TAMIL NADU POLLUTION CONTROL BOARD

ACTION PLAN FOR THE CRITICALLY POLLUTED AREA MANALI, TAMIL NADU

TAMILNADU POLLUTION CONTROL BOARD

ACTION PLAN FOR CRITICALLY POLLUTED

MANALI

August - 2010

CHAPTER - I

INTRODUCTION

ACTON PLAN FOR CRITICALLY POLLUTED INDUSTRIAL AREAS/CLUSTERS - MANALI TAMILNADU

1.INTRODUTION

1.1.Area Details including brief history: Tamil Nadu, in general, and Chennai in particular, has had a strong base for the chemical industry and Manali industrial Complex, on the outskirts of Chennai, is one of the largest Petrochemical Complexes in the Country. The focal point of this cluster is the mother refinery, M/s Chennai Petroleum Corporation Limited(CPCL) and the Petro Chemical-based units, using refinery feedstocks, for producing a range of products, from fertilizers to polyolefin's.

1.2. Location: This Petrochemical Complexes Complex is located at 13˚10'4'' Northern latitude & 80˚15'43'' eastern longitude and is about 20 km north of Chennai. This Industrial complex spreads over an area of 2000 hectares in the revenue village of Manali, Chinnacekadu, Voiyakadu Sadayankuppam & Amulavoyal Village of Ambattur Taluk Tiruvallur District of Tamilnadu. Manali Industrial Complex is bounded by Buckingham canal & Tiruvottiyur on the east and, south by Chennai city, north by Kossathaliyar River in Ponneri talk and west by villages of Manjambakkam, Mathur and Madavaram of Tiruvallur District.

This industrial complex is connected by east with Ennore High Road, and west by Chennai Kolkata NH-5A, north by Ponneri - Manali high road, and south by Madhavaram – Manali road. The Ennore port is situated at a distance of 15km from this industrial Complex and the nearest railway station is Tiruvottiyur at 3km.

The average rainfall is around 100-120 cm. The mean maximum temperature during summer is 45^0 C and the mean minimum temperature during winter is 20^0 C. The relative humidity is around 70 – 80%.

1.3.Digitized Map with Demarcations of Geographical Boundaries and Impact Zones: The map showing the Manali Industrial Complex, and the near by areas is enclosed.

1.4. CEPI Score (Air, Water, Land and Total) : Out of the 88 industrial clusters as identified by the Central Pollution Control Board, the Comprehensive Environmental Pollution Index (CEPI) score for this Manali, Tamilnadu is 76.32.

No	Industrial Cluster/ Area	AIR	WATER	LAND	CEPI	
20	Manali (Tamilnadu)	64.00	59.00	58.00	76.32	Ac_Ws_Ls

Source: Comprehensive Environmental Assessment of Industrial Clusters by CPCB , December 2009

1.5.Total population and sensitive receptors.

The Manali town is the nearest residential and commercial area located at the western side of the this industrial complex,and Tiruvottiyur town is at the eastern side having residential colonies. The details of the towns, villages, which are located around 2.0Km from the Industrial Complex is stated Table-1.1. The list of hospitals, and Educational Institutions are stated in Table 1.2 & 1.3.

Table1.1

Sr No	Village Name	Location		Direction	Distance (km)	Population
		Latitude	Longitude			
1.	Manali	$13^0$10'15"	80^0 15' 47"	West &North	0km	36,588
2	Tiruvottirur Municipality	$13^0$10'29"	80^0 18'29"	Northeast & East	0.20	2,11,436.
3	Madavaram Municipal area	13^0 9' 19"	80^0 14' 28"	West	1.8	76,793
4.	Chinnasekkadu	13^0 9' 36"	80^0 15' 30"	South Weste	1.0	9,744

Table1.2.

List of hospitals

Sr	Name of the Hospital	Address
1	Kurinji Hospital	964, T.H Road
2	Sugam Hospital	349, Thiruvottiyur High Road
3	Vinu Nursing Home	21, Ramakrishna Nagar
4	G. S. Hosital..	855, T. H. Road
5	Jagadeesh Nurshing Home	941A Thiruvottiyur High Road
6	Municipal Maternity Home	Thiruvottiyur High Road
7	Grace Maternity Home	19, Sathangadu High Road
8	Shanmugam Surg & Med Centre	1030,Thiruvottiyur High Road
9	Lakshmi Ram Nurshing Home	59, Sannathi Street
10	Selva Clinic & Maternity Centre	72, Kamaraj Nagar
11	Annai Hospital	855, Thiruvottiyur High Road
12	Ramanathapuram Maternity Centre	Wimco Nagar
13	S.S.S Hospital	924, T.H.Road
14	National Hospital	33, Manali Express Highway
15	Subramani Service Hospital	488, T.H.Road
16	S.S.Hospital & Scan Centre	11, Jeevanlal Nagar
17	Municipal Maternity Home	Manali .

Table1.3. Educational Institution

Sr No	Name of the area	Number of Educational Institution
1	Manali	10
2	Tiruvottirur Municipality	13
3	Madavaram Municipal area	15
4	Chinnasekkadu	2

1.6. Eco-geological features. The eco-geological features within 2Km radius from the Manali Industrial Complex, are studied, and no such important features were noticed generally.

1.6.1. Major Water Bodies: The Buckingham Canal is a salt water navigation canal, running parallel to the Coromandel Coast of South India. The canal connects most of the natural backwaters along the coast to the port of Chennai (Madras). It has a total length of 420 km of which 163 km is in Tamil Nadu and the remaining

257 km in Andhra Pradesh. Araniar River, Korataliyur River, Otteri Nullah, Cooum River, Adyar River and Palar River are connected with this canal.It was once used for carrying goods such as fire wood, salt and lime shell through country boats. It was constructed by the British Raj, and was an important waterway during the late nineteenth and the twentieth century. The canal is the eastern boundary of this Manali Industrial Complex.

1.6.2.Ecological parks,sanctuaries,flora and fauna or any eco sensitives Zones

No ecological parks, sanctuaries, flora and fauna or any eco sensitive zones are present within 2Km radius from the Manali Industrial Complex.

1.6.3.Buildings,Monuments of Historical/archaeological/religious importance

No Buildings, Monuments of Historical/archaeological/religious importance are present within 2Km radius from the Manali Industrial Complex.

1.7. Industry classification and distribution (no.of industries per 10 sq.km area or fraction)

There are fourteen highly polluting 17 category industries and eleven red category industries and four orange category industries located in the industrial complex.

