added. Circulation is maintained for 24 hours and the system is drained.

3 System is filled with fresh make up water giving maximum blow down during the filling. Recommended dosage of mineral dispersant is dosed and system is kept under circulation.

4 The iron content in the circulating water is checked until it is ensured that there is no increase in the values.

5 Hydrochloric Acid mixed with acid corrosion inhibitor (dosage to be specified) is added to the system while pH is monitored. The pH is to be brought down to 5.0 to 5.5. The circulation is continued while mineral dispersant (dosage to be specified) is added. System is kept under circulation while monitoring the iron value and turbidity. As soon as the values are steady, heavy blow down is started with simultaneous make up in order to bring the pH value to >6.5 and NTU to <5.0.

PASSIVATION

Immediately after pre-cleaning and as soon as system pH is stabilized, corrosion inhibitor with mineral dispersant is dosed and Phosphate and Zinc levels are brought up to levels indicated below while maintaining the pH between 6.9 and 7.2.

Orthophosphate	-	15	ppm
Zinc	-	5.0	ppm

Circulation is continued while monitoring the Phosphate level and dosing the corrosion inhibitor is done to maintain Phosphate till steady values are obtained. The system may be allowed to continue for 72 hours and after passivation, blow down is started with make-up in order to bring the system to normal operating condition.

APPENDIX – VI

GENERAL CRITERIA FOR EVALUATION OF TENDERS

The general criteria for evaluation of the offers for cooling water treatment are as follows

1. Based on economics among the technically acceptable bids, FACT shall select the suitable treatment program (i) with chlorine and supporting biocides or (ii) with chlorine dioxide and supporting biocides, for UC-NAS cooling tower.
2. The cost of chemicals required for 3 Nos. of pre-cleaning, 3 Nos. of passivation and regular treatment chemicals required for a period of two years (24 months) and the Technical service charges for two years shall be considered for evaluation.
3. The cost of all chemicals including Chlorine, HCl and Caustic soda (as 100%) indicated in the offer shall be taken for evaluation.
4. Cost of contingency chemicals and contingency biocides shall not be considered for evaluation.
5. Cost of any other chemicals, which the vendor requires for the treatment and FACT agrees to supply shall be added on the price for evaluation.
6. The cost of chemicals provided by FACT and considered for evaluation will be based on the price at which the chemicals are bought by FACT on the day of opening the price bids.
7. Evaluation shall be on landed cost basis after taking Input tax credit benefit (wherever applicable) into account.
8. Acceptable Deviations, if any, on technical and commercial terms shall be appropriately loaded on the price for evaluation at the discretion of FACT.

APPENDIX – VII

COOLING WATER TREATMENT PROGRAMME

By :
Name of Tower :
For the month of :
P.O. No. :

Regular Treatment Chemicals consumption on monthly basis – quantity in Kg.

No.	Chemical Name	Limit for one month (31 days) as per P.O.	Actual consumption for the month	Excess qty. on Vendor's cost as per TPS	Excess qty. on FACT's cost attributed to FACT as per TPS	Pre-cleaning & Passivation (if applicable for the month)	Remarks

Chemicals consumption on annual basis (Kgs)

No.	Chemical Name	Limit for one year (365 days) as per P.O.	Qty. consumed for the month of...	Cumulative days from	Cumulative qty. from	Excess qty. on Vendor's cost as per TPS	Remarks
1	Chlorine						
2	Caustic Soda as 100%						

Microbiology Analysis & Corrosion Rate Details:
Analysis Frequency for microbiology is Fortnightly & Corrosion Rate is once in a month

No.	Name of Microbiology	Unit	Limit as per P.O	Actual analysis for the month	Sampling Date	REMARKS AND PENALTY, IF ANY
1	TVC	Col/ml	100000			
2	SRB	Org/100 ml	60			
3	Nitrifying Bacteria	Org/100 ml	20			
4	Iron Oxidising Bacteria	Org/100 ml	5			
5	Corrosion Rate (MS coupons)	MPY	3			

ANNEXURE- I

PRE-QUALIFICATION DETAILS OF VENDORS FOR NON-CHROMATE TREATMENT OF CIRCULATING COOLING WATER IN COOLING TOWERS OF FACT – PETROCHEMICAL PLANTS CPP IN UDYOGAMANDAL COMPLEX

FACT reserves the right to verify the information given as per the format and enclosures. It is the responsibility of the applicant to give the full details asked for as per the format. Any misrepresentation of facts and withholding of information may result in disqualification.

A0	ADDRESS OF BIDDER	:
A1	Email	:
A2	Telephone & Mobile	:
A3	Fax	:
A4	Contact person	:
B0	KOCHI ADDRESS, IF ANY	:
B1	Email	:
B2	Telephone & Mobile	:
B3	Fax	:
B4	Contact person	:
C0	CONSTITUTION	

C1 Proprietary ( ) Partnership ( ) Pvt. Ltd ( )

Pub.Ltd ( ) Pub.Sector ( )

C2	Registration No	:	
C3	Relevant Act	:	
C4	Relevant proof for the above attached	:	Yes ( )

PETRO-CPP CWT PROGRAMME

D0	NAME AND ADDRESS OF CHIEF EXECUTIVE	:
D1	E-mail	:
D2	Telephone and Mobile	:
D3	Fax	:
E0	ADDRESS OF YOUR BANKERS	:
E1	Email	:
E2	Telephone & Mobile	:
F0	FINANCIAL DATA Description (as per latest audited accounts)	
F1	Paid up capital	:
F2	Free Reserves & Surplus	:
F3	Accumulated loss	:
F4	Long term debts	:
F5	Total current assets	:
F6	Current liabilities (including provisions)	:
F7	Fixed asset (Gross)	:
F8	Depreciation	:
F9	Turnover	:
F10	PAT (Profit After Tax)	:
F11	Turnover for the last three years (Provide true copies of Balance Sheet & P/L for the last three years)	:
G0	FACILITIES	
G1	Factory address	:
G2	Whether own factory	: Yes ( ) No ( )
G3	No. of skilled workers	:
G4	No. of unskilled workers of Managerial staff:	
G5	Production capacity (MT per day)	:
G6	Whether adequate facilities available for formulation and quality control (Provide proof)	:

PETRO-CPP CWT PROGRAMME

H0 EXPERIENCE

H1 Whether cooling water treatment carried out for at least two years during the last ten years in cooling tower of any large Ammonia Plant or any Petrochemical plant capable of handling ammonia contamination with a circulation of at least 5000 m^3 per hour:

Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during the last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The circulation rate should be clearly mentioned in the documentary proof attached.

H2 If so, details of such contracts executed by the bidder and performance are to be indicated as below

Sl no	Contract No. & date	Contract Period & Value	Client	Circulation Rate (m^3/h)	Period of Treatment	Whether treatment covers a Turnaround of the plant	Performance report of cooling water treatment certified by clients etc
1							
2							
3							
4							

Note: To provide true copies in support of the above.

H3 Whether treated cooling water with low hardness (< 150 mg/l) and low alkalinity (< 80 mg/l) for at least two years during last ten years on bid closing date:

Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The values of hardness and alkalinity should be clearly mentioned in the documentary proof attached.

H4 If so, details of such contracts executed by the bidders are to be indicated as below.

Sl No	Contract No. & date	Contract Period & Value	Client	Hardness of water	Alkalinity of water	Remarks if any
1						
2						
3						
4						

NB: To provide certificates in support of the above. For FACT contracts, PO number is sufficient.

I0 OTHER DETAILS

I1 Whether there is any serious labour unrest at present : Yes ( ) No ( )

I2 When does the current long term contract with workers expire : Yes ( ) No ( )

I3 Have you been blacklisted by Govt Dept, Pulic Sector, Quasi Govt undertaking : Yes ( ) No ( )

I4 Any criminal cases pending against you/firm: Yes ( ) No ( )

J0 MOBILISATION TIME : ..... days from receipt of PO

K0 LEAD TIME (Time required for supply of subsequent lot of chemicals from the date of receipt of intimation via e-mail) : ..... weeks from receipt of e-mail

L0 FOLLOWING DOCUMENTS ARE TO BE ENCLOSED

L1 Audited BALANCE SHEET and statement of PROFIT & LOSS for the past 3 years : Yes ( ) No ( )

L2 Copies of INCOME TAX RETURNS for last 3 years : Yes ( ) No ( )

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L3	SOLVENCY CERTIFICATE (ORIGINAL) : FROM NATIONALISED/SCHEDULED BANKS WORTH MINIMUM RS.15 LAKHS		Yes ( )	No ( )
L4	Proof of CONSTITUTION OF YOUR FIRM	:	Yes ( )	No ( )
L5	Previous EXPERIENCE/COMPLETION CERTIFICATE FROM THE CLIENT in support of clauses H2 and H4 above	:	Yes ( )	No ( )
L6	Copies of CONTRACTS UNDERTAKEN in fulfilment of clauses H2 and H4 above	:	Yes ( )	No ( )

DECLARATION

I/We hereby declare that the particulars furnished above are true to the best of my/our knowledge and belief. I/We hereby agree that FACT shall have the right to visit my/our office/works to satisfy themselves that the particulars furnished above are correct and I/We shall furnish any additional information/documents that may be required by FACT. I/We understand that suppression of any facts/furnishing false information shall render us liable for removal from the list of vendors.

Authorised Signatory
Name :
Designation :

Date :
Place : (STAMP)

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ANNEXURE-II

Technical Specification for Non-Chromate treatment of circulating cooling water in Cooling Tower of FACT – Petrochemical Plants CPP in Udyogamandal Complex

1.0 Introduction

1.1 This technical specification gives the requirements of the cooling water treatment program for the cooling tower of two captive power plants of FACT UC – Petrochemical plants, identified as PETRO-CPP

1.2 The treatment schemes for the tower shall be non-chromate based treatment programme with chlorination and supporting biocides.

1.3 The treatment scheme shall be comprehensive and guarantee linked.

2.0 Details of Cooling Towers

The details of the cooling towers can be seen in APPENDIX – I.

3.0 Heat Exchanger Metallurgy

The materials of construction of heat exchangers with respect to each cooling tower system can be seen in APPENDIX-1.

4.0 Make-up Water

The source of make-up water is from the water treatment plant of FACT-UC, which draws raw water from River. The typical analysis of make-up water (Raw Water) is furnished in APPENDIX-II. The vendors are free to verify these values using their facilities at their cost. The Free Residual Chlorine (FRC) indicated in the make-up water is typical.

5.0 Treatment Required

On-line changeover of the cooling water treatment program is envisaged to begin with. In subsequent years, pre-cleaning and passivation is required before the commencement of the regular treatment program. Vendors are required to acquaint themselves with the present systems and devise suitable programs for each of the cooling water systems.

5.1 The broad outline of the scheme of treatment shall consist of:

i. Change over from the present treatment program of cooling water systems.
ii. Subsequent commissioning of the treatment programs and continuous operation of the cooling water systems.

5.2 Type of chemicals required for treatment.

a) Corrosion Inhibitor – Organophosphate and Zinc Based (1 No. Min).

b) Dispersant / Anti-flocculent / Anti-scalant – Polymer based (1 No. Min).

c) Bio-dispersant - 1 No. Min.
(Dispersant/Bio-dispersant level should be prescribed so that the turbidity of cooling water is not greater than 25 NTU preferably).

Note: Dispersant and Bio-dispersant should be independent and not combined.

d) Non-oxidizing biocides – 2 Nos. Min. The programme should take care of immunity effects also. The frequency of dosage shall be once in 15 days.

e) Chlorine Activator - 1 No. (Compulsory for Chlorine based treatment. Optional for Chlorine dioxide based treatment)

f) Chemicals/Biocides required in the absence of chlorination – 1 No. Min. (see clause 5.7).

g) Chemicals required for chlorine- di oxide preparation, (1 No. Min for Chlorine dioxide treatment, Not applicable for Chlorine based treatment)

h) Copper corrosion inhibitor-1 No. Min.
(This is applicable wherever copper, copper alloy metallurgy is involved. Hence applicable to PETRO-CPP cooling towers)

i) Acid corrosion inhibitor for pre-cleaning – 1 No. Min.

j) Contingency Chemicals – Additional quantity of chemicals/any additional new formulations required for handling the following contingency situation may also be included in the program.

