Comprehensive Environmental Pollution Abatement Action Plan Vapi Industrial Cluster -GUJARAT

Gujarat Pollution Control Board
Gandhinagar.
2010

INDEX

Chapter – 1: Introduction

1	Declared Policy Points for Pollution Control (Pillars of Action Plan)	3
2	Recent Infrastructure Expansion in the State	5
3	Environmental Infrastructure Facilities in the State	7

Chapter – 2 : Need and Methodology of the Plan

1	Need of the Action Plan	9
2	Objective and Scope of the Plan	9
3	Methodology	10
4	Stakeholders	10

Chapter -3 : Vapi Industrial Cluster

1	Brief History of the Cluster	14
2	Estate at a Glance with Geological area & Impact zone	15
3	EMS Provided by the Industries	16
4	Environment Track Record of the Cluster	17
5	Probable Pollutants	18
6	Management of Wastes	18
7	Surrounding Environment	19
8	Environmental Status	24
9	Environmental Issues	30
10	Existing Environmental Infrastructure	30
11	Environmental Infrastructure Need	42
12	Monitoring Protocol	44
13	Drawing of Action Points	45

Chapter – 4 : New Initiatives		47
Chapter – 5 : Action Plan for Vapi		49
Chapter - 6 : Effects on CEPI		74
Annexure – 1	Water quality of surface water near GIDC Vapi area	78
Annexure – 2	Ambient Air Quality at GIDC Vapi area	81
Annexure – 3	Water Quality of sub –surface water(Bore well) at GIDC Vapi area	83
Annexure – 4	Analysis results of CETP	84
Annexure - 5	Map showing geographical location and Impact Zone	88
Annexure - 6	Steering committee recommendations	89

FOREWORD

Need of action plan is justified to control pollution in any area where pollution sources are identified, pollutants are measured, assessed and found exceeding permissible limits. To implement such action plans is a duty of any SPCB and all concerned agencies/stakeholders.

After declaration of critically polluted areas by OMs dated 13.1.2010 and 15.3.2010 of MoEF, GOI and imposing temporary moratorium for a period upto August 2010, the action plans for these specified areas (industrial clusters) are desired by the CPCB and MoEF, GOI.

In Gujarat, six areas – Ankleshwar, Vapi, Ahmedabad, Vatva, Bhavnagar and Junagadh – are identified by above OMs as critically polluted. GPCB started quick actions, expanded its infrastructure, decided and declared main points to control pollution at source, prepared action plans including these points and finalized the same in consultation with main stakeholders and issued necessary directions. These action plans were sent to MoEF on 19.4.2010. Meanwhile, by letters dated 19.4.2010 and 18.5.2010, CPCB suggested TOR to make the action plans. Accordingly the action plans are revised.

Consultative meetings were held with various stakeholders including the industries associations, CETP/TSDF operators, NGOs, CPCB and GIDC authorities, who have helped to improve the action plans.

We are thankful to the CPCB and MoEF to have recognized the wholehearted efforts by GPCB team, DoEF, GIDC, VW&EMCL industries of Vapi and all other concerned.

We are hopeful that this will serve the purpose and help various agencies/ authorities to implement and monitor the Action Plans for the six industrial clusters/ areas of the state.

We are also hopeful that the implementation of these Action Plans would bring in the positive results in other clusters also.

Place: Gandhinagar
Date: 30-10-2010

Dr.K.U.Mistry
Chairman, GPCB

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Place: Gandhinagar
Date: 30-06-2010

Dr.K.U.Mistry
Chairman,
GPCB

CHAPTER -1

INTRODUCTION

Object of this chapter is to describe in brief the actions initiated by Gujarat after OM dated 13.1.2010 declaring critically polluted areas in the country.

It is worth mentioning that Gujarat is a fast developing State and has concentration of chemical units in certain areas, which have more pollution potential and hence the State has created more pollution control infrastructure also.

1. DECLARED POLICY POINTS FOR POLLUTION CONTROL (PILLARS OF ACTION PLANS):

During February to May 2010, following main points of pollution control were widely published and circulated to industries associations for further communication to their member industries. Some of these points were also published as 'Public Appeal' on 1.2.2010 and as 'General Improvement Notice' on 20.2.2010 in three leading newspapers of Gujarat. These are the points specific to nature of industries in the State and main pillars of action plans. These briefly stated points have to incorporate detailed procedure and planning for their floor level compliance and are under gradual execution by due deliberation with concerned stakeholders.

1. To measure and control discharges to ETP and CETP, each outlet of ETP and each inlet and outlet of CETP shall have standard flow meter and flow recorder. Only one authorized outlet will be allowed. SCADA system will be required for CETP.

2. Waste generation streams shall be identified from the process plant and collected separately to decide about their treatability. The collected effluent should be subjected to proper treatment method before discharging it to ETP or CETP. Big units (discharge >100 KLD) should have their own incinerator/ evaporator/ dryer/solvent distillation plant, acid handling or recovery plant etc to make the treated waste reusable or to reduce the load on ETP or CETP.

3. All units including zero discharge units should have pH correction and SS removal system, so that they cannot discharge any acidic effluent to CETP or to any unauthorized disposal point. Where spent or mixed acid is generated in large quantity, plan for its recovery or re-use or to send it to authorized place will be required.

4. By-pass system for untreated effluent, stack emission or pumping station shall not be allowed. Adequacy and

efficacy certificate will be required for ETP, CETP and APCM.

5. Dual disposal modes i.e. pipeline and truck/tanker vehicle shall not be allowed to any unit. Only one safer mode of disposal should be selected.

6. All big units having more than 100 KLD discharge should have their own treatment plant to meet with the GPCB norms. They should use the technology to run their treatment plants independently.

7. CETP will be required for each industrial cluster for effluent treatment and safe disposal. No direct discharge in GIDC pipeline or any disposal point will be permitted. Narol, Jhagadia, Khambhat, Dahej, Vilayat, Sarigam, Jetpur, Junagadh, Jamnagar etc. will need CETP on this principle.

8. Interlocking system (e.g. TOC sensing, trip, alarm and safe diversion) should be provided by all big units (discharge > 100 KLD) and CETP to control their excessive hydraulic and pollution discharge.

9. More than one source of water intake will generally be discouraged. Ground (boregwell) water source should be stopped if pipe water source is available. Metering system for water consumption should be implemented.

10. Domestic waste will not be allowed in industrial effluent pipeline. Septic tank, STP or separate pipeline will be required for that purpose.

11. Only authorized fuel shall be permitted to reduce air pollution. Where natural gas is available, no other fuel should be used by industry. Wood as fuel is not at all permitted. More chimney height will be required for more dispersion and dilution.

12. Proper APCM – bag filters, ESP, local exhaust ventilation, scrubber, flare, column-condenser, vent chiller etc shall be required in working condition to reduce gas emission, flying particles, dust, ash etc in air.

13. All TSDF sites will be required to follow the guidelines regarding quantity and time period of waste retention, working of incinerator, sheds for wastes segregation, leachate treatment facility, storm water drain, dyke for liquid tanks, non-acceptance of plastic waste at landfill site, fire fighting facility, information and record of all

wastes at site and no dumping of unauthorized waste in active cell etc.

14. Cleaner production options will be required at CTE/CCA levels. They may be suggested also. Its implementation will be monitored.

15. Plan for reduce, recycle, reuse and recover of resources and trade wastes will be required from each industry. Plans to reduce CO_2 emission, ground water recharging, rain water harvesting, water and electricity conservation and reduction of noise, vibration and plastic wastes will also be required with CTE application. It will be monitored till CCA continuation.

16. Baseline data of land, water and air will be required with CTE application and its status report will be required with annual report to GPCB.

17. Plan to use solar or wind energy for lighting / heating purpose will be required.

18. Transportation of hazardous wastes for a longer distance or throwing at unauthorized place will not be allowed. It will be transported in authorized and covered trucks only.

19. Tree plantation plan will be required and monitored from each unit.

20. Regular monitoring of water and ambient air quality in different areas will be carried out.

2. RECENT INFRASTRUCTURE EXPANSION IN THE STATE:

To have vigorous and intensive monitoring of pollution control laws in the State and for speedy execution of action plans, following steps have already been taken in the State during last two months:

1. Five new GPCB offices are opened at Ankleshwar, Gandhinagar, Himmatnagar, Surendranagar and Porbandar. Including these, now GPCB is functioning at 18 places - (1) Gandhinagar (2) Ahmedabad, (3) Nadiad (4) Vadodara (5) Godhara (6) Bharuch (7) Ankleshwar (8) Surat (9) Vapi (10) Mehsana (11) Himmatnagar (12) Surendranagar (13) Rajkot (14) Bhavnagar (15) Jamnagar (16) Porbandar (17) Junagadh and (18) Bhuj.

2. Three new vigilance teams (Zonal Offices) are started at Surat, Vadodara and Rajkot. Now, total four such vigilance teams are stationed at Gandhinagar, Surat, Vadodara and Rajkot. These teams are equipped with new vehicles and staff.

3. Two new laboratories are started at Mehsana and Bhuj. Now, total at 9 places, GPCB has its own laboratories for sample analysis – Gandhinagar, Vadodara, Bharuch, Surat, Vapi, Mehsana, Rajkot, Jamnagar and Bhuj.

4. Fourteen new vehicles (four-wheelers) have been purchased and allotted to new offices and vigilance teams.

5. 67 new officers are being recruited to GPCB strength. Application receiving process is over and selection procedure is about to start.

6. Full time Chairman from 20.1.2010 and full-time Member Secretary from 21.6.2010 are given by the State to strengthen GPCB.

7. New four storeyed building is at the stage of completion near the existing building of Head Office at Gandhinagar. This will accommodate more and multifarious activities of pollution control from Head Office of GPCB.

8. New Sections of R&D, Cleaner Production options, training & development, environment awareness and award scheme are started at Head Office.

9. New Data Collection Forms are issued and being filled by field visits to record current status of all units. This will also reveal changes made at site.

10. New ambient air quality monitoring station is started at Chitra (Bhavnagar) on 25.6.2010 to monitor $PM_{2.5.}$

11. GPCB is actively participating in Door Darshan TV programs sponsored by MoEF, GOI, to create statewide awareness on environment and pollution control aspects.

12. On-line computer system (XGN) of GPCB has won second prize at National level for e-Governance programme in India and other States inquire to follow this.

13. Planning has been done to procure new laboratory equipments for strengthening of analysis of pollutants.

14. Barcode system for sample containers is introduced.

15. GPCB has received ISO: 9001 and ISO: 14001 certificates and training is being given to staff for internal audit of all its offices.

16. GPCB has reconstituted Technical Committee of Board Members and outside experts to discuss and decide upon the cases of the change of product mix and some typical applications from critically polluted areas.

3. ENVIRONMENTAL INFRASTRUCTURE FACILITIES IN THE STATE:

Comparatively, more environmental infrastructure facilities (CETP, FETP, TSDF, Incinerators, Pipe conveyance etc.) for pollution control are setup and functional in Gujarat.

Following Table provides, at a glance, pollution control facilities existing in the State:

No.	Facility	Total No.
1	ETPs	5808
2	Individual incinerators	41
3	Individual TSDF	15
4	Individual pipe conveyance to sea	18
5	CETPs	26
6	FETP	01
7	Common TSDF with incinerators	04
8	Common TSDF without incinerators	04
9	Common pipe conveyance to sea	05
	TOTAL	**5922**

31 New MoUs are done to invite more such common facilities.

SOME FACILITIES AT INDUSTRIAL CLUSTERS:

Cluster wise facilities are mentioned in respective action plan of the industrial cluster.

CHAPTER -2

NEED AND METHODOLOGY OF THE PLAN

1. NEED OF THE ACTION PLAN :

Central Pollution Control Board (CPCB) in collaboration with Indian Institute of Technology (IIT), Delhi and other institutes formulated the concept for Comprehensive Environmental Pollution Index (CEPI) and has analyzed the environmental status of industrial clusters which were identified in consultation with Ministry of Environment and Forests for CEPI analysis. These clusters have been classified as very critically polluted having CEPI score above 80, critically polluted having CEPI score above 70.

Vapi GIDC industrial cluster, Vapi, Dist: Valsad, Gujarat is having overall CEPI as 88.09 which is very critically polluted CEPI score. This has created a need for detailed study for the critically polluted industrial cluster of Vapi, Dist: Valsad, Gujarat in terms of extent of damage and formulation of appropriate remedial action plan enabling abatement of pollution and restoring the environmental quality of this cluster.

Gujarat Pollution Control Board (GPCB) has prepared this report keeping in view the Terms of Reference (TOR) given by CPCB. GPCB has generated and analyzed the data from primary and secondary sources, which is utilized to draw action points and finalize the action plan. This action plan definitely will improve the situation in the given cluster and help in reducing CEPI score.

2. OBJECTIVE AND SCOPE OF THE PLAN:

GIDC, Vapi -an industrial cluster has been listed with score Air CEPI 74, Water CEPI 74.5 and Land CEPI 72 with ranking 02 in the report with overall CEPI as 88.09. Therefore a detailed Action Plan for the GIDC, Vapi industrial cluster for prevention and control as well as remediation of various environmental components using the best available and appropriate engineering practices is a must.

A comprehensive implementation mechanism including financial, manpower and technology is required to be synchronized in a time bound manner with an efficient monitoring frequency which is necessary for bringing CEPI Score down the line.

3. METHODOLOGY

This report on "Development of Comprehensive Environmental pollution Abatement Action Plan for Industrial Cluster – GIDC, Vapi, Dist: Valsad, Gujarat" is prepared based on the Terms of References (TOR) provided from the desk of CPCB Chairman vide D.O. letter no. B. 29012/ 1/ ESS/ 2010 dated May 18, 2010, which is enclosed herewith as Annexure-1. GPCB has adopted methodology as mentioned in this letter. As mentioned in the methodology, GPCB has conducted series of meetings with the stakeholders, NGOs, State Government agencies to have inputs from them for collection of required data. Based on field survey and monitoring data available with the GPCB primary details are collected. These details include: Demarcation of geographical boundary, physical verification of pollution sources, environmental concern, demographical details, eco geological features, sensitive receptors and details on environmental infrastructure facility/ technology. However due to time constraint, CPCB could not be involved during the survey, but it can be done during the course of review of action plan. Based on findings of the data collected, action points are drawn and comprehensive abatement plan is proposed in this report along with time frame, technological intervention, and infrastructure requirement after gap analysis. With this gap analysis and infrastructure requirement an attempt has been made for cost estimation, project model using PPP, financial outlay, and details of the scheme and present status of the project has been delineated in this report.

4. STAKEHOLDERS:

For the GIDC, Vapi following are the major identified stake holders;

1. Industries, Vapi Industries Associations, Vapi Waste and Effluent Management Co Limited.
2. House holders staying within the cluster and Citizens of Vapi at large
3. NGOs
4. Government bodies (MoEF, CPCB, DoEF, GPCB, GIDC, Notified Area Authority)

ROLE OF STAKE HOLDERS

- **Vapi Industries Association:**
    - Proper coordination between industries, CETP, regulatory authorities for taking necessary steps for reducing and abetting pollution issues.
- **Vapi Waste and Effluent Management Company Limited**
    - Proper operation and maintenance of CETP and TSDF.
    - Up gradation / modification of existing CETP and TSDF for improving its performance so as to achieve norms.
    - Educating, training and giving guidance to industrialists and their personnel for proper operation of individual effluent treatment units.
    - Monitoring of defaulter units and taking appropriate action.
- **Notified Area Authority**
    - Development of green belt.
    - Providing and maintaining necessary infrastructure facilities.
    - Proper handling and management of MSW generated from notified area.
- **GIDC**
    - Providing necessary infrastructure for the development of estate.
    - Operation and maintenance of effluent drainage pipe lines and pumping stations leading to CETP.
- **Industries**
    - Installation, up gradation, modification of individual treatment plant to achieve CETP inlet norms.
    - Adoption of cleaner production technologies and waste minimization techniques to reduce pollution at source.
    - Proper segregation and treatment of high concentrated streams generated by industries as per CPCB guidelines.
    - Treatment of concentrated streams with advanced and modern technologies.
- **NGOs**
    - NGOs have to play a role of watch dog to keep a proper watch on industries and other stake holders for overall improvement in environment and hence benefit to the society as a whole.
    - NGOs have also to create public awareness about environmental issues and their mitigation measures so as to have a sustainable development.