1.7.1. Highly polluting industries (17 categories)

Sl. No	Name of the Industry	Type	Category
1.	Chennai Petroleum Corporation Ltd.	Petroleum Refinery	Ultra-Red
2.	Madras Fertilizers Ltd	Fertilizer	Ultra-Red
3.	Tamilndu Petro Products Ltd (LAB)	Petrochemical	Ultra-Red
4.	Tamilnadu Petro Products Ltd-ECH	Petrochemical	Ultra-Red
5.	Tamilnadu Petro Products Ltd-HCD	Caustic Soda.	Ultra-Red
6.	Manali Petro Chemical Ltd-I	Petrochemical	Ultra-Red
7.	Manali Petro Chemical Ltd-II	Petrochemical	Ultra-Red

8.	Manali Petro Chemical Ltd-II (Captive Power Plant)	Captive Power Plant	Ultra-Red
9-10	Balmer & Lawrie & Co. Ltd (Leather Chemical Division & Grease Division)	Leather chemical	Ultra-Red
11.	Supreme Petrochemicals Ltd	Petrochemical	Ultra-Red
12.	Kothari Petrochemicals Ltd.	Petrochemical	Ultra-Red
13.	Indian Additives Ltd	Additives	Ultra-Red
14.	Petro Araldite (P) Ltd	Adhesives.	Ultra-Red
15.	NATCO Organics Ltd.	Bulk Drug	Ultra-Red
16.	CETEX Petrochemicals Ltd	Petrochemical	Ultra-Red
17.	Eveready Industries Ltd.	Battery Components	Ultra-Red

1.7.2. Red category industries.

Sl. No	Name of the Industry	Type	Category
1	Futura Polyesters Ltd. (Fiber division)	Manmade fiber	Red
2	Futura Polyesters Ltd. (polymer division)	Manmade fiber	Red
3	SRF Ltd (IYB)	Manmade fiber	Red
4	SRF Ltd (EPB Plant)	Manmade fiber	Red
5	IOT Infrastructure & Energy Services Ltd	LPG Storage	Ultra-Red

1.7.3. Orange and Green category industries.

Sl. No	Name of the Industry	Type	Category
1	Pure Industrial Gases Pvt. Ltd	Industrial Gas	Orange.
2	SICGIL India Ltd	Industrial Gas	Orange
3	Popular Carbonic Pvt. Ltd.	Industrial Gas	Orange
4	INOX Air Products Ltd	Industrial Gas	Orange

1.7.4. Grossly polluting industries: Nil

CHAPTER – 2

WATER ENVIRONMENT

2. WATER ENVIRONMENT

2.1.1 Present status of water environment: Buckingham canal is the surface water source, flowing on the eastern boundary of the Manali Industrial Complex and it receives flood discharge only during monsoon season and in the rest of the year it acts as carriers of wastewater received from the other canals passing across the Chennai city.

The surplus water from the Red hills lake is some times drained out through Amullavoyal canal which is flowing on the northern side of the Manali Industrial Complex and finally confluence in the sea.

2.1.2. Present Level of Pollution. Tamilnadu Pollution Control Board is monitoring the Buckingham canal, under the Monitoring of Indian National Aquatic Resources (MINARS) programme, and water samples are being collected and analyzed periodically. The report of analyses of the water sample collected from the Buckingham canal during the year 2009-10 are furnished in the Table 2.1. The report reveals that the canal is unsuitable for any designated use.

TABLE-2.1

	REPORT OF ANALYSIS-2009-2010 RIVER – (BUCKINGAM CANAL)								
		pH	Conductivity	TSS	TDS	Chloride	Amm-Nitrogen	BOD	COD
MONTH	Point of Collection		mmhos/ cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KATHIVAKKAM BRIDGE									
	APR-JUN 09	6.75	13470	150	9756	5190	22	107	330
	JUL-SEP 09	7.39	6357	78	4713	2108	49	47	171
	OCT-DEC 09	7.15	3433	61	2163	834	45	66	176
	JAN-MAR 10	7.47	4613	105	3263	1187	26	51	165
	AVERAGE	**7.19**	**6968**	**99**	**4974**	**2330**	**36**	**68**	**211**
MANALI ROAD BRIDGE									
	APR-JUN 09	6.79	3240	114	2374	803	28	58	192
	JUL-SEP 09	7.41	3033	91	2033	727	51	43	168
	OCT-DEC 09	7.18	2950	84	1882	637	44	72	181
	JAN-MAR 10	7.68	3420	91	2226	722	24	36	123
	AVERAGE	**7.26**	**3161**	**95**	**2129**	**722**	**37**	**52**	**166**
BASIN ROAD BRIDGE		6.81	1686	84	971	282	24	61	165
	APR-JUN 09	7.36	1729	595	1039	284	51	292	733

	JUL-SEP 09	7.34	1550	197	879	232	39	72	187
	OCT-DEC 09	7.34	1550	197	879	232	39	72	187
	JAN-MAR 10	7.60	1633	332	845	262	21	40	181
	AVERAGE	**7.41**	**1616**	**330**	**911**	**252**	**38**	**119**	**322**
ELEPHANT GATE BRIDGE									
	APR-JUN 09	6.79	1714	111	965	312	20	80	216
	JUL-SEP 09	7.36	1805	135	1029	315	39	75	203
	OCT-DEC 09	7.37	1515	88	899	219	39	54	136
	JAN-MAR 10	7.52	2393	515	1526	478	25	41	149
	AVERAGE	**7.26**	**1857**	**212**	**1105**	**331**	**31**	**63**	**176**
CENTRAL STATION BRIDGE									
	APR-JUN 09	6.71	1642	59	941	285	21	54	163
	JUL-SEP 09	7.17	1726	215	991	320	46	112	765
	OCT-DEC 09	7.34	1502	63	867	207	46	54	133
	JAN-MAR 10	7.62	1715	131	937	290	18	25	88
	AVERAGE	**7.21**	**1646**	**117**	**934**	**276**	**33**	**61**	**287**

2.1.3. Predominant sources contributing to various Pollutants: The discharge of domestic waste water from the local bodies, and the discharge effluent form industries located in and around the Manali Industrial Complex are the predominant sources of water pollution.

2.2. Source of Water Pollution: The refining process of crude oil is responsible sources of water pollution as it requires huge volume of water for heating and cooling. The oil bearing water, washed away from the oil transferring, and storage area, pollutes the receiving water body by forming a thin layer over the water surface and cutting down the sun light and oxygen necessary for flora and fauna. Phenol, Hydrogen sulphide and other sulphur compounds in the water emits obnoxious smell and can impart a black colour to the receiving water body.

2.2.1. Industrial. There are 19 waste water generating industries located in the Manali Industrial Complex. M/s Chennai Petroleum Corporation Ltd, M/s Madras Fertilizers Ltd, and M/s Manali Petro Chemical Ltd, are the industries consuming more quantity of water for their process.

The unit of M/s Chennai Petroleum Corporation Ltd, and M/s Madras Fertilizers Ltd are utilizing about 133.18 MLD of sewage effluent, which is being let from the Kodungaiyur Sewage Treatment plant, maintained by Chennai Metro Water supply and sewerage Board, after made necessary treatment in their own Effluent Treatment Plant with RO system.

M/s Chennal Ptroluem Corporation Limited is discharging 1280 KLD of effluent in the Buckingham canal after treatment. The unit of M/s Madras Fertilizer Limited is drained out 1400 KLD of effluent in the Amullavoyal canal after treatment . The unit of M/s Manali Petrochemicals Ltd, M/s Manali Petrochemicals Ltd, and M/S Kothori Petrochemicals are disposing the effluent in the sea through pipe line after treatment.

2.2.2 Domestic: The domestic waste water from the residential colonies, and commercial areas of the near by local bodies, such as Tiruvottiyur Municipality, Manali Municipality, and Madavaram Municipality are discharged in the Buckingham canal with out any treatment. The quantity of generation of sewage from the local bodies, is stated in Table-2.2. Further generation of sewage from industries located in the Manali Industrial Complex is summarized in Table: 2.3.