- Nitrate as NO_3 – 2000 ppm (Max)
- Ammoniacal Nitrogen as NH_3 – 200 ppm (Max)
- Oil and Grease – 40 ppm (Max)

- Salinity as Chloride – 500 ppm (Max)

Vendor shall furnish the details of conditions under which the formulation has to be used, quantity to be used for various ranges of contaminants, technical details of the product offered and the quantity to be stocked. In case the formulation is not required to be used during the period of contract/the shelf-life of the product expires, it shall be taken back/replaced by the vendor at his cost.

5.3 The dosage of chemicals is to be clearly indicated in the offer. All the above chemicals should be biodegradable and non-hazardous. All chemicals must be free flowing and should be added by means of dozing pumps, except for the slug-dosed chemicals. The chlorine activator should be dozed in to the chlorinated water leaving the chlorinator.

5.4 The chemicals requirement for regular treatment for the systems shall be based on typical cooling range and the rates of evaporation loss and blow down rates for the towers is calculated for 5 cycles of concentration and tabulated below: The blow down rates indicated are inclusive of drift losses.

Sl No	Parameter	Towers PETRO-CPP
1	Range °C	10
2	Evaporation m^3/h	89.2
3	Blow down m^3/h	22.3

5.5 The following contaminants are expected in cooling water.

(a) Oil (Lube oil / grease), (b) Ammonia, (c) SO_2 and NO_x (from atmosphere), (d) Salinity as Chloride. The profile of contaminants with respect to cooling water system is given in APPENDIX – III.

The upper limits of contaminants in the cooling tower sump, expected to be treated under normal treatment programme, is given below and the guarantees should hold good for the same.

- Nitrate as NO_3 – 500 ppm (Max)
- Ammoniacal Nitrogen as NH_3 – 50 ppm (Max)
- Oil and Grease – 15 ppm (Max)
- Salinity as Chloride – 250 ppm (Max)

5.6 Bio-control shall be through chlorination and use of supporting biocides or through

ClO_2 treatment along with supporting biocides.

5.7 Chlorination for the cooling tower PETRO-CPP will be continuous. Facility for continuous chlorination is available at PETRO-CPP. Considering the extensive copper/copper alloy metallurgy involved in the heat exchangers of these cooling towers, intermittent chlorination is preferred

The vendors are free to opt for converting part of chlorine to-chlorine-di-oxide for optimization of chlorine and caustic consumption if they desire so for better performance and control for PETRO-CPP. However whenever there is continuous interruption to chlorination (Four days or more in a month), the Vendor shall use chemicals/biocides. Dosage of these chemicals shall be specified separately. All guarantees shall be valid during this period also.

5.8 The Acid (Hydrochloric Acid - HCl) required for pre-cleaning, Caustic Soda and Chlorine required for the regular treatment will be supplied by FACT. Vendor shall specify the quantities of HCl, Caustic Soda and Chlorine in the format as per APPENDIX-IV – PETRO-CPP for the treatment program. The indicated quantity of HCl, Caustic Soda and Chlorine will be considered for evaluation purpose. For chemicals implied in price evaluation, the cost of chemicals consumed in excess of the specified dosages shall be to the Vendor's account at the prevailing rates. Please refer Sl. No. 5.13 also.

5.9 The control limits and parameters including level of Phosphate and Zinc to be maintained in circulating cooling water for satisfactory performance of their recommended treatment and the smooth operation of the cooling water system shall be specified by the Vendor. The pH shall be maintained between 7.0 and 7.5 . The minimum operating pH should be 7.0. At the lower limit, Free Residual Chlorine (FRC) shall be maintained at 0.051 ppm for Petro-CPP cooling towers. The higher limit for FRC shall be 0.25 ppm. The ClO_2 level shall be positive minimum and shall be indicated by the vendor.

5.10 Determining the quantity and frequency of dosage of chemicals required for normal treatment shall be based on 5 cycles of concentration. The parameter for assessing cycles of concentration of the system shall be Silica concentration in circulation water.

5.11 The dosage, the daily quantities of chemicals and monthly quantities required for normal treatment program, based on 31 days per month, should be furnished by the vendor along with technical offer as in APPENDIX-IV – PETRO-CPP. Since the addition of non-oxidising biocides is followed by blow down, the quantities of chemicals required for making up this loss should also be considered while estimating the quantities of chemicals for regular/normal treatment.

For PETRO-CPP cooling towers, price bid format without price shall be filled for either (1) program with chlorination and supporting biocides Or (2) program with chlorine dioxide and supporting biocides or both.

5.12 The offer should be accompanied with a brief description of the chemicals, their functions and advantages/limitations. Details of chemicals as per clause 6.8 are to be submitted by the Vendor with the offer.

5.13 Chemicals consumed in excess of specified quantities (as given in 5.11) in order to achieve performance guarantees under normal treatment program will be to the Vendor's account. The excess consumption, if any, shall be ascertained and recovery shall be made on a monthly basis. However, excess consumption of chemical will be based on the actual number of treatment days in the month.

In the case of caustic soda and chlorine, the quantities shall be ascertained on yearly basis and accordingly, recovery shall be made.

Refer APPENDIX-VII regarding consumption and other details for sample cooling water treatment program for a month.

In case the excess consumption of Chemicals (inclusive of Caustic Soda and chlorine) is by virtue of a new contaminant introduced in the cooling water due to system leaks attributed to FACT and not specified in this TPS, this shall be assessed by FACT and the excess chemical consumption in such a case shall be to FACT's account. However, such a situation should be reported to FACT immediately in writing by the vendor, failing which any future claims by the vendor may not be entertained later. Decision of FACT in this regard will be final.

5.14 If the actual Cycles of Concentration (COC) achieved is less than 5, and the lower COC is due to system leaks, then the excess chemical consumption shall be borne by FACT.

Extra chemicals consumed (regular chemicals, biocides, dispersants and caustic soda) through additional blow down and makeup required for controlling the effects of contaminants when they are above the upper limits specified in 5.5, will be borne by FACT. However all guarantees will be applicable during the contingencies specified in 5.2(j). These situations should be reported to FACT in writing immediately by the vendor.

5.15 During the course of treatment, all efforts shall be made by Vendor jointly with FACT to optimize chemical consumption and to enhance cycles of concentration without affecting performance.

6.0 Scope of Work of Vendor

The scope of work shall cover the following aspects.

6.1 To devise scheme of treatment, supply and meet the complete requirements as per this enquiry but not limited to the following:

i. Initial Pre-cleaning and passivation. Typical procedure is given in APPENDIX- V. Vendor shall furnish detailed procedure for the above.
ii. Subsequent Pre-cleaning and Passivation immediately after the annual turnarounds for two years. Normally annual turnaround is taken during April/May every year. Vendor shall furnish detailed procedure for the above.
iii. Regular treatment program for control of corrosion, scale and deposits and microbiological control.
iv. Any passivation required after bringing on line cleaned heat exchangers and if cleaning/changing of heat exchangers is found necessary and is contemplated during the tenure of the contract.
v. Technical Services as detailed under Sl No 7.0 below

6.2 Uninterrupted supply of chemicals –

The vendor shall ensure uninterrupted supply of chemicals for the treatment. The material received shall be stocked at FACT –PD stores.

6.3 The following items shall be made available by the vendor free of cost to the cooling water system under consideration and the Vendor shall maintain these items and can take back the items after completing the treatment program.

1. At least two Corrosion racks as per ASTM Standards. The racks shall have facility to lock and shall be kept under lock and key.
2. Bio fouling monitors, if any.
3. Deposit monitors, if any.
4. Chemical dosing system for all Chemicals, except for the slug-dosed chemicals, comprising the necessary metering devices, dosing pumps etc.
5. Dosing tanks.
6. Corrosion Scanning Instruments, if any.
7. Dip Slides (minimum 24 Nos. per annum).
8. Trend corrosion coupons & Corrosion rack for the same.
9. Any other latest instruments/gadgets for better performance.
10. ClO_2 generators for Chlorine dioxide treatment programme.

6.4 M.S standard coupons as per ASTM SA 283 Grade C, with certificate of metallurgy of coupons, will be supplied / used by FACT. These coupons will be treated as official coupons for evaluation purpose, as per ASTM 2688 – 94, test method A (re-approved 1999). The vendor shall put standard coupons in the Trend

rack to know the performance trend of the treatment program continuously.

6.5 Erection and commissioning of dosing equipments such as dosing tanks, metering pumps, corrosion measuring equipments like corrosion coupon rack with locking facility, flow meters, fouling monitors, deposit monitors etc. as in 6.3 above shall be under the scope of vendor. Necessary power and water points for the above shall be made available by FACT.

6.6 The vendor as per the dosage levels given in APPENDIX-IV- PETRO CPP shall carry out dosing of chemicals. Sample collection and analysis will be done by FACT and may be counter checked by the vendor, if required, using the facilities available.

6.7 Continuous dosing chemicals shall be added using metering pumps supplied by vendor.

6.8 Data to be submitted.

Following data has to be submitted by the vendor along with the offer:

a) Nature of chemicals and material safety data sheet and procedure for safe handling and first aid requirement in case of accident.
b) A letter of warranty that the chemicals are not hazardous, as specified by Department of Environment and Chemicals, and are bio-degradable in nature.
c) BOD at 27 °C and COD values of all chemicals.
d) Analytical procedure / method to determine the active ingredients of all chemicals used for the treatment, procedure to determine the activity / effectiveness of the biocides and analytical methods for estimation of various chemicals in the re-circulation water.
e) The functions of each formulation separately like corrosion inhibition, scale / deposit inhibition, dispersion, chlorine activation, biocide etc.
f) Shelf life, packing details and safe handling methods of all formulations.

7.0 Technical Services

7.1 Vendor shall provide services in areas pertaining to startup, program monitoring, optimization, testing, troubleshooting and training during the complete tenure of contract.

7.2 Vendor's competent representative shall be available at site every day during the treatment period to ensure maintaining of all recommended parameters with respect to cooling water. The Vendor should maintain the necessary supporting documents. The Vendor shall maintain a daily log of activities carried out at site and submit

daily report and monthly report to the concerned Plant Manager in triplicate about the running of the cooling water system including the cooling water inlet and outlet temperatures, blow down, re-circulation rate, chemical and microbiological analysis of water, chemical consumption, excess consumption if any, stock of chemicals, corrosion rate and other guaranteed parameters of cooling towers and performance of selected critical and vital exchangers. The monthly report should be submitted to the Plant Manager within 10th day of the succeeding month. However any abnormality noticed should be brought to the notice of FACT in writing within 24 hours of the occurrence of such abnormalities.

7.3 The treatment program shall be stabilized within 15 days of commencement of regular treatment and a note to confirm this stabilization shall be furnished by the vendor to the concerned Plant Manager. First coupon, Bio-fouling monitor and Deposit monitor shall be put in line within one week of stabilization.

7.4 Vendor's Site Representative shall be conversant with analytical methods, microbiological tests and shall be equipped to advise FACT for immediate corrective action in case of system upset conditions due to ingress of contaminants such as Nitrates, Ammonia, Oil/grease, salinity etc., in cooling water.

7.5 Vendor has to provide 3 copies of the procedure of treatment program before implementation of the program.

7.6 The treatment program shall be reviewed and recorded jointly by the vendor and FACT once in thirty days

7.7 The typical ranges of control parameters for cooling water are indicated below. However vendors shall indicate the range of parameters recommended for their treatment program and the maximum/minimum limits applicable. The limits specified by the vendor shall be consistent with the requirement of operating the cooling towers at five cycles of concentration. The vendor shall ensure that the control parameters are maintained within the ranges recommended for their treatment program.

TYPICAL RANGES OF COOLING WATER CONTROL PARAMETERS

Sl. No	Parameter	Units	Range
1	Total Hardness (as $CaCO_3$)	mg/l	150 (Max)
2	Calcium Hardness (as $CaCO_3$)	mg/l	100 (Max)
3	Magnesium Hardness (as $CaCO_3$)	mg/l	50 (Max)
4	Inorganic Phosphate	mg/l	10-12
5	Zinc	mg/l	1.5-3.0

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6	Total Iron as Fe	mg/l	3.0 (Max)
7	Copper as Cu	mg/l	0.15 (Max)
8	Total Silica	mg/l	100 (Max)
9	pH		7.0-7.5
10	Free Residual Chlorine	mg/l	0.051 - 0.25
11	M. Alkalinity	mg/l	80 (Max)
12	Chloride as Cl	mg/l	250 (Max)
13	Total Dissolved Solids	mg/l	1000 (Max)
14	Total Suspended Solids	mg/l	20 (Max)
15	Turbidity	NTU	25 (Max)
16	Ammoniacal Nitrogen as NH_3	ppm	50 (Max)
17	Nitrate as NO_3	ppm	500 (Max)
18	Oil / grease	ppm	15 (Max)
19	Soluble/insoluble organics	ppm	15 (Max)
20	ClO_2	ppm	By Vendor

Vendor should specify the limit of ClO_2 to be maintained for the ClO_2 program.