- **Regulatory authorities:**

    - Enforcement of Environmental rules and regulations to prevent and control environmental pollution.
    - Environmental monitoring of industrial units, CETP , TSDF, HCUS, Local bodies to ensure proper functioning of the environmental management systems.

- GPCB is in continuous consultation with above stake holder through meetings and discussion.

CHAPTER-3

VAPI INDUSTRIAL CLUSTER

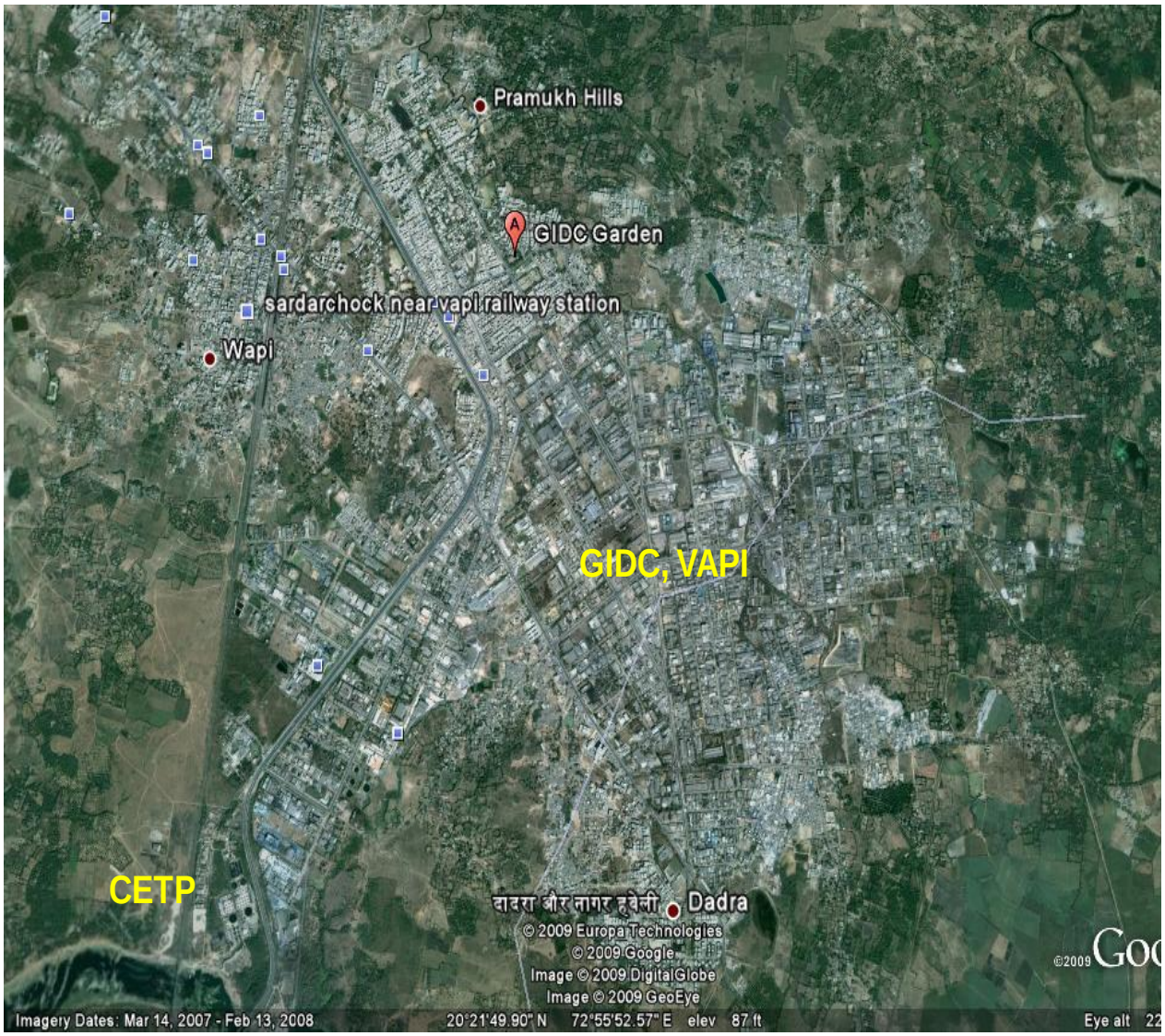
1. BRIEF HISTORY OF THE CLUSTER- G.I.D.C. VAPI.

- Vapi Industrial Estate, developed by GIDC, came into existence about four decades ago, in 1967 -68. The estate, developed in phases, now spreads over 1140 hectares and houses nearly 759 industries, majority of them being small scale units.

- Basically a declared chemical estate, about 70 % of the industries are manufacturing chemicals such as dyes and dyes intermediates, pigments, pesticides, fine chemicals, and pharmaceuticals. The remaining 30 % are paper mills, packaging, engineering, plastic, textiles, food processing, printing ink and many other products.

- **Vapi Industries Association**, popularly known as VIA, came into existence in 1971. VIA floated a company in the name of **Vapi Waste and Effluent Management Company Limited** in 1997, non equity, nonprofit entity based on co-operative principles with corporate culture of management, with an objective of providing a comprehensive environmental management programs for the estate.

2. ESTATE AT A GLANCE



Aerial view of Vapi industrial cluster

- **Area covered by industrial estate and a location map indicating the estate and nearby locations**

  - Total area covered by GIDC estate : 1140 Hectares
  - Area for industrial : 580 Hectares
  - Area for commercial : 30 Hectares
  - Area for residential : 103 Hectares
  - Other PP/Utilities : 427 Hectares

- **No. of operational industries (approx): 759**

Industrial Break-up:

Type→ Size ↓	**Red**	**Orange**	**Green**
Large	50	0	1
Medium	38	3	0
Small-scale	482	115	70
Total	570	118	71
Grand Total	**759**		

- **Types of industries covered by the Estate:**

  Dyes & dyes Intermediate, chemical industries, pigments, printing inks, pesticides, fine chemicals, pharmaceuticals, paper mills, textile, packaging, plastic and engineering.

- **Water consumption:**
  - Industrial (for estate) : 60 MLD
  - Domestic (Residential colonies) : 11 MLD

- **Waste water generation:**
  - Industrial (for estate) : 49 MLD
  - Domestic (for residential colonies) : 10 MLD.

3. EMS PROVIDED BY THE INDUSTRIES

(A) Waste water treatment facilities:

- **No. of units having primary & secondary treatment:**
  - Unit having Primary Treatment : 313
  - Unit having Primary & Secondary treatment : 106
  - Unit having primary, secondary & tertiary treatment :126

- **No. of units attached to CETP** **:** 507.

Note- There is some units which are reusing /evaporating/incinerating their effluent after treatment and maintaining zero discharge.

(B) Air :

As part of air pollution control measures for the flue gas/process emission, industries have adopted multi cyclone, cyclone, dust collector/ scrubbing system as APCM. Nos. of Industries which have installed Bag filters, ESP are as under for the up gradation of the ambient air quality:

1) Bag filters installed by industries : 59 Nos.
2) ESP installed by Industries : 14 Nos
3) Multi Cyclone Separators : 68 Nos.
4) Scrubbers : 186 Nos.
5) No of units using natural gas as fuel : 158 Nos.
   Total consumption of CNG is 4 lacs cubic meter per day.
6) Vehicular pollution-
   - Nos. of Rickshaws switch over to cleaner fuel CNG-2257
   - Nos. of LMVs switched over to cleaner fuel CNG-428
   - Nos. of LMVs switched over to cleaner Fuel LPG-3014
   - One CNG Station of 1200SCMH capacity operated by GSPC is already working. All 7Nos. petrol pumps having 2-T Mix facility in vapi area.

(C) Hazardous waste:

Over all hazardous waste disposed off in to the TSDF site is @ 4, 02,000 MT and all the hazardous waste generated units are member of TSDF site Vapi. Main hazardous waste generation is chemical waste from process, ETP sludge and incinerable waste. The present capacity of the TSDF site is 7.62 lacs MT and average hazardous waste generation is @ 75000 MT per year.

4.ENVIRONMENTAL TRACK RECORD OF CLUSTER.

During period of 1992 to 1995, chemical industries flourished. Due to non -existence of TSDF and CETP during the period, estate remained under stress of pollution of water, air and hazardous waste. Subsequently corrective measures have been initiated. CETP and TSDF have come up. Streamlining of industrial waste water and hazardous waste were undertaken. Air pollution control measures have been adopted by the industrial units. For the last two years, 151 industrial units have been issued closure by GPCB under the Water Act 1974 and Air Act 1981. Moreover industrial units have been issued notice of direction under the environmental Acts.

5. PROBABLE POLLUTANTS:

(A) Water : Probable Water pollutant parameters for waste water going to CETP are pH, COD, BOD, Ammonical Nitrogen, SS, Phenolic compound, Benzene, Hexavalent Chromium, Cadmium.

(B) Air : HCl, SO2, NH3, H2S, NOx, $PM_{2.5}$, PM_{10}, VOCs, PAHs, PCBs, vinyl chloride.

Note- Benzene, VOCs, PAHs, PCBs, vinyl chloride are not being monitored by GPCB as no measuring facility available with GPCB.

6. MANANGEMENT OF WASTE:

(A) MSW Management of Waste:

At present 35 MT per day of municipal solid waste generated from notified area is dumped near fire station-2, GIDC, Phase 2, Vapi. Proposed landfill site for MSW is at plot nos: 4507/1 to 4508, 4510.4801 to 4803/1, GIDC, Vapi, measuring Totally 40,000 m^2 area.
Note-At present authorization is not given to notified area authority. MSW disposal site is under proposal stage.

(B) BMW: Management of Waste:

There are four major hospitals and about 27 private clinical centre within GIDC area. All the HCUs of Vapi are presently giving their BMW to CBMWI of Envision Enviro Contro Private Limited, Surat for treatment and disposal .At present there is no CBMWI in Vapi.

(C) Domestic waste water:

Domestic wastewater of GIDC estate is being treated at CETP along with industrial effluent.

7. SURROUNDING ENVIRONMENT:

- **Population residing in the area:**

Valsad District consists 8 Talukas, total area being 5135 km^2. Pardi Taluka has an area of 425.89 km^2 and has 79 villages and two towns. Approximately 75% of its population is tribal. 0.87 % of the area falls under forest category. Demographic details of Pardi Taluka are presented in ***Table***.

PARTICULARS	RURAL	URBAN	TOTAL
Area in sq km.	395.67	30.22	425.89
No. of Houses	37554	15146	52700
No. of Occupied Houses	36105	13429	49534
Total Population	206345	65874	272219
Male population	105722	35147	140869
Female Population	100623	30727	131350
Male Literates	71160	26672	97832
Female Literates	47630	19050	66680
Population per sq. km.	521.5	2179.81	639.17

Basic Information on population in villages around the around the GIDC Vapi.

Table: Basic information on population

Sr.NO	Village	Area in Hec	Population			No. of House Holds	Occupied Residential Houses
			Total	M	F		
1.	Morai	308.77	951	471	480	203	203
2.	Bagwada	31.20	907	472	435	190	190
3.	Tukwada	814.35	3832	1939	1893	763	763
4.	Salvav	801.64	4046	2163	1883	736	580
5.	Balitha	402.58	34831	1774	1709	694	682

The population in Vapi Industrial area is cosmopolitan and education level is high.

1) Average Population Density : 639.20 persons /sq. km.
2) Population in Rural Areas : 75.00%
3) Population in Urban Areas : 25.00%

- **Flora & fauna.**

Some orchards and plantation of Mango, Chiku, Banana are found. Forests occurring in the area are not under the category of reserved forest, but are under the control of revenue department. The tree species found in the study area as well as in the mixed forest area are presented in following ***Table***:

Table: Flora in study area

Local name	Botanical name	Local name	Botanical name
Ashok	Polyaltha longfolia	Khizado	Prosopis spicigera
Mitho Limbdo	Murrya koenigii	Gando Baval	Prosopis juliflora
Limbdo	Azadirrachta indica	Siras	Albizzria lebbeck
Sargave	Moringa petriygosperma	Jambu	Eugania jambulana
Agashive	Sesbania grandiflora	Mehandi	Lansonia inermis
Khakhar	Butea forundosa	Karvands	Carrisa carandos
Karanj	Pongamia globra	Vad	Ficus bengalnsis
Gulmohor	Poinciana regia	Pipod	Ficus religiosa

Vilayati Baval	Parkinsonia aculasata	Saru	Casuriana equisetifolia
Awal	Carsia auriculata	Tad	Borassus flabelifer
Amli	Tamrindus indica		

Fauna

Since the area is devoid of thick vegetation, no significant wild life habitat is reported. There is no national park in the region. The common species of fauna found in the study area is shown in the following.

Table : Fauna of the study area

Zoological name	**Local name**	**Zoological name**	**Local name**
A. Invertibrates		**B. Vertibrates (cont...)**	
Hirudinaria granulosa	Leech	Lycodon aulicus	Indian Wolf Snake
Megascolex mauripii	Earth Worm	Python molurus	Indian Python
Palamon maleumsoni	Prawn	Bulbulcus ibis	Cattle Egret
Peripatus sps	Peripetes	Columba livia	Pegion
Araneus diadematus	The garden spider	Corvus splendews	Crows
Nereis bumerilii	Sand Worm	Eqretta qarzetta	Little Egret
Seolopendra marsidens	Millipede	Psittacula karameri	Green Parrot
Acheta domestica	House Cricket	Circus aeruginosus	Marsh Harrier
Bacillus rossii	Grass Hopper	Oriolus oriolus kundoo	Golden Oriole
Glossina palpalis	Fly	Phoenicurus ochruror	Black Redstart
Myrmecocytus setipes	Ant	B. bubalus	Buffalo
Periplaneta americana	Cockroach	Bus indica	Cow
Anopheles maculipennis	Mosquito	Canis famiaris	Dog

Apis mellificia	Honey bee	Capra hiscus	Goat
B. Vertibrates		Funambulus palmarum	Squirrel
Rana tigrina	Frog	Hanuman langur	Monkey
Calotes berticolar	Garden lizard	Rattus rattles	Rat
Hemidactylus sps	House Lizard		

The livestock population as well as poultry birds have shown an increase in population.

Table : Livestock population in the district

Sr. No.	Category of Livestock	Year 2000
1.	Bullocksand Cows	390892
2.	Buffaloes	153200
3.	Sheep	9231
4.	Goats	189456
5.	Horses and Ponies	176
6.	Donkeys	330
7.	Camels	44
8.	Pigs	4981
9.	**TOTAL**	**748311**

- **Ecogeological features (sensitive receptors like River, hospital, school, canal)**

- **Details of civil amenities of Vapi area.**

Vapi has two post and telegraph offices. A large number of STD booths are available. Modern facilities like Internet are now day's commonly available in Vapi.

Tabel : Existing civil amenities in the district

Eduction	Medical	Public Transport Facility	Water Supply	Post & Telegra-phs
▪ P&MS : 1656 ▪ H/HSC : 244 ▪ Colleges : 21 ▪ Total : 1921	▪ H : 11 ▪ PHC : 60 ▪ No. of Beds : 999 ▪ Doctors :	▪ No of Vehicles: 425/day. (Avg) ▪ Villages Connected	▪ OPW ▪ BW ▪ RIVERS ▪ DAMS ▪ CANAL	▪ Post Offices : 473

Literacy : ▪ Male : 62.03% ▪ Female: 54.27% ▪ Libraries : 323	108 ▪ Nurses : 727	with all Weather roads : 693	S ▪ HAND- ▪ PUMPS	

P&MS = Primary & Middle School
H/HSC = Higher School & Higher Secondary
H = Hospital
PHC = Primary Health Center
OPW = Open well
BW = Bore-well

Vapi town and industrial area has good and adequate facilities. Water is supplied by GIDC. Adequate power is available from Gujarat Electricity Board (GEB). Good hospitals and adequate dispensaries with well qualified doctors are available. Good communication systems, fire brigades etc. are available. Ample residential areas are developed around this industrial belt.

Vapi has very good transport and communication system. National Highway No. 8 connecting Mumbai and Ahmedabad touches the G.I.D.C. estate. State transport and private buses are available at various bus stops and pick up points. A number of private taxis are available. Vapi is an important railway station on Western Railway. Mumbai-Vadodara main line is situated at 6 km from the plant. Most of the important trains stop at Vapi. Daman port is about 15 km and Mumbai port about 170 km from the GIDC. Closest airport is at Mumbai, 170 km south from the GIDC. There is an air strip at Daman.