Table:2.2

Sl. No	Name of the Industry	Sewage
1.	Tiruvottiyur Municipality.	28.0 MLD
2.	Manali Municipality.	5.0MLD
3.	Madavaram Municipality.	10.0MLD
4.	Chinnasekkadu Town Panchayat.	1.20MLD

Table-2.3

Sl. No	Name of the Industry	Source	Sewage
1.	Chennai Petroleum Corporation Ltd.	Toilet & canteen	1257KLD
2.	Madras Fertilizers Ltd	Toilet & canteen	300KLD
3.	Tamilndu Petro Products Ltd (LAB)	Toilet & canteen	60KLD
4.	Tamilnadu Petro Products Ltd-ECH	Toilet & canteen	10KLD

5.	Tamilnadu Petro Products Ltd-HCD	Toilet & canteen	100KLD
6.	Manali Petro Chemical Ltd-I	Toilet & canteen	15KLD
7.	Manali Petro Chemical Ltd-II	Toilet & canteen	15KLD
8.	Manali Petro Chemical Ltd-II (C P P)	Toilet & canteen	2KLD
9-10	Balmer & Lawrie & Co. Ltd (Leather Chemical Division & Grease Division)	Toilet & canteen	10KLD
11.	Supreme Petrochemicals Ltd	Toilet & canteen	5KLD
12.	Kothari Petrochemicals Ltd.	Toilet & canteen	22KLD
13-14	Futura Polyesters Ltd. (Fiber division)	Toilet & canteen	115KLD
14	Futura Polyesters Ltd. polymer division	Toilet & canteen	20KLD
15	SRF Ltd (IYB)	Toilet & canteen	137KLD
16	SRF Ltd (EPB Plant)	Toilet & canteen	10KLD
17.	Indian Additives Ltd	Toilet & canteen	27 KLD
18.	Petro Araldite (P) Ltd	Toilet & canteen	5KLD
19.	IOT Infrastructure & Energy Services Ltd	Toilet & canteen	2.5KLD
20.	NATCO Organics Ltd.	Toilet & canteen	20KLD
21.	CETEX Petrochemicals Ltd	Toilet & canteen	5 KLD
22.	Eveready Industries Ltd.	Toilet & canteen	2KLD
23.	Pure Industrial Gases Pvt. Ltd	Toilet & canteen	0.24
24.	SICGIL India Ltd	Toilet & canteen	2.0
25.	Popular Carbonic Pvt. Ltd.	Toilet & canteen	0.2
26.	NOX Air Products Ltd	Toilet & canteen	1.5
	Total		1940 KLD

2.2.3 Others: (agricultural run off , leachate from MSW dump, illegal dump site).

There is no any agricultural lands in the near by areas of the Manali Industrial Complex and hence no possibility of agricultural runoff. There is no illegal dump site in the Manali Industrial Complex. The Thiruvottiyur Municipality has dumped the municipal solid waste in the bank of Buckingham canal, and there may be a possibility of reaching the leachate generated during rainy season.

2.2.4. Impact on surrounding area: The wastewater generated from the industries located in Manali Industrial Complex is being treated in the effluent treat plant provided by individual industries. The treated effluent is either discharged in to sea, or in the Buckingham Canal or Amullavoyal canal or reused in their process

by the industries. The units are treating the sewage and trade effluent to the standards prescribed by the Board.

2.3. Details of the Water Polluting Industries. The list of waste water generating units and the source and quantity of generation of trade effluent by the individual industries are furnished in the Table:2.4

Table 2.4

Sl. No	Name of the Industry	Source	Quantity
1.	Chennai Petroleum Corporation Ltd.	Boiler Blow down, Cooling Tower blow down, RO Plant reject, floor washings and surface runoff.	19118 KLD
2.	Madras Fertilizers Ltd	Boiler Blow down, Cooling Tower blow down, Regeneration from the Water Treatment Plant & Plant washings	8400KLD
3.	Tamilndu Petro Products Ltd (LAB)	Process, Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water and Plant washings.	1164KLD
4.	Tamilnadu Petro Products Ltd-ECH	Process, Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water and Plant washings.	1805KLD
5.	Tamilnadu Petro Products Ltd-HCD	Process, Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water and Plant washings.	310KLD
6.	Manali Petro Chemical Ltd-I	Industrial process and cooling.	3400KLD
7.	Manali Petro Chemical Ltd-II	Industrial process and cooling	4500KLD
8.	Manali Petro Chemical Ltd-II	Boiler Blow down,	1 KLD

	(Captive Power Plant)		
9-10	Balmer & Lawrie & Co. Ltd (Leather Chemical Division & Grease Division)	Process, Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water and Plant washings	50KLD
11.	Supreme Petrochemicals Ltd	Process	50KLD
12.	Kothari Petrochemicals Ltd.	Cooling Tower blow down Boiler blow down Process effluents	180 KLD
13	Futura Polyesters Ltd. (Fiber division)	Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water, & Plant washings	1420KLD
14	Futura Polyesters Ltd. polymer division	Cooling Tower blow down, Water Treatment Plant Regeneration water, & Plant washings	50 KLD
15	SRF Ltd (IYB)	Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water, & Plant washings	427KLD
16	SRF Ltd (EPB Plant)	Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water, & Plant washings	20KLD
17.	Indian Additives Ltd	1.Effluent from process plants - 2.Cooling tower blow down 3.Boiler blow down	120KLD

18.	Petro Araldite (P) Ltd	Process.	426KLD
19.	IOT Infrastructure & Energy Services Ltd	No effluent generation.	0
20.	NATCO Organics Ltd.	Process, Boiler Blow down, Cooling Tower blow down.	93.7 KLD
21.	CETEX Petrochemicals Ltd	Boiler Blow down, Cooling Tower blow down, Water Treatment Plant Regeneration water, and Plant washings	70KLD
22.	Eveready Industries Ltd.	Scrubber bleed off	0.1KLD
23.	Pure Industrial Gases Pvt. Ltd	No effluent generation.	0
24.	SICGIL India Ltd	No effluent generation.	0
25.	Popular Carbonic Pvt. Ltd.	No effluent generation.	0
26.	INOX Air Products Ltd	From the process.	0.50
	Total	No effluent generation.	38357.10

2.4. Effluent Disposal Method – (Trade effluent) Recipient water bodies.

The effluent after treated by the industrial units is being disposed in the following ways.

a. Reused in their process after treated in the effluent treatment system and by adopting RO Plant.

b. Utilized by the other industries for their process.

c. Utilized for gardening.

d. Disposed through Solar Evaporation pan.

e. Discharged in the Buckingham canal after treatment.

f. Discharged in to the sea through pipe line.

g. Discharged in the Amullavoyal Canal after treatment.

The details of mode of disposal treated sewage & trade effluent by the individual industries are stated in the Table-5