8.0 Performance Guarantee

The criteria for performance evaluation and the guarantees required are explained under clause 9.0 of Special Terms and Conditions (Annexure-III). The guarantees should also hold good in the presence of contaminants under conditions outlined in clauses 5.2(j) and 5.5.

ANNEXURE-III

Special Terms and Conditions

1.0 Scope of work

1.1 The scope of work shall be as specified under clause 6.0 of technical specifications. (Annexure-II)

1.2 The supply of chemicals shall be done by the vendor on staggered basis, in such a way that the stock of required chemicals for treatment of the cooling water systems under consideration is essentially maintained in Stores (FACT-PD) based on the Annual schedule for the delivery of the chemicals, which is to be furnished by the vendor. Any deviation or delays in delivery shall attract Liquidated Damage (LD) as per clause 8.0. The annual schedule of delivery of chemicals shall be revised as and when required by the vendor depending upon the site requirement and treatment conditions, subject to approval of FACT.

2.0 Duration of Contract

The contract is envisaged for a period of two (24 months) years, from the date of commencement of treatment. FACT also reserves the right to terminate / cancel the order due to unsatisfactory performance as detailed in clause 10.0 and 11.0 below.

3.0 Acceptance

Vendor shall acknowledge receipt of Purchase Order within 15 days of the date of its issue by returning a copy thereof duly signed by an authorized officer in confirmation that the vendor accepts all terms and conditions contained therein and is proceeding accordingly. If this is not furnished within 15 days of receipt of Purchase Order, it will be presumed that the vender has accepted the Purchase Order in toto.

4.0 Price

4.1 Price shall be firm without any escalation throughout the duration of the contract as defined in 2.0 above.

4.2 Price quoted shall be for delivery to our Stores inclusive of packing and forwarding charges, octroi, transit insurance and any other charges. Freight charges payable shall be shown separately.

4.3 Taxes and duties on the supplied goods shall be paid extra at actuals. GST will be paid against documentary evidence. Documents enabling FACT to avail INPUT

TAX CREDIT benefit shall be furnished by the vendor on request by FACT. Present rate of taxes and duties also are to be indicated separately. Unless otherwise specified, all Central, State or Municipal taxes, duties and levies payable shall be deemed to have been included in the price.

4.4 In case the rate of duties and taxes on the finished goods are revised by the Government by Statutory Orders, during the delivery period stipulated in the order, the extra cost so incurred shall be reimbursed by FACT based on documentary evidence. Any reduction on such duties and taxes shall be passed on to FACT. If delivery is delayed beyond the time stipulated in the order and the rates go up, during this period of delay, the extra cost so incurred shall be borne by the seller. However, any reduction in this case shall be passed on to FACT. All such variations shall be supported by documentary evidence and proof of payment.

4.5 In the absence of specific mention of all the applicable taxes/duties/levies with applicable percentages thereof in the price specified, no claim for extra payments on account of these shall be entertained by FACT.

4.6 All taxes, duties and levies payable by the vender on his purchases from his suppliers are deemed to be included in the price and any variations therein shall not affect the price payable by FACT as per order in any manner.

4.7 Prices shall be quoted as per APPENDIX-IV- PETRO-CPP in the price bid. Prices for pre-cleaning and passivation etc. shall be quoted separately in the above formats. Technical Service charges, if any, should be quoted separately against the appropriate columns. Service tax, in case, to be paid extra shall be indicated separately.

5.0 Payment

5.1 100% payment within 30 days of receipt and acceptance of chemicals at FACT stores as per this specification and delivery schedule issued by FACT.

The technical service charges quoted, if any, shall be paid on monthly basis. Proportionate deduction in payment shall be made if the treatment is discontinued for more than seven days continuously due to unforeseen shut downs.

5.2 Cost of extra chemicals as per clause 5.8 and 5.13 of Annexure-II and deductions as per clause 7.0, 8.0 and 10.0 herein shall be recovered at the prevailing cost to the company from any payment due to the vendor or from the security deposit / performance bank guarantee amounts.

5.3 The payment towards contingency chemicals would be made based on the actual consumption as per the certification by the Plant Manager

6.0 Delivery

6.1 First supply of chemicals consisting of 3 months requirement of regular chemicals, contingency chemicals required and the quantities of chemicals required for one pre-cleaning and passivation should be delivered at Stores (at FACT-PD) within 21 calendar days from the date of Purchase Order. The date of commencement of treatment will be intimated by the Plant Manager as 'Work To Proceed' notice. The contract period will be two years from the commencement date. Subsequent supplies of regular chemicals and chemicals required for two pre-cleaning and passivation shall be made within the lead-time agreed by the Vendor as per the delivery schedule issued by FACT. Vendor shall advise FACT for necessary modifications in delivery schedule. It shall be the responsibility of the vendor to monitor the actual requirements of chemicals in the plant and make available the materials to ensure continuous treatment without any interruption.

6.2 Date of delivery of chemicals at our Stores will be considered as the Delivery date.

6.3 Stock of chemicals required to meet contingency situation may be indicated separately and stocked at the time of commencement of the program.

7.0 Surplus Chemicals

7.1 The chemicals remaining at site and other items brought by the vendor shall be taken back by the vendor ex-FACT PD Stores after the contract period and subject to satisfactory completion and other formalities as per PO terms. Packing, freight and other charges for the return of the chemicals shall be in the vendor's scope. However FACT shall have the option to retain such stock for their use.

7.2 Payment made towards the surplus chemicals if any will be recovered by FACT.

8.0 Liquidated damages for delay in delivery

8.1 In the case of delay in commencement of the treatment, LD shall be applicable at the rate of 0.5% of the total order value per week of delay or part there of subject to a maximum of 7.5% of the total order value.

8.2 For delay in supply of chemicals during the treatment period LD shall be applicable at the rate of 0.5% of the total value of chemical of the respective delivery schedule per week of delay or part there of subject to a maximum of 7.5% of the total value of chemicals of the respective delivery schedule.

8.3 Vendor has to take care that there is no stock out situation. Stock out situation will be viewed very seriously and FACT has the option to terminate the contract without notice and without prejudice to FACT's rights otherwise as per contract.

9.0 Performance Evaluation and Guarantee

The treatment program would be assessed from the following aspects.

9.1 Corrosion Coupons

Corrosion evaluation shall be done every month. For PETRO-CPP Cooling Towers, the corrosion rate of coupons inserted in the racks shall not exceed 2 MPY for MS coupons and 0.2 MPY for Brass coupons, wherever applicable, monitored on a monthly basis.

In addition to this, the coupons should be free from inorganic or biological fouling, localized under deposit corrosion or pitting corrosion.

The installation and evaluation of corrosion coupon results shall be done jointly in the presence of concerned FACT personnel and vendor, in accordance with the procedure laid down in ASTM D-2688-94, test method A (re-approved 1999).

9.2 Microbiological Analysis

The program should limit microbiological levels as given below:

i)	TVC	-	1×10^5 Col/ml	(Max)
ii)	SRB	-	60 org/100 ml	(Max)
iii)	Nitrifying bacteria	-	20 org/100 ml	(Max)
iv)	Iron Bacteria	-	5 org/100 ml	(Max)

The above analysis will be done on a fortnightly basis.

9.3 Open inspection of exchangers and Scale and Deposit Control

FACT will periodically open process-heat exchangers or test heat exchangers put in line for control purposes and assess the condition of heat exchangers with respect to corrosion, scaling and bio-fouling. The treatment program should avoid heat transfer limitations arising out of fouling. Also there shall not be any tube leakage in heat exchangers due to inadequacy in cooling water treatment.

9.4 The party has to achieve the guarantee figures mentioned in 9.1 and 9.2 above during the treatment period. Conditions which do not permit achieving any of the above guarantees and which cannot be controlled by the vendor must be intimated to the Plant Manager in writing, who will verify the genuineness of the contention in consultation with Technical Services. Decision by FACT shall be final.

9.5 The treatment program should not give limitation to heat transfer rate. For the purpose of evaluation of heat exchanger performance the Cold End temperature difference of heat exchangers shall be taken as base.

Cold End Temperature difference of heat exchangers shall be calculated as follows:
Cold End Temperature Difference of the heat exchanger $= T_2 - T_{w1}\ ^0C$

Where,
T_2 is the process fluid outlet temperature of heat exchanger in ^0C
T_{w1} is the cooling water inlet temperature of heat exchanger in ^0C

For a fixed plant load and constant cooling water pressure, the 'Cold end temperature difference' should not increase more than 20% of the reference value recorded during the start-up of the program after stabilization of treatment.

For evaluation, the choice of critical heat exchangers can be fixed on implementation of the treatment program and after mutual discussion between the vendor and the concerned Plant Manager.

9.6 Failure on the part of the vendor in complying with any of the conditions 9.1 to 9.5 will be treated as performance failure.

10.0 Penalty for Shortfall in Performance

10.1 If the corrosion rate exceeds the guaranteed rate of 2 MPY on MS coupons and/or 0.2 MPY for Brass coupons, the penalty shall be paid by the vendor at the following rates subject to a maximum of 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered during the corresponding period.

1.5% (One and a half percentage) of the cost of chemicals consumed including taxes, duties, freight and cost of service charges during the corresponding treatment period for every increase of 0.1 MPY (One tenth (1/10) MPY) or part thereof on MS coupons and/or 0.01 MPY or part thereof on brass coupons.

10.2 If the microbiology analysis for two consecutive results exceeds the guaranteed figures as per 9.2 above, the penalty shall be applicable to the vendor as per the following rates.

1.25% (One and a quarter percentage) of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered for the corresponding treatment period for each one of the four (4) guarantees.

10.3 The maximum penalty under 10.1 and 10.2 above together for a particular month will however be limited to 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered.

11.0 Termination of contract within the contract period

11.1 In case the vendor is not able to achieve the guaranteed performance figures consecutively for three evaluations with regard to clause 9.1 and 9.2 above or fails to meet the performance evaluation and guarantee requirements under clause 9.3 to 9.5 above due to reasons attributable to the vendor, a show cause notice will be initially served to the vendor giving eight weeks' time for taking corrective action. In spite of the same, if the party is still not able to achieve the performance guarantees as per the above, FACT shall be at liberty to discontinue the treatment and carry out alternate arrangements at the risk and cost of the vendor.

11.2 However, even after discontinuation of contract, the vendor shall be bound to carry out the treatment for a period of 3 months or till finalisation of a new contract, whichever is earlier from the notice date at the same terms and conditions to enable FACT to arrange an alternative contractor.

In case of default by the vendor, FACT shall be at liberty to carry out the treatment using the available chemicals with the vendor and/or carry out alternate arrangements all at the risk and cost of the vendor.

11.3 Any stock out situation, as detailed under Sl No 8.3 above.

12.0 Packing

12.1 The chemicals shall be packed in HDPE containers. The packing shall be preferably in different coloured containers or with coloured stripes marked with brand name for different chemicals. Vendor shall clearly and indelibly indicate the shelf life, manufacturing date and batch number of each chemical on the container. The manufacturing date and batch No. should also be shown in the invoice.

12.2 Packing shall withstand hazards normally encountered during transportation, including loading and unloading operations, both by handling equipments and by pushing off.

13.0 Shelf life

The supply of chemicals should be from fresh stock and shall have a minimum shelf life of 6 months at the time of supply. Items for which shelf life expires while in our storage shall be replaced free of cost by the vendor. It shall be the vendor's responsibility to ensure that chemicals are drawn from Stores after considering the

shelf life.

14.0 Security Deposit and Performance Bank Guarantee

Bank Guarantee for 15% of the contract value for supply and services shall be furnished towards security deposit for faithful performance of the contract as per the contractual terms and conditions. The Bank Guarantee shall be furnished from a Nationalised/Scheduled Bank as per our format within 15 days of issue of order and shall be valid till the completion of the contract to the entire satisfaction of FACT with 6 months grace period thereafter.

15.0 General

15.1 The vendor shall faithfully observe the security regulations of FACT and any loss or damage incurred by FACT on account of the failure of the contractor or his employees to observe such security regulations shall be made good by the vendor at his expense.