8. ENVIRONMENTAL STATUS:

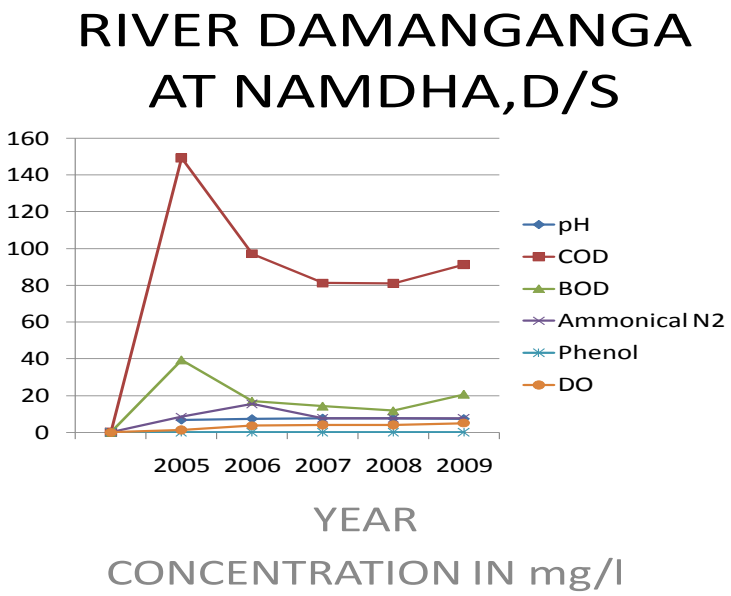
Monitoring & findings

Apart from monitoring by GPCB, stringent monitoring is also being carried out by SVNIT, SURAT, and VWEMCL.

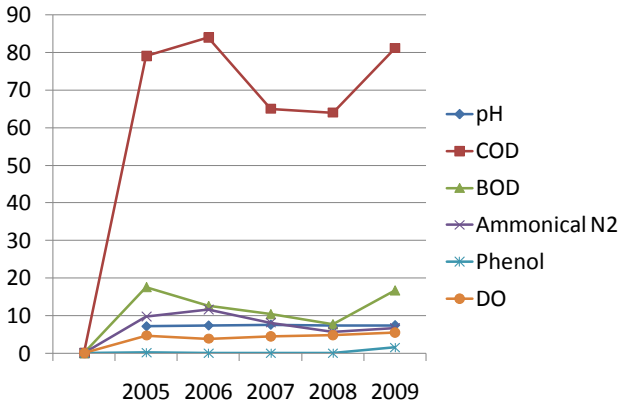
The final outcome as per the present scenario has been elaborated under "environmental track record of cluster" which may please be referred. Accordingly, inlet and outlet norms for CETP are found not to be complying with permissible norms particularly in terms of COD and ammonical nitrogen.

- **Water quality of surface water near Vapi area**

(1) Water quality of River Damanganga at various sampling locations.(PLEASE REFER ANNEXURE-I)



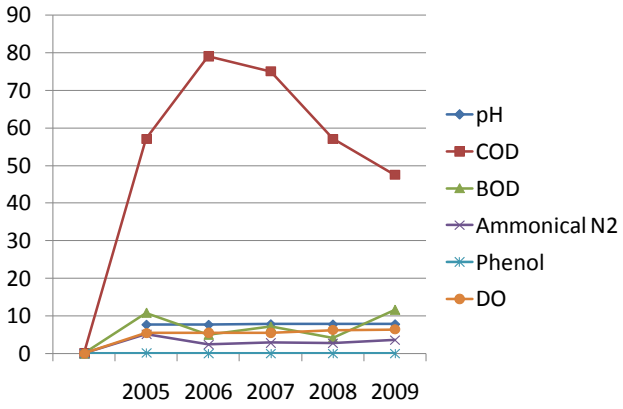
RIVER DAMANGANGA AT KACHIGAM,D/S



YEAR

CONCENTRATION IN mg/l

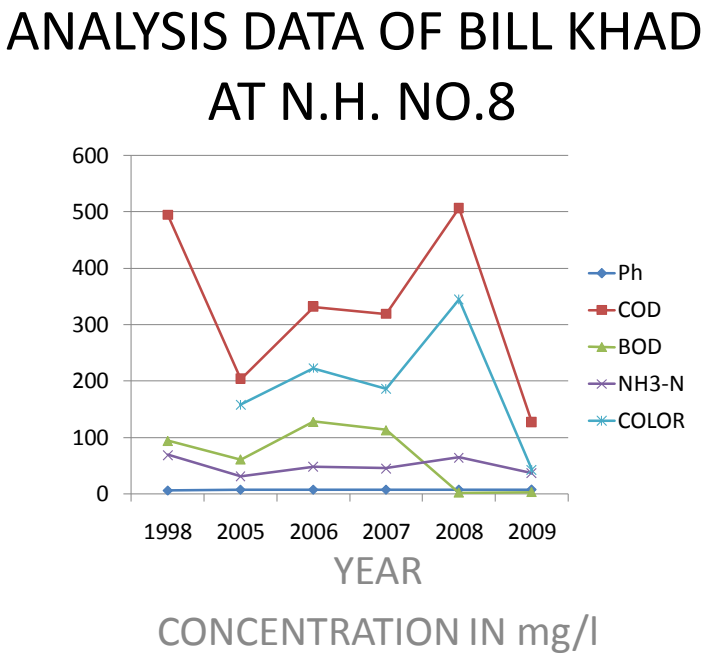
RIVER DAMANGANGA AT DAMAN JETTY,D/S



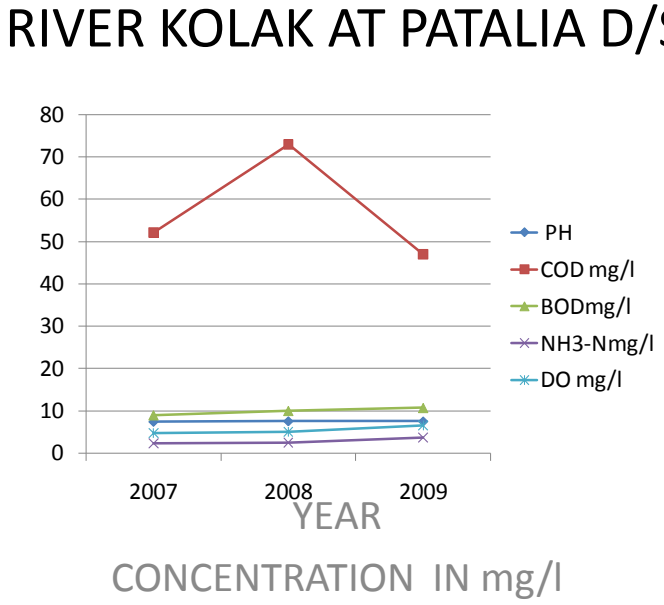
YEAR

CONCENTRATION IN mg/l

(2) Annual average analysis data of water sample collected from BILL KHADI at N.H. No:8

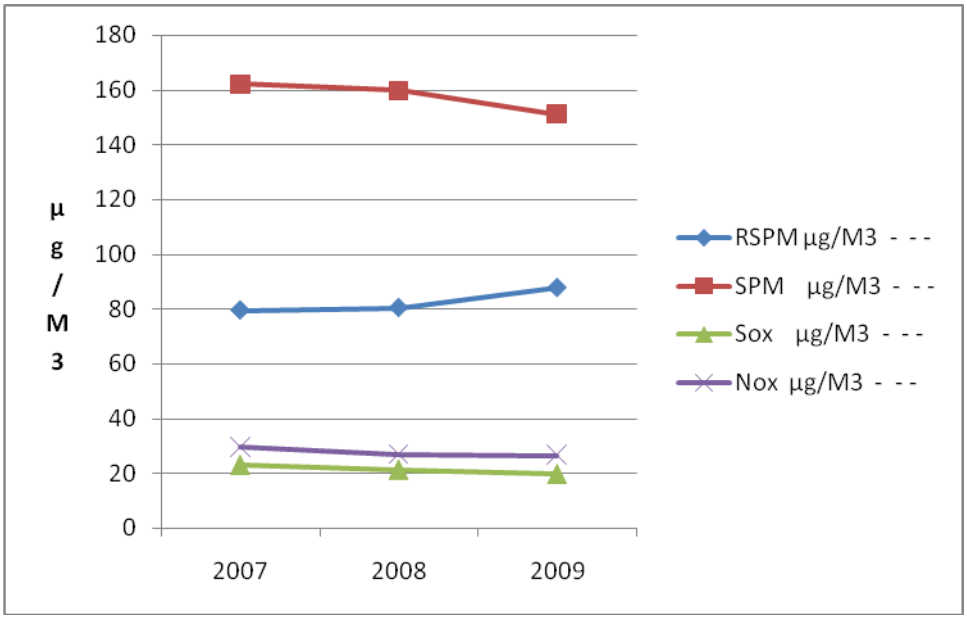


(3) Water quality of River Kolak at Pataliya bridge

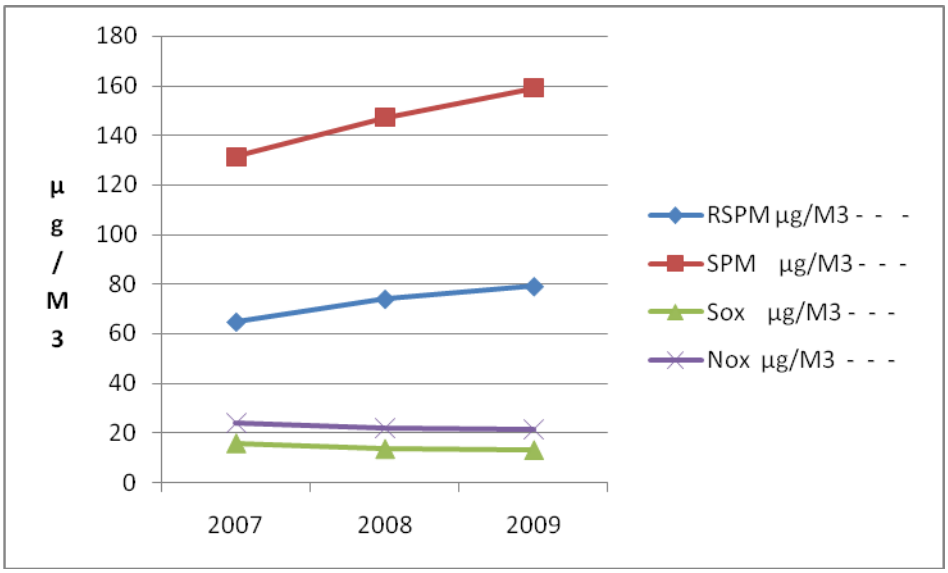


- **AMBIENT AIR QUALITY DATA AT VARIOUS SAMPLING LOCATIONS. (PLEASE REFER ANNEXURE-II)**

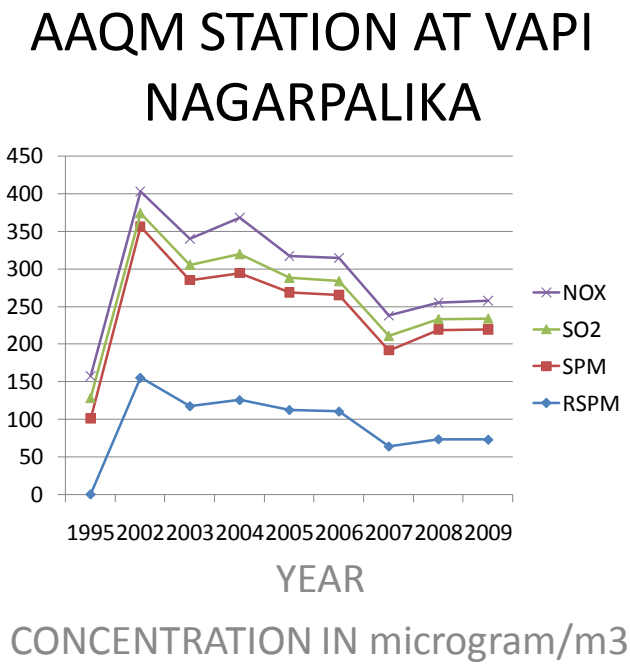
  (1) AAQM at Lalchand Techno engineering, 40-Shed, GIDC, Vapi (Under SAMP project by GEMI)



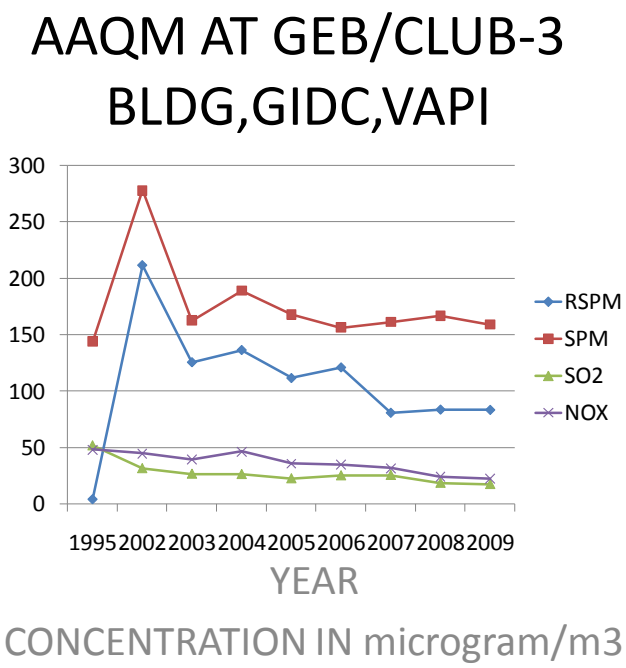
(2)AAQM AT GPCB OFFICE, GIDC, Vapi (Under SAMP project by GEMI)



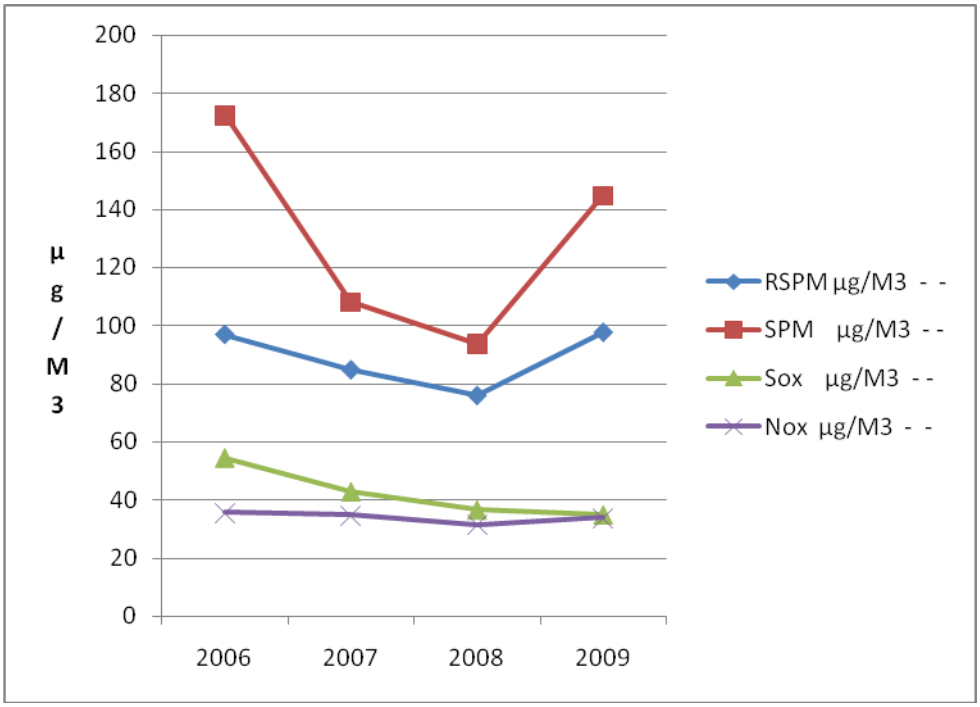
(3)AAQM at Vapi Nagar Palika(Under SAMP project by GEMI)



(4) AAQM at GEB/CLUB-3 BUILDING, GIDC,Vapi (Under SAMP project by GEMI)



(5) AAQM AT CETP,NH NO: 8,GIDC,Vapi(BY GPCB)



9. ENVIRONMENTAL ISSUES:

- Currently the discharge norms of the effluent from the CETP exceeds the stipulated standards, with reference to BOD, COD & Ammo. Nitrogen

- Safe disposal of treated effluent of GIDC, Vapi is to be carried out by laying pipe line up to deep sea as per NIO recommendation

- Illegal hazardous waste dump sites have been identified in Vapi and disposal of the hazardous waste is required.