Table-5

Sl. No	Name of the Industry	Effluent Quantity KLD	Reused in their process. KLD	Given to other industries for their process. KLD	Buckingham canal KLD	Amullavoyal canal KLD	Bay of Bengal KLD	Gardening KLD	Solar evaporation pan KLD
1.	**Chennai Petroleum Corporation Ltd.**	**TE-19118** **SW-1257**	16118 1257.	720 -	1280 -	- -	- -	1000 -	0 -
2.	**Madras Fertilizers Ltd**	**TE-5150** **SW-300**	2270 200	980 -	- -	1400 -	- -	- 100	500 -
3.	**Tamilndu Petro Products Ltd (LAB)**	**TE-1164** **SW-60**	- -	301.2 to TPL-ECH	- -	- -	- -	- 24.6	- -
4.	**Tamilnadu Petro Products Ltd-ECH**	**TE-1805** **SW-10**	- -	-- -	- -	- -	1475 -	- 5.5	- -
5.	**Tamilnadu Petro Products Ltd-HCD**	**TE-310** **SW-100**	-	177.2 to TPL-ECH	-	-	-	- 11.9	- -
6.	**Manali Petro Chemical Ltd-I**	**TE-3400** **SW-15**	- -	- -	- -	- -	2403 -	- -	- -
7.	**Manali Petro Chemical Ltd-II**	**TE-4500** **SW-15**	- -	- -	- -	- -	2586 -	- -	- -
8-9	**Balmer & Lawrie & Co. Ltd (Leather Chemical Division & Grease Division)**	**TE-50** **SW-10**	- -	- -	- -	- -	- -	15 10	15 -
10.	**Supreme Petrochemicals Ltd**	**TE-50** **SW-5**	25 -	- -	- -	- -	- -	- 5	7 -
11.	**Kothari Petrochemicals Ltd.**	**TE-180** **SW-22**	150 -	- -	- -	- -	30 -	- 22	- -
12	**Futura Polyesters Ltd. (Fiber division)**	**TE-1420** **SW-115**	450 -	376 to TPL	- -	- -	- -	- 100	- -
13	**Futura Polyesters Ltd. polymer division**	**TE-50** **SW-20**	50 -	- -	- -	- -	- -	- 20	- -
14	**SRF Ltd (IYB)**	**TE- 427** **SW-137**	427 -	- -	- -	- -	- -	- 120	- -
15	**SRF Ltd (EPB Plant)**	**TE-20** **SW-10**	20 -	- -	- -	- -	- -	- 10	- -
16.	**Indian Additives Ltd**	**TE-120** **SW-27**	- -	- -	- -	- -	- -	120 27	- -
17.	**Petro Araldite (P) Ltd**	**TE-426** **SW-5**	- -	426 to TPL-ETP	- -	- -	- -	- -	- -
18.	**NATCO Organics Ltd.**	**TE-97** **SW-20**	35 20						

19.	**CETEX Petrochemicals Ltd**	**TE-70 SW-5**	- -	- -	- -	- -	- -	40 5	6 -
20	**Eveready Industries Ltd.**	**TE-0.1 SW-2**	- -	- -	- -	- -	- --	- 2	0.1 --
Total		**TE-38357.1 SW-2135**	**19545 1477**	**802 -**	**1280 -**	**1400 -**	**6494 -**	**1175 463**	**528.1 -**

Quantity Trade effluent generation & disposal

The maximum quantity of total trade effluent generation from the Manali Industries complex is - **38357.1 KLD (38.36 MLD).** But the actual quantity of generation at present is **31224.1 KLD (31.22MLD).** The various mode of disposal treated effluent with quantity are furnished below**.**

- Treated effluent reused by the industries for their process – 19545 KLD or 19.55 MLD.
- Utilization treated effluent by the other industry - 802 KLD or 0.802 MLD
- Treated effluent discharged into Buckingham canal (CPCL) - 1280 KLD or 1.28 MLD
- Treated effluent discharged into Amullavoyal canal (MFL) - 1400 KLD or 1.40 MLD
- Treated effluent discharged into sea(TPL,MPL& Kothari) - 6494 KLD or 6.50 MLD
- Treated effluent utilized for gardening by the industries - 1175 KLD or 1.17 MLD
- Effluent disposed through solar pond - 528.1KLD or 0.52 MLD

Quantity Sewage generation & disposal

The maximum quantity of total swage generation from the Manali Industries complex will be **2135 KLD (2.135 MLD).** But the actual quantity of generation at present is only **1940 KLD (1.94 MLD).** The various mode of disposal treated sewage with quantity are furnished given below**.**

- Treated sewage reused by the industries for their process –1477 KLD or 1.477MLD
- Treated sewage used for gardening – 463 KLD or 0.463MLD

2.5. Quantification of waste water pollution load and relative contribution by the sources viz industrial/domestic.

The pollution load contributed by the above two sources of industrial outlets are quantified in respect of parameters on industries wise furnished below.

1. M/S Chennai Petroleum Corporation Limited.

Pollutants	**Quantity of pollutants discharged**			Annual average concentration in treated effluents		% variation w.r.t MINAS
	Mass in Kg / Day	Kg / 1000 tons of crude		Actual	As per new MINAS	
		* Actual	As per new MINAS			
S.S.	-	2.36	8.0	26.91	20	Nil
Phenols	-	0.00008	0.14	<0.01	0.35	Nil
Sulfides	-	0.043	0.2	0.5	0.5	Nil
BOD	-	1.38	6	15.82	15	Nil
Oil & Grease	-	0.14	2	1.64	10	Nil
pH	-	-	-	7.14	6.0- 8.5	Nil
COD	-	13.05	50	148.73	125	Nil
Phosphate	-	0.017	1.2	0.19	3	Nil
Zinc	-	0.017	2	0.20	5	Nil
Cyanide	-	0.0008	0.08	< 0.001	0.2	Nil

Hexavalent chromium	-	0.0008	0.04	<0.001	0.1	Nil
Total Chromium	-	0.0008	0.8	<0.001	2.0	Nil
Ammonia Nitrogen	-	1.69	6	19.32	15	Nil
TKN	-	0.722	16	8.23	40	Nil
Lead	-	0.06	1.2	0.7	0.1	Nil
Mercury	-	0.00008	0.004	<0.001	0.01	Nil
Nickel	-	0.00008	0.4	< 0.01	0.01	Nil
Copper	-	0.0004	0.4	<0.002	1	
Benzene	-	-	0.04	BDL	0.1	
Benzopyrene	-	-	0.08	BDL	0.2	

2.Madras Fertilizers Limited

Parameters	Quantity			Concentration		
	Per StatuteMT	ActualMT	Variation %	Per Statute mgm/L	Actual mgm/L	Variation %
TKN as N	234.97	5.31	97.74(F)	100	8.23	91.77(F)
Amm N as N	117.49	3.33	97.16(F)	50	5.13	89.74(F)
Nitrate as N	23.49	0.05	99.79(F)	10	0.08	99.20(F)
PO4 as P	11.75	0.08	99.32(F)	5	0.13	97.40(F)
Fluoride as F	4.69	0.02	99.57(F)	2	0.03	98.50(F)
TSS	234.97	12.77	94.58(F)	100	20.17	79.83(F)
BOD	70.48	5.91	91.61(F)	30	9.00	70.00(F)
COD	587.43	46.44	92.10(F)	250	70.67	71.73(F)
Oil & Grease	23.49	0.96	95.91(F)	10	1.44	85.60(F)
pH				6.5 – 8.0	6.8 - 7.8	

3. Tamilnadu Petrol Products – LAB

Parameter	Pollution Load, Kg/Day (2009 – 10)	
	Inlet Effluent	Treated Effluent
pH	5.5 – 9.0	7.2
TDS	2444.4	249.37
TSS	116.4	5.67

Chlorides	1164	86.79
Sulphates	1164	48.76
BOD	34.92	3.01
COD	291	26.94
Oil & Grease	11.64	0.36
Phenolic Compound	1.16	0.003
Sulphide	1.16	0.30
Fluoride	2.33	0.015
Chromium	2.33	0.003

4. Tamilnadu Petrol Products – HCD

Parameter	**Pollution Load, Kg/Day (2009 – 10)**	
	Inlet Effluent	**Treated Effluent**
pH	5.5 – 9.0	7.3
TSS	31.0	3.76
Sulphates	310	32.7
BOD	31	4.84
COD	77.5	23.4
Oil & Grease	6.2	0.25
Phenolic Compound	1.55	0.002
Fluoride	6.2	0.01
Chromium	0.31	0.01

