# REPORT OF JOINT INSPECTION-CUM-MONITORING OF COMMON EFFLUENT TREATMENT PLANT (CETP) VAPI INDUSTRIAL AREA, GUJARAT

**(As per order of Hon'ble National Green Tribunal (NGT), Principal Bench, New Delhi dated 11.01.2019 in Original Application NO. 95 of 2018 (Aryavart Foundation Vs. M/s. Vapi Green Enviro Ltd. (CETP, Vapi) & Ors)**

**Prepared**
**By**



**CENTRAL POLLUTION CONTROL BOARD**
**Regional Directorate (West), Vadodara**

**GUJARAT POLLUTION CONTROL BOARD**
**Regional Office, Vapi**

**FOR SUBMISSION TO**

## HON'BLE NATIONAL GREEN TRIBUNAL
## PRINCIPAL BENCH, NEW DELHI

**MAY 2019**

# CONTENT

# REPORT OF JOINT INSPECTION-CUM- MONITORING OF COMMON EFFLUENT TREATMENT PLANT (CETP) VAPI INDUSTRIAL AREA, GUJARAT

## 1.0 BACKGROUND:

Hon'ble National Green Tribunal, Principal Bench, New Delhi passed order on 11.01.2019 in Original Application (OA) NO. 95 of 2018 in the matter of Aryavart Foundation Vs. M/s Vapi Green Enviro Ltd. (CETP, Vapi) & Ors. The matter was regarding discharge of untreated/partially treated trade effluent by more than 500 industrial units in Vapi industrial cluster into River Damanganga. There are non-compliances of the industries, CETP, Vapi, and pollution is causing threat to aquatic life in River Damanganga and in the Arabian Sea.

In the said matter vide order dated 11.01.2019, Hon'ble NGT has given various directions to execute different tasks and formation of committees for execution of these tasks as per the para no. 55 of the order.

As per the para no. 55 (iv), it was directed to CPCB to undertake jointly with GPCB extensive surveillance and monitoring of CETP at regular interval of three months and submit its report to this Tribunal.

Accordingly, joint inspection-cum-monitoring on 12.02.2019 during the visit of the five member committee constituted as per parano. 55 (i) comprising representatives/nominees of Central Pollution Control Board (CPCB), Indian Institute of Management (IIM) Ahmedabad, Indian Institute of Technology (IIT) Gandhinagar, National Environmental Engineering Research Institute (NEERI) Nagpur and Gujarat Pollution Control Board (GPCB) to assess the extent of damage and cots of restoration of the environment and individual accountability of CETP and polluting industrial units.

## 2.0 COMMON EFFLUENT TREATMENT PLANT (CETP), VAPI

CETP is located near National Highway- 8, River Damanganga, GIDC Estate, Vapi, Dist-Valsad. The CETP, Vapi was designed by National Environmental Engineering Research Institute (NEERI), Nagpur in collaboration with Kirloskar consultants for a capacity of 55 MLD. It was commissioned in January 1997. The CETP is designed for the parameters:

**Table: 1 CETP DESIGNED PARAMETER**

| Parameter(s) mg/l | Influent | Effluent |
|---|---|---|
| pH | 6.5-8.5 | 6.5-8.5 |
| BOD | 400 | 100 |
| COD | 1000 | 250 |
| SS | 300 | 100 |

M/s Vapi Green Enviro Ltd (VGEL) formerly known as Vapi Waste & Effluent Management Company Ltd (VWEMCL) operates the CETP and a TSDF. The company incorporated in pursuant to the suggestions of Hon'ble High Court of Gujarat to manage the CETP and other environment related activities. Accordingly the company took over the CETP built by Gujarat Industrial Development Corporation (GIDC) in 1998. The Board of directors of M/s VGEL consist of GIDC Vice Chairman and Managing Director as nominee director and other directors including Industries.

The CETP Vapi is receiving the partially treated effluent from member industries (present members-519) which are located in GIDC area, and also it is receiving domestic wastewater from GIDC residential areas. The location of GIDC, CETP and River Damanganga is given in **Figure-1.**


**Figure 1: Location of Vapi Industrial Area, CETP and River Damanganga**

## 2.1 PRESENT TREATMENT SCHEME OF CETP

The wastewater treatment consists of pre-primary, primary (physico-chemical treatment) and secondary biological oxidation treatment process based on activated sludge process. The final treated effluent is discharged into the River Damanganga.

The operational units of the CETP are:

Pre-primary : Auto screen, Grit Chamber (2 nos.), Equalization Tank (3 nos.)

Primary treatment : Flash Mixer (2 nos.) & Flocculator (4 nos.) & Primary Clarifiers (2 nos.)

Secondary Treatment: Aeration tanks (2 nos.), Secondary Clarifier (2 nos.)

The sludge is handled through sludge thickeners, centrifuges and sludge drying beds and ultimately disposed to TSDF of M/s VGEL.

M/s VGEL has established four stage forced circulation common multiple effect evaporator (CMEE) of 200 KLD capacity in March 2015, within the CETP premises. The CMEE is provided to handle refractory COD & high strength TDS effluent streams generated from pesticides, bulk drugs, dyes intermediate etc. The CMEE has been designed to handle TDS ranging from 3 – 12.5% and COD: 20,000 – 1,00,000 mg/L. Presently, around 86 nos. of industries have become members with common MEE and reportedly booked quantity of effluent is app. 157 KLD from member industries. The effluent from member industries are collected and conveyed to MEE through tankers. Spray dryer (4 KL/hr) is in operation for handling the concentrate generated from CMEE.

The various unit operations & processes handled at the CETP for handling concentrated & lean effluent streams are depicted in **Figure 2**. Few photographs of CETP are given in **Annexure-1**.

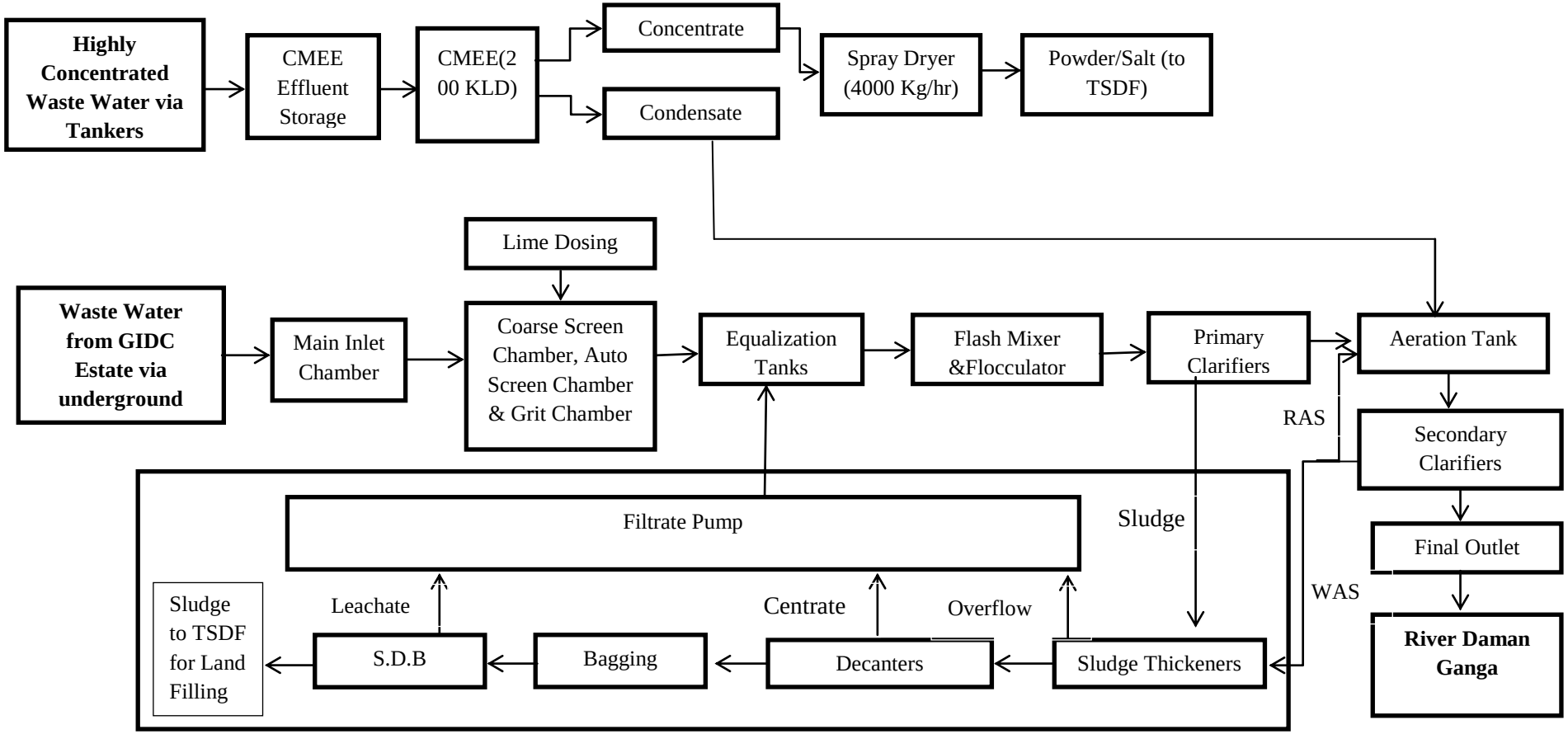



**Figure-2: Flow diagram of CETP**

The details of various units/equipment used in operations and processes of CETP are depicted in the below **Table-2**.