10. EXISTING ENVIRONMENTAL INFRASTRUCTURE

(A) CETP

The industrial units are diverse in nature and consist of pestisides,pulp and paper mills, dyes and intermediates, drugs and pharmaceuticals, fine chemicals etc. Partially treated wastewaters from these units are collected through GIDC's underground pipeline system and conveyed to a Common Effluent Treatment Plant (CETP).

National Environmental Engineering Research Institute (NEERI) designed the CETP at Vapi in collaboration with Kirloskar Consultants for a capacity of 55 MLD. The CETP is owned and operated by the Vapi Waste & Effluent Management Co. Ltd.

The CETP was commissioned in January 1997 and started receiving an average 18000 m^3/d of partially treated effluent.

CETP, Vapi is a simple, conventional plant consisting of physical, chemical and biological treatment.
It was designed for the following parameters:

Table 1: Design Parameters

Capacity : 55MLD

Parameter	Influent	Effluent
BOD_5, mg/L	400	100
COD, mg/L	1000	250
SS, mg/L	300	100
pH	6.5 – 8.5	6.5 – 8.5

At present the CETP treats, on an average, around **51MLD** including domestic sewage.

It consists of following treatment:

1. Primary Treatment
2. Secondary Treatment
3. Tertiary Treatment

PRIMARY TREATMENT

The waste water generated by all the industrial units is conveyed to CETP through an underground pipeline network.

Inlet Chamber:

Inlet chamber – 3 m x 3m x 2.75 m – 24.75 m^3
The main incoming chamber receives the influent from where it goes to Coarse Screen chamber for removal of large floating particles, plastics, debris, etc.

After the coarse screen, the effluent then moves to automatic fine screen chamber

Automatic Fine screen:

Screen Chamber – 3 m x 3 m x 2 m – 18 m^3
Automatic screen – 3 HP x 3 Nos. – 9 HP
The fine screening is done by automatic screening system.The fine screens are capable of handling solids upto the size of 4 mm. The total screen is of SS 316 MOC resulting is longer life of the equipment. No manual labour is required to do the screening as a result decreasing the manpower consumption with more output. The scum gets collected automatically in the waste bins.

Grit Chamber:

Grit Chamber – 7m x 7 m x 1.5 m – 73.5 m^3 x 2 Nos.
The next stage of treatment is done in de-gritters unit where the sand and grit particles are removed through grit classifier.

Equalization Tank:

Equalization tank no. 1 – 78 x 19.5 x 2.5 m +0.5 m FB – 3803 m^3
Equalization tank no. 2 – 78 x 19.5 x 2.5 m + 0.5 m FB – 3803 m^3
Equalization tank no. 3 – 78 x 39.0 x 2.5 m + 0.5 m FB – 7605 m^3
Blower House no. 1 - 75 HP x 3 Nos.
Blower House no. 2 – 75 HP x 3 Nos.

Flash Mixer & Flocculator:

Flash Mixer Tank – 3.5 x 3.5 x 3.5 x 2 Nos. – 85.75 m^3
Stirrer – 2 HP x 2 Nos. – 4 HP
Flocculator Tank – 10 x 7 x 3.5 x 4 Nos. – 980 m^3
Stirrer – 3 HP x 4 Nos. – 12 HP
The effluent is then pumped into flash mixer and flocculator tanks where dosing of Poly Aluminium Chloride and Polyelectrolyte is done respectively so as to coagulate and flocculate the solids before going into Primary Clarifiers. Automatic lime dosing through silo is done in the flash mixer to maintain the pH is the range of 7 to 7.5

Primary Clarifier:

Primary clarifier – 37 m Φ x 2.5 m + 0.5 m FB – 2688 m^3 x 2 Nos.
The overflow from flash mixer and flocculator then by gravity flows into Primary Clarifiers where the settling takes place. The sludge is scrapped from the bottom into sludge collection tank and is then pumps to sludge thickeners. The overflow from Primary Clarifiers flows into aeration tanks.

Secondary treatment:

Aeration Tank:

Aeration Channel No. 1 – 85m x 17m x 3 m +0.5m FB – 4335 m^3
Surface Aerators in Aeration channel no. 1 – 40 HP x 5 Nos. – 200 HP
Aeration Channel No. 2 to 11 – 85m x 17m x 2.5 m +0.5m FB – 3613 m^3
Surface Aerators in Aeration channel no. 1 – 25 HP x 50 Nos. – 1250 HP
Aeration Channel No. 12 – 85m x 17m x 3.5 m +0.5m FB – 5058 m^3
Surface Aerators in Aeration channel no. 1 – 40 HP x 5 Nos. – 200 HP
Aeration tanks consist of 60 Nos. of surface aerators. Here biological treatment takes place and maximum reduction in terms of COD & BOD takes place. RAS is circulated in the system in order to maintain the desired level of MLSS.
12 Nos. of online DO meters are installed in each channel in order check the DO level of the effluent in the outlet of the tank. The data is logged and stored into the system

UASB Reactors:

UASB Reactor - 37 m Φ x 7.00 m+ 0.65 m FB - 7526 m^3 X 2 Nos.
Partial overflow from Primary clarifier is taken into UASB reactors for anaerobic digestion. The flow is pumped into the reactor in upward flow and the overflow from the top is been taken into Reactivator Clarifier. As it is an anaerobic digestor, methane gas is obtained from the reactor and is currently flared but shall be used as a resource for generating power in future.

Secondary Clarifier:

Secondary Clarifier – 44 m Φ x 2.0 m + 0.5 m FB – 3041 m^3 x 2 Nos.
From aeration tank the effluent, partially by gravity and partially by pumping is taken into Secondary Clarifiers. Dosing of alum is done in the clarifier and the sludge is scrapped from the bottom and the overflow is then taken into Reactivator Clarifier

Tertiary treatment:

Reactivator Clarifier:

Reactivator Clarifier – 32 m Φ x 4.0 m +0.5m FB – 3217 m^3
The overflow from UASB reactors is taken into reactivator clarifier through gravity. PAC and Polyelectrolyte are dosed in the reactor in order to bring the level of suspended solids less than 50 ppm.

Dyna Sand Filter:

Dyna Sand filter: 12.5 m x 7.5 m
It is fine polishing unit used for removal of SS. Overflow from Reactivator Clarifier is fed into dyna sand filter.

CAACO (Chemo Autotrophic Activated Catalytic Oxidation):

CAACO (9 A, 10 A, 11A) – 17.5 m Φ x 4.2 m + 0.5 m FB – 1010 m^3
CAACO (9 B, 10 B, 11B) – 16.0 m Φ x 3.7 m + 0.5 m FB – 744 m^3
CAACO (9 C, 10 C, 11C) – 15.0 m Φ x 3.2 m + 0.5 m FB – 565 m^3
CAACO 12 A – 17.5 m Φ x 5.2 m + 0.5 m FB – 1251 m^3
CAACO 12 B – 16.0 m Φ x 4.2 m + 0.5 m FB – 844 m^3
CAACO 12 C – 15.0 m Φ x 3.2 m + 0.5 m FB – 565 m^3

It is an aerobic treatment system. Outlet from dyna sand is fed into the CAACO reactors. There is a carbon bed inside the reactor through which air is passed in order to facilitate oxidation. Carbon acts as a

catalytic media in the treatment of the effluent. This is the final stage of treatment and the outlet from CAACO is discharged to tidal zone of Damanganga river.

Sludge handling

Primary Sludge:

Sludge Thickeners – 11m Φ x 5 m x 2Nos.
Sludge from primary clarifiers is collected into sump from where it is pumped to Sludge thickeners. The thickened sludge is then pumped to Decanters. The solid cake is sent to our CSWP site.
Overflow of the thickener and leachate from the decanter is taken into filtrate tank which is again brought back into the system.

RAS (Reactivated Sludge):

RAS Pump House
R1 & R2 100 HP x 2Nos.
R3 & R4 40 HP x 2Nos.
R5 & R6 20 HP x 2Nos.

Sludge Drying Bed:

SDB – 40 m x 16 m x 0.6 m – 384 m^3 x 10 Nos.

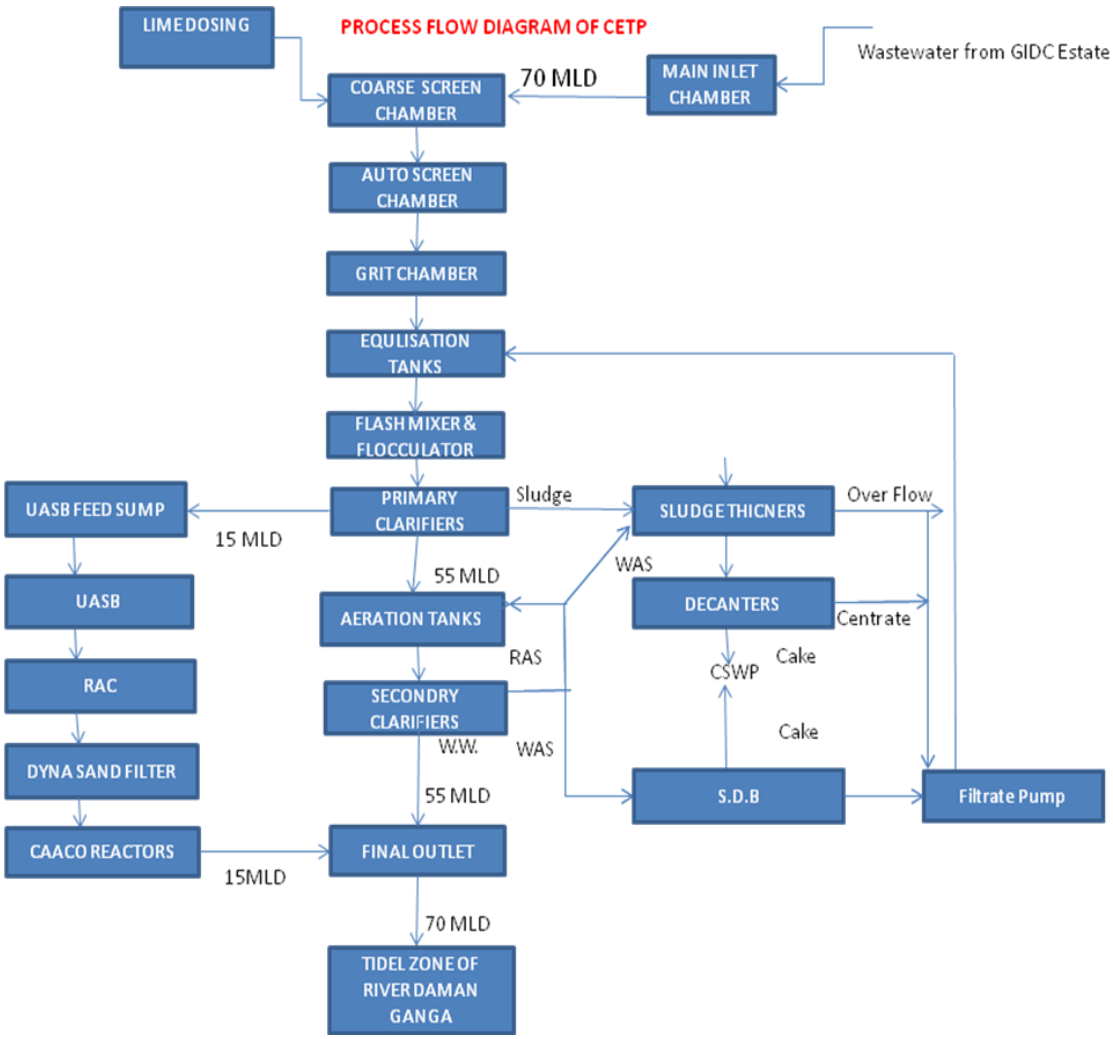
Decanters:

Humboldt Decanter – 30 m^3/hr, 40 HP, 2 Nos.
Humboldt Decanter – 20 m^3/hr, 30 HP, 1 No.
Alfa Laval - 10 m^3/hr, 20 HP, 1 No.

Partial sludge from Secondary clarifier is taken in RAS and is pumped into aeration tank and partial sludge is pumped to sludge drying bed. The dried sludge is scooped and transported to CSWP site and the leachate taken back into filtrate tank.

Instrumentation:

1) Inlet Flow Meter: Open channel flow meter with automatic data logging system is installed at the inlet.
2) Outlet Flow Meter: Magnetic Flow meter is installed at the outlet of CETP with the facility of cumulative flow and data logging.
3) Online DO Meter: Online DO meter is installed at the outlet of CETP.
4) Online pH Meter: Online pH meter is installed at the outlet of CETP.
5) Online TOC Meter: Online TOC meter is installed at CETP to measure the TOC of the outlet and various other points. The system is imported from Australia and is and totally automatic system.



Upgradation of CETP,Vapi.

Sr. No	Upgradation completed
1	Installation of auto screening system at in flow chamber
2	Aeration grid in ET 1, 2 & 3 and associated work
3	Flash mixers and flocculators and associates items like tank for PAC and PE and dosing systems
4	Provision for 40 HP surface aerators at 6th channel west side
5	Provision for storage tanks for alkali/acids & pH controlled auto dosing system at inlet of equalization feed channel
7	Enhancement of flow capacity from AT1 to SC1 and AT2 to SC2
8	Provision for DO measuring devices at aeration channels
9	Installation of flow meter, pH meter and TOC
10	Phosphorous addition in aeration tank

- NEERI(EIRAD) was also engaged to monitor CETP performance and adequacy to treat hydraulic and organic loading.

- Capacity expansion work of CETP is in progress to make it 85 MLD from 55 MLD .Adequacy report from NEERI is received for 70 MLD. Currently 55 MLD effluent is treated.

INITIATIVES TAKEN BY CETP FOR OUTSOURCING TECHNOLOGICAL HELP.

The major problem encountered by CETP in achieving the set norms is refractory COD, which cannot be degraded by normal biological treatment under anaerobic / aerobic conditions.
In order to treat this parameter, VWEMCL has entered into an agreement with institutes - NEERI, NAGPUR, CLRI, CHENNAI , XH2O – Solutions to look for other technological options.

Technological Innovation-1: NEERI –Genomics Division, Nagpur for using specially developed bacterial cultures to enhance biodegradability.

- VWEMCL approached Environmental Genomics Division of NEERI, Nagpur for availability of bacterial cultures capable of improving the assimilatory capacity.

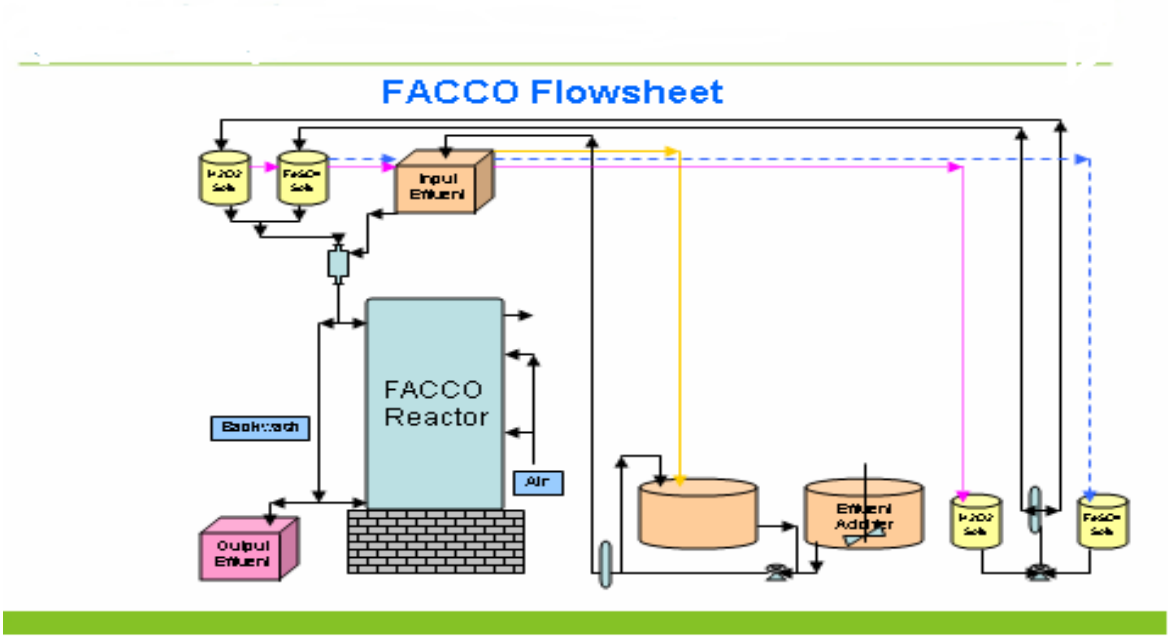
- The study will involve assessment of existing degradative capacity of activated sludge, followed by nutrient balancing and final correction with bio augmentation and or biostimulation.
- Assessment of existing microbial catabolic capacity and its improvement.
- Assessment of nutrients and their requirement at CETP.
- Development of Bio augmentation strategy.
- Establishing microbiological laboratory at CETP.
- Training of CETP staff to support the on going project activity.

