NATIONAL INSTITUTE OF PLANT GENOME RESEARCH

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No.: NCPGR/7/68(ETP) /Vol.IV / Dated: 04/06/2013

NOTICE INVITING QUOTATIONS

Sealed item rate quotations are invited on behalf of the Director, NIPGR, New Delhi, from approved & eligible contractor in respect of the subject work, so as to reach his office on or before 17.06.2013 up to 3.00 P.M. The quotation shall be opened on the same day at3.30 P.M.in the presence of the intending quotationers.

Schedule of Quantity

Name of work: Running maintenance & operation of Effluent Treatment Plant (ETP) and Treated Effluent pumps at N.I.P.G.R Campus New Delhi during the year 2013-2014

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SCHEDULE OF QUANTITIES

Sl. No.	Description	Unit	Rate	Qty.	Amount
	AS PER SHEETS ATTACHED				

Administrative Officer
NIPGR New Delhi

M/s_____

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Seal & Signature of Contractor

NATIONAL INSTITUTE OF PLANT GENOME RESEARCH

SCHEDULE OF QUANTITY

Name of work: Running maintenance & operation of Effluent Treatment Plant (ETP) and Treated Effluent pumps at N.I.P.G.R Campus New Delhi during the year 2013-2014

Sl. No.	DESCRIPTION OF ITEMS	QTY	UNIT	RATE	AMOUNT
1.	Running maintenance & operation of Effluent treatment plant and treated effluent pumps at NIPGR New Delhi during the year 2013-2014. (Asper Terms& conditions enclosed)	12 Month	Per Month		
				TOTAL	
(In wordsRs.----------)					

Administrative Officer
NIPGR New Delhi

Seal & Sign of Contractor

Terms & Conditions

Name of work: Running maintenance & operation of Effluent Treatment Plant (ETP) and Treated Effluent pumps at N.I.P.G.R Campus New Delhi during the year 2013-2014

1. All required tools such as pliers, screw drivers, wrenches etc. required for the proper maintenance of the installation shall be arranged by the contractor and nothing extra shall be paid.

2. The contractor is responsible for the upkeep of the installations in perfect working condition, carrying out routine check ups and to attend any breakdown immediately.

3. After taking over the site, the contractor will check all the installations and submit the report mentioning the defects during taking over the system within 15 days. After 15 days every defect noticed will be attended by the contractor.

4. Contractor would be bound to execute such additional items, which can be termed as logical, essential and necessary (even though not listed in schedule of work) for the effective execution of the work in totality, rates for such items of work shall be rationally analyzed / derived and would be binding on the contractor.

5. In case of leave of any staff, a substitute has to be arranged by the contractor who has got the required qualification and adequate experience. The staff will attend the duty on all working days including holidays.

6. The rates quoted shall be firm and hold good throughout the contract period. The contractcan be extended depending upon satisfactory performance and discretion of the Institute.

7. Payment shall be made quarterly after deduction of the Security Deposit, income tax, Statutory deductions etc. as per Government rules.

8. If any worker engaged, is found to be not suitable for the position, the contractor has to remove the person from the site immediately and substitute posted. The decision of the Institute in this regard shall be final and binding on the contractor.

9. The Institute shall in no way be involved in any dispute of whatever kind between the contractor and the staff engaged by him.

10. The contractor shall arrange required bench, table and chairs for the staff at his own cost.

11. Attendance register of the staff engaged shall be maintained and the same shall be submitted weekly or as desired by the Institute.

12. The contractor shall be responsible for good behavior and character of the staff engaged by him.

13. The contractor shall be responsible for any damage caused to any equipment, fitting of building of NIPGR due to the negligence of the staff. The same shall be made good by the contractor at his cost. In this case the decision of the Institute shall be final & binding to the contractor.

14. The contractor will follow all labour laws of Central Govt./State Govt. as applicable and enforced from time to time. Any violation for not following the labour laws shall be contractor's responsibility.