**TABLE-2: DETAILS OF UNIT-WISE INSTALLED EQUIPMENT**

| S. no. | Nameof theunit | Nos. | Dimensions, m-each | Area, $m^2$ | Volume,$m^3$ |
|---|---|---|---|---|---|
| 1. | Inlet Chamber | 1 | 3x3x2.75 | 9 | 24.75 |
| 2. | Screen Chamber (Course) | 1 | 3x3x2 | 9 | 18.00 |
| 3. | SyloforLimeDosing | 1 | | | 12MT |
| 4. | ScreenChamber(Fine) | 1 | 3x3x2 | 9 | 18.00 |
| 5. | AutoScreen | 3 | 40MLDeach | | |
| 6. | GritChambers | 2 | 7x7x1.5 | 49 | 73.50 |
| 7. | EqualizationTanks | | | | |
| 8. | TankNo.1 | 1 | 78x19.5x3 | 1521 | 4563 |
| 9. | TankNo.2 | 1 | 78x19.5x3 | 1521 | 4563 |
| 10. | TankNo.3 | 1 | 78x39x3 | 3042 | 9126 |
| 11. | EqualizationTanks Blowers | 3 | 75HP | 3250$m^3$/hr | |
| | | 2 | 75HP | 2425$m^3$/hr | |
| | | 1 | 50HP | 2425$m^3$/hr | |
| 12. | FlashMixer | 2 | 3.5x3.5x3.5 m | 12.25 | 85.74 |
| 13. | Flocculator | 4 | 10x7x3.5 m | 70 | 980 |
| 14. | Polytank | 2 | 3.5x5x1 | 17.5 | 17 |
| 15. | PolytankMixer | 4 | 2HP | | |
| 16. | EqualizationPumping | | | | |
| 17. | Pumpsump | 2 | 7.5x2.8x3.6 | 21 | 75.6 |
| 18. | Pumphouse | 1 | 15.5x7.5 | 116 | |
| 19. | Pumps | 1 | 30HP | 576$m^3$/hr | |
| 20. | | 2 | 75HP | 1146$m^3$/hr | |
| | | 2 | 100HP | 2291$m^3$/hr | |
| | | 2 | 150 HP | 2500 $m^3$/hr | |
| 21. | Primarysettling Withmech.Raker | | | | |
| 22. | TankNo.1 | 1 | Dia 37mx3 | 1075 | 3225 |
| 23. | TankNo.2 | 1 | Dia 37mx3 | 1075 | 3225 |
| 24. | PrimarySludge | | | | |
| 25. | Pumpingstation | 1 | 8.5x5.7x5.5 | 48.5 | -- |
| 26. | Sludgesump | 1 | 4x4.5mx5 | 18 | 90 |
| 27. | Sludgepump | 1 | 7.5HP | 30$m^3$/hr | |
| | | 1 | 12.5HP | 55 $m^3$/hr | |
| 28. | UASBFeedSump | 1 | 7x7x2 | 49 | 98 |

| | | | | | |
|---|---|---|---|---|---|
| 29. | UASBFeedPump | 1 | 50HP | 500$m^3$/hr | |
| | | 1 | 60HP | 600$m^3$/hr | |
| 30. | AerationBattery (6channels) | 2 | 85x17x3x(10)<br>85x17x3.5x(1)<br>85x17x4.0x(1) | 17340(total) | 54187 (total) |
| 31. | Aerators | 60 | 40x25HP<br>20x40HP | | |
| 32. | Secondarysettlingwith mech.Raker | 2 | Dia 44mx2.5 | 1520 | 3800 |
| 33. | Returnactivatedsludge (RAS) Pumping | 1 | | | |
| 34. | Pumphouse | 1 | 12.5mx6 | 122 | -- |
| 35. | Sludgestorage | 1 | (20.5-12.5)x6 | 208 | 1248 |
| 36. | Sludgepump | 6 | 2x20HP | 285$m^3$/hr | |
| | | | 2x40HP | 570$m^3$/hr | |
| | | | 2x100HP | 1150$m^3$/hr | |
| 37. | SludgeThicker | 2 | Dia 11mx5 | 95 | 475 |
| 38. | Thickenedsludge | | | | |
| 39. | Pumpingstation | 1 | 4x6 | 24 | -- |
| 40. | Sludgesump | 1 | 3x3x5 | 9 | 45 |
| | | | | | |
| 41. | Thickenedsludgepumps | 2 | 15HP | 150$m^3$/hr | |
| | | 2 | 12.5HP | 100$m^3$/hr | |
| 42. | Centrifuge | | | | |
| 43. | DecanterHouse | 2 | 11x 16 | | -- |
| 44. | Decanter-1 | 1 | Humboldt | 30HP | 20$m^3$/hr |
| 45. | Decanter-2,3,4,5,6 | 5 | Humboldt | 40HP | 30$m^3$/hr |
| 46. | TreatedEffluent | | | | |
| 47. | Dischargechamber | 1 | 2x2 | 4 | -- |
| 48. | Dischargepipe | 1 | 1.2mx500m | -- | -- |
| 49. | FiltratePumping | | | | |
| 50. | Tank | 1 | 3.5x3.5x2 | 12 | 25 |
| 51. | Pumps | 2 | 12.5HP | 50$m^3$/hr | |
| | | 1 | 20HP | 100m3/hr | |
| 52. | Filterfeedsump | 1 | 7.87x7.0x 4.65 | 55.09 | 256.17 |
| 53. | Filterfeedpumps | 1 | 30HP | 576$m^3$/hr | |
| | | 1 | 50HP | 800$m^3$/hr | |
| 54. | CACCOfeedsump[$] | | 12.5x9.7x3.3 | 121.25 | 400.13 |
| 55. | CACCOfeedpumps[$] | 2 | 25HP | 325$m^3$/hr | |
| | | 1 | 50HP | 800$m^3$/hr | |
| 56. | CACCOreactorsA[$] | 3 | 17.0mx4.7m | 226.98 | 1066.8 |
| 57. | CACCOreactorsB[$] | 3 | 16.5mx4.2m | 213.83 | 898.07 |
| 58. | CACCOreactorsC[$] | 3 | 15.5mx3.7m | 188.69 | 698.16 |
| 59. | UASBreactors[#] | 2 | Dia 37.0mx7.65 m | 1075.21 | 8225.38 |

| | | | | | |
|---|---|---|---|---|---|
| 60. | GasHolder# | 1 | 2.2mx4.35 | 4 | 15 |
| 61. | Reactivatedclarifier | 1 | Dia 32m x4.5m | 804.25 | 3619.21 |
| 62. | InterimSludgeStorage | 2 | Cell-1: 35x30m Cell-2: 60x30m | 1050M$^2$ 1800M$^2$ | |
| 63. | Boiler with ESP | 1 | | 8 TPH | |
| 64. | CMEE (Common Multi effect Evaporator) | 1 | Four Effect | 200 KLD | |
| 65. | Coal fired Boiler | 1 | Fluidized Bed | 8 TPH | |
| 66. | New Sludge Drying Beds | 3 | 155 x9x3 m | 1395 M$^2$ | 4185 M$^3$ |
| 67. | Spray Dryer | 1 | | 4000 Kg/hr | |
| 68. | Sun Drying Platform | 1 | 155 m x 58 m | 9000 m$^2$ | |

(Note: #-UASB- ideal/ not working & $-CAACO treatment units – use for storage of CMEE feed)

## 2.2 DISPOSAL OF TREATED EFFLUENT

The treated effluent of CETP is discharged into River Damanganga. This location is about 13 km up stream of mouth of river into the Arabian Sea. As per NIO map, high tide line (HTL) reaches up to the railway bridge near this location. The aerial view of CETP, location of common MEE and treated effluent discharge point in River Damanganga are depicted in the below **Figure 3**.