NEERI pilot plant

- NEERI pilot plant is aimed to degrade the non-biodegradable COD and ammonical nitrogen through using NEERI - EGU consortia.
- Reactor –A has been seeded with CETP biomass and Reactor - B being loaded with NEERI consortia with CETP MLSS .

Technological Innovation-2: CLRI, Chennai: Tertiary Treatment Technology:
FACCO technology (Fenton Activated Catalytic Carbon Oxidation)

- FACCO technology is adoptable for treating majority of refractive COD molecules. This technology is developed by Dr. G. Sekaran from CLRI – Chennai and also it is patented.
- VWEMCL has executed the contracts for licensing the technology and consulting for the implementation of the technology, on 13th July 2009.
- This FACCO – technology License is in the name of VWEMCL and VWEMCL in turn issue sub-licenses to CETP member units for utilization of this technologies. It is anticipated that refractive COD has to be treated by member units as it will be beyond CETP's scope.
- Ammonical – Nitrogen problem is also addressed by CLRI, specific technology will be developed and extended to member units.
- Both these relationships will help CETP to overcome present problems and help in achieving GPCB - norms.



FACCO plant of 300 KL/day capacity is commissioned at CETP in January 2010.

Fenton Activated Catalytic Carbon Oxidation

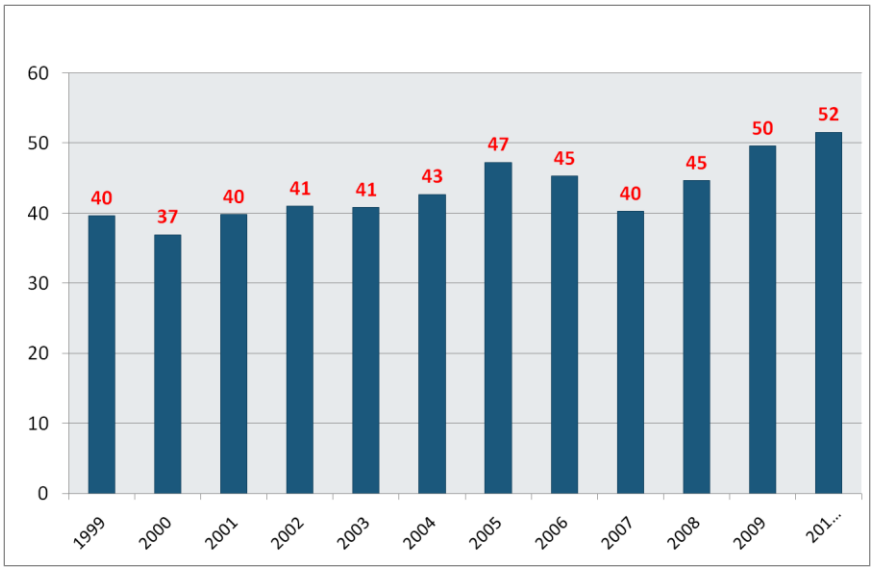
Results of FACCO Plant for some of the member industries

Industry	Inlet COD mg/l.	Outlet COD mg/l.	COD REDUCED mg/l.	COD Reduction %
A	8960	3040	5920	**66**
B	4000	1800	2200	**55**
C	14400	7360	7040	**49**
D	16160	9440	6720	**42**
E	34800	17200	17600	**51**
F	33600	13600	20000	**60**

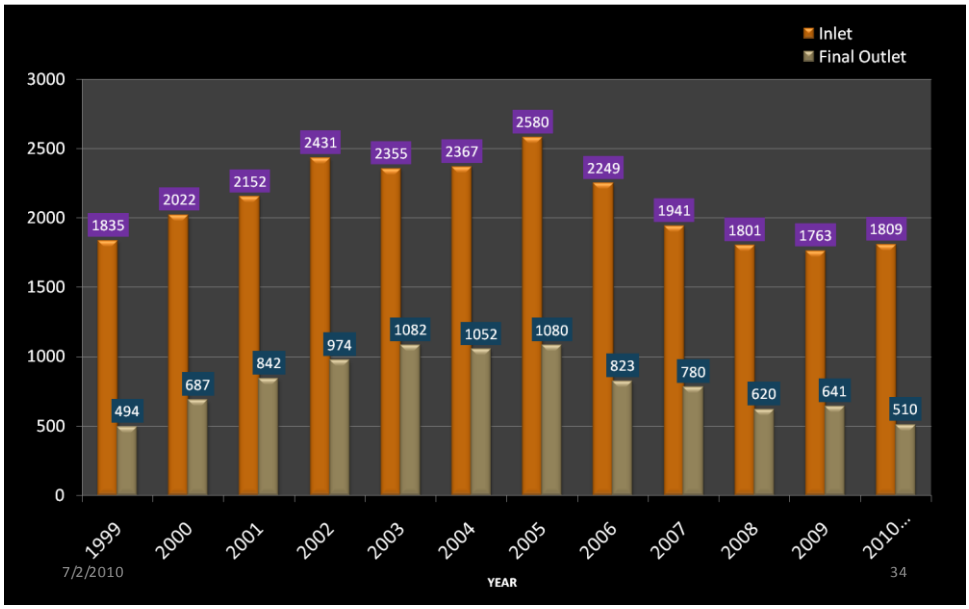
Technological Innovation-3: XH2O – Solutions. Electrochemical oxidation

This option is also on pilot scale trial at present.

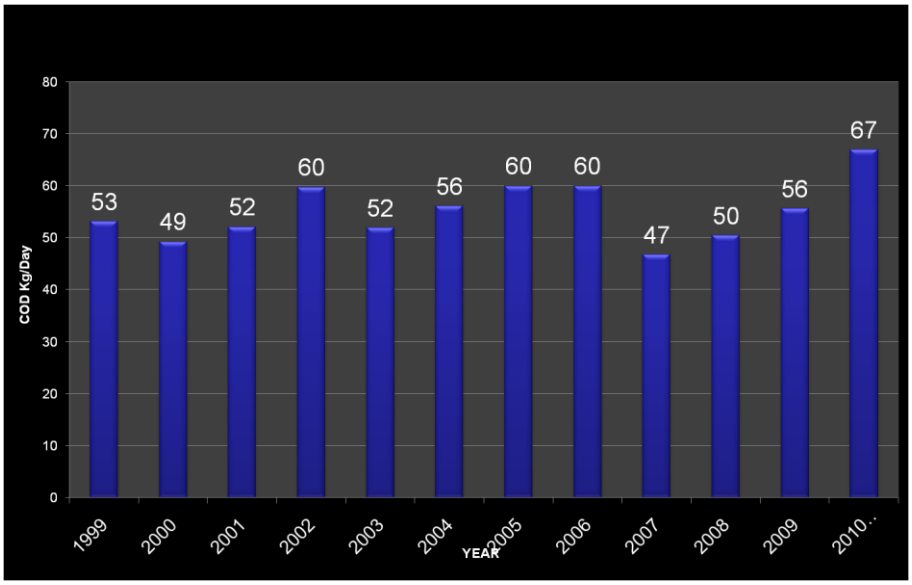
Inflow MLD from 1999 to 2010 .

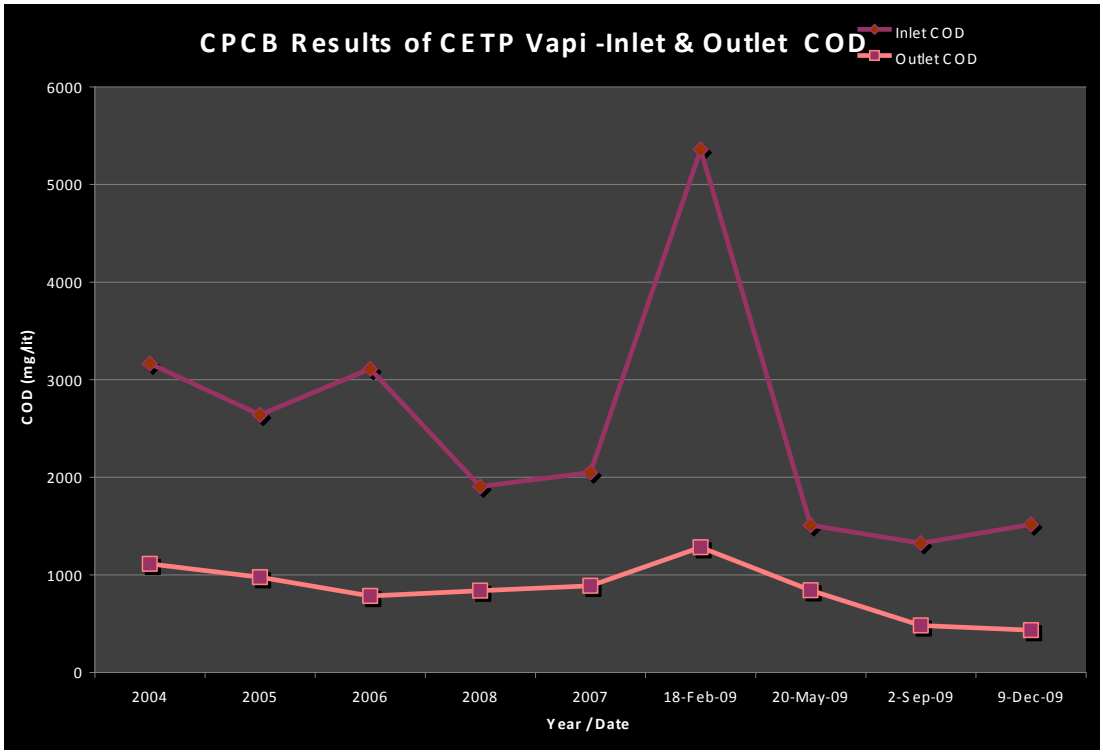


Inlet & Outlet COD (mg /lit)



COD Reduction MT / Day





(B) <u>TSDF</u>

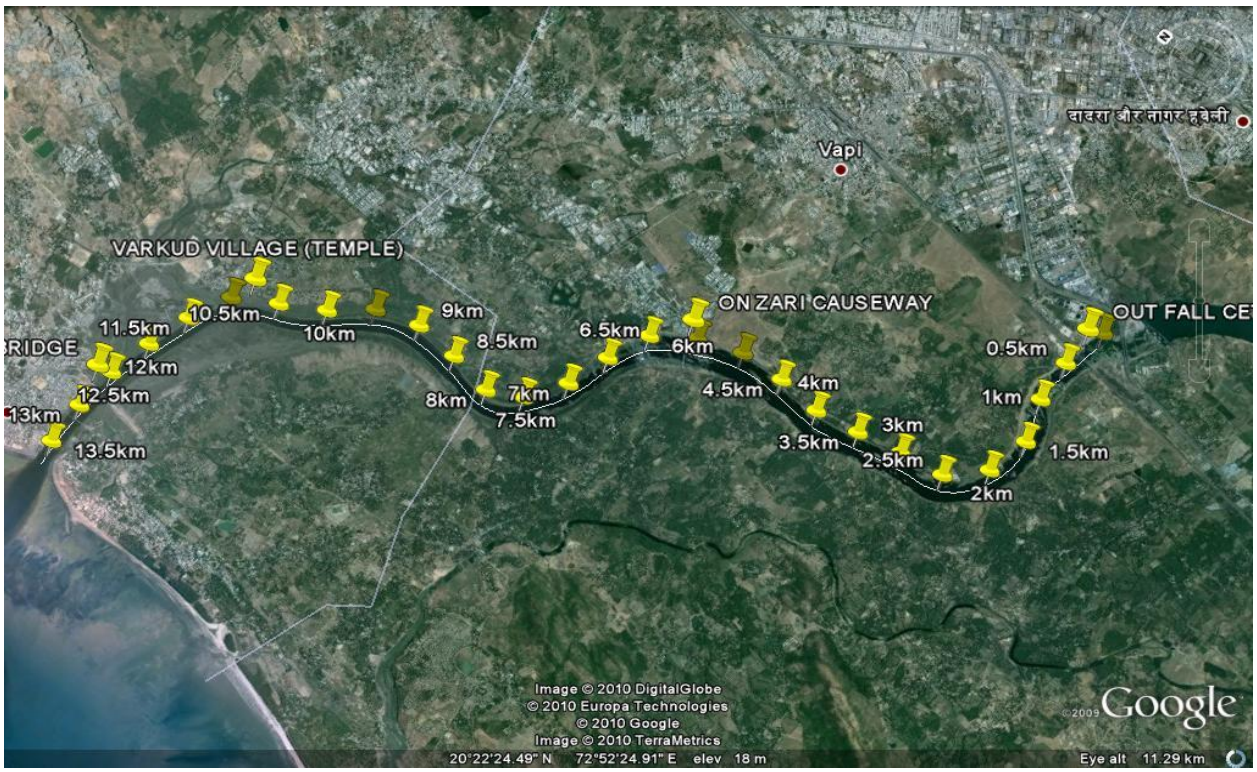
VWEMCL established a TSDF site for the disposal of hazardous solid waste of 7.62 lac MT capacity in 100000 m^2 plot at GIDC Vapi.
The approved common solid waste disposal site (TSDF) was set up in year 1999, first cell was commission in year 2000 as per German Design based on asphalt concrete base liners . In the expansion phase, for second cell, Geo Membrane – Geo Textile liner system was adopted as per CPCB guide lines.