15. The contractor shall follow all the labour wages rules as per Govt. of NCT and as amended from time to time by the Government.

16. Wages of ETP operator and helper shall be payable as per minimum wages fixed by Government of the National Capital Territory, Delhi. The statuary increases in wages from time to time in Govt. NCT shall be re-imbursed on production of having paid the said increase.

17. All instruments as & when required for testing, checking, measuring, etc., shall be arranged by the contractor in addition to the tools required for day to day maintenance and operation.

18. The agency must be expertise and experienced in the specializedin Running Maintenance of STP/ETP.
19. NIPGR reserves the right to terminate the contract at any time without assigning any reasons thereof.

20. Preventive routine maintenance of the above system should be carried out as per maintenance schedule.

21. Only qualified staff and fully conversant with the operation and maintenance of ETP and pump set along with their electrical starter panels shall be provided. The contractor shall engage staff having following qualification & submit the proof of qualification, experience etc., of the staff before deploying at site.

    ETP Operator : Shall have minimum 3 years of experience in handling The Effluent treatment Plant and pumps.

    Helper : 8^{th} standard pass (minimum).

22. Recovery Clause :

    In case of non-availability of staff, recoveries as given below will be made.

    a) ETP Operator : Rs.600.00 per shift
    b) Helper : Rs. 350.00 per shift
    c) Mechanic : Rs. 600.00 per visit
    d) Electrician : Rs. 600.00 per visit

23. In the case of any type of breakdown in any services, the same shall be restored by deploying extra manpower without any extra charge to the Institute.

24. The Contractor shall adhere to following :
    a) The complaint should be attended within 24 hours from getting the complaint. Minor and urgent complaints should be attended on the same day.
    b) Payment will be made extra for major repairs of the E & M installation, which require workshop machining job, spares parts and specialized workmanship for the works mentioned above from a to c.

25. The Quotationers must visit site of execution before quoting the rates.

26. The items costing less than Rs.1500.00 (Rs. One Thousand & Five Hundred only) shall be issued by the Institute free of cost for replacement. However replacement of other items like rewinding of motors etc. costing more than Rs.1500.00 shall be arranged by contractor and replaced as & when required aftergetting approval of the Institute. The payment however shall be made on production of valid original vouchers and justified amount at prevailing market rates of the item. Nothing extra on account of handling & transportation etc shall be paid. The decision of the Institute in this matter shall be final & binding on contractor.

27. Unit size &equipment specification along with its operation and maintenance schedule are enclosed and shall be followed.
28. Cleaning of tanks of ETP plant shall be carried out on half yearly basis.

29. The quotation must be accompanied with EMD of amounting Rs.7,450.00 (Rs. Seven Thousand Four Hundred & Fifty Only) of their quoted amount. The earnest money shall be in the form of DD drawn in favour of “Director NIPGR” New Delhi.

30. The EMD shall be enclosed in a separate envelop duly marked EMD which shall be opened first and without EMD quotation shall not be considered.

31. Security deposit @ 10% shall be deducted from the bills, the EMD shall however be adjusted against the Security Deposit’.

32. Security Deposit shall be refunded after one month of the completion of work.
33. All papers attached with this Quotation should be signed & submitted in original.
34. PAN/TIN issued by the respective departments must be mentioned while quoting the rates.