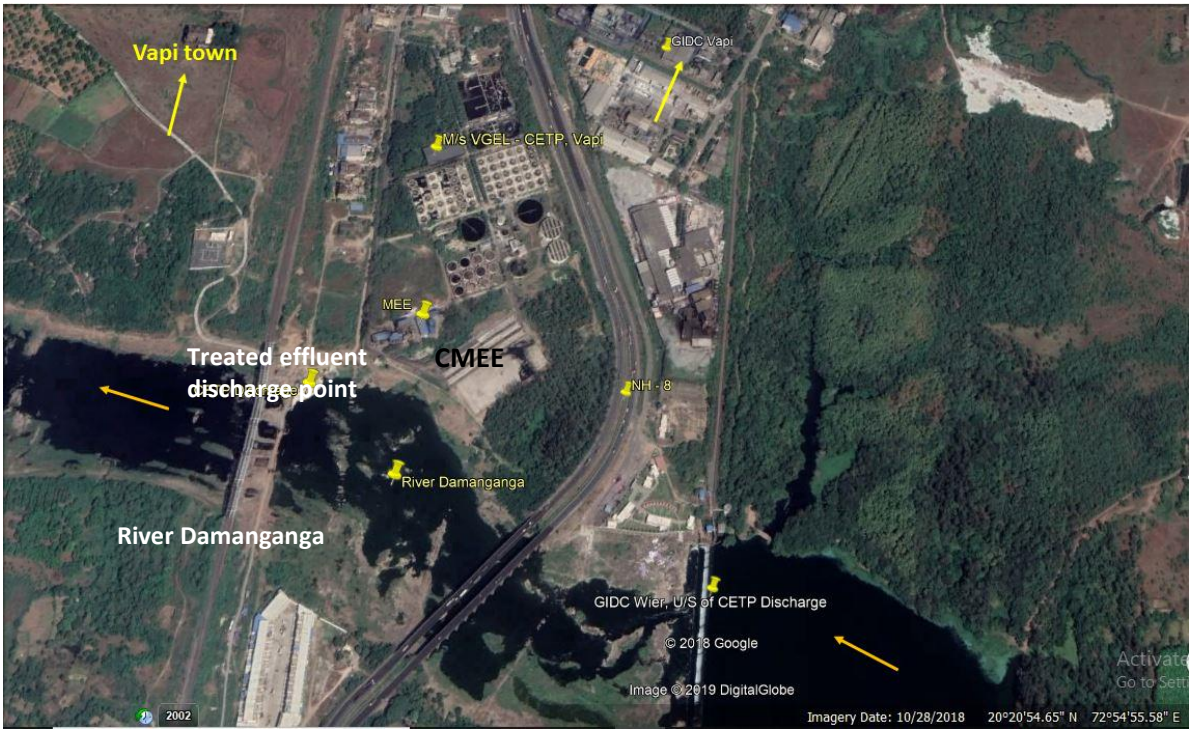



**Figure 3: Location map of CETP at Vapi and discharge of CETP in to river Damanganga**

## 2.3 MAJOR UP-GRADATION DONE AT CETP, VAPI

Over the years M/s VGEL has upgraded various unit operations & processes in the CETP for improving the performance with technical guidance/studies of NEERI, GIZ, IIT Mumbai, IIT Kanpur etc. The details of major up-gradation done over the years are summarized chronologically in the **Table-3** below:

**TABLE-3 MAJOR UP-GRADATION DONE OVER THE YEARS**

| Month & Year | Unit added |
|---|---|
| Jan 1997 | CETP taken over from GIDC |
| April 2000 | Two Equalization tanks of 4500 each of CUM capacity . |
| June 2000 | Decanters & Decanter house |
| August 2003 | 3 x 500 KVA D G Sets |
| Feb 2004 | Two new aeration channels which enhanced 10, 000 $m^3$ volume of aeration system |
| April 2005 | Pilot plant of UASB & CACCO |
| April 2008 | Online TOC meter |
| April 2009 | CACCO system |
| April 2009 | UASB : 1 commissioned |
| April 2009 | Micro bio & R&D Lab |
| June 2009 | Auto Screen |
| Jul 2009 | Equalization tank air blowers |
| Sep 2009 | Flash mixer &Floculator |
| Sep 2009 | Online lime dosing system |
| Jan 2010 | FACCO System |
| Feb 2010 | Reactivator clarifier (RAC) |
| March 2010 | Online DO measurement |
| March 2010 | UASB :II reactor |
| Mar 2010 | 20 x 40 HP surface Aerators |
| August 2010 | Electro chemical oxidation system x $-H_2O$ |
| Feb -2011 | Humboldt Decanter |
| Aug 2012 | Filter Press |
| August 2012 | Interim Sludge Storage Facility 1 and 2 |
| December 2012 | Online TOC meter |
| April 2013 | 2 Humboldt Decanter |
| Dec 2013 | Sludge conveying system screw pump & line installation |
| Dec 2013 | Mixer in equalization tank no -3 ( 2 No's) |
| April 2014 | Installation of SC-3 ( RAC conversion) |
| May 2014 | MEE project |
| July 2014 | On line pH meter with data analogue in GIDC pumping station |
| Aug 2014 | Filtrate augmentation |
| May 2016 | Equalization tank No 1& 2 cleaning |
| March 2018 | Spray dryer 94 KLD |
| June 2018 | Salt Storage area |
| Oct 2018 | Sun drying plat form |

## 2.4 UPGRADATION/CAPACITY ENHANCEMENT OF PLAN OF CETP:

- It is informed that the M/s VGEL has proposed to enhance the hydraulic capacity of existing CETP and also spray dryer system. M/s VGEL is going for expansion of CETP in two phases. In phase-I 55 MLD to 70 MLD immediate for which CTE is obtained and awaiting for EC.For Phase-II, 70 MLD to 100 MLD within one year.

- For Phase-I expansion i.e. 55 MLD to 70 MLD, two existing UASB reactors of 7.5 MLD each which are currently not in operation, will be converted to aeration tanks.

- M/s VGEL has also proposed Acid Bank with capacity 300 MTD which will take care of spent acids generated in the GIDC estate so that spent acids with high COD, TDS shall not come to CETP. It also helps in recycling and reuse for other purposes.

  The details of various up-gradation/capacity enhancement activities are depicted in the below **Table-4** along with the estimated cost and target time for commissioning.

**TABLE -4 LIST OF UP-GRADATION OF VARIOUS PROJECTS**

| S. No | Name of project | Cost in Cr | Time of execution, Months |
|---|---|---|---|
| 01 | 55 to 70 MLD | 6.50 | 06 |
| 02 | Disposal pipe line extension 3.5 Km | 41.00 | 12 |
| 03 | Deep Sea Discharge for 100 MLD | 200.00 | 24 |
| 05 | 70 to 100 MLD | 150.00 | 36 |
| 07 | Spray dryer 8 TPH evaporation rate | 10.00 | 06 |
| 08 | Acid Bank 300 MTD | 21.00 | 24 |
| **Total** | | **442.80** | |

- In addition, VGEL prepared the **Action Plan** (**Table 5**) for improving their performance and meet the discharge norms.

**TABLE 5: ACTION PLAN FROM VGEL TO IMPROVE PERFORMANCE OF CETP**

| S. No | Actions Point | Details | Remarks |
|---|---|---|---|
| **1** | To re-activation of Captive MEE at member units. | The Member Industries having MEE at their premises and sending waste water to CMEE has been instructed to run their own facility and treat their highly concentrated waste water in their own in-house Captive MEE facility. VGEL had already sent a request letter to GPCB to issue directions to the Concerned Industry Member units in this regard. | This will help to reduce the hydraulic load on Common MEE operating at CETP – Vapi. |
| **2** | Divert Concentrate (MEE-Bottom) of Captive MEE units for treatment in CSD at CETP. | Captive MEE members who are not having ATFD/SD for the treatment of their MEE concentrate will be instructed to send their Concentrate to CSD facility at CETP- Vapi, through dedicated Tankers fitted with GPS and Manifest Systems.<br><br>GPCB may be requested to issue Notice of Directions in this regard to Captive MEE Units. | This will provide proper treatment of concentrate streams and reduce the High Levels of Refractory COD chance of mixing with inlet waste water hence to meet Inlet Norms at CETP. |
| **3** | Identification of Color imparting Industries. | To reduce color in CETP inlet effluent VGEL has started analyzing color in monitoring samples.<br><br>VGEL has identified Industries and shall help them out to treat the same at source. | Reduction of color by member industries at source will reduce color at CETP inlet and at outlet. |
| **4** | Control Room Concept for Monitoring to be Established at CETP. | On-line Monitoring of PS-3 and PS-6 are also monitored from this Control Room and necessary checking information are passed on to Day and Night Vigilance Monitoring Team at the various Industry sub sectors for better control of effluent quality on 24 x 7 basis.<br><br>It will be strengthened by Data Base Management Software, which will provide round the clock information for effective monitoring and control. | Effective Control on Monitoring activity will enhance the efficiency of Monitoring activities which will help in reduction of inlet load to CETP. |

| | | | |
|---|---|---|---|
| **5** | Installation of one 8000 Kg/Hr capacity Common Spray Dryer (CSD) for high TDS waste water. | Presently, CSD is in operation. | More Concentrated waste water can be treated from Small scale industries which will reduce refractory COD in CETP inlet and outlet. |
| **6** | Technical Assistance to Member Industries. | VGEL has started providing technical help to its member industries to carryout treatability studies and providing suitable technology for treatment of waste water at their plant itself (primary treatment).<br><br>Various lab scale trials at CETP are being done with waste water from member industries and treatability study outcomes are shared with problematic member units. | Implementation of Industry specific primary waste water treatment like chlorination/sodium hypochlorite dosing, lime dosing and press filter, etc. will help to improve CETP inlet quality.<br><br>Proper operation of Primary ETP by Member industries will reduce shock/over loading to CETP. |
| **7** | Segregation of non-biodegradable waste water having high Refractory COD from member industries. | Non-Biodegradable waste water from Pesticide/Pharma/Dyes and Intermediates will be separated and taking them to CETP by dedicated tankers for physicochemical treatment through Electro oxidation/chemical oxidation followed by treatment at CMEE/CSD. | This system will help CETP to reduce refractory COD at Inlet of CETP which will help CETP to meet COD norm at outlet.<br><br>Those waste will be treated under CMEE or Spray Dryer instead of allowing discharge in CETP. |
| **8** | Proper Operation of GIDC Pumping Stations. | To provide all the pumping stations with Automatic level indicators and Automatic system to switch on DG set in case of power failure. | This will ensure smooth functioning of Pumping stations, hence reduce shock loads at CETP. |
| **9** | Bio-assay test facility to be provided at CETP | More appropriate state of the art Bio-assay testing facility will be provided at CETP to measure Toxicity of waste water on regular basis. | Bio-assay testing facility at CETP will help to review the status, analyze toxicants if any and remedy thereupon. |
| 10. | Over ground pipe lines to carry the waste water from Member Industries to CETP. | Industries and GIDC shall have to install over ground pipeline with SCADA system and continuous auto sampler, collection wells shall be installed in consultation with VGEL and GPCB.<br><br>Notice will be issued by GIDC to the effect that large and medium Industries should install lines within one month and Small Industries should do within 3 months. | GIDC will implement this scheme in co-ordination with VGEL and VGEL will pay the cost of installation of such a facility implemented by GIDC.<br><br>If ghost lines are found, VGEL will take steps to cancel the membership of that member industry and inform GPCB for permanent closure in order to control unauthorized inlet discharges. |