- Loading, transporting and storage of hazardous solid waste.
- Monitoring and analysis of borewell, and cell vent.
- Briquetting of agro waste with solid waste (at present not function due to unavailibility of agro waste)

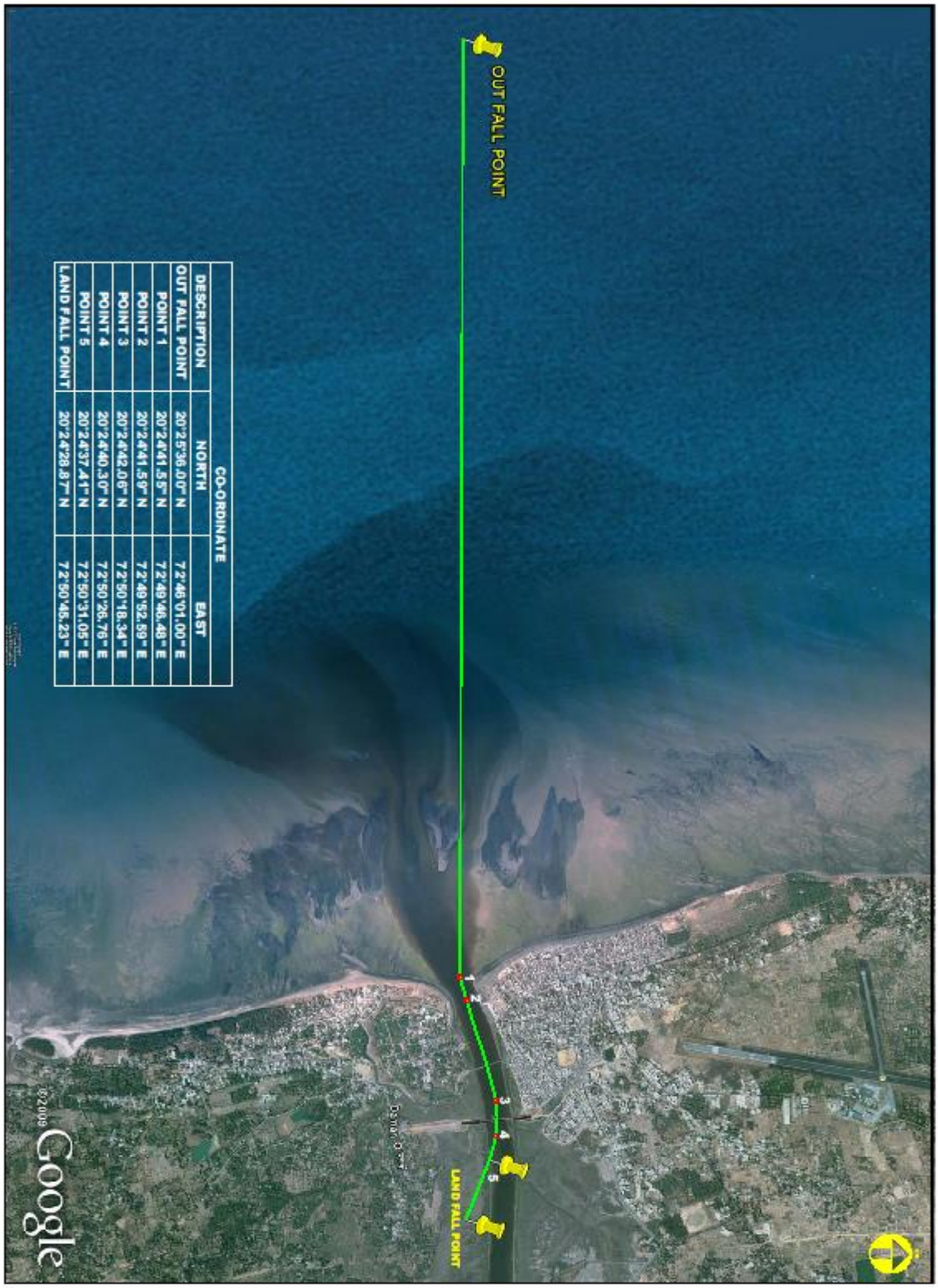
11. ENVIRONMENTAL INFRASTRUCTURE NEED

- There is need for up gradation /augmentation of existing underground drainage system in G.I.D.C. –Vapi.
- C.E.T.P. is required fine tuning to achieve prescribed norms.
- There is need for effluent disposal pipe line with diffuser up to deep sea for the safe disposal of treated wastewater.
- There should be common hazardous waste incinerator.
- There is need for proper facility for segregation and bailing of plastic waste generated form paper industries.
- There is need for separate pipeline for disposal of treated effluent from the units outside the GIDC area.

- **Proposed Layout of pipeline conveyance (On shore)**



- **Proposed Layout of pipeline conveyance (Off shore)**



DESCRIPTION	CO-ORDINATE	
	NORTH	EA ST
OUT FALL POINT	20°2'536.00" N	72°46'01.00" E
POINT 1	20°2'441.55" N	72°49'46.48" E
POINT 2	20°2'441.59" N	72°49'52.59" E
POINT 3	20°2'442.05" N	72°50'18.34" E
POINT 4	20°2'440.30" N	72°50'26.76" E
POINT 5	20°2'437.41" N	72°50'31.05" E
LAND FALL POINT	20°2'428.87" N	72°50'45.23" E

12.MONITORING PROTOCOL :

Currently GPCB carries out regular water quality monitoring under GEMS, MINAR and regular monitoring program and ambient air quality monitoring in the area under SAMP and NAMP. At present samples from 6 Nos of the surface water quality and 4 nos sub-surface(borewell) monitoring station are collected and 05 Nos of the ambient air quality monitoring station are operated and samples are collected regularly as per the CPCB protocol. All the CETPs & TSDF in the area are monitored and samples are collected regularly. Sample from the River Danaganga is regularly collected to know the water quality of the river after the outfall of the CETP outfall. Industrial units located in the area are monitored under Water Act, Air Act and E P Act as per the CPCB guidelines.

Additionally one continuous ambient air quality monitoring station is proposed to monitor the ambient air quality.

13.DRAWING OF ACTION POINTS:

GPCB has conducted series of meetings with the stakeholders, NGOs and State Government agencies to have inputs from them for collection of required data. Based on field survey and monitoring data available with the GPCB, primary details are collected. These details include: Demarcation of geographical boundary, physical verification of pollution sources, environmental concern, demographical details, eco geological features, sensitive receptors and details on environmental infrastructure facility/ technology. Action plan based on this, suggests the various activities/concern, remedial actions, agency responsible along with the time frame for various environmental components. The points specifically highlighted are restriction of water consumption/ wastewater generation, upgradation of individual ETP, modification/upgradation of CETP, stringent CETP inlet and outlet norms, strengthening of APCM, use of cleaner fuel, control on fugitive emission, green belt development, proper hazardous waste management and cleaner production and cleaner technology for the reduction of the waste at source.

See Chapter – 5 for details of action plan.

CHAPTER-4
NEW INITIATIVES

Recent initiates for control of pollution by GPCB and State Government.

1. We have reconstituted technical committee of Board members and outside experts to discuss and decide upon the cases of the change of product mix and some typical applications from critically polluted areas.
2. For vigorous and surprise monitoring, a specific vigilance teams has been formed under the leadership of senior officer of GPCB.
3. Industrial units are directed to set up multi effect evaporator for their concentrated waste water.
4. Third Party monitoring of the entire industrial estate and CETP.
5. Board of Vapi Waste and Effluent Management Co Limited (VWEMCL) is taken over by the State Government (GIDC).
6. Professional chief executive officer is appointed for VWEMCL.
7. VWEMCL has constituted of technical, disciplinary and audit committees for day to day functioning.
8. Trial run for technological innovations at CETP to meet with discharge norms are going on.
9. Treatment units at CETP are upgraded.
10. Nine industrial units has installed FACCO at their premises to meet CETP inlet norms

CHAPTER -5

ACTION PLAN

ACTION PLAN FOR VAPI

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			WATER			
1	Standard flow meter at final outlet of ETP	To control overflowing of drainage pipeline, it is necessary to control the discharge of excessive quantity of w/w from the industrial units (i.e. the w/w discharge should be as per CCA condition). To check the quantity of w/w being discharged it is proposed that in the 1st phase the units having effluent quantity > 25 KLD should provide standard flow meter at the final outlet.	Identification of units having effluent quantity > 25 KLD.	GPCB, Concerned industries, VIA, VWEMCL	Already identified & verification by 15.07.2010	To be borne by the concerned industry. Association may assist individual units
			Industrial Association will issue the circular to their members to provide the standard flow meter. GPCB will also issue notice to such units.	Concerned industries, VIA, GPCB	31.7.2010	
			Standard flow meter required to install at final outlet of all ETPs connected to CETP.	Concerned industries.	31.12.2010	
2	Water consumption from non-permitted sources (e.g. borewell, tanker	It is observed that many industrial units have no proper control over water consumption which not only increase the	Identification of source of water i.e. tanker, bore well etc. for its authenticity.	Concerned industries, VIA, VWEMCL, GIDC, GPCB	31.8.2010	-

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
	etc) or more than permitted quantity is to be identified	overall w/w generation but also tends to w/w disposal mismanagement. There-fore, it is necessary to direct unit to restrict water consumption as per the quantity mentioned in CCA application and to also to direct GIDC to seal the non permitted bore wells.	Issue direction to stop the unauthorized use of water by the industries.	Concerned industries, VIA, GIDC, GPCB	31.10.2010	
			Direction to seal the non permitted bore well, tankers	GIDC/ Concern agency	31.12.2010	
3	Sealing of unauthorized discharge other than regular discharge of effluent.	All industrial units shall be directed to operate only one outlet through flow meter for effluent disposal so that unauthorized discharge can be checked. The concerned authority shall disconnect / seal such unauthorized discharge.	Concern authority will be asked to identify unauthorized outlet.	Concerned industries, VIA, GIDC, GPCB.	Ongoing process and will be made more vigorous	Expense is to be borne by the unit having unauthorized outlet.
			All industrial units will be asked to submit notarized undertaking to GPCB with a copy to respective association stating that there is no unauthorized outlet.	Concerned industries, VIA	31.8.2010	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
4	GIDC drainage connection required to be discontinued to permanently closed & non operative industrial units	GIDC drainage connection to be disconnected to permanently closed & non operative industrial units and certified by GIDC and checked by GPCB. Careful monitoring of such units required to undertake by GPCB as well as Vapi Waste & Effluent Management Company Ltd.	Inventorisation of the permanently closed & non operative industrial units	VIA, GPCB	31.7.2010	Expense is to be borne by the defaulter unit.
			Drainage connection to be disconnected of permanently closed & non operative industrial units and certified by GIDC and checked by GPCB.	Concerned industries, VIA, GIDC, GPCB.	30.9.2010	
			All zero discharge units will be asked to submit notarized undertaking to GPCB with a copy to respective association stating that there is no unauthorized outlet and observing zero discharge.	Concerned industries	30.9.2010	
5	Identification of unauthorized connection to GIDC drainage line or discharge to Bill Khadi.	Intensive monitoring shall be carried out of the units, which are located on the bank / adjacent to Bill Khadi.	Unauthorized connection in drainage line to be checked and disconnected by competent authority and verified by GPCB.	GIDC, VIA, GPCB, VWEMCL	Ongoing process	Expense is to be borne by the defaulter unit.
			Third party monitoring is to be carried out	SVNIT	Ongoing process	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
6	Identification of non-biodegradable effluent	For better treatability at ETP/ CETP ,units having non-biodegradable effluent shall be identified and shall be directed to segregate the said stream ,and to install appropriate and effective treatment units like multiple effect evaporator, RO system, incinerator etc	Identification of the streams having non-biodegradable effluent containing refractory COD, toxicants like ammonical nitrogen where treatability not possible/difficult/techno-economically not viable.	Concerned industries, VIA, VWEMCL CETP, GPCB	31.8.2010	Common incinerator may be installed for non-biodegradable effluent. Cost may be worked out by VIA, VWEMCL on PPP mode on or before 30.11.2010
			The units manufacturing pesticides, dyes intermediates, bulk drugs etc will be required to study their present treat- ability of effluent and accordingly segregate non-biodegradable streams.	Concerned industries, GPCb, Third Party.	31.12.2010	
			A time bound action plan required to be submitted to install multiple effect evaporator/RO system/ Incinerator System/Ammonia stripper/ New technology like FACCO including cleaner production and cleaner technology by concerned industries.	Concerned industries in consultation with GCPC	31.12.2010 (For Submission) 30.09.2011 (For implementation.	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			Implementation/ Commissioning of above proposal	Concerned industries	Long term(6 month to 2 years)	
7	Reduction of pollution load on CETP, upgradation of CETP and efficient operation of CETP	It is observed that CETP inlet and outlet norms are not meeting with the prescribed norms.	All units have to strengthen individual effluent treatment plant to meet with the CETP inlet norms, so as to reduce inlet pollution load on CETP and thereby improvement in treated effluent quality from CETP.	GPCB, Concerned Industries, VWEMCL.	31.03.2011	PPP mode
			Installation of FACCO at CETP for small scale industrial unit.	VWEMCL	Implemented	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			Identification of high COD and high ammonical nitrogen containing effluent and individual installation of FACCO/other technical advanced system for large scale units having specific very high COD effluent.	GPCB, VWEMCL	31.12.2010	
			An action plan for strengthening of individual ETP to be submitted to VWEMCL, Vapi & GPCB and required to monitor its progress by concerned agencies.	GPCB, VWEMCL		
			Performance evaluation of strengthen ETP required to be done by third party agency.	SVNIT		
		The performance evaluation of CETP indicates quality of effluent discharge is	CETP authority shall study their treatability of effluent from prominent agency.	VWEMCL	30.9.2010	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
		not as per the specified norms, which clearly indicates the CETP requires up gradation/modification	Based on the recommendation of agency CETP authority shall upgrade CETP.	VWEMCL	31.12.2010 (For optimization) 31.12.2011 (For completion of modifications)	
			To change the management of CETP under Government Supervision and Chief Executive Officer have to be appointed.	GIDC, Govt. of Gujarat,	Implemented	
			Disciplinary action against noncomplying units	GPCB, VWEMCL.	On going process	
			To divert domestic wastewater of Bill Khadi to CETP for treatment.	VWEMCL	31.12.2010	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
8	Checking of illegal discharge of acidic/ highly polluted effluent	Units manufacturing dye-intermediates are generating spent acid of low concentration which is required to manage properly. Necessary directions shall be issued to the spent acid generating as well as acid using industrial units for proper management of spent acid.	Movement of spent acid shall be checked vigilantly. Acidic/ highly polluted effluent which is discharged illegally to be checked by GPCB as well as Industrial Association on routine basis	VWEMCL, GPCB	Ongoing process	-
			Third party monitoring	Third Party, VWEMCL	Implemented	
			To set up vigilance cell for vigorous & surprise monitoring under supervision of senior officer.	GPCB	Implemented	
9	To stop tray drying and salting process in dyes manufacturing unit.	Generation of high TDS effluent from dyes manufacturing unit is affecting proper functioning of CETP	Identification of the unit having tray drying and salting process	Concerned industries, GPCB.	30.09.2010	
			Setting up of common spray drying facility.	VIA	31.03.2011	
			Complete phase out of tray drying and salting process	Concerned industries, GPCB.	30.06.2011	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
10	Identification & rectification of various leaking manholes, overflowing pumping stations and other bypass system.	Master plan to Identify & rectify Various leaking man holes, overflowing pumping stations and other bypass system in GIDC Vapi to be prepared & implemented.	Foolproof mechanism for regular monitoring, cleaning and maintenance is required by concerned authority.	GIDC	31.08.2010	Scheme in this connection may be prepared by the concerned authority for financial help under the government policy.
			To identify reasons of overflow of man-holes and to take adequate measures to control overflow.	GIDC	31.03.2011	
11	Safe disposal of treated effluent of GIDC,Vapi	At present treated wastewater is discharged in River Damanganga	To lay down pipe line up to deep sea as per NIO recommendation.	GIDC, VIA, VWEMCL	31.12.2012	--DO--
12	Cleaning of Bill Khadi and dredging to increase carrying capacity.	Bill Khadi is over flooded during monsoon period causing backflow of runoff in GIDC area	Cleaning of Bill Khadi	VWEMCL	31.12.2010	
			Dredging of Bill Khadi	Irrigation Department ,Dist.Admn.		
			Construction of motarable road for Bill Khadi passing through GIDC stretch	GIDC, Notified Area Authority		

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			To stop washing activities carried out by scrape dealers in Dungri falia and surrounding area to the cluster	GPCB, DIST. COLLECTOR, DDO		
13	Safe disposal of treated effluent of units located outside GIDC	Pollution in Kolak River	To lay down pipe line up to deep sea as per NIO recommendation.	Pardi /Morai Industries Association	31.12.2010	
14	Monitoring of surface and sub surface water quality	Surface and sub surface water quality is required to be checked periodically	To monitor surface and sub surface water quality. To increase monitoring locations.	GPCB, VWEMCL	On going process.	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			AIR			
1	Upgradation of air pollution control measures.	Air action plan for Vapi is under implementation. The industrial units shall be directed to upgrade APCM to meet the amended ambient air quality norms, if required.	Industrial units consuming solid fuel like coal, agro waste, etc. required to upgrade air pollution control system by installing bag filters /multi cyclone separator so that ambient air in the nearby area meet with the revised norms of $PM_{2.5}$.	Concerned industries, GPCB	31.12.2010	To be borne by the concerned industry. Association may assist individual units