Administrative Officer
NIPGR, New Delhi

Seal & Signature of Contractor

MAINTENANCE SCHEDULE

1. Oil level is to be checked daily. The deficit level is to be made up by using SAE-90/ Servosystem-553 oil.
2. Clean up the motor and fan enclosure if necessary. Turn the shaft by hand to see that it rotates freely. To check connection to see that they are tight and clean.
3. Remove bearing cover on the end shield and fill as much grease as possible. After 3 or 4 regressing the grease should be changed completely. For replenishing fresh grease of Lithium base should be used. Mixing of different base grease should be avoided as the essential lubricating properties may be lost. Bharat petroleum grease 'MP 2' is recommended.
4. Do not run the pump dry for longer period
5. If the pump is idle for some time, it may stuck or locked in place. This sticking is usually due to film of dust or dirt developed between the impeller and the pump body. Give jerk at the free end of the shaft to ensure free rotation.
6. The pump bearings should be lubricated once a month. Servo Gem-2, Indian Oil make or equivalent grade is recommended for greasing.
7. After every six month open the pump, check and clear the interior part.
8. After every year remove impeller, replace vanes, shaft sleeve, gland packing and other worn out parts.
9. Pump Suction Line should be checked periodically and to be cleaned manually to avoid screw pump dry running.
10. Screw Pump belt drive to be checked regularly for proper belt tension and adjust periodically if necessary.
11. The dried sludge to be scrapped manually. After the dried sludge is removed the individual plates are taken out, filter cloth is cleaned and plates are placed to its original position

TREATMENT SCHEME

DESIGN CRITERIA

Flow	100 M^3/Day
pH	6.0 to 8.5
BOD 5days at 20 deg. C	300 ppm
COD	800 ppm
Total Solids	300 ppm
Oil & Grease	40 ppm
F/M Ratio	0.15

Design criteria of the ETP is well reviewed and the system is so designed that it will treat 100 .M^3 / Day of effluent. The conceptual approach of the treatment scheme is primarily for removal of Grit and floating suspended solids ,Oil & Grease, BOD, COD, Suspended Solids etc. The following units have been considered as most suitable:

1. Screen Chamber
2. Grit Chamber
3. Oil &Grease Removal Tank
4. Equalisation Tank
5. Aeration tank-
6. Plate Settler
7. Cholorine Contact Tank
8. Sludge Holding Tank
9. Pressure Filter
10. Activated Carbon column
11. Filter Press for sludge dewatering.

The raw effluent generated from the campus shall be passed through bar screens and grit removal unit for removal of large floating solids and grit. After screening the effluent shall be led to oil removal unit for gravity separation of oil & grease and then to equalisation tank where fluctuating characteristic of slug discharge will get equalized. Effluent in the equalisation tank shall be properly agitated continuously by means of diffused air to avoid any settlement in the tank. The effluent from the equalisation tank then shall be pumped to the Aeration Tank where the effluent is subjected to biological treatment. In this process the oxidation of organic matter is brought about by aerobic microorganisms under mixed flow condition and the oxygen is supplied by diffused air system. The mixed liquor shall be received in the Plate settler type settling tank. The

sludge will settle at the Hopper Bottom of settling tank. A part of settled sludge from the settling tank is recirculated to aeration tank for the maintenance of required micro biological population and the balance is pumped to the filter press for dewatering. The filtrate from the filter press shall be received in the equalisation tank by gravity.

The clear supernatant from the Settling Tank shall flow to the filter feed sump. The effluent is pumped through the Pressure Filter and activated carbon column for further polishing the effluent. The treated effluent shall be received in the Garden Pump sump from where it shall be pumped for gardening.

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TREATED EFFLUENT CHARACTERISTIC

Flow	100 M^3/Day
pH	7 - 8
BOD 5days at 20 deg. C	<30 ppm
COD	<100 ppm
Total Suspended Solids	<100 ppm
Oil & Grease	<10 ppm

UNIT SIZE & EQUIPMENT SPECIFICATION

1. Bar Screen & Grit Chamber

Size	500x1000
MOC	RCC M 20
No of units	Two
Type	Bar Rack Fabricated From MS Bars.
Size of Bars	10mm x 50 mm deep
Spacing Between Bars	20mm
Angle of Inclination	45^0 with the Horizontal