| | | | |
|---|---|---|---|
| | | | Size of the pipeline shall be decided by GIDC as per quantity of effluent discharged. |
| 11. | Compulsory Sampling of Member Industries. | Compulsory sampling of discharge of all member industries of VGEL shall be carried out and tested at least FOUR times a year. Sampling will be done on basis of random allotment and pickup by computer based systems. | A monitoring supervising and advisory committee consisting of two Technical Directors of VGEL Board has been constituted and CEO-VGEL wills co-ordinate with the above committee for the effective monitoring of member industries. |
| **13.** | Appointment Technical Expert from National Level Reputed Institutes like IITs for Evaluation of VGEL's Effectiveness and Performance. | To Review the overall Operational effectiveness of VGEL's Systems by a third party Expert of National Repute and to suggest any improvements required to meet the Country's Environmental Laws. | Review of VGEL's Operational Systems' Effectiveness by a Technical Expert from National Level reputed Institutes like IITs will help to critically audit the VGEL systems and suggest any additional measures to enhance the performance of VGEL to maintain the state of the art systems in VGEL. |

## 3.0 MONITORING OF CETP, VAPI

## 3.1 RECENT JOINT MONITORING:

Stage wise grab sampling was carried out on 12.02.2019 at CETP, Vapi during the visit of the committee constituted as per order dated 11.01.2019 in OA No. 95 of 2018. The samples were analyzed at laboratory of GPCB, Vapi.

The sampling was carried out following locations:

- Inlet to CETP (Out of equalization Tank)
- Outlet of primary clarifier no. 1
- Outlet of primary clarifier no. 2
- Outlet of secondary clarifier no. 1
- Outlet of secondary clarifier no. 2
- Final outlet of CETP

The analysis results are given in **Table-6**:

**TABLE-6: ANALYSIS RESULTS OF MONITORING CARRIED-OUT DURING COMMITTEE VISIT IN FEB 2019**

| Sampling location(s) | Parameter(s) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | pH | TSS | FDS | BOD | COD | $NH_3$-N | Phenols | $Cl^-$ | $SO_4^-$ |
| **Inlet Norms** | **6.5-8.5** | **300** | **2100** | **400** | **1000** | **50** | **1** | **600** | **1000** |
| Inlet to CETP (outlet of eqt tank) | 8.02 | 188 | 4714 | 288 | 1184 | 55 | 2.37 | 2009 | 1440 |
| Outlet of primary clarifier no. 1 | 7.24 | 118 | 5010 | 213 | 939 | 53 | 1.84 | 3178 | 1275 |
| Outlet of primary clarifier no. 2 | 7.28 | 92 | 4612 | 191 | 907 | 51 | 1.56 | 2439 | 1127 |
| Outlet of secondary clarifier no. 1 | 7.41 | 50 | 4596 | 34 | 284 | 48 | 0.88 | 2329 | 1107 |
| Outlet of secondary clarifier no. 2 | 7.38 | 32 | 4808 | 31 | 255 | 42 | 1.07 | 2309 | 1093 |
| Final outlet of CETP | 7.21 | 34 | 4852 | 28 | 258 | 43 | 0.839 | 1984 | 1535 |
| **GPCB prescribed Norms (Outlet )** | **6.5-8.5** | **100** | **2100** | **30** | **250** | **50** | **1** | **600** | **1000** |

Note : Concentration of all the parameters are expressed in mg/L, except pH

: Mode of sampling – Grab

## 3.2 PREVIOUS MONITORING:

CPCB regularly carry out quarterly monitoring CETP Vapi since last many years. GPCB also carry out regular sampling of CETP Vapi. The results of previous monitoring carried out by CPCB, RD, Vadodara is given in **Annexure-2** and GPCB, RO, Vapi is given at **Annexure-3.**

## 4.0 OBSERVATIONS:

- It is observed from recent monitoring carried out on 12.02.2019 that CETP is not meeting with inlet norms as well as outlet norms for COD, FDS, Chloride & Sulphate. COD (258 mg/l) slightly exceeds the Outlet norm (250 mg/l). The other parameters such as pH, TSS, BOD, $NH_3$-N, phenols are meeting the outlet norms whereas $NH_3$-N, Phenols are not meeting with Inlet norms. In the recent monitoring, there is reduction of 82 % TSS, 90 % BOD & 78 % COD reduction due to treatment in CETP. If there is reduction in inlet quality of the CETP by achieving their CCA (outlet) norms of each member industry, there are fair chances that CETP achieves outlet norms.
- It is observed from the above analysis and the data provided in **Annexure-2** & **Annesure-3** that though there is improvement over the year in the treatment at CETP and treated effluent quality, still CETP is not able to meet outlet norms broadly for COD, FDS, Chloride

Sulphate and Color. Inlet quality is not meeting with inlet norms of CETP which shows that some members industries are discharging without meeting specified inlet norms as mentioned in the consents of member industries issued by GPCB. However, it is observed that there is improvement in inlet effluent quality over the years.

- The member industries are discharging their effluent in GIDC underground drainage system which leads to CETP. M/s VGEL –CETP needs to ensure that all the member industries discharge the trade effluent meeting the inlet norms of CETP. In case of non-compliance, the list of such industrial units needs to be provided to GPCB from time to time for necessary action against such units.
- The improving trend of treated effluent quality may be attributed due to source reduction, best management practices adopted by individual member industries of CETP, vigilance and enforcement of GPCB. The various up-gradations done in operation of different units of CETP, identification and segregation of high COD and TDS effluent streams from member industries and treatment through common MEE is encouraging. The various matters through Applications in Hon'ble NGT improved the situations over the years. Particularly improvement in the year 2016 and sometimes observed to be meeting with the COD norms in the Outlet which attributed towards the efforts taken up by GPCB and M/s VGEL due to Original Application No 89 of 2014 (Tarun Patel VS Gujarat Pollution Control Board &Ors) & 109 of 2014 (Tarun Patel Vs The Collector, Valsad & Ors.) in National Green Tribunal (NGT) (WZ), Pune. However, Vapi CETP is required to improve and strictly maintain the inlet quality, operate properly and upgrade adequately so as to meet the norms continuously.
- As per order of Hon'ble NGT (WZ), Pune in O.A. No. 109 of 2014, CETP has planned for disposal pipeline up to 3.5 km from present location in the river towards the Arabian Sea. The matter was between Tarun Patel Vs Collector, Valsad &Ors related to pipeline for disposal of CETP effluent into deep sea (marine outfall). The Application is disposed on 27.10.2017 with direction to VGEL to extend the discharge point through the pipeline and a diffuser system as earlier suggested by NIO to the location at $20^0$21'45.290N, $72^0$ 52' 51.98" E approximately 4.5 km downstream from existing discharge location of CETP, Vapi in the Damanganga estuary within a period of 18 months at their own cost. Though, the matter was for marine outfall, instead of deep sea pipeline, the said order was given for pipeline up

to 4.5 km from present discharge location in consideration of amicable resolution in meeting between Applicant, GPCB, NIO, VGEL (CETP) and representative of villagers in view of difficulties in implementing the deep sea pipeline project due to resistance from locals faced by collector Daman (Daman Administration).

It is learned that National Institute of Oceanography (NIO) further studied the locations and it is stated in the report in November 2018 that now revised the discharge location with pipeline up to 3.5 downstream instead of 4.5 km from present location. However, as per report-"PIPELINE ROUTE SURVEY AND DIFFUSER DESIGN FOR DISCHARGE OF TREATED INDUSTRIAL EFFLUENTS GENERATED BY CETP, VAPI"- "*the proposed location is on temporary basis as there is no enough dilution for disposal of effluent in the estuarine waterbody, and hence the pipeline should be extended to offshore location in future. The pipeline should be laid along river bank and very close to water column and it should be buried wherever it is possible. Since very low dilutions are available at this proposed location, increase in outfall quantity of more than 55 MLD is not advisable at this location. Hence the release of 100 MLD as proposed by VGEL for future expansion is not recommended at this location*."

Collector, Daman approached Hon'ble NGT, PB, New Delhi though Review Application No. 21 of 2018 for review of the order dated 27.10.2017 and delay in condonation, However, Hon'ble NGT dismissed the said RA and related Misc Applications. Further, Daman collector approached Hon'ble Supreme Court with Civil Appeal Dairy No (s) 9808/2019 (arising out of impugned final judgement and order dated 14.12.2018 in RA No. 21 of 2018 and 27.10.2017 in OA No. 109 of 2014 passed by the National Green Tribunal, Western Zone, Pune).