15.2 Notice Correspondence

All instructions, directions and notices from FACT to the vendor and from the vendor to FACT for the purpose of the contract shall be conveyed in writing.

15.3 FACT's Rights

FACT has the right to make any investigation necessary to satisfy themselves of compliance by the vendor and reject any material or work that does not conform to the specification.

15.4 Statutory Regulations

Vendor shall, in all matters arising out of performance of the order, conform at his own expense with all acts, orders, regulations, rules and bye-laws of Government of India, State Governments, Local bodies and other authorities there under for the time-being in force and applicable to the work. Vendor shall also hold FACT harmless from liability or penalty, which might be imposed by reason of any asserted or established violation of such acts, regulations, rules etc.

Vendor shall indemnify and hold FACT harmless from all claims including patent claims, losses, demands, causes of action or suits arising out of the services, labour, equipment and materials furnished by the vendor under the Order.

15.5 Should any part of the work fail to achieve the performance specified by FACT, the vendor shall at his own cost effect required changes to achieve the required

specification of FACT.

15.6 Default

In the event of any default of vendor to comply with any of the provisions of requirement hereof, FACT shall have the right to terminate and cancel the order with or without notice and without prejudice to any other rights, options or remedies FACT may have and FACT shall be relieved from any further obligations to vendor hereunder. In the event of such default by the vendor, FACT shall be entitled to make alternate arrangements for materials and services at the risk and cost of the vendor. The waiver of any initial default shall not be considered an automatic waiver for any future default of the same or any other nature.

15.7 Force Majeure

15.7.1 Neither the vendor nor FACT shall be considered in default in the performance of their obligations as per the contract so long as such performance is prevented or delayed because of strikes, war, hostilities, revolution, civil commotion, epidemics, accidents, fire, cyclone, flood or because of any law and order proclamation, regulation or ordinance of Government or sub division thereof or because of any act of god, provided the party shall be promptly, in any case, not later than 14 days of happening of the event, notify the details of the force majeure and the influence on its activity under contract. The proof of existence of force majeure shall be provided by the party claiming to the satisfaction of the other.

15.7.2 Should either party be prevented from fulfilling the obligations provided for in the contract by the existence of clause(s) of force majeure lasting continuously for a period exceeding 3 months then the parties shall consult immediately with each other with regard to the future implementation of the contract.

15.7.3 In the event of indefinite delay, even if arising out of reasons due to force majeure, FACT shall have the right at their discretion to cancel the order or part of the order without any liability on their part to make any payment to the vendor, while reserving the right to claim refund of any payment if advanced or paid to the vendor.

15.8 Applicable Law And Settlement Of Disputes

This order shall be subject to and shall in all respects be governed by Indian Law.

If any dispute(s) arises out of or in connection with this contract, or in respect of any defined legal relationship associated therewith or derived there from, the parties agree to submit the disputes to arbitration under the ICADR (International

Centre for Alternative Dispute Resolution) Arbitration Rules 1996. The authority to appoint the Arbitrator shall be the International Centre for Alternative Dispute Resolution. The number of Arbitrator shall be one and the language of the arbitration proceedings shall be English. The place of arbitration proceedings shall be Ernakulam in Kerala.

Any legal proceeding relating to this order shall be limited to courts of law under the Jurisdiction of Kerala High Court at Ernakulam.

15.9 Entirety Of Contract

All the terms agreed to between the contractor and FACT are included in the order and no other communication, proposal, understanding, written, oral or implied will be considered to be included in the order or form part of the contract between the vendor and FACT. Unless specifically agreed to in writing by FACT with their acceptance of the contract with all its terms and conditions, vendor waives and considers as void any and all of his general conditions of contract.

APPENDIX-I

DETAILS OF PETRO-CPP COOLING TOWERS OF FACT

SL No	PARAMETER	PETRO-CPP TOWER	
		CPP TOWER	AUX TOWER
1	Circulation rate (m^3/h)	3000	2000
2	Hold up volume (m^3)	850	500
3	Cooling Range(typical) (°C)	10	10
4	Cooling water inlet temperature (typical) (°C)	41	40.5
5	Cooling water outlet temperature (typical)	31	30.5
6	Side Stream filters	2 Nos available Normally, one in line with 45 m^3/h throughput	1 No. available with 50 m^3/h throughput
7	Chlorinator	Available; Maximum flow 10 kg/h (Shared by CPP & Aux towers)	Shared by CPP & Aux towers
8	Heat Exchanger Metallurgy	Mainly admirality brass with a few CS heat exchangers.	Mainly admirality brass with a few CS heat exchangers.

APPENDIX –II

Raw Water Analysis : Typical Range		
Calcium as Ca	(ppm)	4.0 to 10.0
Magnesium as Mg	(ppm)	1.0 to 3.0
Aluminium as Al	(ppm)	< 0.02
Sodium as Na	(ppm)	3.0 to 10.0
M. Alk. as $CaCO_3$	(ppm)	10.0 to 15.0
Chloride as Cl	(ppm)	6.0 to 12.0
Sulphate as SO_4	(ppm)	10.0 to 20.0
Total Iron as Fe	(ppm)	0.1 to 0.3
Colloidal Iron as Fe	(ppm)	0.1 (Max)
Copper as Cu	(ppm)	0.05 (Max)
Total Silica as SiO_2	(ppm)	5.0 to 9.0
Org. Matter as $KMnO_4$	(ppm)	4.0 (Max)
Residual Cl_2 as Cl	(ppm)	0.1 to 0.2
Suspended Solids	(ppm)	3.0 to 10.0
pH		6.5 to 7.2
Total Hardness as $CaCO_3$	(ppm)	12.0 to 30.0
Reactive Silica as SiO_2	(ppm)	4.5 to 9.0

APPENDIX-III

PROFILE OF CONTAMINANTS OF COOLING TOWER

SL No	CONTAMINANT	PETRO-CPP TOWER	
		CPP TOWER	AUX TOWER
1	Nitrate as NO_3	From atmosphere and system	From atmosphere and system
2	Ammonia as Ammonical Nitrogen	From atmosphere and system	From atmosphere and system
3	Sulphur dioxide as SO_X	From atmosphere	From atmosphere
4	Oil/grease	From system	From system
5	Salinity as Chloride	From raw water ; occasional excursion during summer	From raw water ; occasional excursion during summer
6	Ammonium Sulphate	Not applicable	Not applicable

APPENDIX – IV

Dosage of chemicals for cooling water treatment on PETRO-CPP Cooling Towers

UNPRICED BID FORMAT For Cooling Water Treatment at PETRO-CPP					
A: PRECLEANING (Quantity and rate for THREE Precleaning)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
5	Acid Inhibitor (Name to be mentioned)			Price in BOQ	Price in BOQ
6	HCl (Qty. required to be quoted)			Supply by FACT	
B: PASSIVATION (Quantity and rate for TIIREE Passivation)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
C: CONTINGENCY CHEMICALS AND BIOCIDES					
	I. CONTINGENCY CHEMICALS for tackling contaminants.				
Item Sl No	Contingency Situation	CHEMICAL DESCRIPTION		For one time Qty. (Kgs)	Unit Price Rs/Kg
1	Nitrate as NO_3>500 ppm to 2000 ppm				Price in BOQ
					Price in BOQ
2	Ammoniacal Nitrogen as Ammonia > 50 ppm to 200 ppm				Price in BOQ
					Price in BOQ
3	Oil/Grease >15 ppm to 40 ppm				Price in BOQ
					Price in BOQ
4	Salinity as Cl > 250 ppm to 500 ppm				Price in BOQ
					Price in BOQ
	II. CONTINGENCY BIOCIDES (see clause 5.7 of Annexure-II) in absence of Chlorine for 4 days or more in a month.				
6	Absence of chlorine				Price in BOQ
					Price in BOQ

Dosage of chemicals for cooling water treatment on PETRO-CPP Cooling Towers

UNPRICED BID FORMAT For Cooling Water Treatment at PETRO-CPP							
D: REGULAR TREATMENT CHEMICALS AND BIOCIDES							
Item Sl No	Description	Dosage (PPM)	Qty.per day (kg)*	Qty.for one month (kg) (31 days)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs/Kg)	Total Price for 730 days (24 months) (Rs)
	I. REGULAR CHEMICALS						
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						TOTAL	
	II: REGULAR BIOCIDES (TO BE QUOTED FOR ONE DOSE) Pl.see note below:						
Item Sl No	Description	Dosage (PPM)	Qty. for one Dose (Kg)*	Unit Price (Rs./Kg)	No.of doses for 2 years**		Total Price for 2 years (Rs.)
1				Price in BOQ	24		Price in BOQ
2				Price in BOQ	24		Price in BOQ
						TOTAL	

E: CHEMICALS SUPPLIED BY FACT (see clause 5.8 of Annexure – II)						
Item Sl No	Description	Qty. for one day (Kg)*	Qty. for one month 31 days (kg)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs./Kg)	Total Price for 730days (24 months) (Rs.)
1	Chlorine				Price not to be indicated (Supply by FACT)	
2	Caustic Soda 100%					

The above rates shall be inclusive of P&F, Octroi, Transit Insurance, etc. but excluding the following, which are to be shown / quoted below:

	GST/TARIFF HEAD – Current Rate to be shown:	Price in BOQ
	INPUT TAX CREDIT – Current Rate/amount to be shown	Price in BOQ
	FREIGHT (Rate in Rs.per kg to be quoted)	Price in BOQ
	TECHNICAL SERVICE CHARGES FOR 2 YEARS including GST to be Quoted	Price in BOQ
	OTHER CHARGES (if any to be specified and quoted)	Price in BOQ
Notes	*Chemical projection to be rounded to 3 decimals.	
	**The regular biocides are used once in 15 days alternatively.	

APPENDIX – V

PRECLEANING

1 System is filled with fresh make up water giving maximum blow down during the filling.

2 Recommended dosage of biocide and bio-dispersant is added. Circulation is maintained for 24 hours and the system is drained.

3 System is filled with fresh make up water giving maximum blow down during the filling. Recommended dosage of mineral dispersant is dosed and system is kept under circulation.

4 The iron content in the circulating water is checked until it is ensured that there is no increase in the values.

5 Hydrochloric Acid mixed with acid corrosion inhibitor (dosage to be specified) is added to the system while pH is monitored. The pH is to be brought down to 5.0 to 5.5. The circulation is continued while mineral dispersant (dosage to be specified) is added. System is kept under circulation while monitoring the iron value and turbidity. As soon as the values are steady, heavy blow down is started with simultaneous make up in order to bring the pH value to >6.5 and NTU to <5.0.

PASSIVATION

Immediately after pre-cleaning and as soon as system pH is stabilized, corrosion inhibitor with mineral dispersant is dosed and Phosphate and Zinc levels are brought up to levels indicated below while maintaining the pH between 6.9 and 7.2.

Orthophosphate	-	15	ppm
Zinc	-	5.0	ppm

Circulation is continued while monitoring the Phosphate level and dosing the corrosion inhibitor is done to maintain Phosphate till steady values are obtained. The system may be allowed to continue for 72 hours and after passivation, blow down is started with make-up in order to bring the system to normal operating condition.

APPENDIX – VI

GENERAL CRITERIA FOR EVALUATION OF TENDERS

The general criteria for evaluation of the offers for cooling water treatment are as follows

1. Based on economics among the technically acceptable bids, FACT shall select the suitable treatment program (i) with chlorine and supporting biocides or (ii) with chlorine dioxide and supporting biocides, for PETRO-CPP cooling towers.
2. The cost of chemicals required for 3 Nos. of pre-cleaning, 3 Nos. of passivation and regular treatment chemicals required for a period of two years (24 months) and the Technical service charges for two years shall be considered for evaluation.
3. The cost of all chemicals including Chlorine, HCl and Caustic soda (as 100%) indicated in the offer shall be taken for evaluation.
4. Cost of contingency chemicals and contingency biocides shall not be considered for evaluation.
5. Cost of any other chemicals, which the vendor requires for the treatment and FACT agrees to supply shall be added on the price for evaluation.
6. The cost of chemicals provided by FACT and considered for evaluation will be based on the price at which the chemicals are bought by FACT on the day of opening the price bids.
7. Evaluation shall be on landed cost basis after taking Input tax credit benefit (wherever applicable) into account.
8. Acceptable Deviations, if any, on technical and commercial terms shall be appropriately loaded on the price for evaluation at the discretion of FACT.