2. Oil & Grease Removal Unit

SIZE	1100x1100
MOC	RCC M 20
NO. OF UNIT	ONE

3. EQUALISATION TANK

DESIGN FLOW	100 KLD
SIZE	3000x4500
MOC	RCC
NO. OF UNIT	ONE
AGITATION	BY DIFFUSED AIR
MOC	EPDM

EFFLUENT TRANFER PUMP

DUTY	TO TRANSFER RAW EFFLUENT FROM EQUALISATION TANK TO AERATION TANK
NO. OF UNITS	2 (1 W + 1 S)
CAPACITY	$6M^3$ /HR 10 M WC
TYPE	NON CLOG, SUBMERSIBLE PUMPS
MODEL	GROUNDFOS MAKE, AP 12.40.06A1, SIGAL PHASE,

4. AERATION TANK

NO OF UNIT / MOC	ONE / RCC M20
SIZE	3000X6000X3.0M LIQUID DEPTH
TANK VOLUME	54.0 CU.M
DESIGN BOD	300
F/M RATIO	.0.15
MLSS	3000
AERATION	DIFFUSED AIR SYSTEM.
AIR BLOWE CAPACITY	75 Cu.M/HR, AT 5000 MM WC
MODEL	EVEREST TRASMISSION MAKE, MODEL-42.

5. PLATE SETTLLER

NO. OF UNIT	ONE
SIZE	3000X2000
TUBE DEK	MM AQUA
MOC	MS
Sludge recirculation Pump	
MODEL	SP –O, KIRLOSKAR

6 FILTER PRESS

Structure	Cast Iron
Filter Plate MOC	PP
Size	600X6000 mm
Filter Plate	Recessed Chamber
No. of Plates Provided	24Nos.
Filter Cloth	PP
Nozzle	SS 304
Closing Device	Hydraulic operated
Sludge Feed Pump	1 CuM/Hr.
Make	CHEMECH, CES 2/25/32

UNIT OPERATIONS

INLET SCREEN AND GRIT REMOVAL CHANNEL

OBJECT

The object of this unit is to arrest the voluminous substances carried by the effluent and subsequently pumping the same into the proceeding units.

PROCESS

The effluent originating from the different are is received in the inlet screen channel where the voluminous substances are arrested. The retained debris in the bar screen are removed manually and disposed off to a suitable site. The screened effluent is then received in the equalisation tank.

OPERATION

1. Allow the effluent to flow through the screen channel.
2. Clean the screen and grit channel from time to time, the frequency of which depends on the debris accumulation on the bar screen. The debris collected are to be disposed off to a suitable distant location.

OIL & GREASE REMOVAL UNIT

OBJECT

The object of Unit is to remove the floating oil and grease from the effluent.

PROCESS

The screened effluent is received in the oil and grease trap. The floating oil and grease is manually removed from the surface time to time, and disposed off to a suitable site.

OPERATION

Remove the floating oil and grease from time to time, the frequency of which depends on the accumulation of oil in the trap.

EQULAISATION TANK

OBJECT

The object of the equalisation tank is to receive and equalize the screened effluent to maintain uniformity in its characteristics before it is subjected for treatment in the subsequent units.

PROCESS

The effluent from fat removal is received in the equalisation tank where the effluent is sufficiently detained to attain uniformity in its physico-chemical characteristics. Agitation is provided by means of slow speed floating agitator, to avoid putrefication and to increase the DO of the effluent which will further enable the removal of BOD, COD and other impurities in effluent subsequently in Aeration Tank.

OPERATION

Allow the equalisation tank to be filled up with the effluent and run the air blower to inject air for agitation in the equalisation tank.

AERATION TANK

OBJECT

The unit is provided for two stage biological treatment of effluent for the removal of organic matters.

PROCESS

The effluent from equalisation tank is pumped into aeration tank for biological treatment. The effluent is aerated by means of slow speed floating surface aerator provided, which supply the necessary oxygen to the effluent and help in keeping the developed biological mass in suspension. The diffused air produce high turbulence by agitating the biological mass to entrain air in the effluent which causes a change in the air-water interface to facilitate the oxygen transfer into the mixed liquor. The mixed liquor suspended solids is to be maintained around 3000 mg/l and F/M ratio around 0.15.