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			To check air pollution control system attached to with respect to adequacy and if needed upgrade the same. For controlling of pollutants like VOCs,PAHs,PCBs industries which are engaged in handling of solvents, Solvents shall be recovered & reused. Solvent recovery shall not be less than 95%.Separate godowns for the storage of finish goods ,raw materials & separate tank farm for solvents & other chemical storage as per MSIHC Rules 1989 shall be provided. Solvents Management shall be as follows :Reactor shall be connected to chilled brine condenser system. Industries shall provide the chilled brine solution in secondary condenser.	Concerned industries GPCB	31.12.2010.	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
2	Adoption of cleaner fuel	Gas infrastructure agency has created an infrastructure for industrial gas supply. The industrial units shall be motivated to switch over to clean fuel. Fluctuation in gas prices, assured supply and competition are major issue.	Large industrial units using solid fuel shall be switch over to cleaner fuel wherever it is feasible considering availability of gas and economics.	Concerned industries, GSPC, GPCB	To start from 15/7/2010	
3	Plantation in the industrial estate	Concerned authority shall be asked to provide adequate green belt in the periphery as well as wherever possible within the estate.	Considering the present plantation as baseline datum, five years plan for plantation of industrial estate to be submitted by the GIDC/ Association in consultation with Forest department. To allot unused plots, road side areas and other areas reserved for green belt within GIDC and to sign MoU between GIDC and association for plantation	VIA, VWEMCL GIDC, Forest dept.	Implemented and on going process	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
4	Restriction on using un authorized fuel.	Use of unauthorized fuel like petcock, shall be stopped. The industrial units shall be directed to use the fuel as per the consented condition	Verification drive to be initiated and completed	Concerned industries, GPCB	31.10.2010	
5	Control of fugitive emissions.	Fuel handling, chemical storage and processes including pickling are the major source of fugitive emission. Hence the industrial units should adopt good housekeeping practices.	Good practices like cleaner production and cleaner technology to be adopted in fuel handling, process control in closed system and to have better house keeping	Concerned industries.	30.09.2010 and ongoing process.	Concerned industries.
			To keep vigil checking on the concerned industries.	GPCB	Ongoing process.	
6	Strengthening of ambient Air Quality Monitoring	Concerned agency shall be asked to operate the existing AAQMS regularly and also to increase the no of stations	Existing AAQMS to be strengthened to monitor AAQ as per new notification	GPCB, VIA	31.12.2011	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
			New AAQMS shall be installed.			
			Installation of continuous ambient air monitoring station.			
7	To prepare guidelines for coal handling	Poor ambient air quality due to unloading and loading activity at railway yard.	1. To prepare guideline to control air pollution due to coal handling.	GPCB	31.08.2010	
			2. To implement guidelines and take measures to control ambient air pollution.	Railway Authority and coal trading agent	31.12.2010	
8	Impact on health of within and surrounding population	Probable health risk within vicinity of 2 km from the cluster.	To carry out survey by reputed agency like NIOH to know the detailed health impact assessment.	VWEMCL	31.12.2011	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
9	Monitoring of VOC in cluster	Health risk on population at large due to VOC.	To estimate the VOC concentration in cluster and to take remedial measures. To monitor VOCs quarterly.	GPCB, Third Party	First quarterly report by 31.12.2010 then on going activity.	
HAZARDOUS WASTE						
1	Checking of illegal transportation and dumping of Hazardous waste	TSDF operators/Industries Association shall be asked to keep vigil on their member units regarding timely and regular disposal of HAZ wastes	Vigil check required to be kept on illegal transportation and dumping of hazardous waste.	Concerned industries, VIA, VWEMCL, GPCB, RTO, NGO.	On going process	
			Six identified illegal hazardous waste dumping sites are to be cleared by lifting and shifting hazardous waste to TSDF and remedified.	VIA, VWEMCL	31.12.2010	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
2	CPCB guidelines for TSDF are to be strictly followed.	TSDF guidelines for waste quantity at site, sheds for different waste, fire fighting facility, working of incinerator etc are not properly observed.	TSDF operator will comply with requirement as per CPCB guidelines.	VWEMCL	30.09.2010	
3	Adoption of 4-R's (Reduce, Recover, Reuse, Recycle)	It is required to adopt 4-R"s for better management of Hazardous waste and co-incineration of incinerable hazardous waste in cement kiln.	Inventorisation of the various solid/ Hazardous waste generated from the industries	GPCB, Concerned industries, VIA, Gujarat Cleaner Production Centre	31.12.2010	Concerned industries
			Creation of waste exchange center	Concern industries, VIA	30.6.2011	
4	Common facility for collection, storage & transportation of incinerable waste generated from individual industrial units	Common facility for collection, storage & transportation of incinerable waste generated from individual industrial units shall be developed.	Common hazardous waste incinerator is to be installed.	VWEMCL, VIA, Concerned Industries.	31.08.2011	
			To explore possibility for co-processing of hazardous waste in Cement/Power Plant/Steel Plant.	GPCB, VWEMCL, VIA, Concerned Industries.	31.12.2011	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
5	Captive facility for destruction of incinerable waste	Industrial units having own incinerator (liquid and solid) required to upgrade/ install adequate incineration system as per guidelines of CPCB.	Up gradation of captive incineration system.	Concerned industries GPCB	31.12.2010	
6	Transportation of Hazardous waste	Hazardous waste shall be transported through only dedicated & well covered vehicles.	Vigil checking on transportation of hazardous waste.	VWEMCL, GPCB	Ongoing Process	
			To incorporate GPS based tracking system for transport of hazardous waste.	VWEMCL	31.12.2011	
7	Proper disposal of plastic waste	There is no proper management for disposal of plastic waste from paper industries	Development of co-incineration system	VWEMCL in consultation with Paper Mill Association.	31.12.2010	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
8	Centre of Excellance at Vapi	Centre of Excellence at Vapi can be further strengthen to take additional assignment, R&D activities in field of Cleaner Production, Cleaner Technology and Waste Exchange Schemes	To upgrade the Centre for Excellance at Vapi and use its capacity for the purpose of Cleaner Production, Cleaner Technology and Waste Exchange Schemes	VWEMCL, GCPC	31.12.2010 and ongoing process.	

Sr No	Activity	Issue	Action	Implementing Agency	Time limit	Financial implication & outlay
9	Waste Minimization Measures	To reduce the quantity of waste material.	Industries shall install, • Metering and control of quantities of active ingredients to minimize waste. • Reuse of byproducts from the process as raw materials or as raw material substitutes in other processes. • Use of automated filling to minimize spillage. • Use of Close Feed system into batch reactors. • Venting equipment through vapour recovery system and APCM. • Use of high pressure hoses for equipment clearing to reduce waste water generation.	Concerned Units	31.12.2010	

- **Suggestions / comments of Steering Committee:**

Sr. No.	Suggestions / Comments	Action Taken
1	Need for demarcation of Geographical boundaries and the impact zones in a digitized map.	Map already obtained and included.
2	Long term and short term plans along with sector and region-wise action points have to be defined clearly with time line, cost and responsible implementing agencies/ stakeholders.	As suggested, this has been included in the Action Plan. However, for micro level monitoring, pollution potential industries are identified and were asked to submit the upgradation plan with financial outlay. Verification of compliance of this commitment by an individual industry is presently going on.
3	Major industry-based action plans should be prepared so that the problems of individual units could be identified and action points (long term and short term) be implemented within stipulated time-frame.	On the basis of the pollution potentiality, industries have been identified and specific directions issued. These directions are being presently under verification.
4	Functioning of CETP should be reviewed and design should be re-checked on the basis of COD load, carbonaceous BOD, refractive COD through performance study.	Letter in this regard has been issued to VWEMCL to improve performance and R & D work is going on .
5	Appropriate action points should be incorporated in action plan to control flow of sewage in Amla Khadi and Chhapre Khadi in Ankleshwar.	N.A for Vapi.
6	Groundwater quality should be assessed properly and taken into consideration and remedial measures should be incorporated for the improvement in groundwater quality.	This has already been covered under point no. 14.1 of Water Part.

7	Quantification of pollution from non-point sources should be done and baseline data of VOC should be collected.	This has already been covered under point no. 9 of Air part
8	Short-term and long term awareness programme should be incorporated.	This has already been covered.
9	Online monitoring system linked with regional office and head office at-least at two stations (Ankleshwar and Panoli) should be included in plan.	For Vapi , too covered at point no. 6 of Air Part.
10	Scheme of plantation with clear defined policy should be incorporated to control odour problem in Ankleshwar.	Odour Control Expert Committee is constituted and suggestions are being implemented. However, GIDC / Notified Area Authority will be asked to consider this aspect while developing green belt. For Vapi , too covered at point no. 3 of Air Part.
11	GPS based transportation and tracking system for hazardous waste should be ensured.	Included at Action Point no. 6 of Hazardous Waste part.
12	Action plans should clearly be defined with short term and long term actions including technological improvement in small scale sector and budgetary requirement for various works.	Identified pollution potential industries, common infrastructure facilities and other related Government agencies / departments have already submitted time bound technological improvement programme along with its financial outlay which is coming out to be approximately Rs. 230 crores. Compliance verification for the same is also being done from time-to-time.
13	DG sets should be provided at all pumping stations/ETPs/STPs to avoid overflow of untreated effluent during power failure in all clusters.	DG sets at all pumping stations and CETPs are already provided.
14	Efforts should be made for technological intervention (Green/clean technology) in all the industrial clusters where SSI's using old technology exist in cluster.	Letter in this regard has been issued to GCPC .

15	Efforts should be made for complete utilization / recycling of treated effluent in the industries and discharge in deep sea should be avoided for resource conservation.	
16	Industrial and domestic waste should be treated separately.	Domestic waste water by an individual industry is mainly discharged into GIDC drain to CETP.
17	Action points for proper functioning of TSDF/CETP and FETP should be prepared.	Included at Action Point no. 7 of Water part and at Action Point no. 2 of Hazardous Waste part.
18	Sectoral/regional/micro level plans for reduction / reuse / recycling of wastewater /awareness and control of fugitive emission for non-point sources should be prepared.	Included at Action Point no. 5 of Air part.
19	Action points for Groundwater management/VOC/HAPS control /noise pollution control should be incorporated in plan.	This has already been included under various action points of the Action Plan.
20	Resource management plan/future development/managerial plan for new sitting of industries should also be incorporated.	New sitting of industries having pollution potential is not granted consent to establish in Vapi Industrial Cluster
21	Quantification of pollutants needs to be done including solvent consumption of industries.	Covered at point no .1 of Air part.
22	Health Impact Assessment Study to be undertaken.	Included at Action Point no. 8 of Air part
23	Plan of Green Belt development to be incorporated.	Included at Action Point no. 3 of Air part
24	Impact on CEPI score after implementation of short term and Long term Action points should be estimated.	Estimated and presented as Chapter 6 with Action Plan.
25	Review of locations of existing Air, Water and Ground water monitoring stations and need of new stations with regard to density of Industries.	Under SAMP, NAMP, GEMS, MINARS etc. samples are collected regularly. However, need of new stations with regard to density

		of industries, if any, is being explored.
26	Monitoring of all STPs and CETPs must be conducted regularly and should be recorded.	Monthly visit is being carried out and data of visit as well as analysis results can be made available using XGN.
27	Plan for Municipal Solid Waste, plastic waste, Bio-medical and Hazardous Waste quantification and management. Present status need to be mentioned.	This has already been covered.
28	GPS based continuous transportation and tracking system for hazardous waste in Ankleshwar.	Included at Action Point no. 6 of Hazardous Waste part.
29	The plastic waste management in Vapi through co-processing in Cement Kiln would be more environment friendly rather than its conversion into Diesel to avoid sludge disposal problem.	Included at Action Point no. 7 of Hazardous Waste part.
30	Vehicular pollution and Traffic management should be addressed in the action plan.	This has already been covered .
31	Magnetic flow meters/ electric meters with recorders should be used for flow measurements.	Included at Action Point no. 1 of Water Part.
32	Action for reducing consumption of fresh water by the industries as per CREP recommendations based on consumption per unit production.	Compliance of CREP action points are being monitored. Additionally, provision of MEE and RO by various industries has resulted into recycling of water and thus total fresh water requirements have reduced.
33	Action regarding capacity building of SPCB to ensure proper monitoring and compliance of action points.	Implemented by forming separate Vigilance cell .
34	Adoption of Principles of reduce, reuse, recycle & recover in action plan.	Included at Action Point no. 3 of Hazardous Waste part.

CHAPTER 6

EFFECTS ON CEPI

Expected CEPI score based on Action plan framed by GPCB

Sub com-ponent	Basis for sub component rating	Max.	CEPI as published in CPCB document of DEC-09			Expected reduction in CEPI based on GPCB action plan			Justification for expected reduction.		
			Air	Water	Land	Air	Water	Land	Air	Water	Land
A1	Based on the data on the presence of toxins	**6**	5	5	4	3	5	4	(B + B + A) & penalty 1 = 2+ 1 = 3		
A2	Based on the scale of industrial activities	**5**	5	5	5	5	5	5			
A	A1*A2	**30**	25	25	20	15	25	20			
B1	Based on the pollutant concentrati on data (Ambient Pollutant Concentrat i-on)	**8**	8	8	8	4	7.75	2	Exceedenc e factor value 3 high & penalty value 1= 4	EF (Critical, High & Moderate)	Two parameters are having moderate exceedence factor

B2	Based on the impact on people (Evidence* of adverse impact on people)	**6**	3	3	3	0	0	0	VWEMCL is having report of NGO - Parirakshna which is indicating that there is no adverse impact on people.
B3	Based on the impact on eco-geological features(reliable evidence of adverse impact on eco-geological features)	**6**	3	6	6	0	0	0	
B	B1+B2+B3	**20**	14	17	17	4	7.75	2	

C1	Based on potentially affected population)	**5**	5	5	5	5	3	3		For water and land -less than 1.0 lac people affected.
C2	(Based on the level of exposure)	**5**	5	4.5	5	3	4.5	2	Falls under high + high + moderate SNLF category and correspon ds value with penalty is 2 +1 = 3		High SNLF but falls under 0 penalty
C3	Based on the risk to sensitive receptors	**5**	0	0	0	0	0	0			
C	(C1*C2) + C3	**30**	25	22.5	25	15	13.5	6			

D	Based on the information on pollution control facilities	**20**	10	10	10	5	10	5	Adequate, Inadequat eAdequate		Adequate, Inadequate Adequate
CEPI	A+B+C+D	**100**	74	74.5	72	39	72	33			
	max.CEPI		74.5			72					
Aggregated CEPI			**88.09**			**61.88**					

Annexure-1

WATER QUALITY OF SURFACE WATER NEAR GIDC, VAPI AREA

(1) Water quality of River Damanganga at various sampling locations.

- **RIVER DAMANGANGA AT NAMDHA**

(Sampling point is about @ 1kilometers away from CETP outfall)

(YEARLY AVERAGE)

YEAR	pH	COD mg/l	BOD mg/l	D.O. mg/l	Ammonical Nitrogen mg/l	Phenolic Compounds mg/l
2005	6.72	149	39.4	1.36	8.4	0.114
2006	7.32	97.08	16.87	3.67	15.56	0
2007	7.61	81.13	15.69	4.05	7.69	0
2008	7.53	80.89	11.68	4.07	7.68	0
2009	7.35	91.17	20.75	5.05	7.57	0

- **RIVER DAMANGANGA AT KACCHINGAM, D/S,Daman**

(Sampling is about @ 6 kilometers away from CETP outfall)

(YEARLY AVERAGE)

Year	pH	COD mg/l	BOD mg/l	D.O. mg/l	Ammonical Nitrogen mg/l	Phenolic Compounds mg/l
2005	7.16	79	17.59	4.73	9.67	0.19
2006	7.38	84	12.57	3.84	11.59	00
2007	7.59	65	10.38	4.48	8.07	00
2008	7.35	64	7.69	4.77	5.62	00
2009	7.46	81.13	16.71	5.52	6.73	1.53

- **RIVER DAMANGANGA AT DAMAN JETTY**

(Sampling point is about @ 13 kilometers away from CETP outlfall)

(YEARLY AVERAGE)

Year	pH	COD mg/l	BOD mg/l	Ammonical Nitrogen mg/l	Phenolic Compounds mg/l	DO mg/l
2005	7.66	57	10.86	5.08	0.09	5.47
2006	7.64	79	5.0	2.40	ND	5.52
2007	7.79	75	7.14	2.83	ND	5.52
2008	7.72	57	4.11	2.69	ND	6.28
2009	7.78	47.46	11.65	3.62	ND	6.41

(2) Annual average analysis data of water sample collected from BILL KHADI at N.H. No:8

Parameters / Year	pH	Colour Pt-co scale	COD mg/l	BOD mg/l	Ammonical Nitrogen mg/l
2005	7.03	158	204	61	31
2006	7.07	223	332	128	48
2007	7.10	186	319	113	45
2008	7.19	345	507	172	64
2009	7.34	42	169	38	37

(3) Water quality of River Kolak at Pataliya bridge

YEAR	PH	COD mg/lit	BOD mg/lit	Ammonical Nitrogen mg/l	D.O. mg/lit	Phenolic Compounds mg/l
2005	7.4	37.8	9.7	4	5.2	ND
2006	7.6	51.6	6.6	3.9	5	ND
2007	7.28	61	10.45	3.43	4.13	ND
2008	7.53	73	10	2.44	5.06	ND
2009	7.49	47	10.7	3.62	6.54	ND

- **REASONS WITH JUSTIFICATION FOR IMPROVEMENT OF RESULTS INCONTEXT OF IMPROVEMENT IN CETP PERFORMANCE AND SURFACE WATER QUALITY.**

1) Segregation adopted for high COD streams.
2) Installation of FACCO system
3) Installation and modification of effluent conveyance system
4) Stoppage of pumping station overflow line into bill Khadi.
5) Enhancement of monitoring frequency of the Defaulter units.
6) Third party monitoring
7) Reduction/stoppage of unauthorized washing activities of Plastic Bags/ containers.
8) Disciplinary action against defaulter industry (During last six months)

Notice U/S 33-A under water Act-1974-	38Nos.
Notice U/S 31-A under Air Act-1981-	02Nos.
Direction U/S 33-A under water Act-1974-	82Nos.
Direction U/S 31-A under Air Act-1981-	02Nos.