APPENDIX – VII

COOLING WATER TREATMENT PROGRAMME

By :
Name of Tower :
For the month of :
P.O. No. :

Regular Treatment Chemicals consumption on monthly basis – quantity in Kg.

No.	Chemical Name	Limit for one month (31 days) as per P.O.	Actual consumption for the month	Excess qty. on Vendor's cost as per TPS	Excess qty. on FACT's cost attributed to FACT as per TPS	Pre-cleaning & Passivation (if applicable for the month)	Remarks

Chemicals consumption on annual basis (Kgs)

No.	Chemical Name	Limit for one year (365 days) as per P.O.	Qty. consumed for the month of...	Cumulative days from	Cumulative qty. from	Excess qty. on Vendor's cost as per TPS	Remarks
1	Chlorine						
2	Caustic Soda as 100%						

Microbiology Analysis & Corrosion Rate Details:
Analysis Frequency for microbiology is Fortnightly & Corrosion Rate is once in a month

No.	Name of Microbiology	Unit	Limit as per P.O	Actual analysis for the month	Sampling Date	REMARKS AND PENALTY, IF ANY
1	TVC	Col/ml	100000			
2	SRB	Org/100 ml	60			
3	Nitrifying Bacteria	Org/100 ml	20			
4	Iron Oxidising Bacteria	Org/100 ml	5			
5	Corrosion Rate (MS coupons)	MPY	2			
6	Corrosion Rate (Brass coupons)	MPY	0.2			

ANNEXURE- I

PRE-QUALIFICATION DETAILS OF VENDORS FOR NON-CHROMATE TREATMENT OF CIRCULATING COOLING WATER OF MAIN COOLING TOWER IN FACT – PETROCHEMICAL PLANTS IN UDYOGAMANDAL COMPLEX

FACT reserves the right to verify the information given as per the format and enclosures. It is the responsibility of the applicant to give the full details asked for as per the format. Any misrepresentation of facts and withholding of information may result in disqualification.

A0	ADDRESS OF BIDDER	:
A1	Email	:
A2	Telephone & Mobile	:
A3	Fax	:
A4	Contact person	:
B0	KOCHI ADDRESS, IF ANY	:
B1	Email	:
B2	Telephone & Mobile	:
B3	Fax	:
B4	Contact person	:
C0	CONSTITUTION	
C1	Proprietary ( ) Partnership ( ) Pvt. Ltd ( )	
	Pub.Ltd ( ) Pub.Sector ( )	
C2	Registration No	:
C3	Relevant Act	:
C4	Relevant proof for the above attached	: Yes ( )

PETRO-MCT CWT PROGRAMME

D0	NAME AND ADDRESS OF CHIEF EXECUTIVE	:
D1	E-mail	:
D2	Telephone and Mobile	:
D3	Fax	:
E0	ADDRESS OF YOUR BANKERS	:
E1	Email	:
E2	Telephone & Mobile	:
F0	FINANCIAL DATA Description (as per latest audited accounts)	
F1	Paid up capital	:
F2	Free Reserves & Surplus	:
F3	Accumulated loss	:
F4	Long term debts	:
F5	Total current assets	:
F6	Current liabilities (including provisions)	:
F7	Fixed asset (Gross)	:
F8	Depreciation	:
F9	Turnover	:
F10	PAT (Profit After Tax)	:
F11	Turnover for the last three years (Provide true copies of Balance Sheet & P/L for the last three years)	:
G0	FACILITIES	
G1	Factory address	:
G2	Whether own factory	: Yes ( ) No ( )
G3	No. of skilled workers	:
G4	No. of unskilled workers of Managerial staff:	
G5	Production capacity (MT per day)	:
G6	Whether adequate facilities available for formulation and quality control (Provide proof)	:

H0 EXPERIENCE

H1 Whether cooling water treatment carried out for at least two years during the last ten years in cooling tower of any large Ammonia Plant or any Petrochemical plant capable of handling ammonia contamination with a circulation of at least 5000 m^3 per hour:

Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during the last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The circulation rate should be clearly mentioned in the documentary proof attached.

H2 If so, details of such contracts executed by the bidder and performance are to be indicated as below

Sl no	Contract No. & date	Contract Period & Value	Client	Circulation Rate (m^3/h)	Period of Treatment	Whether treatment covers a Turnaround of the plant	Performance report of cooling water treatment certified by clients etc
1							
2							
3							
4							

Note. To provide true copies in support of the above.

H3 Whether treated cooling water with low hardness (< 150 mg/l) and low alkalinity (< 80 mg/l) for at least two years during last ten years on bid closing date:

Yes ( ) No ( )

One work order for continuous cooling water treatment for a period of at least two years during last ten year period, ending on bid closing date.

Or

Two work orders for continuous cooling water treatment for a period of at least one year during last ten year period, ending on bid closing date.

The work order date, work commencement date and work completion date shall be within the above 10 year period. The values of hardness and alkalinity should be clearly mentioned in the documentary proof attached.

H4 If so, details of such contracts executed by the bidders are to be indicated as below.

Sl No	Contract No. & date	Contract Period & Value	Client	Hardness of water	Alkalinity of water	Remarks if any
1						
2						
3						
4						

NB: To provide certificates in support of the above. For FACT contracts, PO number is sufficient.

I0 OTHER DETAILS

I1 Whether there is any serious labour unrest at present : Yes ( ) No ( )

I2 When does the current long term contract with workers expire : Yes ( ) No ( )

I3 Have you been blacklisted by Govt Dept, Pulic Sector, Quasi Govt undertaking : Yes ( ) No ( )

I4 Any criminal cases pending against you/firm: Yes ( ) No ( )

J0 MOBILISATION TIME : ..... days from receipt of PO

K0 LEAD TIME (Time required for supply of subsequent lot of chemicals from the date of receipt of intimation via e-mail) : ..... weeks from receipt of e-mail

L0 FOLLOWING DOCUMENTS ARE TO BE ENCLOSED

L1 Audited BALANCE SHEET and statement of PROFIT & LOSS for the past 3 years : Yes ( ) No ( )

L2 Copies of INCOME TAX RETURNS for last 3 years : Yes ( ) No ( )

L3	SOLVENCY CERTIFICATE (ORIGINAL) : FROM NATIONALISED/SCHEDULED BANKS WORTH MINIMUM RS.15 LAKHS		Yes ( )	No ( )
L4	Proof of CONSTITUTION OF YOUR FIRM	:	Yes ( )	No ( )
L5	Previous EXPERIENCE/COMPLETION CERTIFICATE FROM THE CLIENT in support of clauses H2 and H4 above	:	Yes ( )	No ( )
L6	Copies of CONTRACTS UNDERTAKEN in fulfilment of clauses H2 and H4 above	:	Yes ( )	No ( )

DECLARATION

I/We hereby declare that the particulars furnished above are true to the best of my/our knowledge and belief. I/We hereby agree that FACT shall have the right to visit my/our office/works to satisfy themselves that the particulars furnished above are correct and I/We shall furnish any additional information/documents that may be required by FACT. I/We understand that suppression of any facts/furnishing false information shall render us liable for removal from the list of vendors.

Authorised Signatory
Name :
Designation :

Date :
Place : (STAMP)

ANNEXURE-II

Technical Specification for Non-Chromate treatment of circulating cooling water in Main Cooling Tower of FACT – Petrochemical Plants in Udyogamandal Complex

1.0 Introduction

1.1 This technical specification gives the requirements of the cooling water treatment program for the main cooling tower of FACT UC –Petrochemical plants, identified as PETRO-MCT

1.2 The treatment schemes for the tower shall be non-chromate based treatment programme with chlorination and supporting biocides.

1.3 The treatment scheme shall be comprehensive and guarantee linked.

2.0 Details of Cooling Tower

The details of the cooling tower can be seen in APPENDIX – 1.

3.0 Heat Exchanger Metallurgy

The materials of construction of heat exchangers with respect to each cooling tower system can be seen in APPENDIX-1.

4.0 Make-up Water

The source of make-up water is from the water treatment plant of FACT-UC, which draws raw water from River. The typical analysis of make-up water (Raw Water) is furnished in APPENDIX-II. The vendors are free to verify these values using their facilities at their cost. The Free Residual Chlorine (FRC) indicated in the make-up water is typical.

5.0 Treatment Required

On-line changeover of the cooling water treatment program is envisaged to begin with. In subsequent years, pre-cleaning and passivation is required before the commencement of the regular treatment program. Vendors are required to acquaint themselves with the present systems and devise suitable programs for each of the cooling water systems.

5.1 The broad outline of the scheme of treatment shall consist of:

i. Change over from the present treatment program of cooling water systems.
ii. Subsequent commissioning of the treatment programs and continuous operation of the cooling water systems.

5.2 Type of chemicals required for treatment.

a) Corrosion Inhibitor – Organophosphate and Zinc Based (1 No. Min).

b) Dispersant / Anti-flocculent / Anti-scalant – Polymer based (1 No. Min).

c) Bio-dispersant - 1 No. Min.
(Dispersant/Bio-dispersant level should be prescribed so that the turbidity of cooling water is not greater than 25 NTU preferably).

Note: Dispersant and Bio-dispersant should be independent and not combined.

d) Non-oxidizing biocides – 2 Nos. Min. The programme should take care of immunity effects also. The frequency of dosage shall be once in 15 days.

e) Chlorine Activator - 1 No. (Compulsory for Chlorine based treatment. Optional for Chlorine dioxide based treatment)

f) Chemicals/Biocides required in the absence of chlorination – 1 No. Min. (see clause 5.7).

g) Chemicals required for chlorine- di oxide preparation (1 No. Min for Chlorine dioxide treatment, Not applicable for Chlorine based treatment).

h) Copper corrosion inhibitor-1 No. Min.
(This is applicable wherever copper, copper alloy metallurgy is involved. Hence applicable to PETRO-MCT cooling tower)

i) Acid corrosion inhibitor for pre-cleaning – 1 No. Min.

j) Contingency Chemicals – Additional quantity of chemicals/any additional new formulations required for handling the following contingency situation may also be included in the program.

- Nitrate as NO_3 – 2000 ppm (Max)
- Ammoniacal Nitrogen as NH_3 – 200 ppm (Max)
- Oil and Grease – 40 ppm (Max)

- Salinity as Chloride – 500 ppm (Max)
- Soluble/insoluble organics - 40 ppm (Max)

Vendor shall furnish the details of conditions under which the formulation has to be used, quantity to be used for various ranges of contaminants, technical details of the product offered and the quantity to be stocked. In case the formulation is not required to be used during the period of contract/the shelf-life of the product expires, it shall be taken back/replaced by the vendor at his cost.

5.3 The dosage of chemicals is to be clearly indicated in the offer. All the above chemicals should be biodegradable and non-hazardous. All chemicals must be free flowing and should be added by means of dozing pumps, except for the slug-dosed chemicals. The chlorine activator should be dozed in to the chlorinated water leaving the chlorinator.

5.4 The chemicals requirement for regular treatment for the systems shall be based on typical cooling range and the rates of evaporation loss and blow down rates for the tower is calculated for 5 cycles of concentration and tabulated below: The blow down rates indicated are inclusive of drift losses.

Sl No	Parameter	Tower PETRO-MCT
1	Range °C	9
2	Evaporation m^3/h	161
3	Blow down m^3/h	40.25

5.5 The following contaminants are expected in cooling water.

(a) Oil (Lube oil / grease), (b) Ammonia, (c) SO_2 and NO_x (from atmosphere), (d) Salinity as Chloride, (e) Soluble/insoluble organics. The profile of contaminants with respect to cooling water system is given in APPENDIX – III.

The upper limits of contaminants in the cooling tower sump, expected to be treated under normal treatment programme, is given below and the guarantees should hold good for the same.

- Nitrate as NO_3 – 500 ppm (Max)
- Ammoniacal Nitrogen as NH_3 – 50 ppm (Max)
- Oil and Grease – 15 ppm (Max)
- Salinity as Chloride – 250 ppm (Max)
- Soluble/insoluble organics - 15 ppm (Max)

5.6 Bio-control shall be through chlorination and use of supporting biocides or through ClO_2 treatment along with supporting biocides.