OPERATION

START UP OF THE ACTIVATED SLUDGE PROCESS

The start up of activated sludge process can be accomplished by using seed sludge available from septic tank or night soil / cow dung to suit micro-organism population expressed as mixed liquor suspended solids (MLSS). The method to be adopted for initial development of MLSS and its further acclimatization to treat the effluent of its organic pollutants is enumerated below :

Fill up the aeration tank with fresh water upto the top water level. Turn air blower on and maintain minimum DO residual level of 2 mg/l. Add the night soil or cow dung in to the aeration tank. Aerate the mixture in the basin for 4-5 days. A continuous dosing of urea and DAP of about 1.25 kg. and 0.5 kg. respectively, should be fed to the aeration tank daily to provide sufficient nutrients for the production of biological mass. Fresh water should be added into the aeration tank in small quantities so that the Settling Tank is filled gradually. Sludge recirculation pump must be started at this stage.

During the process start up stage, the entire return sludge from the Settling Tank is returned back into the aeration tank, which is a continuous process. This process is to be continued till the MLSS concentration reaches 3000 mg/l . At this stage, the effluent pumping is started with an initial flow of 10 % of the total flow. The flow is increased gradually in daily increments of 10%. The over all process takes between 25 to 35 days for development of culture & to take 100 % of designed flow to the Aeration Tank.

PROCESS MONITORING DURING START UP / NORMAL OPERATION

1. During the cultivation of biomass, regular MLSS and dissolved oxygen test are conducted on the aeration tank contents. Check influent COD/BOD and suspended solids regularly. These tests enable a quick measure of the efficiency through the activated sludge treatment process and a quick means of estimating the ratio of organic BOD to the microbial population (MLSS) usually referred to as the food to microorganism ratio(F/M). The relationship among COD/BOD/SS allows the COD test to be used for process control in lieu of the much longer BOD test.

2. When MLSS in the aeration tank reaches around 3000 mg/l, carefully attention is required to sustain the required MLSS in the aeration tank. In maintaining so, regular checks on aeration tank and return sludge MLSS / SVI are necessary and based on the above observations, required quantity of sludge is to be recirculated back into the aeration tank and the excess is to be wasted in Filter Press. The following method may be applied while calculating the sludge wastage rate.

Amount of sludge to be wasted in 24 hrs in Kg / day

$$= \frac{(\text{Laboratory MLSS} - \text{Designed MLSS}) \times (\text{Avg. Daily effluent flow})}{1000}$$

Flow in KL / DAY

$$\text{Waste sludge pumping rate} = \frac{\text{Sludge to be wasted Kg/day} \times 1000}{\text{Return Sludge MLSS (mg/l)}} \text{ KL / DAY}$$

Thus the calculated amount of excess sludge can be wasted suitably within the day and the remaining is to be drawn back into the aeration tank.

3. It is to be noted that 3000 mg/l MLSS is considered with respect to the designed BOD and inflow only. However, it may also happen that either of the BOD and the inflow may vary in the actual course of operation. In the case of variations on the higher side, ensure that quality and the quantity that is being fed in the aeration tank is within 10% margin failing which the performance of the activated sludge system may deteriorate. In case of variations towards lower side, the actually required .

MLSS is to be calculated to maintain F/M of the design order so that a quality effluent can be ensured from the treatment facility.

$$\text{F/M} = \frac{\text{BOD mg/l} \times \text{Raw effluent flow } M^3 \text{ / day}}{\text{MLSS mg/l} \times \text{Volume of aeration tank } M^3}$$

Thus the required MLSS can be calculated for any change in flow / characteristics of the raw effluent to maintain the designed F/M.