Hon'ble Supreme Court in its order dated 15.04.2019 stayed the operation of the directions contained in the order dated 27.10.2017 of the Hon'ble NGT, Pune in OA No. 109 of 2017 (WZ) and the order dated 14.12.2018 in RA No. 21 of 2018.

- There was huge stock of sludge (13000 MT) and salt (2050 MT) from common spray dryer stored on in the premises.

## 5.0 RECOMMENDATIONS:

- CETP should up-grade/provide treatment units for meeting with outlet norms.

- CETP should start implementation of Action Plan (**Table:5 in Section 2.4**) to meet with inlet as well as outlet norms.

- CETP should regularly send the sludge and salt (generated from Common Spray Dryer) to CHWTSDF for proper disposal.

- List of defaulting industries should be regularly (monthly) share with GPCB for taking action against these industries.

(Jaimin Rana)
AEE, GPCB, RO, Vapi

(B.R. Gajjar)
RO, GPCB, Vapi

(Pratik Bharne)
Sc E, CPCB, Vadodara

**Annexure-1**

## PHOTOGRAPHS

Photo-1 CETP Vapi- Grit Chamber & Equalization Tanks

Photo-2 Primary Clarifier

Photo-3 Secondary Clarifier

Photo-4 Sludge dewatering (centrifuge)

Photo-5 Sludge and salt storage area

Photo-6 Spray dryer (for concentrate from Common MEE)

Photo-7 Treated effluent discharge chamber before discharge point

Photo-8 Treated effluent discharge in to the river

Photo-9 Treated effluent discharge in to the river

**Annexure-2**

# ANALYSIS RESULTS OF SAMPLING CARRIED OUT AT CETP VAPI BY CPCB, RD, VADODARA OVER THE YEAR

## ANNUAL AVERAGE CONCENTRATION OF VARIOUS INLET & OUTLET PARAMETERS (Calendar year 2008-2012)

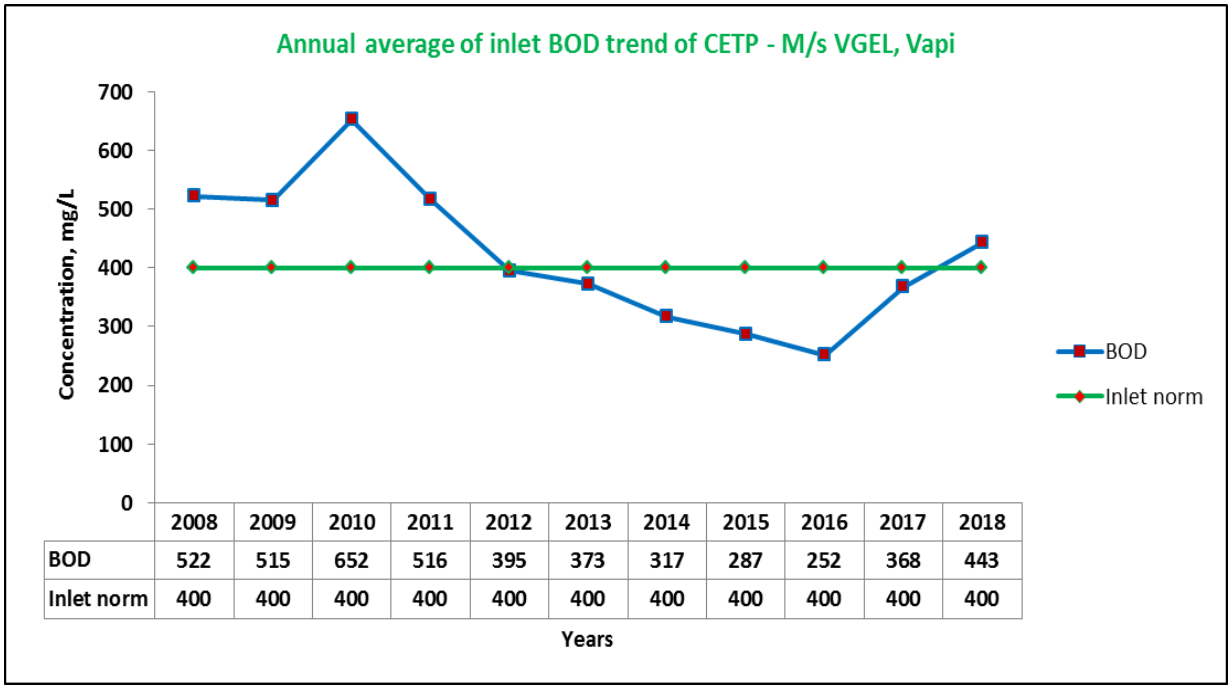
| Sampling location(s) & Year(s) | Parameters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **pH** | **TSS** | **TDS** | **BOD** | **COD** | **O & G** | **$NH_3$-N** | **Phenols** | **$S^{-2}$** | **$CN^-$** |
| Inlet-2008 | 6.04-7.53 | 358 | 6716 | 522.2 | 1904.4 | 34.2 | 194.4 | -- | -- | -- |
| Outlet-2008 | 6.32-7.66 | 290.5 | 6957.4 | 185.4 | 886.5 | 21.02 | 184.2 | -- | -- | -- |
| | | | | | | | | | | |
| Inlet-2009 | 6.58-7.6 | 782 | 7555.8 | 515.8 | 2427 | 35.6 | 87.2 | -- | -- | -- |
| Outlet-2009 | 6.9-7.56 | 342.8 | 7539.8 | 168.5 | 759 | 19.5 | 83.8 | -- | -- | -- |
| | | | | | | | | | | |
| Inlet-2010 | 6.57-7.01 | 1440.5 | 7591 | 652.5 | 2055 | 58 | 60.5 | 3.055 | 2.24 | 0.13 |
| Outlet-2010 | 6.99-7.50 | 221.8 | 7870.4 | 113 | 631 | 21.8 | 59 | 1.6 | 1.56 | 0.18 |
| | | | | | | | | | | |
| Inlet-2011 | 6.83-7.54 | 681.5 | 8987.3 | 516 | 1771.8 | 22.6 | 48.9 | 2.8 | 3.4 | 0.85 |
| Outlet-2011 | 7.25-7.52 | 127.8 | 7620.8 | 82 | 508.3 | 11.9 | 49.7 | 0.9 | 2.5 | 0.3 |
| | | | | | | | | | | |
| Inlet-2012 | 6.55-7.81 | 311.8 | 6674 | 395.3 | 1359.5 | 30.7 | 51.6 | 2.16 | 1.84 | 0.85 |
| Outlet-2012 | 6.56-7.43 | 136.5 | 6775.3 | 75.8 | 450 | 15.5 | 32.4 | 1.25 | 1.7 | 0.33 |

Note : Concentration of all the parameters are expressed in mg/L, except pH
: Mode of sampling – Grab
: Annual average of four quarterly values

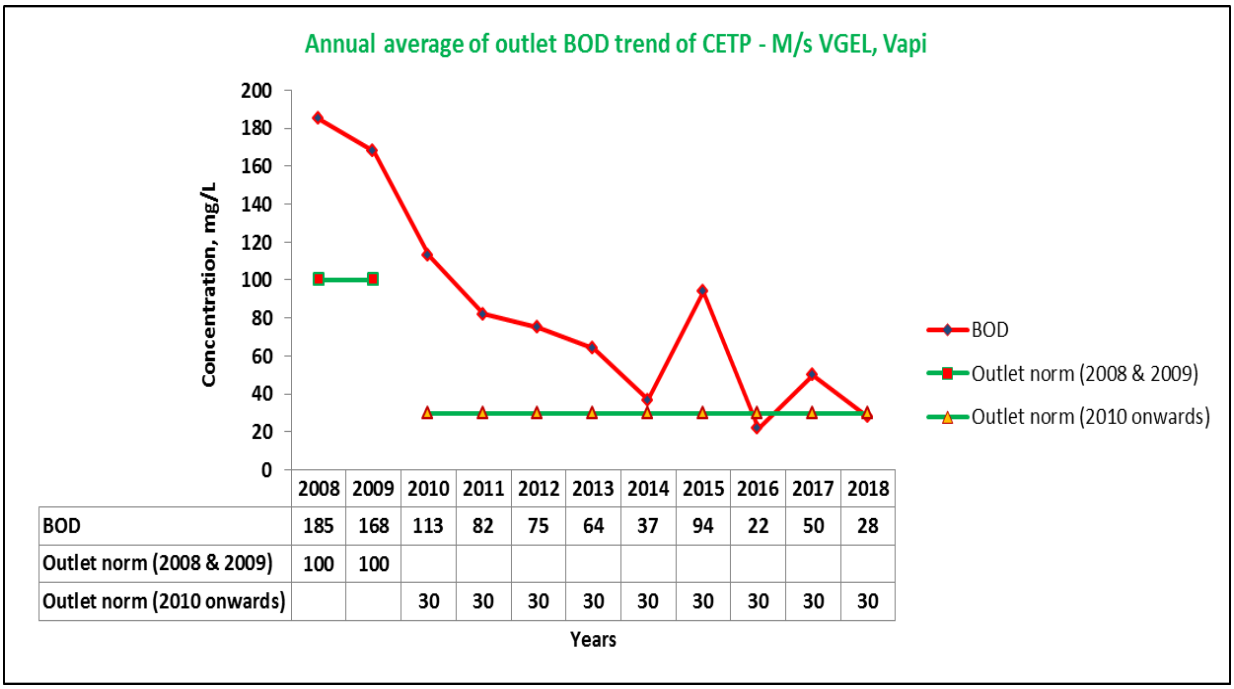
**Annual average concentration of various inlet & outlet parameters (Calendar year 2013-2018)**