5.Tamilnadu Petrol Products – ECH

Parameter	**Pollution Load, Kg/Day (2009 – 10)**	
	Inlet Effluent	**Treated Effluent**
pH	5.5 – 9.0	7.2
TSS	180.5	61.93
Sulphates	1805	127.4
BOD	180.5	44.53
COD	451.25	217
Oil & Grease	36.1	2.06
Phenolic Compound	9.02	0.015
Fluoride	36.1	0.07
Chromium	1.81	0.15

6. Manali Petro Chemicals – I

Parameter	Pollution Load, Kg/Day (2009 – 10)
	Treated Effluent
pH	7.43 ,
TSS	43.77
Sulphates	36.66
BOD	19.25
COD	206
Oil & Grease	1.13

7. Manali Petro Chemicals – II

Parameter	Pollution Load, Kg/Day (2009 – 10)
	Treated Effluent
pH	7.01 ,
TSS	44
Sulphates	61.20
BOD	16.7
COD	172
Oil & Grease	1.3

8.Futura Polyesters Ltd

Parameter	Pollution Load, Kg/Day (2009 – 10)	
	Inlet Effluent	Treated Effluent
pH	5.5 – 9.0	7.2
TSS	180.5	61.93
Sulphates	1805	127.4
BOD	180.5	44.53

COD	451.25	217
Oil & Grease	36.1	2.06
Phenolic Compound	9.02	0.015
Fluoride	36.1	0.07
Chromium	1.81	0.15

9.Indian Additives Ltd.,

Parameters	**Inlet 2009-10**	**Outlet 2009-10**
Sulphate	28-335	88-397
Chlorides	193-859	320-650
Hexavalent chromium	0.04-0.32	<0.01
Total chromium	0.06-0.57	<0.01
Fluoride	0.1-0.6	<0.05
Sulphides	0.07-0.99	
Total PO4	0.8-18.3	0.07-0.38
BOD	53-1010	8-21
COD	265-1963	40-128
Oil and grease	10-17	1.2-2.8
PH	6.1-10.7	6.99-7.87
Phenol	0.1-0.5	<0.01
TDS	645-2000	788-1846
TSS	32-85	24-74

10.CETEX PETROCHEMICALS LIMITED

S. No	Parameter	Pollution Load (kg/day/MT of product)
1	PH	--
2	TDS	3.404
3	TSS	0.076
4	Chlorides	0.972
5	Sulphates	0.545
6	BOD	0.073
7	COD	0.542
8	Oil & Grease	0.010
9	Phenolic Compound	BDL
10	Sulphide	BDL
11	Fluoride	BDL
12	Chromium	BDL

13. Kothari Petrochemicals Ltd.,

Parameter	**Inlet, Kg/day**	**Outlet Kg/day**	**Remarks / Suggestions**
PH	7.25	7.74	Nil
TSS	12.75	0.5	Nil
TDS	273	105	Nil
Chlorides	60	54	Nil

Sulphates	8.8	5.4	Nil
Oil & Grease	2	0.04	Nil
BOD	5	0.3	Nil
COD	13.2	2.6	Nil
Sodium %	31.4	3.2	Nil

14. SRF Ltd - TTBM

Parameter	Remarks / Suggestions **Inlet**	Remarks / Suggestions **Outlet**
	2009 - 2010	2009- 2010
Total Dissolved Solids (Mg/lit)	850	114
Total Suspended Solids (Mg/lit)	20	<1.0
PH at 25 deg Centigrade	7	7.22
COD	125	8
BOD at 27deg.c/3 days	36	<1.0

2.6 Action Plan for Compliance and Control of Pollution.

2.6.1. Existing infrastructure facilities – Water quality monitoring net work, ETPs. CETPs, Sewage Treatment plant of industry STPs, Surface drainage system, effluent conveyance channels/Out falls,

- The sewage effluent generated by the industries is treated in the sewage treatment system provided by the industries with in the unit premises.

- All industries generating trade effluent are provided effluent treatment system for the treatment of trade effluent.

- The unit of M/s Chennai Petroleum Corporation Ltd & M/s Madras Fertilizers Ltd, have there own infrastructure facilities for the transferring, and treatment of sewage with R .O Plant, for the utilization of sewage effluent collected from Chennai Metropolitan area at the Kodungaiyur Sewage Treatment plant maintained by Chennai Metro Water supply and sewerage Board.

- The unit of M/s Manali Petro Chemicals Limited and M/s Tamilnadu Petro chemicals Limited have provided infrastructure facilities for transferring and utilization of waste water let out by the unit of M/s Madras Fertilizers Ltd, and M/s. Futura Polyesters Limited from the ETP respectively.

- Manali Petrochemical Limited having two independent pipelines for disposing the treated effluents collected from MPL – 1, MPL – II, TPL, Kothari Petro Chemicals into the sea

- The unit of M/s, Madras Fertilizers Ltd, M/s Manali Petro Chemicals Limited, M/s Tamilnadu Petro chemicals Limited, and M/s Kothari Petrochemicals Ltd, are having their infrastructure facilities to receive the raw materials from the unit of M/s Chennai Petroleum Corporation Ltd .

2.6.2. Pollution Control Measures Installed by the Industries.

The trade effluent generated by the industries are treated in the effluent treatment system and the methodology of treatment is based on the characteristic and of the effluent. The treatment components of the effluent treatment plant provided by the industrial unit s are stated for each industrial units separately.

1. **Chennai Petroleum Corporation Limited.**

S.No	ITEM DESCRIPTION	ETP I	ETP II	ETP III
		CAPACITY M3/HR	CAPACITY M3/HR	CAPACITY M3/HR
1	API SEPARATOR	1X 600	65	300
2	API EFFLUENT PUMP	3X175	250	4X100
3	SURGE POND	10000	250	2X2400
		-	2x10000	-
4	SURGE POND EFF PUMP	3X175	2X90	3X100
		-	2X100	-
5	DAF	2X125	2 x 70 + 90	200
6	TPI	-	70	200
		-	-	216
7	CLARIFLOCULATOR	-	120	200
	CLARIFLOCULATOR	-	60	
8	TRICKLING FILTER	250	220	400
9	AERATION TANK	250	220	200
10	FINAL CLARIFIER	250	2X220	180
11	GUARD POND	-	10000	8034
12	DUAL MEDIA FILTER	-	-	3X100
	DUAL MEDIA FILTER	-	-	2X210
13	ACF	-	-	3X100

2. Madras Fertilizers Limited

a. Efluent Treatment System for Ammonia / Urea Plant's Effluent/

	Hydrolyser Stripper	
1	Urea Sump	17 Cu M Capacity
2	Ammonia Sump	50 Cu M Capacity
3	Equalisation tank	100 Cu M Capacity
4	Stripper	58 No.of trays with 28 bubble caps in each tray
5	Flow monitors	Available
6	Type of Record	DCS

b. Effluent Treatment System for NPK Plant's Effluent.

1	Effluent Holding Tank	125 Cu M Capacity
2	Clarifies (2 sets) (two streams of two Dia nos each)	Flow rate 7.5 Cu.M/Hr. each 8.0 M
3	Clear water tank	125 Cu M Capacity
4	Sludge Sump	5 Cu M Capacity
5	Blender	2 T/Hr

	Capacity	
6	Centrifuge	6 Cu.M/Hr. Capacity
7	Flow monitors	Available
8	Type of Record	Manual

C.Canteen Waste Water and septic tank over flow Treatment plant.