5.7 Chlorination for the cooling tower PETRO-MCT will be continuous. Facility for continuous chlorination is available at PETRO-MCT. Considering the extensive copper/copper alloy metallurgy involved in the heat exchangers of this cooling tower, intermittent chlorination is preferred

The vendors are free to opt for converting part of chlorine to-chlorine-di-oxide for optimization of chlorine and caustic consumption if they desire so for better performance and control for PETRO-MCT. However whenever there is continuous interruption to chlorination (Four days or more in a month), the Vendor shall use chemicals/biocides. Dosage of these chemicals shall be specified separately. All guarantees shall be valid during this period also.

5.8 The Acid (Hydrochloric Acid - HCl) required for pre-cleaning, Caustic Soda and Chlorine required for the regular treatment will be supplied by FACT. Vendor shall specify the quantities of HCl, Caustic Soda and Chlorine in the format as per APPENDIX-IV – PETRO-MCT for the treatment program. The indicated quantity of HCl, Caustic Soda and Chlorine will be considered for evaluation purpose. For chemicals implied in price evaluation, the cost of chemicals consumed in excess of the specified dosages shall be to the Vendor's account at the prevailing rates. Please refer Sl. No. 5.13 also.

5.9 The control limits and parameters including level of Phosphate and Zinc to be maintained in circulating cooling water for satisfactory performance of their recommended treatment and the smooth operation of the cooling water system shall be specified by the Vendor. The pH shall be maintained between 7.0 -7.5. However Vendor may indicate their preferred minimum operating pH. At the lower limit, Free Residual Chlorine (FRC) shall be maintained at 0.1 ppm for PETRO-MCT cooling tower. The higher limit for FRC shall be 0.25 ppm. The ClO_2 level shall be positive minimum and shall be indicated by the vendor.

5.10 Determining the quantity and frequency of dosage of chemicals required for normal treatment shall be based on 5 cycles of concentration. The parameter for assessing cycles of concentration of the system shall be Silica concentration in circulation water.

5.11 The dosage, the daily quantities of chemicals and monthly quantities required for normal treatment program, based on 31 days per month, should be furnished by the vendor along with technical offer as in APPENDIX-IV – PETRO-MCT. Since the addition of non-oxidising biocides is followed by blow-down, the quantities of

chemicals required for making up this loss should also be considered while estimating the quantities of chemicals for regular/normal treatment.

For PETRO-MCT cooling tower, price bid format without price shall be filled for either (1) program with chlorination and supporting biocides Or (2) program with chlorine dioxide and supporting biocides or both.

5.12 The offer should be accompanied with a brief description of the chemicals, their functions and advantages/limitations. Details of chemicals as per clause 6.8 are to be submitted by the Vendor with the offer.

5.13 Chemicals consumed in excess of specified quantities (as given in 5.11) in order to achieve performance guarantees under normal treatment program will be to the Vendor's account. The excess consumption, if any, shall be ascertained and recovery shall be made on a monthly basis. However, excess consumption of chemical will be based on the actual number of treatment days in the month.

In the case of caustic soda and chlorine, the quantities shall be ascertained on yearly basis and accordingly, recovery shall be made.

Refer APPENDIX-VII regarding consumption and other details for sample cooling water treatment program for a month.

In case the excess consumption of Chemicals (inclusive of Caustic Soda and chlorine) is by virtue of a new contaminant introduced in the cooling water due to system leaks attributed to FACT and not specified in this TPS, this shall be assessed by FACT and the excess chemical consumption in such a case shall be to FACT's account. However, such a situation should be reported to FACT immediately in writing by the vendor, failing which any future claims by the vendor may not be entertained later. Decision of FACT in this regard will be final.

5.14 If the actual Cycles of Concentration (COC) achieved is less than 5, and the lower COC is due to system leaks, then the excess chemical consumption shall be borne by FACT.

Extra chemicals consumed (regular chemicals, biocides, dispersants and caustic soda) through additional blow down and makeup required for controlling the effects of contaminants when they are above the upper limits specified in 5.5, will be borne by FACT. However all guarantees will be applicable during the contingencies specified in 5.2(j). These situations should be reported to FACT in writing immediately by the vendor.

5.15 During the course of treatment, all efforts shall be made by Vendor jointly with

FACT to optimize chemical consumption and to enhance cycles of concentration without affecting performance.

6.0 Scope of Work of Vendor

The scope of work shall cover the following aspects.

6.1 To devise scheme of treatment, supply and meet the complete requirements as per this enquiry but not limited to the following:

i. Initial Pre-cleaning and passivation. Typical procedure is given in APPENDIX- V. Vendor shall furnish detailed procedure for the above.
ii. Subsequent Pre-cleaning and Passivation immediately after the annual turnarounds for two years. Normally annual turnaround is taken during April/May every year. Vendor shall furnish detailed procedure for the above.
iii. Regular treatment program for control of corrosion, scale and deposits and microbiological control.
iv. Any passivation required after bringing on line cleaned heat exchangers and if cleaning/changing of heat exchangers is found necessary and is contemplated during the tenure of the contract.
v. Technical Services as detailed under Sl No 7.0 below

6.2 Uninterrupted supply of chemicals –

The vendor shall ensure uninterrupted supply of chemicals for the treatment. The material received shall be stocked at FACT –PD stores.

6.3 The following items shall be made available by the vendor free of cost to the cooling water system under consideration and the Vendor shall maintain these items and can take back the items after completing the treatment program.

1. At least two Corrosion racks as per ASTM Standards. The racks shall have facility to lock and shall be kept under lock and key.
2. Bio fouling monitors, if any.
3. Deposit monitors, if any.
4. Chemical dosing system for all Chemicals, except for the slug dosed chemicals, comprising the necessary metering devices, dosing pumps etc.
5. Dosing tanks.
6. Corrosion Scanning Instruments, if any.
7. Dip Slides (minimum 24 Nos. per annum).
8. Trend corrosion coupons & Corrosion rack for the same.
9. Any other latest instruments/gadgets for better performance.
10. ClO_2 generators for Chlorine dioxide treatment programme.

6.4 M.S standard coupons as per ASTM-SA 283 Grade C, with certificate of

metallurgy of coupons, will be supplied / used by FACT. These coupons will be treated as official coupons for evaluation purpose, as per ASTM 2688 – 94, test method A (re-approved 1999). The vendor shall put standard coupons in the Trend rack to know the performance trend of the treatment program continuously.

6.5 Erection and commissioning of dosing equipments such as dosing tanks, metering pumps, corrosion measuring equipments like corrosion coupon rack with locking facility, flow meters, fouling monitors, deposit monitors etc. as in 6.3 above shall be under the scope of vendor. Necessary power and water points for the above shall be made available by FACT.

6.6 The vendor as per the dosage levels given in APPENDIX-IV- PETRO-MCT shall carry out dosing of chemicals. Sample collection and analysis will be done by FACT and may be counter checked by the vendor, if required, using the facilities available.

6.7 Continuous dosing chemicals shall be added using metering pumps supplied by vendor.

6.8 Data to be submitted.

Following data has to be submitted by the vendor along with the offer:

a) Nature of chemicals and material safety data sheet and procedure for safe handling and first aid requirement in case of accident.
b) A letter of warranty that the chemicals are not hazardous, as specified by Department of Environment and Chemicals, and are bio-degradable in nature.
c) BOD at 27 °C and COD values of all chemicals.
d) Analytical procedure / method to determine the active ingredients of all chemicals used for the treatment, procedure to determine the activity / effectiveness of the biocides and analytical methods for estimation of various chemicals in the re-circulation water.
e) The functions of each formulation separately like corrosion inhibition, scale / deposit inhibition, dispersion, chlorine activation, biocide etc.
f) Shelf life, packing details and safe handling methods of all formulations.

7.0 <u>Technical Services</u>

7.1 Vendor shall provide services in areas pertaining to startup, program monitoring, optimization, testing, troubleshooting and training during the complete tenure of contract.

7.2 Vendor's competent representative shall be available at site every day during the

treatment period to ensure maintaining of all recommended parameters with respect to cooling water. The Vendor should maintain the necessary supporting documents. The Vendor shall maintain a daily log of activities carried out at site and submit daily report and monthly report to the concerned Plant Manager in triplicate about the running of the cooling water system including the cooling water inlet and outlet temperatures, blow down, re-circulation rate, chemical and microbiological analysis of water, chemical consumption, excess consumption if any, stock of chemicals, corrosion rate and other guaranteed parameters of cooling tower and performance of selected critical and vital exchangers. The monthly report should be submitted to the Plant Manager within 10th day of the succeeding month. However any abnormality noticed should be brought to the notice of FACT in writing within 24 hours of the occurrence of such abnormalities.

7.3 The treatment program shall be stabilized within 15 days of commencement of regular treatment and a note to confirm this stabilization shall be furnished by the vendor to the concerned Plant Manager. First coupon, Bio-fouling monitor and Deposit monitor shall be put in line within one week of stabilization.

7.4 Vendor's Site Representative shall be conversant with analytical methods, microbiological tests and shall be equipped to advise FACT for immediate corrective action in case of system upset conditions due to ingress of contaminants such as Nitrates, Ammonia, Oil/grease, salinity etc., in cooling water.

7.5 Vendor has to provide 3 copies of the procedure of treatment program before implementation of the program.

7.6 The treatment program shall be reviewed and recorded jointly by the vendor and FACT once in thirty days.

7.7 The typical ranges of control parameters for cooling water are indicated below. However vendors shall indicate the range of parameters recommended for their treatment program and the maximum/minimum limits applicable. The limits specified by the vendor shall be consistent with the requirement of operating the cooling tower at five cycles of concentration. The vendor shall ensure that the control parameters are maintained within the ranges recommended for their treatment program.

TYPICAL RANGES OF COOLING WATER CONTROL PARAMETERS

Sl. No	Parameter	Units	Range
1	Total Hardness (as $CaCO_3$)	mg/l	150 (Max)
2	Calcium Hardness (as $CaCO_3$)	mg/l	100 (Max)

3	Magnesium Hardness (as $CaCO_3$)	mg/l	50 (Max)
4	Inorganic Phosphate	mg/l	10-12
5	Zinc	mg/l	1.5-3.0
6	Total Iron as Fe	mg/l	3.0 (Max)
7	Copper as Cu	mg/l	0.15 (Max)
8	Total Silica	mg/l	100 (Max)
9	pH		7.0-7.5
10	Free Residual Chlorine	mg/l	0.1 - 0.25
11	M. Alkalinity	mg/l	80 (Max)
12	Chloride as Cl	mg/l	250 (Max)
13	Total Dissolved Solids	mg/l	1000 (Max)
14	Total Suspended Solids	mg/l	20 (Max)
15	Turbidity	NTU	25 (Max)
16	Ammoniacal Nitrogen as NH_3	ppm	50 (Max)
17	Nitrate as NO_3	ppm	500 (Max)
18	Oil / grease	ppm	15 (Max)
19	Soluble/insoluble organics	ppm	15 (Max)
20	ClO_2	ppm	By Vendor

Vendor should specify the limit of ClO_2 to be maintained for the ClO_2 program.

8.0 Performance Guarantee

The criteria for performance evaluation and the guarantees required are explained under clause 9.0 of Special Terms and Conditions (Annexure-III). The guarantees should also hold good in the presence of contaminants under conditions outlined in clauses 5.2(j) and 5.5.

ANNEXURE-III

Special Terms and Conditions

1.0 Scope of work

1.1 The scope of work shall be as specified under clause 6.0 of technical specifications. (Annexure-II)

1.2 The supply of chemicals shall be done by the vendor on staggered basis, in such a way that the stock of required chemicals for treatment of the cooling water systems under consideration is essentially maintained in Stores (FACT-PD) based on the Annual schedule for the delivery of the chemicals, which is to be furnished by the vendor. Any deviation or delays in delivery shall attract Liquidated Damage (LD) as per clause 8.0. The annual schedule of delivery of chemicals shall be revised as and when required by the vendor depending upon the site requirement and treatment conditions, subject to approval of FACT.

2.0 Duration of Contract

The contract is envisaged for a period of two (24 months) years, from the date of commencement of treatment. FACT also reserves the right to terminate / cancel the order due to unsatisfactory performance as detailed in clause 10.0 and 11.0 below.

3.0 Acceptance

Vendor shall acknowledge receipt of Purchase Order within 15 days of the date of its issue by returning a copy thereof duly signed by an authorized officer in confirmation that the vendor accepts all terms and conditions contained therein and is proceeding accordingly. If this is not furnished within 15 days of receipt of Purchase Order, it will be presumed that the vender has accepted the Purchase Order in toto.