| Sampling location(s) & Year(s) | Parameters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **pH** | **TSS** | **TDS** | **BOD** | **COD** | **O & G** | **$NH_3$-N** | **Phenols** | **$S^{-2}$** | **$CN^-$** |
| Inlet-2013 | 6.97-7.9 | 783.3 | 7811.3 | 373.3 | 1502 | -- | 44.4 | 3.3 | -- | -- |
| Outlet-2013 | 7.3-7.85 | 204 | 8120.8 | 64 | 531.8 | 20 | 44.4 | 1.9 | 5.1 | 0.66 |
| | | | | | | | | | | |
| Inlet-2014 | 6.67-7.86 | 423 | 9084 | 309 | 1339.5 | -- | 51.6 | 2.47 | -- | -- |
| Outlet-2014 | 6.72-7.17 | 132 | 9117 | 37 | 474.5 | 2.92 | 48.3 | 0.66 | 1.38 | 0.45 |
| | | | | | | | | | | |
| Inlet-2015 | 7.34-7.73 | 564.2 | 7772.6 | 289.6 | 1197.4 | 4.5 | 54.3 | 4.7 | 26.4 | 0.32 |
| Outlet-2015 | 6.73-7.68 | 143.6 | 7808.4 | 97 | 458.8 | 8.3 | 56.9 | 0.86 | 1.13 | 0.40 |
| | | | | | | | | | | |
| Inlet-2016 | 6.83-8.4 | 376.4 | 6545.4 | 252.6 | 960.4 | -- | 51 | 2.6 | -- | -- |
| Outlet-2016 | 6.82-7.03 | 140.6 | 8400.6 | 22 | 200.2 | 4.2 | 17.4 | 0.3 | 0.8 | 0.1 |
| | | | | | | | | | | |
| Inlet-2017 | 6.51-8.29 | 249.75 | 7144.5 | 368.5 | 1212 | -- | 69 | -- | -- | -- |
| Outlet-2017 | 6.47-7.56 | 72.75 | 7673 | 50 | 333.75 | 3.75 | 47.06 | 3.39 | 0.288 | 0.089 |
| | | | | | | | | | | |
| Inlet-2018 | 7.69-8.1 | 270 | 8081 | 443 | 1368 | 8.35 | 85 | 5.18 | 4.38 | 0.12 |
| Outlet-2018 | 7.15-7.64 | 57.25 | 7277 | 28 | 250 | 2.46 | 53 | 1.14 | .68 | 0.11 |

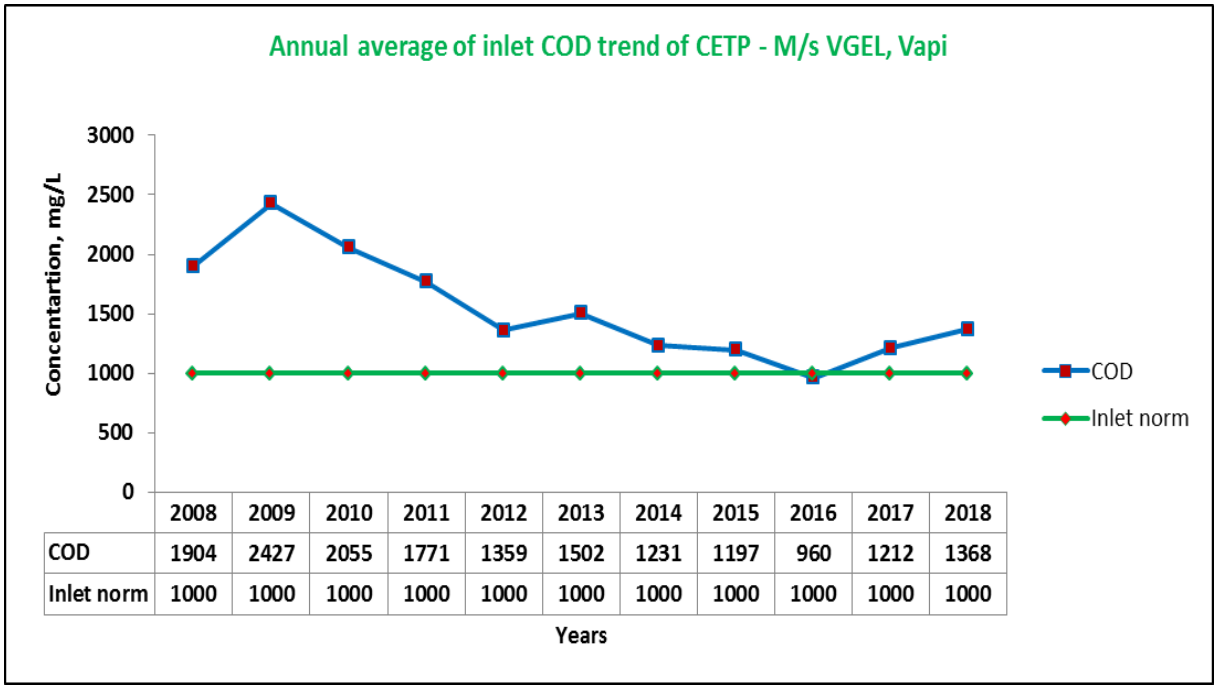
Note : Concentration of all the parameters are expressed in mg/L, except pH
: Mode of sampling – Grab
: Annual average of four quarterly values



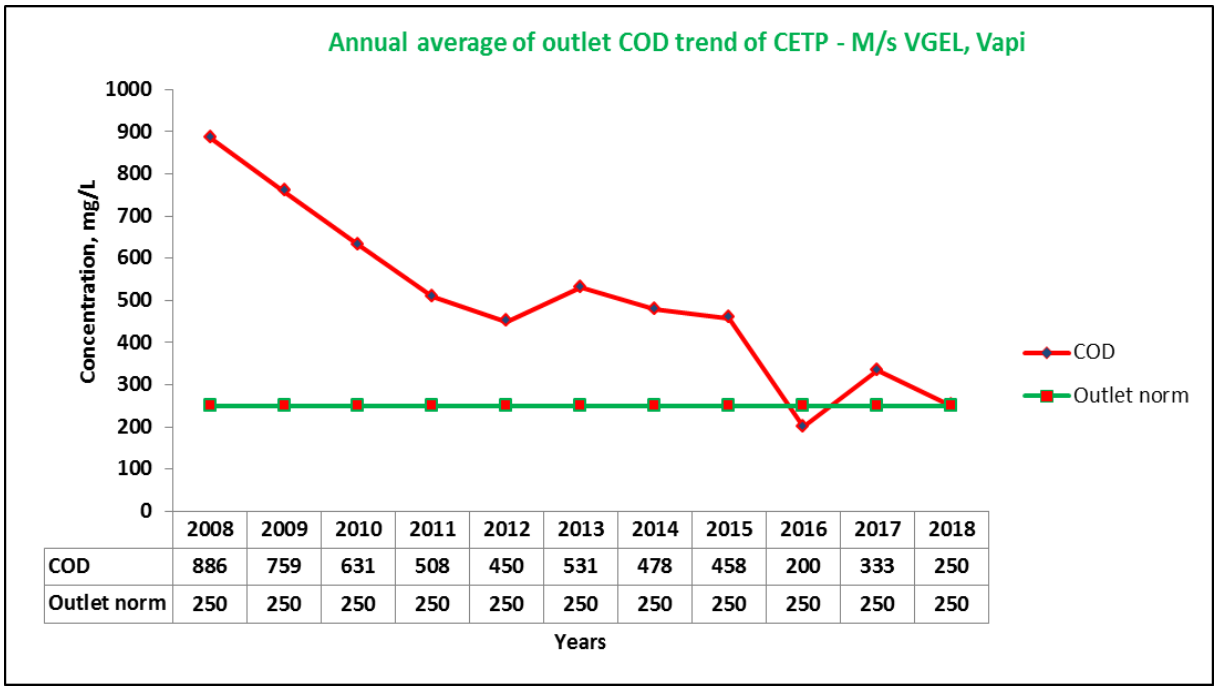

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BOD | 522 | 515 | 652 | 516 | 395 | 373 | 317 | 287 | 252 | 368 | 443 |
| Inlet norm | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |



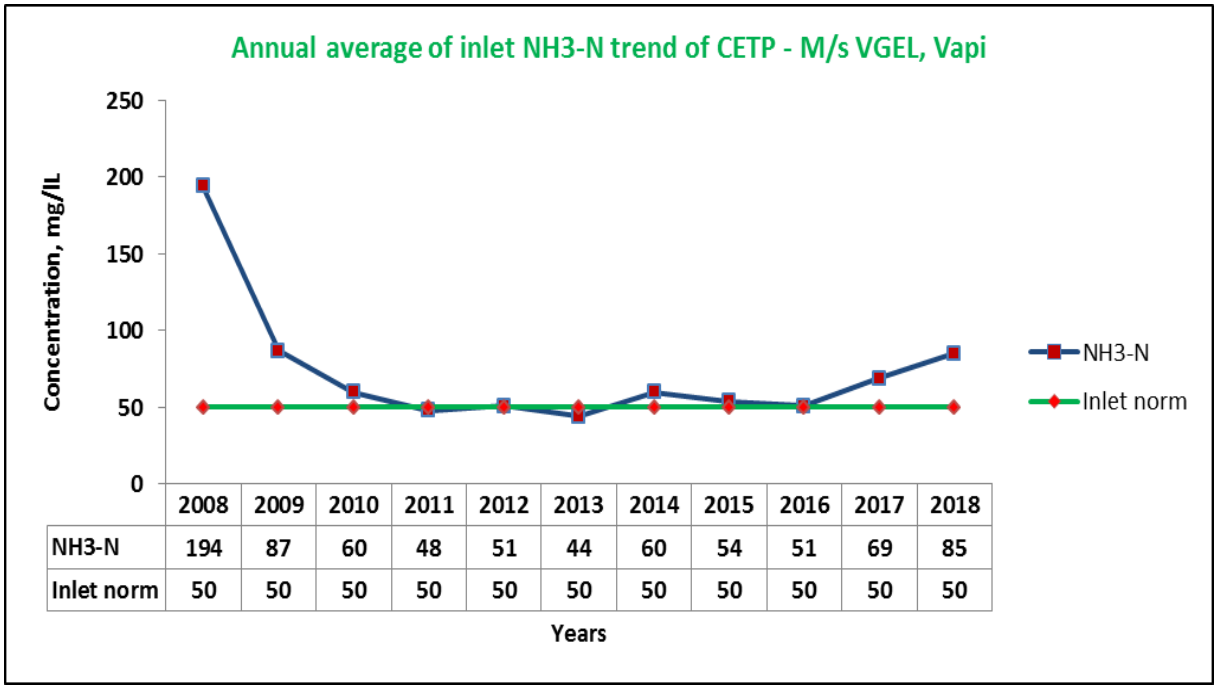

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BOD | 185 | 168 | 113 | 82 | 75 | 64 | 37 | 94 | 22 | 50 | 28 |
| Outlet norm (2008 & 2009) | 100 | 100 | | | | | | | | | |
| Outlet norm (2010 onwards) | | | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |



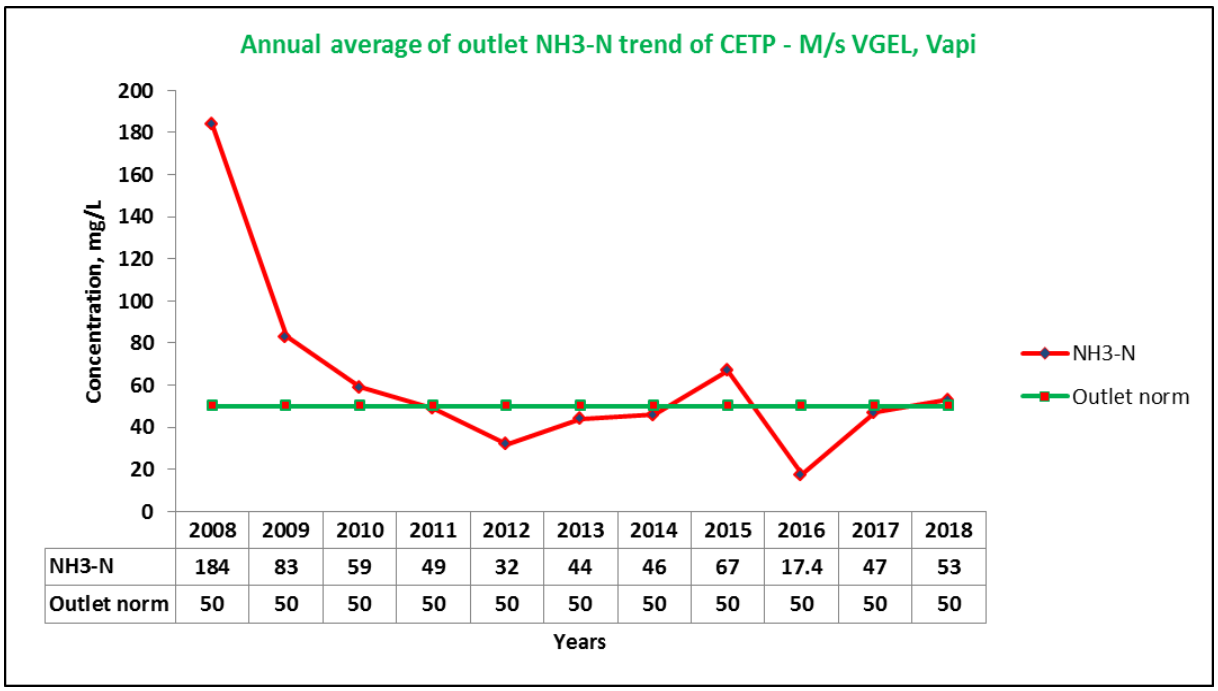

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COD | 1904 | 2427 | 2055 | 1771 | 1359 | 1502 | 1231 | 1197 | 960 | 1212 | 1368 |
| Inlet norm | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COD | 886 | 759 | 631 | 508 | 450 | 531 | 478 | 458 | 200 | 333 | 250 |
| Outlet norm | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NH3-N | 194 | 87 | 60 | 48 | 51 | 44 | 60 | 54 | 51 | 69 | 85 |
| Inlet norm | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NH3-N | 184 | 83 | 59 | 49 | 32 | 44 | 46 | 67 | 17.4 | 47 | 53 |
| Outlet norm | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |

**Annexure-3,**

# ANALYSIS RESULTS OF MONITORING CARRIED AT CETP VAPI BY GPCB, RO, VAPI (2013-2018)

**Inlet of CETPYear - 2013**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.74 | 62 | 2359 | 543 | 1020 |
| February | 7.43 | 27.44 | 1773 | 543 | 532 |
| March | 7.5 | 27.44 | 612 | 180 | 214 |
| April | 7.078 | 43.792 | 1616.8 | 529.6 | 540 |
| May | 7.685 | 64.4 | 1269 | 329.5 | 432 |
| June | 7.22 | 11.76 | 677 | 216 | 606 |
| July | --- | --- | --- | --- | --- |
| August | 7.62 | 24.92 | 685.67 | --- | 501.7 |
| September | 7.313 | 34.185 | 975.75 | 293.5 | 412 |
| October | 7.851 | 41.44 | 1315 | 454 | 502 |
| November | 7.67 | 82.848 | 1108.2 | 421 | 674.2 |
| December | 7.453 | 60.312 | 983.5 | 264.67 | 519.2 |

**Outlet of CETP**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.29 | 28.28 | 619.5 | 177 | 193 |
| February | 7.44 | 50.4 | 606 | 178 | 170 |
| March | 7.46 | 51.52 | 373 | 91 | 222 |
| April | 7.61 | 51.19 | 410 | 108 | 166 |
| May | 7.68 | 64.4 | 1269 | 329.5 | 432 |
| June | 7.4 | 22.4 | 432.66 | 124 | 165.33 |
| July | 6.87 | 21.84 | 207 | 76 | 168 |
| August | 6.90 | 23.33 | 389.5 | --- | 190.33 |
| September | 7.57 | 40.89 | 688.5 | 274.5 | 208.5 |
| October | 7.72 | 50.4 | 408 | 144 | 388 |
| November | 7.38 | 77.71 | 645.75 | 231.67 | 223 |
| December | 7.80 | 37.16 | 507.273 | 155.286 | 210.8 |

**Inlet of CETPYear - 2014**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.68 | 40.4 | 1209 | 458 | 690 |
| February | 7.37 | 55.305 | 1551.3 | 281.5 | 1036 |
| March | 7.46 | 118.7 | 1627.5 | 319 | 521 |
| April | 7.821 | 70.28 | 1028.5 | 256 | 797.5 |
| May | 7.91 | 38.36 | 582 | 148.5 | 322 |
| June | 8.095 | 25.5 | 913.5 | 255.5 | 540 |
| July | 7.49 | 28.6114 | 587.57 | 140.285 | 312.3 |
| August | 7.73 | 37.49 | 1431.7 | 297 | 580 |
| September | 7.56 | 44.115 | 1323.5 | 314.67 | 366.5 |
| October | 7.41 | 35.62 | 1181 | 320 | 405 |
| November | 7.96 | 66.105 | 895 | 182 | 332 |
| December | 7.55 | 50.41 | 1125.6 | 280.75 | 399.4 |
| **Avg.** | 7.66 | 50.90 | 1121.34 | 271.10 | 525.14 |

**Outlet of CETP**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.60 | 29.96 | 387.5 | 133 | 114 |
| February | 7.45 | 53.05 | 592.25 | 177 | 145.5 |
| March | 7.73 | 54.32 | 705 | 205 | 145 |
| April | 7.02 | 45.17 | 477.33 | 171 | 312 |
| May | 7.42 | 13.42 | 610 | 137 | 152 |
| June | 7.75 | 49.69 | 441 | 115 | 188 |
| July | 7.30 | 15.44 | 391.44 | 81.44 | 158.22 |
| August | 7.29 | 24.05 | 554.75 | 104.75 | 211 |
| September | 7.43 | 25.23 | 599.2 | 145.66 | 216 |
| October | 7.23 | 35.24 | 1227.5 | 388 | 198 |
| November | 7.55 | 33.63 | 382 | 72 | 117 |
| December | 7.33 | 38.168 | 457.57 | 92 | 129.71 |
| **Avg.** | 7.42 | 34.78 | 568.79 | 151.82 | 173.86 |