1.	Equalisation Tank	60 Cu M Capacity
2.	Aeration Tank	245 Cu.M Capacity Retention time 16.3
3.	Clarifier	SM (dia) x 2.5 M height Retention time 3 Hrs.
4.	Sludge drying beds	4.75 x 4.0 M
5.	Treated Effluent Sump	60 Cu. M Capacity
6.	Dual Media Filter	Flow 15 Cu.M/Hr
7.	Flow monitors	Available
8.	Type of Record	Manual

D. Reverse Osmosis Plant.

1.	Roughing Filters (6 No.)	Filtration area 13 Sq.M
2.	Filtered water storage tank	3000 Cu. M capacity
3.	Chlorine retention tank	325 Cu M
4.	Dual Media Filters (6 No)	Filtration area 13 Sq.M
5.	Rejects Sump	1000 Cu.M Capacity
6.	Flow Monitor	Available
7.	Type of record	DCS

3. Tamilnadu Petrol Products - LAB

a. ETP for Oily Stream		
1. Collection Tank	:	15m * 14m * 4.25m 892.5 cu.m
2. Tilted Plate Separator	:	3.2 m * 0.6 m * 5.65 m 112.5 cu.m
3. API Separator	:	
4. Recycle sump	:	2.6 m * 2.6 m * 1.8 m 12.1 cu.m
5. Bio Filter	:	7 m dia * 3.4 m ht
6. Settling Tank	:	3.15 m dia * 2.5 m swd
7. Sludge drying bed	:	6 m * 4 m
8. V- Notch Chamber	:	3 m * 2.8 m * 1.2 m 10.0 cu.m
9. Final mixing chamber	:	2m*2m*2m 8 cu.m
b. ETP for Non- Oily Stream		
1. Primary Neutralisation Tank	:	2.6m * 2.6m* 5.65 m 38.2 cu.m

2. Secondary Neutralisation Tank :	2.6m * 2.6m* 5.65 m 38.2 cu.m	
3. Clarifier	:	6.77 m dia * 2.5 m swd
4. Polishing Tank	:	2.83 m * 2.83 m * 2.15 m 17.3 cu.m
5. V- Notch Chamber	:	3 m * 2.8 m * 1.2 m 10.0 cu.m

4. Tamilnadu Petrol Products – ECH ETP components

1. Primary Clarifier
2. Equalization Tank
3. Acid dozing Tank
4. Caustic Dosing Pump
5. Mass Culture Tank
6. Bio Reactors (10 nos)
7. DAP Preparation Tank
8 Urea Tank
9. Flocculation Tank (2 nos)
10 Poly electrolyte Tanks
11. Secondary Clarifier
12. Secondary Thickner
13. Treated Effluent Tank (2 nos)

5. Manali Petro Chemicals – I

S. No.	Equipment Name	Details
1	Clariflaculator	14 m dia. x 3.5 m depth. RCC
2	Thickener	10 m dia x 3.5 m depth. RCC
3	Cooling Tower	8.05 m l x 6.5 w x 3.35 h. RCC
4	Bio-reactor	46.38 m x 30.92 m. RCC **No. of Compartments: 6** Dimension of Each : 15 m x 15 m x 5.2 m
5	Treated Effluent Storage Tank	50 m x 15 m x 3.20.RCC -No. of Compartments : 2 Dimension of Each : 25 m x 15 m x 3.2 m
6	Nutrient Tank	2 m x 2 m
7	Mass Culture Tank	6.4 m x 6.4 m x 3.2 m. RCC
8	Rotary Vacuum Drum Filter	2.44 m x 3.05 length (2 Nos.)

6. Manali Petrol Chemical – II

S. No.	Equipment Name	Details
1	High Rate Thickener	9 m dia. x 3.4 m depth. RCC (Old) 13 m dia. x 4.5 m depth. RCC (New)
2	Cooling Tower	5.5 m x 4.5 m
3	Equalization Tank 1 Equalization Tank 2 Equalization Tank 3	15 m x 40 m x 1.5 m (RCC) 7 m x 6 m x 2 m (RCC) 10 m x 25 m x 2.5 m (RCC)
4	Neutralization Tank	3 m x 3 m x 3 m (RCC)
5	Aeration Tank	21 m x 40 m x 3.5 m (RCC)
6	Secondary Clarifier	14 m x 3.5 m (RCC)
7	Treated Effluent Sump	12 m x 15 m x 2 m (RCC)
8	Rotary Vacuum Drum Filter	2.44 m x 3.05 length (2 Nos.)

7. Balmer & Lawrie & Co Ltd.,

ETP system (components)
Leather Chemicals: Low TDS
1)Collection Sump
2)Flash Mixer

3)Settling Tank-Primary &Secondary
4)Aeration Tank
5)Sludge Drying Bed -2Nos
High TDS
1)Settling Tank
2)Solar Evaporation Pond-2Nos
3)Forced Accelerated Evaporation System 1KL/Hr
Barrel Division
1)Collection Tank
2)Dosing Tank
3)Aeration Tank
4)Settling Tank
5)treated water Storage Tank

8. Supreme Petrochemicals Ltd.,

Effluent Treatment Plant details		
S. No	Equipment Name	size
I	**STP**	
1	Bar screen	0.6×0.6×0.6m
2	Raw sewage collection tank	3×3×2.1m
3	Bio aeration tank	2.5×3×2m
4	Settling tank	2.5×2×2m
5	Filter feed tank	2.5×2×2m
6	Pressure sand tank	0.6m dia ×2m
7	Activated carbon filter	0.6m dia ×2m
8	Sludge drying beds	1.8×1.8×0.8m
II	**ETP**	
1	Bar screen	1.5×1.56×1.5m
2	Raw effluent collection tank	5×4×3.2m
3	Flash mixer	1×1×.05m
4	Flocculation Tank	1×1×1m
5	Primary clarifier	4m dia ×2.5m
6	Bio aeration tank	6×6×3.5m
7	Secondary clarifier	4m dia ×2.5m
8	Dual media filter	0.8m dia ×1.5m
9	Ultra filter	0.2m dia ×1m

10	Filter press	2.5 cu. m hr
11	Treated effluent collection tank	6×6×6m

9. Kothari Petrochemicals Ltd.,

Effluent Treatment Plant Details

S.N	EQUIPMENT NAME	DETAILS (all dimensions are in mts.)
1	Process Effluent Water Collection Pit	10 (L) x 2.10 (W) x1.80M (D)
2	Primary Polymer Separator	5M (L) x 2.5M (W) x 2.8M (D)
3	Secondary Polymer Separator	0.35M (D) & 3.50M (H)
4	Equalisation Tank	10M (L) x 5M (W) x 1.0M (D)
5	Flash mixer	1M (L) x 1M (W) x 1.25M (D)
6	On line pH meter	
7	Treated Eff.Collection pit	10M (L) x 10M (W) x 1.0M (D)
8	Flash mixer	1M (L) X 1M (W) X 1M (D)
9	Flocculation tank	2.5M(L) X 2.6M(W) X3.3M (D)
10	Clear water tank	6.2M(L) X2.35M (D)
11	UF water collection tank	2.4M(L) X2.4M (W) X2.0M (D)

10. Futura Polyesters Ltd

COMPONENTS OF STP	NO. & DIMENSION	FLOW MONITORS
A. Oil Sump	3.5 x 3.5 x 3	Ultrasonic flow sensor and counter.
B. Equalization Tank	10.57 x 10.57 x 3.5	
C. High Rate Bio Filter	8.054 x 4.2	
D. Recycle Sump	4.5 x 2.5 x 3.5	
E. Aeration Tank	24.5 x 12.25 x 3.7	
F. Clarifier	11.28 x 2.75	
G. Sludge Drying Beds	2 x 5 x 10	
h. Settling tank	10.5X5.87X1.5	

11. SRF Limited – TTBM

Components of ETP	Nos.