1. In general, air blower to be run continuously along with the continuous sludge recirculation. In case of blower is stopped for longer durations, i.e. more than 4 hrs, the biological mass in the system is adversely affected. The system may turn septic. The process of culture development may be required to be started afresh to develop the biological culture in the aeration system.
2. During start up when MLSS are low, the aeration tank may experience severe foaming. Foaming is believed to occur because of synthetic detergents and other surfactants in conjunction with high aeration and low aeration MLSS. The foam contains sludge solids, grease, and bacteria and should be brought under control as quickly as possible. The foaming should decrease as the MLSS continue to increase.
3. Sludge bulking may occur during start-up due to overloading the basin. Sludge bulking is indicated by a poorly settling sludge and poor sludge compaction. The sludge settle ability decreases as indicated by a significant rise in SVI and the sludge appears light fluffy. Sludge bulking is associated with growth of filamentous organisms that attach themselves from one floc to another and prevent compaction of the sludge particles and poor settling results. Another cause of sludge bulking is bound water in which the bacteria, composing the floc, swell because of the addition of water and thereby decrease in density.
4. When sludge bulking occur , it is usually associated with low pH, low DO, low nitrogen concentration, high F/M, or septic effluent. The primary purpose of control is to increase the sludge age or decrease the F/M ratio.

LOW DO The Do should be checked to see that at least 1-2 mg/l of DO exist in the aeration tank, if not, then inspect the aerating equipment and see that it is functioning correctly.

LOW pH Lime is usually added, often with flocculent aids, to raise the pH and control bulking by improving the settling characteristics of the sludge while corrective action is being taken.

HIGH F/M (Low Sludge Age) To reduce the F/M, the organic load on the aeration tank is decreased by reducing the influent flow to the aeration tank or MLSS is

increased by increasing the return sludge rate and decreasing the wasting rate. Both of these actions should increase the sludge age.

Rising sludge should not be confused with sludge bulking. In a rising sludge, the settling characteristic and compaction are good. Rising sludge occur as a result of too long a detention time in the clarifier. The sludge rises in chunks from size of a pea to as large as a basketball, usually forming a brown, fine scum or froth on the surface of the settling tank. The sludge undergoes denitrification with the release of nitrogen gas that becomes entrapped in the sludge causing it to rise to the surface. By increasing the rate of return of activated sludge pumping or increase the sludge wasting rate and decreasing the sludge age, the problem of rising sludge should be corrected.

PLATE SETTLER /PUMP

OBJECT

Plate settler is meant for the separation of biological solids from the effluent.

PROCESS

The mixed liquor from the aeration tank is received in the settling tank. The mixed liquor flows to the settling tank, the biological solids settles at the bottom of the tank, leaving the clarified water which overflows into the launder and then to the Filter feed sump. The biological sludge settled at the bottom of the settler is continuously removed by means of sludge pump.

OPERATION

1. Let the Settling Tank be filled up with mixed liquor from the aeration tank.
2. Open the sludge withdrawal valve depending upon the quantity of sludge to be wasted
3. Start the sludge recirculation pump.
4. Ensure that sludge pump runs continuously.
5. Ensure that the sludge withdrawal valve is kept closed when not in use.

FILTER PRESS

OBJECT

The FILTER PRESS is provided to reduce the moisture content of the waste biological sludge by dewatering for easy disposal.

PROCESS

The water is separated out by Forced filtration through the PP cloth (filter media) provided between the PP Plates, while the sludge is retained in PP cloth provided between the PP Plates. The trapped sludge between the PP plates is allowed to fall on the floor by loosening plates in the Filter Press by rachet gear arrangement before it is hauled up for disposal. The Filtrate from the Filter Press flows to the equalisation tank by gravity.

OPERATION

1. Open the sludge withdrawal valve depending upon the quantity of sludge to be wasted. Open the sludge delivery valve to Filter Press.
2. Ensure that sludge pump runs continuously. When the filtrate stops coming out of Taps of Filter Plates stop pumping sludge into Filter Press by stopping the Filter Pump.
3. The trapped sludge between the PP plates is allowed to fall on the floor by Loosening the Filter Press
4. The dried sludge is scrapped manually. After the dried up sludge is removed, the individual plates are taken out, filter cloth is cleaned and plates are placed to its original position.