**Inlet of CETP- Year - 2015**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.74 | 43.70 | 967.22 | 146.43 | 299.78 |
| February | 7.53 | 57.02 | 1146.71 | 246.00 | 267.71 |
| March | 7.75 | 33.76 | 849.25 | 190.3 | 408.3 |
| April | 7.49 | 46.20 | 935.11 | 225.50 | 378.44 |
| May | 7.77 | 54.28 | 982.43 | 176.75 | 363.71 |
| June | 7.76 | 23.93 | 1179.00 | 271.00 | 554.00 |
| July | 7.67 | 32.86 | 906.00 | 235.30 | 229.60 |
| August | 7.72 | 74.45 | 1128.40 | 277.20 | 728.40 |
| September | 7.61 | 46.11 | 1008.67 | 307.67 | 739.33 |
| October | 7.87 | 80.18 | 1101.00 | 253.00 | 386.00 |
| November | 7.68 | 50.03 | 1125.40 | 338.40 | 219.20 |
| December | 7.66 | 64.61 | 1080.86 | 231 | 211.71 |
| **Avg.** | **7.69** | **50.59** | **1034.17** | **244.72** | **398.85** |

**Outlet of CETP– Year 2015**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.59 | 40.63 | 383.9 | 61.38 | 143.20 |
| February | 7.42 | 36.27 | 348.25 | 56.88 | 140.00 |
| March | 7.43 | 41.39 | 478.00 | 47.00 | 159.00 |
| April | 7.57 | 29.42 | 390.56 | 53.83 | 178.67 |
| May | 7.41 | 30.703 | 418.75 | 51.40 | 114.75 |
| June | 7.54 | 17.802 | 326.60 | 34.00 | 171.20 |
| July | 7.43 | 27.68 | 454.18 | 64.64 | 118.36 |
| August | 7.46 | 28.39 | 382.33 | 57.00 | 108.67 |
| September | 7.31 | 29.40 | 334.25 | 44.25 | 98.50 |
| October | 7.36 | 37.99 | 370.22 | 36.56 | 73.11 |
| November | 7.55 | 42.79 | 532.29 | 75.00 | 126.00 |
| December | 7.43 | 43.95 | 497.00 | 39.00 | 174.00 |
| **Avg.** | **7.46** | **33.87** | **409.69** | **61.37** | **131.18** |

**Inlet of CETPYear - 2016**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.63 | 49.46 | 1115.05 | 370.07 | 323.12 |
| February | 7.84 | 43.66 | 835.33 | 287.37 | 313.27 |
| March | 7.55 | 27.12 | 868.20 | 205.50 | 139.10 |
| April | 8.03 | 51.87 | 866.30 | 193.40 | 113.20 |
| May | 7.96 | 72.08 | 1031.30 | 254.20 | 201.40 |
| June | 7.95 | 62.37 | 947.80 | 219.00 | 250.80 |
| July | 7.73 | 49.53 | 635.70 | 147.70 | 192.50 |
| August | 7.68 | 21.92 | 574 | 149.5 | 135.67 |
| September | 7.65 | 42.12 | 863.67 | 208.89 | 295 |
| October | 7.93 | 43.56 | 793.33 | 196.9 | 187.5 |
| November | 7.82 | 67.21 | 1149.44 | 301.11 | 205.78 |
| December | 7.81 | 52.91 | 1033.6 | 299.8 | 200.4 |
| **Avg.** | **7.80** | **48.6** | **892.81** | **236.12** | **213.14** |

**outlet of CETPYear 2016**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.49 | 43.34 | 356.95 | 58.53 | 118 |
| February | 7.55 | 37.12 | 336.75 | 42.37 | 109.64 |
| March | 7.62 | 27.44 | 297.83 | 39.52 | 62.17 |
| April | 7.54 | 34.36 | 239.90 | 32.59 | 52.12 |
| May | 7.39 | 36.08 | 254.33 | 37.11 | 63.55 |
| June | 7.26 | 29.85 | 235.80 | 28.88 | 79.00 |
| July | 7.19 | 27.39 | 213.80 | 26.38 | 81.85 |
| August | 7.20 | 23.06 | 181.5 | 24.5 | 57 |
| September | 7.23 | 23.56 | 226.33 | 31 | 66.22 |
| October | 7.57 | 28.39 | 220.75 | 24.08 | 57 |
| November | 7.43 | 35.46 | 303.78 | 44 | 72.89 |
| December | 7.26 | 44.85 | 259.6 | 28 | 82.8 |
| **Avg.** | **7.39** | **32.57** | **260.61** | **34.75** | **75.19** |

**Inlet of CETP Year - 2017**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.68 | 64.34 | 1445.75 | 367.62 | 290.5 |
| February | 7.74 | 84.25 | 1261.25 | 255 | 428.5 |
| March | 7.86 | 58.68 | 1026.12 | 225.67 | 413.67 |
| April | 7.97 | 57.57 | 1105.5 | 233.5 | 250.5 |
| May | 7.79 | 44.71 | 1041.5 | 226.17 | 248.33 |
| June | 7.87 | 36.97 | 760 | 155 | 114.67 |
| July | 7.43 | 33.76 | 771 | 172.28 | 150 |
| August | 7.40 | 58.24 | 907.17 | 239.17 | 106.3 |
| September | 8.04 | 50.21 | 1102 | 236.5 | 268 |
| October | 7.73 | 110.09 | 1404.7 | 286 | 157.3 |
| November | 7.82 | 87.21 | 1004.5 | 221.5 | 321 |
| December | 7.56 | 82.37 | 1496.3 | 219.67 | 270 |
| **Avg.** | **7.74** | **64.03** | **1110.48** | **236.50** | **251.56** |

**Outlet of CETP Vapi Year-2017**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.39 | 56.01 | 293.5 | 34.25 | 77.5 |
| February | 7.59 | 57.5 | 266.75 | 29.5 | 77 |
| March | 7.27 | 45.62 | 245.25 | 27.33 | 81 |
| April | 7.34 | 26.55 | 240.25 | 26 | 73.5 |
| May | 7.33 | 37.41 | 251.33 | 28.33 | 69.33 |
| June | 7.23 | 35.18 | 228.33 | 26 | 65.33 |
| July | 7.3 | 30.82 | 232 | 33.28 | 84.86 |
| August | 7.36 | 49.05 | 268 | 40.83 | 88 |
| September | 7.39 | 36.71 | 249.5 | 30.5 | 54 |
| October | 7.58 | 41.81 | 296.67 | 41.33 | 59.33 |
| November | 7.45 | 55.78 | 300.5 | 38 | 103 |
| December | 7.67 | 54.81 | 390.33 | 28.33 | 40.67 |
| **Avg.** | **7.40** | **43.93** | **271.86** | **31.97** | **72.79** |

**Inlet of CETP ,Year - 2018**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **1000 mg/l** | **400 mg/l** | **300 mg/l** |
| January | 7.54 | 65.19 | 1181.33 | 290.33 | 283.50 |
| February | 7.75 | 55.15 | 910.00 | 202.50 | 178.00 |
| March | 7.95 | 106.86 | 1524.50 | 402.50 | 436.00 |
| April | 7.88 | 71.85 | 981.00 | 230.33 | 445.33 |
| May | 8.01 | 74.20 | 1068.50 | 268.75 | 239.00 |
| June | 7.66 | 76.75 | 808.67 | 196.00 | 287.67 |
| July | 7.45 | 75.04 | 833.00 | 232.50 | 246.00 |
| August | 8.41 | 89.25 | 1370.50 | 394.00 | 253.00 |
| September | 7.98 | 85.82 | 1489.50 | 400.00 | 917.50 |
| October | 7.38 | 105.45 | 1261.75 | 330.00 | 406.75 |
| November | 7.77 | 65.87 | 1080.67 | 279.00 | 335.33 |
| December | 8.02 | 59.28 | 1149.75 | 271.50 | 353.75 |
| **Avg.** | **7.81** | **77.55** | **1138.26** | **291.45** | **365.15** |

**outlet of CETP Year 2018**

| Parameter | pH | NH3 | COD | BOD | SS |
|---|---|---|---|---|---|
| **Limit ->** | **6.5 TO 8.5** | **50 mg/l** | **250 mg/l** | **30 mg/l** | **100 mg/l** |
| January | 7.54 | 48.63 | 317.33 | 31.83 | 39.67 |
| February | 7.77 | 53.82 | 275.00 | 31.00 | 119.00 |
| March | 7.97 | 90.38 | 524.00 | 126.00 | 72.00 |
| April | 7.65 | 73.21 | 390.67 | 82.67 | 84.00 |
| May | 7.70 | 49.79 | 267.00 | 45.50 | 69.00 |
| June | 7.58 | 49.86 | 222.00 | 27.00 | 78.00 |
| July | 7.60 | 45.65 | 263.17 | 35.67 | 97.67 |
| August | 7.46 | 60.21 | 285.00 | 35.00 | 105.00 |
| September | 7.62 | 50.21 | 343.00 | 48.00 | 120.00 |
| October | 7.66 | 55.23 | 303.50 | 44.75 | 122.50 |
| November | 7.74 | 51.60 | 259.00 | 29.00 | 95.33 |
| December | 7.77 | 46.46 | 267.50 | 33.00 | 94.50 |
| **Avg.** | **7.67** | **56.25** | **309.76** | **47.45** | **91.38** |