1. Collection Tank Oil Trap.	1
2. Second Collection Tank.	1
3. Lime Dosing Tank	1
4. Floculator Tank	1
5. Primary Clarifier	1
6. Aeration Tank20HP -1	1
7. Aeration Tank 5HP -1	1
8. Secondary Clarifier -2	4
9.Final Pond	1
10. Sludge Pit	1
11. RO (Capacity 412M3/Day)	1
12. Mechanical Evaporator (Capacity 48M3/Day)	1

12. Indian Additives Ltd.,

S.No.	Tag No.	Equipment name	L X B X H + FB
1.		Chemical House	16750 x 8250
2.	X-801	Screen Chamber	2500 x 150 x 150
3.	T-802	chemical sump	6400 x 6400 x 1250
4.	T-811	utility sump	5250 x 5250 x 1350
5.	T-812	Sanitary sump	5250 x 950 x 1300
6.	T-803	Cross flow separator	2000 x 1000 x 2500 + 250
7.	T-823	Oily sump	2000 x 1000 x 2500 + 250
8.	T- 824	Oil collection tank	1500 (Dia) x 1500 LD
9.	T-827	Primary sludge sump	2000 x 1000 x 2500 + 250
10.	T-804	Surge pond	21250 x 21250 x 2500 x + 250
11.		Surge pond outlet sump	3500 x 3500 x 2400 + 350
12.		Fire hydrant sump	2000 x 2000 x 2400 + 350
13.	T-805	DAF unit	3500 x 2000 x 2500 + 250

14.	T-809	Float Separator	500 x 250 x 1500 + 250
15.	T-810	Slop oil sump	1000 x 1000 x 1500 + 250
16.	T-813	Equalization basin	6400 x 6400 x 2500 +300
17.	T-814	Aeration Tank	8000 x 8000 x 2750 + 500
18.	T- 817	Intermediate settlingtank	8000 x 1500 x 2000 + 600
19.	T-818	Intermediate sludge sump	750 x 750 x 2000 + 600
20.	T- 820	Final clarifier	51200 (Dia) x 2250 + 250
21.	T-821	Final effluent sump	2100 x 2100 x 1500 + 450
22.	T- 819	Oxidation Ditch	18000 x 8000 x 1350 + 500
23.	-	Hypo chlorite preparation area	2000 x 2000
24.	T- 825 A/B	Recovered oil tanks	4800 (Dia) x 3000 LD
25.	T-828	Aerobic Digester	5600 x 5600 x 2750 LD + 500
26.	T- 829	Thickener	2000 (Dia) x 2250 + 250
27.	T-830	Thickened sludge sump	1000 x 750 x 2250 +250
28.	T-831	Centrifuge shed	4000 x 3000
29.		Sludge drying bed (3 Nos.)	2000 x 2000 x 1250 + 250

2.6.3. Technological Intervention & Action plan.

SR No	Name of the unit	Action plan
REDUCTION OF COD		
1	M/s Tamilnadu Petro Products	To improve colour and reduce the level of COD
REDUCTION OF BOD		
1	M/s Indian Additives Ltd.,	Installation and running of vacuum pump and installation

		of additional aspirator in the ETP.
REDUCTION OF OIL & Grease.		
1	M/s Chennai Petroluem Corporation Ltd.	Installation of additional oil skimmer in the ETP
Marine Discharge.		
1	M/s Manali Petro Chemicals Ltd unit-I	Laying of new pipe line for marine disposal of effluent
2	M/s Manali Petro Chemicals Ltd unit-I	Laying of new pipe line for marine disposal of effluent
3	M/s Chennai Petroluem Corporation Ltd.	Laying of new pipe line for marine disposal of R.O Reject.
ETP Improvement		
1	M/s Balmer Lawrie & Co Ltd.,	To upgrade the ETP
2	M/s Chennai Petroluem Corporation Ltd.	Revamping of ETP-2
3	M/s Indian Additives Ltd.,	Installation of RO Plant & RMS
4	M/s Petro Araldite Private Limited.,	To upgrade the ETP

2.6.4 Infrastructural Renewal:

- Adequate storm water drains to be provided with in the Manali Industrial Complex with proper disposal facility.
- The road facility connecting the Manali Industrial Complex has to be strengthened and widened to by considering the present traffic condition.
- The road connecting Manali service road to be repaired and maintained.
- The lighting all along the roads of Manali Industrial Complex .
- The ponds located in the surrounding area of the industrial complex has to be de silted in order to preserve the water sources.

- The Buckingham canal has to be preserved.

2.6.5 Managerial and Financial aspect: The existing infrastructure facilities provided by the industrial units for their own use has to be maintained by the concern industries and hence the cost involving for the monitoring, and revamping of the same has to be beard by them. The cost required to up grade the common existing infrastructure such as lighting of roads, strengthening of roads , desilting of ponds, and other water resources has to be provided by the concern authority of the State Government.

2.6.6. Self monitoring system in industries:

The industries also have the facility of self monitoring mechanism. The effluent treatment system is being monitored by the industries. The performances of the effluent treatment system is monitored by the industries by collecting and analyzing the simples periodically in their own lab. Some of the industries are engaged some external agencies for the operation and monitoring of effluent treatment plant and for the sewage treatment plant. The industries also have the monitoring mechanism to check the parameters incidentally.

2.6.7 Data linkages to SPCB (of monitoring devices):

At present no industries have installed data linking facility with the Tamilnadu Pollution Control Board to monitor the level of parameters in the water environment. Tamilnadu pollution Control Board have only facility to monitor level of air pollutant let out by the industries through their stacks. However the Tamilnadu Pollution Control Board is planning to monitor the level of parameters in the treated effluent and the rate of flow of treated effluent to the water bodies.

2.6.8 – Impact on CEPI score after installation /commissioning of full fledged Water pollution control system

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	3	5	15	8	3	3	14	3	5	5	20	10	59
During 2009-10	3	5	15	8	3	0	11	3	5	5	20	10	56
After Shorterm & Longterm Measure	3	5	15	1	0	0	1	3	1	5	8	10	34

CHAPTER – 3

AIR ENVIRONMENT

3. AIR ENVIRONMENT

3.1. Present Status of Air environment: Petroleum products, petrochemicals, are primarily derived from crude oil,and the primary petrochemicals are further converted to petrochemical intermediates, which are all the complex derivative products. Hence the air pollutants comes out in the form smoke, particulate matter, hydrocarbons, oxides of sulphur and nitrogen,carbon monoxide and VOC.

3.1.1 Critical Locations for Air Quality monitoring: The industries identified the critical location of monitoring the air pollutant with respect to the process adopted by them and based on the quantum of pollutant let out from the process stack. But the Ambient air quality monitoring stations has to be fixed based on the maximum ground level concentration of the pollutants.

The western boundary and southern side of the Manali Industrial complex are completely occupied by the habitations of Manali municipality and Madavaram Municipality. Particularly the residential colony of Harikrishanpuram is located adjacent to the west and south west compound wall of M/s. Madras Fertilizer Limited. Though the unit M/s. Madras Fertilizer Limited, has installed air pollution control measures, the level of ammonia in the ambient air may rise, in the event of any de-pressuring operation carried out by the unit during any plant upset. However there is one continuous Air quality monitoring is under functioning at the Govt Higher Secondary School, Manali.

Critical Location in Industries.