4.0 Price

4.1 Price shall be firm without any escalation throughout the duration of the contract as defined in 2.0 above.

4.2 Price quoted shall be for delivery to our Stores inclusive of packing and forwarding charges, octroi, transit insurance and any other charges. Freight charges payable shall be shown separately.

4.3 Taxes and duties on the supplied goods shall be paid extra at actuals. GST will be paid against documentary evidence. Documents enabling FACT to avail INPUT

TAX CREDIT benefit shall be furnished by the vendor on request by FACT. Present rate of taxes and duties also are to be indicated separately. Unless otherwise specified, all Central, State or Municipal taxes, duties and levies payable shall be deemed to have been included in the price.

4.4 In case the rate of duties and taxes on the finished goods are revised by the Government by Statutory Orders, during the delivery period stipulated in the order, the extra cost so incurred shall be reimbursed by FACT based on documentary evidence. Any reduction on such duties and taxes shall be passed on to FACT. If delivery is delayed beyond the time stipulated in the order and the rates go up, during this period of delay, the extra cost so incurred shall be borne by the seller. However, any reduction in this case shall be passed on to FACT. All such variations shall be supported by documentary evidence and proof of payment.

4.5 In the absence of specific mention of all the applicable taxes/duties/levies with applicable percentages thereof in the price specified, no claim for extra payments on account of these shall be entertained by FACT.

4.6 All taxes, duties and levies payable by the vender on his purchases from his suppliers are deemed to be included in the price and any variations therein shall not affect the price payable by FACT as per order in any manner.

4.7 Prices shall be quoted as per APPENDIX-IV- PETRO-MCT in the price bid. Prices for pre-cleaning and passivation etc. shall be quoted separately in the above formats. Technical Service charges, if any, should be quoted separately against the appropriate columns. Service tax, in case, to be paid extra shall be indicated separately.

5.0 Payment

5.1 100% payment within 30 days of receipt and acceptance of chemicals at FACT stores as per this specification and delivery schedule issued by FACT.

The technical service charges quoted, if any, shall be paid on monthly basis. Proportionate deduction in payment shall be made if the treatment is discontinued for more than seven days continuously due to unforeseen shut downs.

5.2 Cost of extra chemicals as per clause 5.8 and 5.13 of Annexure-II and deductions as per clause 7.0, 8.0 and 10.0 herein shall be recovered at the prevailing cost to the company from any payment due to the vendor or from the security deposit / performance bank guarantee amounts.

5.3 The payment towards contingency chemicals would be made based on the actual consumption as per the certification by the Plant Manager

6.0 Delivery

6.1 First supply of chemicals consisting of 3 months requirement of regular chemicals, contingency chemicals required and the quantities of chemicals required for one pre-cleaning and passivation should be delivered at Stores (at FACT-PD) within 21 calendar days from the date of Purchase Order. The date of commencement of treatment will be intimated by the Plant Manager as 'Work To Proceed' notice. The contract period will be two years from the commencement date. Subsequent supplies of regular chemicals and chemicals required for two pre-cleaning and passivation shall be made within the lead-time agreed by the Vendor as per the delivery schedule issued by FACT. Vendor shall advise FACT for necessary modifications in delivery schedule. It shall be the responsibility of the vendor to monitor the actual requirements of chemicals in the plant and make available the materials to ensure continuous treatment without any interruption.

6.2 Date of delivery of chemicals at our Stores will be considered as the Delivery date.

6.3 Stock of chemicals required to meet contingency situation may be indicated separately and stocked at the time of commencement of the program.

7.0 Surplus Chemicals

7.1 The chemicals remaining at site and other items brought by the vendor shall be taken back by the vendor ex-FACT PD Stores after the contract period and subject to satisfactory completion and other formalities as per PO terms. Packing, freight and other charges for the return of the chemicals shall be in the vendor's scope. However FACT shall have the option to retain such stock for their use.

7.2 Payment made towards the surplus chemicals if any will be recovered by FACT.

8.0 Liquidated damages for delay in delivery

8.1 In the case of delay in commencement of the treatment, LD shall be applicable at the rate of 0.5% of the total order value per week of delay or part there of subject to a maximum of 7.5% of the total order value.

8.2 For delay in supply of chemicals during the treatment period LD shall be applicable at the rate of 0.5% of the total value of chemical of the respective delivery schedule per week of delay or part there of subject to a maximum of 7.5% of the total value of chemicals of the respective delivery schedule.

8.3 Vendor has to take care that there is no stock out situation. Stock out situation will be viewed very seriously and FACT has the option to terminate the contract without notice and without prejudice to FACT's rights otherwise as per contract.

PETRO-MCT CWT PROGRAMME

9.0 Performance Evaluation and Guarantee

The treatment program would be assessed from the following aspects.

9.1 Corrosion Coupons

Corrosion evaluation shall be done every month. For PETRO-MCT Cooling Tower, the corrosion rate of coupons inserted in the racks shall not exceed 2 MPY for MS coupons and 0.2 MPY for Brass coupons, wherever applicable, monitored on a monthly basis.

In addition to this, the coupons should be free from inorganic or biological fouling, localized under deposit corrosion or pitting corrosion.

The installation and evaluation of corrosion coupon results shall be done jointly in the presence of concerned FACT personnel and vendor, in accordance with the procedure laid down in ASTM D-2688-94, test method A (re-approved 1999).

9.2 Microbiological Analysis

The program should limit microbiological levels as given below:

i)	TVC	-	1×10^5 Col/ml	(Max)
ii)	SRB	-	60 org/100 ml	(Max)
iii)	Nitrifying bacteria	-	20 org/100 ml	(Max)
iv)	Iron Bacteria	-	5 org/100 ml	(Max)

The above analysis will be done on a fortnightly basis.

9.3 Open inspection of exchangers and Scale and Deposit Control

FACT will periodically open process-heat exchangers or test heat exchangers put in line for control purposes and assess the condition of heat exchangers with respect to corrosion, scaling and bio-fouling. The treatment program should avoid heat transfer limitations arising out of fouling. Also there shall not be any tube leakage in heat exchangers due to inadequacy in cooling water treatment.

9.4 The party has to achieve the guarantee figures mentioned in 9.1 and 9.2 above during the treatment period. Conditions which do not permit achieving any of the above guarantees and which cannot be controlled by the vendor must be intimated to the concerned Plant Manager in writing, who will verify the genuineness of the contention in consultation with Technical Services. Decision by FACT shall be final.

PETRO-MCT CWT PROGRAMME

9.5 The treatment program should not give limitation to heat transfer rate. For the purpose of evaluation of heat exchanger performance the Cold End temperature difference of heat exchangers shall be taken as base.

Cold End Temperature difference of heat exchangers shall be calculated as follows:
Cold End Temperature Difference of the heat exchanger = $T_2 - T_{w1}$ ^0C

Where,
T_2 is the process fluid outlet temperature of heat exchanger in ^0C
T_{w1} is the cooling water inlet temperature of heat exchanger in ^0C

For a fixed plant load and constant cooling water pressure, the 'Cold end temperature difference' should not increase more than 20% of the reference value recorded during the start-up of the program after stabilization of treatment.

For evaluation, the choice of critical heat exchangers can be fixed on implementation of the treatment program and after mutual discussion between the vendor and the concerned Plant Manager.

9.6 Failure on the part of the vendor in complying with any of the conditions 9.1 to 9.5 will be treated as performance failure.

10.0 Penalty for Shortfall in Performance

10.1 If the corrosion rate exceeds the guaranteed rate of 2 MPY on MS coupons and/or 0.2 MPY for Brass coupons, the penalty shall be paid by the vendor at the following rates subject to a maximum of 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered during the corresponding period.

1.5% (One and a half percentage) of the cost of chemicals consumed including taxes, duties, freight and cost of service charges during the corresponding treatment period for every increase of 0.1 MPY (One tenth (1/10) MPY) or part thereof on MS coupons and/or 0.01 MPY or part thereof on brass coupons.

10.2 If the microbiology analysis for two consecutive results exceeds the guaranteed figures as per 9.2 above, the penalty shall be applicable to the vendor as per the following rates.

1.25% (One and a quarter percentage) of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered for the corresponding treatment period for each one of the four (4) guarantees.

10.3 The maximum penalty under 10.1 and 10.2 above together for a particular month will however be limited to 60% of the cost of chemicals consumed including taxes, duties, freight and the cost of services rendered.

11.0 Termination of contract within the contract period

11.1 In case the vendor is not able to achieve the guaranteed performance figures consecutively for three evaluations with regard to clause 9.1 and 9.2 above or fails to meet the performance evaluation and guarantee requirements under clause 9.3 to 9.5 above due to reasons attributable to the vendor, a show cause notice will be initially served to the vendor giving eight weeks' time for taking corrective action. In spite of the same, if the party is still not able to achieve the performance guarantees as per the above, FACT shall be at liberty to discontinue the treatment and carry out alternate arrangements at the risk and cost of the vendor.

11.2 However, even after discontinuation of contract, the vendor shall be bound to carry out the treatment for a period of 3 months or till finalisation of a new contract, whichever is earlier from the notice date at the same terms and conditions to enable FACT to arrange an alternative contractor.

In case of default by the vendor, FACT shall be at liberty to carry out the treatment using the available chemicals with the vendor and/or carry out alternate arrangements all at the risk and cost of the vendor.

11.3 Any stock out situation, as detailed under Sl No 8.3 above.

12.0 Packing

12.1 The chemicals shall be packed in HDPE containers. The packing shall be preferably in different coloured containers or with coloured stripes marked with brand name for different chemicals. Vendor shall clearly and indelibly indicate the shelf life, manufacturing date and batch number of each chemical on the container. The manufacturing date and batch No. should also be shown in the invoice.

12.2 Packing shall withstand hazards normally encountered during transportation, including loading and unloading operations, both by handling equipments and by pushing off.

13.0 Shelf life

The supply of chemicals should be from fresh stock and shall have a minimum shelf life of 6 months at the time of supply. Items for which shelf life expires while in our storage shall be replaced free of cost by the vendor. It shall be the vendor's

responsibility to ensure that chemicals are drawn from Stores after considering the shelf life.

14.0 Security Deposit and Performance Bank Guarantee

Bank Guarantee for 15% of the contract value for supply and services shall be furnished towards security deposit for faithful performance of the contract as per the contractual terms and conditions. The Bank Guarantee shall be furnished from a Nationalised/Scheduled Bank as per our format within 15 days of issue of order and shall be valid till the completion of the contract to the entire satisfaction of FACT with 6 months grace period thereafter.

15.0 General

15.1 The vendor shall faithfully observe the security regulations of FACT and any loss or damage incurred by FACT on account of the failure of the contractor or his employees to observe such security regulations shall be made good by the vendor at his expense.

15.2 Notice Correspondence

All instructions, directions and notices from FACT to the vendor and from the vendor to FACT for the purpose of the contract shall be conveyed in writing.

15.3 FACT's Rights

FACT has the right to make any investigation necessary to satisfy themselves of compliance by the vendor and reject any material or work that does not conform to the specification.

15.4 Statutory Regulations

Vendor shall, in all matters arising out of performance of the order, conform at his own expense with all acts, orders, regulations, rules and bye-laws of Government of India, State Governments, Local bodies and other authorities there under for the time-being in force and applicable to the work. Vendor shall also hold FACT harmless from liability or penalty, which might be imposed by reason of any asserted or established violation of such acts, regulations, rules etc.

Vendor shall indemnify and hold FACT harmless from all claims including patent claims, losses, demands, causes of action or suits arising out of the services, labour, equipment and materials furnished by the vendor under the Order.

15.5 Should any part of the work fail to achieve the performance specified by FACT, the

vendor shall at his own cost effect required changes to achieve the required specification of FACT.

15.6 Default

In the event of any default of vendor to comply with any of the provisions of requirement hereof, FACT shall have the right to terminate and cancel the order with or without notice and without prejudice to any other rights, options or remedies FACT may have and FACT shall be relieved from any further obligations to vendor hereunder. In the event of such default by the vendor, FACT shall be entitled to make alternate arrangements for materials and services at the risk and cost of the vendor. The waiver of any initial default shall not be considered an automatic waiver for any future default of the same or any other nature.

15.7 Force Majeure

15.7.1 Neither the vendor nor FACT shall be considered in default in the performance of their obligations as per the contract so long as such performance is prevented or delayed because of strikes, war, hostilities, revolution, civil commotion, epidemics, accidents, fire, cyclone, flood or because of any law and order proclamation, regulation or ordinance of Government or sub division thereof or because of any act of god, provided the party shall be promptly, in any case, not later than 14 days of happening of the event, notify the details of the force majeure and the influence on its activity under contract. The proof of existence of force majeure shall be provided by the party claiming to the satisfaction of the other.