ANNEXURE-2

AMBIENT AIR QUALITY DATA AT VARIOUS SAMPLING LOCATIONS.

(1) AAQM at Lalchand Techno engineering, 40-Shed, GIDC, Vapi (Under SAMP project by GEMI)

Year	RSPM µg/M3	SPM µg/M3	SO_x µg/M3	NO_x µg/M3
Permissible Limit	100		80	80
2007	79.52	162.07	23.1	29.6
2008	80.45	159.75	21.48	26.99
2009	87.8	151.2	19.9	26.6

(2)AAQM AT GPCB OFFICE, GIDC, Vapi (Under SAMP project by GEMI)

Year	RSPM µg/M3	SPM µg/M3	SO_x µg/M3	NO_x µg/M3
Permissible Limit	100		80	80
2007	64.6	131.25	15.9	23.97
2008	73.92	147.23	13.68	21.69
2009	79.1	159.1	13.2	21.2

(3)AAQM at Vapi Nagar Palika (Under SAMP project by GEMI)

Year	RSPM µg/M3	SPM µg/M3	SO_x µg/M3	NO_x µg/M3
Permissible Limit	100		80	80
2002	155.4	200.6	18.16	28.66
2003	117.5	167.5	20.42	34.64
2004	125.6	168.68	25.36	48.4
2005	112.5	156.08	19.55	29.08
2006	110.4	154.67	18.58	31
2007	63.81	127.62	19.38	26.98
2008	73.38	145.58	14.35	21.98
2009	70.4	142	13.97	22.52

(4)AAQM at GEB/CLUB-3 BUILDING, GIDC,Vapi (Under SAMP project by GEMI)

Year	RSPM µg/M3	SPM µg/M3	SO_x µg/M3	NO_x µg/M3
Permissible Limit	100		80	80
2002	211.8	278.2	31.72	44.86
2003	125.75	162.58	26.83	39.55
2004	136.6	189	26.5	46.6
2005	111.75	167.92	22.69	35.92
2006	121.17	156.5	25.33	35.08
2007	80.96	161.4	25.71	31.82
2008	83.77	166.73	18.72	24.55
2009	77.8	157	16.72	23.51

(5) AAQM AT CETP,NH NO: 8,GIDC,Vapi(BY GPCB)

Year	RSPM µg/M3	SPM µg/M3	SO_x µg/M3	NO_x µg/M3
Permissible Limit	100		80	80
2006	96.8	172.55	54.44	35.6
2007	84.7	108	42.7	34.7
2008	75.9	93.6	36.4	31.4
2009	97.5	144.8	34.7	33.8

ANNEXURE -3

GROUND WATER QUALITY OF GIDC AREA

(1) ANALYSIS RESULTS OF BOREWELL – AT TSDF, VAPI

YEAR	pH	Color	TDS mg/l	Nitrite mg/l	Alkalinity mg/l	Total Hardness mg/l	COD mg/l	F mg/l
2005								
2006	7.8	6	1337	-	352	302	24	0.338
2007	7.78	5.4	1045	-	212	260	19	0.388
2008	7.83	5.8	1341	0.254	307	283	25	0.252
2009	7.64	0	2113	0.212	410	248	15	0.173

(2) ANALYSIS RESULTS OF BOREWELL- AT PURUSH ADHYAPAN KENDRA - VAPI

YEAR	pH	Color	TDS mg/l	Nitrite mg/l	Alkalinity mg/l	Total Hardness mg/l	COD mg/l	F mg/l
2005	7.55	5	**1006**		**245**	**530**	**8**	**0.25**
2006								
2007	7.84	2.5	1146		283	533	9	0.234
2008	7.56	5	856		380	440	8	0.015
2009	7.45	0	826	0.051	400	186	11.3	0.143

(3) ANALYSIS RESULTS OF BOREWELL-RAJASTHAN BHUVAN -VAPI

YEAR	pH	Color	TDS mg/l	Alkalinity mg/l	Total Hardness mg/l	COD mg/l	F mg/l
2005	**7.75**	**2.5**	**506**	**268**	**303**	**6**	**0.36**
2006							
2007	7.67	2.5	1751	244	464	10	0.272
2008	7.63	5	2180	340	420	11	0.176
2009	7.84	5	593	340	140	11	1.1

ANNEXURE-4

ANALYSIS RESULTS OF CETP

PERFORMANCE OF CETP

- **Annual average analysis data of w/w sample collected from the final outlet of CETP**

Parameters / Year	pH Unit	SS mg/l	TDS mg/l	COD mg/l	BOD mg/l	NH_3-N mg/l	PHENOL mg/l
Permissible Limit	6.5-8.5	100	2100	250	30	50	1
1998	7.24	78	6967	304	24	72	0.14
2005	7.03	440	9467	923	236	266	1.92
2006	7.06	281	8053	625	209	168	1.34
2007	7.15	205	7945	643	253	158	0.89
2008	7.13	386	7660	662	234	162	1.83
2009	7.33	186	7102	709	195	104	0.93

- **Annual average analysis data of w/w sample collected from the Inlet of CETP**

Parameters / Year	pH Unit	SS mg/l	COD mg/l	BOD mg/l	NH3-N mg/l	PHENOL mg/l
Inlet norms	6.5-8.5	300	1000	400	50	1
2006	6.81	656.07	1564.67	603.97	191.34	3.59
2007	6.84	568.07	1698.37	721.4	235.37	2.07
2008	6.76	744.12	1574.04	586.28	186.38	5.807
2009	7.06	286.65	1408.4	395.68	99.9	2.55

CETP-VAPI INLET DATA OF LAST SIX MONTH

DATE	**SS** mg/l	**COD** mg/l	**BOD** mg/l	**NH3** mg/l	**pH**	**PHENOL** mg/l	**TDS** mg/l
Inlet norms	300	1000	400	50	6.5-8.5	1	2100
7/1/2010	180	2023	561	109	6.79	2.1	11800
21/1/2010	260	1394	317	113	6.88	1.68	11872
9/2/2010	258	1532	364	108	7.29	2.13	11860
3/3/2010	270	1435	371	97	7.36	2.13	12610
29/03/2010	800	2086	522	98	6.79	0.75	13180
04/05/10	268	1926	485	97	7.31	2.5	12684
AVERAGE	339.33	1732.67	436.66	103.66	7.07	1.88	12334.33

- **CETP-VAPI FINAL OUTLET DATA LAST SIX MONTH**

DATE	**SS** mg/l	**COD** mg/l	**BOD** mg/l	**NH3** mg/l	**pH**	**PHENOL** mg/l	**TDS** mg/l
Permissible Limit	100	250	30	50	6.5-8.5	1	2100
09/11/09	160	740	110	125	7.17	0.81	7862
25/11/09	152	682	97	102	7.36	0.42	7240
30/11/09	138	533	79	98	7.23	0.83	7440
09/12/10	178	628	91	85	7.39	0.28	8152
19/12/09	170	631	97	91	7.33		8040
31/12/09	182	646	90	98	7.53	0.9	8820
7/1/10	110	538	97	123	7.37	0.93	7002
21/1/10	140	606	97	116	7.47	0.87	7698
9/2/10	148	617	109	113	6.93	0.69	7832
3/3/10	152	696	123	108	7.17	0.83	7642
29/03/10	152	638	107	97	7.67	0.3	7490
04/05/10	138	629	105	91	7.49	0.56	7432
AVG	**151.7**	**632.0**	**100.2**	**103.9**	**7.3**	**0.7**	**7720.8**

- **Monthly Average Results of SVNIT**

Month	**COD mg / lit**		**BOD mg / lit**		**NH3-N mg / lit**	
	Inlet	**Final Outlet**	**Inlet**	**Final Outlet**	**Inlet**	**Final Outlet**
Dec-09	1850	622	557	96	78	77
Jan-10	1947	626	590	89	92	99
Feb-10	1765	574	555	79	86	93
Mar-10	1813	549	598	66	81	77
Apr-10	2099	610	657	78	90	71
May-10	2053	587	664	70	75	69
AVERAGE	**1921.17**	**594.67**	**603.5**	**79.67**	**83.67**	**81**

- **Analysis results of CPCB**

Inlet Results			Outlet Results		
Year/Date	**COD mg/lit**	**NH3-N mg/lit**	**Year/Date**	**COD mg/lit**	**NH3-N mg/lit**
2004	3165	445	2004	1112	551
2005	2640	238	2005	976	246
2006	3111	333	2006	784	239
2008	1904	194	2007	837	258
2007	2048	125	2008	887	184
18-02-09	5358	104	18-02-09	1281	105
20-05-09	1509	117	20-05-09	842	99
2-09-09	1324	63	2-09-09	481	63
9-12-09	1517	68	9-12-09	432	68
30-06-10	1183	72	30-06-10	440	24
28-09-10	1622	48	29-09-10	540	57

ANALYSIS RESULTS OF MONITORING CARRIED OUT AT BILL KHADI BY CPCB

(Sampling location- Bil Khadi at NH-8 Bridge, Vapi)

Year(s)	**pH**	**TSS**	**TDS**	**BOD**	**COD**	**O & G**	**NH_3-N**
01.07.10	7.24	92	3212	48	197	19	35
28.09.10	6.55	34	1244	59	169	15	11

Note:

- All parameters, except pH, are expressed in mg/l.

RIVER DAMANGANGA WATER QUALITY IN VAPI-DAMAN REGION by CPCB

Sampling Locations	**Year(s)**	**pH**	**DO**	**TDS**	**BOD**	**COD**	**NH_3-N**	**Phenols**
Damanganga River, GIDC Weir, U/S of CETP discharge,	30.06.2010	8.22	7.1	198	2.0	15	0.48	0.020
	28.09.2010	8.32	7.0	172	1.6	7.8	0.48	0.04
Damanganga River near Jari Causeway (Gujarat-Daman Border)	30.06.2010	7.42	4.3	29325	17	101	3.2	0.02
	28.09.2010	6.7	3.7	625	3	33	1.6	0.02
Damanganga River, Near bridge joining Moti Daman & Nani Daman, near mouth of Damanganga Estuary	30.06.2010	7.75	5.7	36379	19	144	1.0	0.001
	28.09.2010	7.25	4.4	11934	2.0	144	1.4	BDL

Annexure - 5

Map showing geographical location and Impact Zone

Compliance of suggestions of steering committee for Vapi Industrial Cluster.

Sr. No	Action Point	Suggestion	Remarks
Action Plan for Water Pollution Control			
1.	1.1	Identification of units having effluent quantity greater than 25 KL per day should also be taken into consideration to meet the flow standards as per design of CETP	Covered at 1.1. 170 units having potential to discharge 25 KLPD of waste water in GIDC, Vapi clusters have been considered to meet the flow standard as per design of CETP,Vapi.
2.	1.3	Installation of flow meters at the outlet of all ETPs connected to CETP should be incorporated as a short term plan.	Covered at 1.3. 42 numbers of industries have installed standard flow meter at their final outlet of ETP.
3.	6.3	Time bound action plan for installation of multiple effect evaporator/RO system/Incinerator system/Ammonia Stripper/New Technology like FACCO including cleaner production and cleaner technology by concerned industries should be submitted to GPCB by 31 Dec 2010 and its implementation should be ensured by 30th September 2011.	Covered at 6.3. About 30 nos. of industrial units are sending their segregated waste water having refractive COD to common FACCO at CETP,vapi.More over industrial units have been asked to explore the possinilities in regard of cleaner production by optimizing usage of materials.
4.	7.7	CETP should be optimized by 31st December 2010 and modification if required shall be completed by 31.12.2011.	Covered at 7.7. CETP is exploring possibilities of MBR technology through GE and strengthening microbiological activity through NEERI.
5.	10	Reasons of overflow of manholes should be identified & adequate measures should be adopted by 31st March 2011.	Covered at 10.2. Notified area officer, Vapi has been asked for regular clean up of underground pipeline/desilting of sump/pump house in order to prevent overflow of manholes/sump. Notified area officer has published tender for laying of pipeline in Phase 3

			area and making of two new pumping stations.Moreover bund has been made near the pumping station no 3 to divert the waste water of bill Khadi to the sump of pumping station in upstream of GIDC,Vapi. It is also planned to make the bund wall in bill khadi in the downstream near R K Desai college in order to prevent confluence of industrial effluent to river Kolak.
6.	11.	Time limit for laying pipeline up to deep sea as per NIO recommendation should be reduced to December 2011.	Covered at 11.Exploring the possibilities to reduce time limit as many agencies and detailed technical work is involved.
Action Plan for Air Pollution Control			
7.	5	GPCB should also be involved as the implementing agency for control of fugitive emissions by keeping a vigil on the concerned industries.	Covered at 5.2. On going process.
8.	8	Detailed health impact assessment should be carried out through reputed agency as it is linked with B1 and B2 scores.	Covered at 8.1. VWEMCA has approached NIOH for the health impact study in and around of industrial cluster of Vapi vide letter dated 13 th November 2010.
9	9	VOCs should be monitored quarterly and present status should be submitted within 3 months i.e.,31st December 2010.	Covered at 9.1. Vapi Waste and Effluent Management Co.Limited has proposed to monitor VOCs and other parameters through SGS,Mumbai.
Action Plan for Hazardous Waste Management			
10	4	Possibility shall be explored for co processing of hazardous waste in Cement/Power Plant/Steel Plant.	Covered at 4.2. President,Paper Mill Association has been asked to explore the possibility of usage of plastic waste in cement industry as fuel.
11	6	GPS based tracking system for transport of hazardous waste	Covered at 6.2

		should be incorporated.	
OTHER SUGGESTIONS			
Sr.No.	**Suggestion**		**REMARKS**
1.	CEPI should be evaluated for the same criteria pollutants considered by CPCB and various indices should be considered as per the standard guidelines mentioned in CPCB documents.		--
2.	CEPI should be evaluated on the basis of the real time data after implementation of short term and long term action plans.		--
3.	Present status and future plan for green belt development should be incorporated as per norms fixed in the master plan of the area with respect to area under green belt, numbers and type of saplings.		Balgali Baval,Rain tree,Pelta,Neem, Kala Jambu & other medicinal saplings have been planted.About 15000 saplings have been planted.About 50,000 sq. Meter is proposed to be covered under the green belt.At present 30% area has been tranformed into the green belt.
4.	Demographic details and water drainage pattern and road networks in 2 km buffer zone should be incorporated.		--
5.	Sector wise and industry wise action points should be incorporated.		Complied.
6.	Odor problem resulting from VOCs should be addressed along with capacity building of SPCB for VOCs monitoring.		Training of GPCB,Vapi official in this regard is arranged for capacity buiding in regard of VOCs modeling.
7.	Managerial and financial plans should be incorporated.		----
8.	Online monitoring system linked with regional office and head office at least at two stations should be included in plan.		Two units have installed TOC meter at their final outlet of ETP.Linking of online monitoring is being explored by these units to Regional office,Vapi.

9.	D G Sets should be provided at all pumping stations/ETPs/STP to avoid overflow of untreated effluent during power failure in all clusters.	Notified Area Officer, Vapi has been asked for installation of D G Sets to avoid overflow of untreated effluent during power failure.
10.	Resource management plan/future development/managerial plan for new sitting of industries should be incorporated.	--
11.	Quantification of pollutants needs to be done including solvent consumption of industries.	--
12.	Possibility of co-processing of hazardous waste may be explored and the same may be incorporated.	President,Paper Mill Association has been asked to explore the possibility of usage of plastic waste in cement industry as fuel.