15.7.2 Should either party be prevented from fulfilling the obligations provided for in the contract by the existence of clause(s) of force majeure lasting continuously for a period exceeding 3 months then the parties shall consult immediately with each other with regard to the future implementation of the contract.

15.7.3 In the event of indefinite delay, even if arising out of reasons due to force majeure, FACT shall have the right at their discretion to cancel the order or part of the order without any liability on their part to make any payment to the vendor, while reserving the right to claim refund of any payment if advanced or paid to the vendor.

15.8 Applicable Law And Settlement Of Disputes

This order shall be subject to and shall in all respects be governed by Indian Law.

If any dispute(s) arises out of or in connection with this contract, or in respect of any defined legal relationship associated therewith or derived there from, the

parties agree to submit the disputes to arbitration under the ICADR (International Centre for Alternative Dispute Resolution) Arbitration Rules 1996. The authority to appoint the Arbitrator shall be the International Centre for Alternative Dispute Resolution. The number of Arbitrator shall be one and the language of the arbitration proceedings shall be English. The place of arbitration proceedings shall be Ernakulam in Kerala.

Any legal proceeding relating to this order shall be limited to courts of law under the Jurisdiction of Kerala High Court at Ernakulam.

15.9 Entirety Of Contract

All the terms agreed to between the contractor and FACT are included in the order and no other communication, proposal, understanding, written, oral or implied will be considered to be included in the order or form part of the contract between the vendor and FACT. Unless specifically agreed to in writing by FACT with their acceptance of the contract with all its terms and conditions, vendor waives and considers as void any and all of his general conditions of contract.

APPENDIX-I

DETAILS OF PETRO-MCT COOLING TOWER OF FACT

SL NO	PARAMETER	PETRO-MCT TOWER
1	Circulation rate (m^3/h)	15000
2	Hold up volume (m^3)	3750
3	Cooling Range(typical) (^oC)	9
4	Cooling water inlet temperature (typical) (^oC)	41
5	Cooling water outlet temperature (typical) (^oC)	32
6	Side Stream filters	2 Nos available Normally. One in line with 150 m^3/h throughput
7	Chlorinator	Available; Maximum flow 10 kg/h
8	Heat Exchanger Metallurgy	Mainly CS & SS. Few made of copper alloy.

APPENDIX –II

Raw Water Analysis : Typical Range		
Calcium as Ca	(ppm)	4.0 to 10.0
Magnesium as Mg	(ppm)	1.0 to 3.0
Aluminium as Al	(ppm)	< 0.02
Sodium as Na	(ppm)	3.0 to 10.0
M. Alk. as $CaCO_3$	(ppm)	10.0 to 15.0
Chloride as Cl	(ppm)	6.0 to 12.0
Sulphate as SO_4	(ppm)	10.0 to 20.0
Total Iron as Fe	(ppm)	0.1 to 0.3
Colloidal Iron as Fe	(ppm)	0.1 (Max)
Copper as Cu	(ppm)	0.05 (Max)
Total Silica as SiO_2	(ppm)	5.0 to 9.0
Org. Matter as $KMnO_4$	(ppm)	4.0 (Max)
Residual Cl_2 as Cl	(ppm)	0.1 to 0.2
Suspended Solids	(ppm)	3.0 to 10.0
pH		6.5 to 7.2
Total Hardness as $CaCO_3$	(ppm)	12.0 to 30.0
Reactive Silica as SiO_2	(ppm)	4.5 to 9.0

APPENDIX-III

PROFILE OF CONTAMINANTS OF COOLING TOWER

SL NO	CONTAMINANT	PETRO-MCT TOWER
1	Nitrate as NO_3	From atmosphere and system
2	Ammonia as Ammonical Nitrogen	From atmosphere and system
3	Sulphur dioxide as SO_X	From atmosphere
4	Oil/grease/organics	From system: Organics as Cyclohexane, Cyclohexanone, Cyclohexanol, Benzene and Caprolactam
5	Salinity as Chloride	From raw water ; occasional excursion during summer
6	Ammonium Sulphate	Not applicable

Dosage of chemicals for cooling water treatment on PETRO-MCT Cooling Tower

UNPRICED BID FORMAT For Cooling Water Treatment at PETRO-MCT					
A: PRECLEANING (Quantity and rate for THREE Precleaning)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
5	Acid Inhibitor (Name to be mentioned)			Price in BOQ	Price in BOQ
6	HCl (Qty. required to be quoted)			Supply by FACT	
B: PASSIVATION (Quantity and rate for THREE Passivation)					
Item Sl.No.	CHEMICAL DESCRIPTION	For one time Qty. (Kg)*	Qty. for 3 times (Kg)	Unit Price Rs/Kg	TOTAL PRICE for 3 times(Rs)
1				Price in BOQ	Price in BOQ
2				Price in BOQ	Price in BOQ
3				Price in BOQ	Price in BOQ
4				Price in BOQ	Price in BOQ
C: CONTINGENCY CHEMICALS AND BIOCIDES					
	I. CONTINGENCY CHEMICALS for tackling contaminants.				
Item Sl No	Contingency Situation	CHEMICAL DESCRIPTION		For one time Qty. (Kgs)	Unit Price Rs/Kg
1	Nitrate as NO_3>500 ppm to 2000 ppm				Price in BOQ
					Price in BOQ
2	Ammoniacal Nitrogen as Ammonia > 50 ppm to 200 ppm				Price in BOQ
					Price in BOQ
3	Oil/Grease >15 ppm to 40 ppm				Price in BOQ
					Price in BOQ
4	Salinity as Cl > 250 ppm to 500 ppm				Price in BOQ
					Price in BOQ
5	Soluble/insoluble organics > 15 ppm to 40 ppm				Price in BOQ
					Price in BOQ
	II. CONTINGENCY BIOCIDES (see clause 5.7 of Annexure II) in absence of Chlorine for 4 days or more in a month.				
6	Absence of chlorine				Price in BOQ
					Price in BOQ

PETRO-MCT CWT PROGRAMME

Dosage of chemicals for cooling water treatment on PETRO-MCT Cooling Tower

UNPRICED BID FORMAT For Cooling Water Treatment at PETRO-MCT							
D: REGULAR TREATMENT CHEMICALS AND BIOCIDES							
Item Sl No	Description	Dosage (PPM)	Qty.per day (kg)*	Qty.for one month (kg) (31 days)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs/Kg)	Total Price for 730 days (24 months) (Rs)
	I. REGULAR CHEMICALS						
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						Price in BOQ	Price in BOQ
						TOTAL	
	II: REGULAR BIOCIDES (TO BE QUOTED FOR ONE DOSE) Pl.see note below:						
Item Sl No	Description	Dosage (PPM)	Qty. for one Dose (Kg)*	Unit Price (Rs./Kg)	No.of doses for 2 years**		Total Price for 2 years (Rs.)
1				Price in BOQ	24		Price in BOQ
2				Price in BOQ	24		Price in BOQ
						TOTAL	
E: CHEMICALS SUPPLIED BY FACT (see clause 5.8 of Annexure – II)							
Item Sl No	Description	Qty. for one day (Kg)*	Qty. for one month 31 days (kg)	Qty. for 730 days (24 months) (kg)	Unit Price (Rs./Kg)		Total Price for 730days (24 months) (Rs.)
1	Chlorine				Price not to be indicated (Supply by FACT)		
2	Caustic Soda 100%						
The above rates shall be inclusive of P&F, Octroi, Transit Insurance, etc. but excluding the following, which are to be shown / quoted below:							
	GST/TARIFF HEAD – Current Rate to be shown:						Price in BOQ
	INPUT TAX CREDIT – Current Rate/amount to be shown						Price in BOQ
	FREIGHT (Rate in Rs.per kg to be quoted)						Price in BOQ
	TECHNICAL SERVICE CHARGES FOR 2 YEARS including GST to be Quoted						Price in BOQ
	OTHER CHARGES (if any to be specified and quoted)						Price in BOQ
Notes	*Chemical projection to be rounded to 3 decimals.						
	**The regular biocides are used once in 15 days alternatively.						

APPENDIX – V

PRECLEANING

1 System is filled with fresh make up water giving maximum blow down during the filling.

2 Recommended dosage of biocide and bio-dispersant is added. Circulation is maintained for 24 hours and the system is drained.

3 System is filled with fresh make up water giving maximum blow down during the filling. Recommended dosage of mineral dispersant is dosed and system is kept under circulation.

4 The iron content in the circulating water is checked until it is ensured that there is no increase in the values.

5 Hydrochloric Acid mixed with acid corrosion inhibitor (dosage to be specified) is added to the system while pH is monitored. The pH is to be brought down to 5.0 to 5.5. The circulation is continued while mineral dispersant (dosage to be specified) is added. System is kept under circulation while monitoring the iron value and turbidity. As soon as the values are steady, heavy blow down is started with simultaneous make up in order to bring the pH value to >6.5 and NTU to <5.0.

PASSIVATION

Immediately after pre-cleaning and as soon as system pH is stabilized, corrosion inhibitor with mineral dispersant is dosed and Phosphate and Zinc levels are brought up to levels indicated below while maintaining the pH between 6.9 and 7.2.

Orthophosphate	-	15	ppm
Zinc	-	5.0	ppm

Circulation is continued while monitoring the Phosphate level and dosing the corrosion inhibitor is done to maintain Phosphate till steady values are obtained. The system may be allowed to continue for 72 hours and after passivation, blow down is started with make-up in order to bring the system to normal operating condition.

APPENDIX – VI

GENERAL CRITERIA FOR EVALUATION OF TENDERS

The general criteria for evaluation of the offers for cooling water treatment are as follows

1. Based on economics among the technically acceptable bids, FACT shall select the suitable treatment program (i) with chlorine and supporting biocides or (ii) with chlorine dioxide and supporting biocides, for PETRO-MCT cooling tower.
2. The cost of chemicals required for 3 Nos. of pre-cleaning, 3 Nos. of passivation and regular treatment chemicals required for a period of two years (24 months) and the Technical service charges for two years shall be considered for evaluation.
3. The cost of all chemicals including Chlorine, HCl and Caustic soda (as 100%) indicated in the offer shall be taken for evaluation.
4. Cost of contingency chemicals and contingency biocides shall not be considered for evaluation.
5. Cost of any other chemicals, which the vendor requires for the treatment and FACT agrees to supply shall be added on the price for evaluation.
6. The cost of chemicals provided by FACT and considered for evaluation will be based on the price at which the chemicals are bought by FACT on the day of opening the price bids.
7. Evaluation shall be on landed cost basis after taking Input tax credit benefit (wherever applicable) into account.
8. Acceptable Deviations, if any, on technical and commercial terms shall be appropriately loaded on the price for evaluation at the discretion of FACT.

APPENDIX – VII

COOLING WATER TREATMENT PROGRAMME

By :
Name of Tower :
For the month of :
P.O. No. :

Regular Treatment Chemicals consumption on monthly basis – quantity in Kg.

No.	Chemical Name	Limit for one month (31 days) as per P.O.	Actual consumption for the month	Excess qty. on Vendor's cost as per TPS	Excess qty. on FACT's cost attributed to FACT as per TPS	Pre-cleaning & Passivation (if applicable for the month)	Remarks

Chemicals consumption on annual basis (Kgs)

No.	Chemical Name	Limit for one year (365 days) as per P.O.	Qty. consumed for the month of...	Cumulative days from	Cumulative qty. from	Excess qty. on Vendor's cost as per TPS	Remarks
1	Chlorine						
2	Caustic Soda as 100%						

Microbiology Analysis & Corrosion Rate Details:
Analysis Frequency for microbiology is Fortnightly & Corrosion Rate is once in a month

No	Name of Microbiology	Unit	Limit as per P.O	Actual analysis for the month	Sampling Date	REMARKS AND PENALTY, IF ANY
1	TVC	Col/ml	100000			
2	SRB	Org/100 ml	60			
3	Nitrifying Bacteria	Org/100 ml	20			
4	Iron Oxidising Bacteria	Org/100 ml	5			
5	Corrosion Rate (MS coupons)	MPY	2			
6	Corrosion Rate (Brass coupons)	MPY	0.2			

PETRO-MCT CWT PROGRAMME