S. No	Company Name	Critical Location
1	**Madras Fertilizers Limited**	1. Stack attached to the Boiler. 2. To monitor NH3 at the prill tower 3. Ammonia vent stack and urea vent stack 4. South and western side compound wall both in side and out side the unit.

2	**Chennai Petroleum Corporation Limited**	1 Stack attached to the Boilers. 2 To monitor the level VOC in the vulnerable point in the processing section. 3 To monitor the level hydrocarbon in the processing section. 4 To monitor the level of PM, SO2, NOx, in the stack attached to the captive power plant. 5 The tank forming areas 6Flare stack.
3.	**Tamilnadu Petrol Products** **LAB**	1. To monitor the level of PM, CO, SO2, NOx stack attached to the oil heater, captive power plants of 3.2MW, 6.6MW and 6.8MW., 2. Flare stack.
4.	**Tamilnadu Petrol Products** **HCD**	1. To monitor the level of SPM, SO2, NOx, for the stack attached to the Fusion plant, Hydrochloric acid plant. 2. To monitor the level Ammonia in the stack attached to the NH4CL2 plant of 2 Nos.
5.	**Tamilnadu Petrol Products** **ECH**	1. To monitor the level of PM, SO2, NOx, in the stack attached to the propylene furnace, 8 T/hr capacity boiler, captive power plant. 2. To monitor the level VOC in the vulnerable point of the processing area.
6.	**Manali Petro Chemicals – I**	1. To monitor the level VOC in the vulnerable point in the processing section. 2. To monitor the Flame stack.
7.	**Manali Petro Chemicals – II**	1. To monitor the stack attached to the PO unit. 2. To monitor the 2 VOC vulnerable point in the processing section.

8.	**Balmer & Lawrie & Co Ltd.,**	1. Chlorine and SO2 emissions in the process stack.
9.	**Supreme Petrochemicals Ltd.,**	1. To monitor VOC in the processing area. .
10	**Futura Polyesters Ltd.,**	1. To monitor the level of SPM in the stack attached to the Biomass Boiler 24 T/hr.
11.	**IOT Infrastructure Energy Services Ltd.,**	1. Gas detectors at bottling area, LPG storage area
12.	**SRF Limited – TTBM**	1. To monitor the level of SPM, NOX, and SO2 for the stack attached to the captive power plant, and SPM monitor for the stack attached to the Bio mass boiler of 12 T/hr capacity. .
13.	**Indian Additives Ltd.,**	1. To monitor the level of SPM in the stack attached to the pibsa reactor. 2. To monitor the level of H2Sinthe phenate reactor. 3. To monitor the level VOC at the vulnerable point of the processing area.
14.	**Cetex Petrochemicals Limited**	1. To monitor the level of SPM in the stack attached Bio mass Boiler 8T/hr. 2 To monitor the level VOC at the vulnerable point of the processing area.

15.	**Kothari Petrochemicals Ltd.,**	1. To monitor the level VOC at the vulnerable point of the processing area
16.	**Petro Araldite Private Limited**	1. To monitor the level SPM, SO2 & NOx in the stack attached to the Absorption column and Biphenol aspiration blower. 2. To monitor the level VOC at the vulnerable point of the processing area.
17.	**NATCO Organics Ltd.,**	1. To monitor the level VOC at the vulnerable point of the processing area. 2. To monitor the hazardous waste incinerator stack, SO2 scrubber, HCI scrubber.

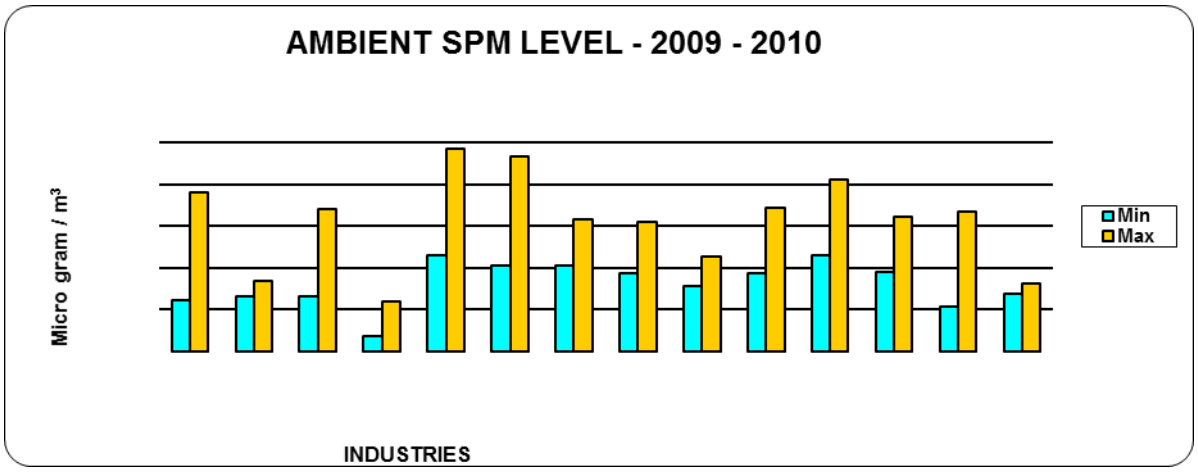
3.1.2. Present level of pollutant in the air. The Tamilnadu Pollution Control Board is monitoring the level of pollutants present in the ambient air and pollutants let out through the process stack provided by the industry periodically. Further the level of pollutant in ambient air around the Manali Industrial area is being monitored by the Continuous Ambient Air Quality monitoring station situated at Manali, Kattivakkam, and Tiruvottiyur by the Tamilnadu Pollution Control Board under the National Ambient Air Quality monitoring Project.

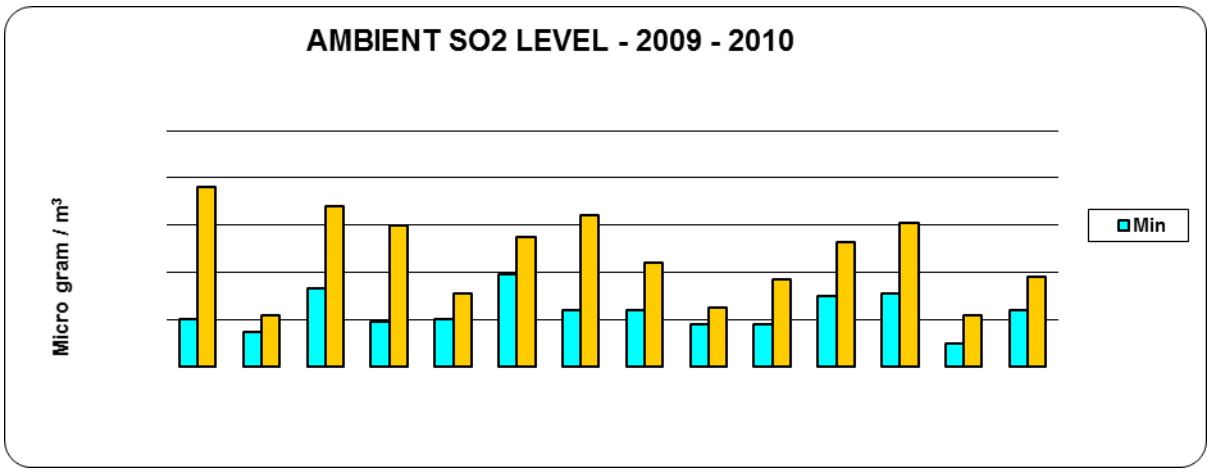
The consolidated report of analysis of the ambient air quality survey, and stack monitoring survey carried out by the Board in the industries located in Manali is summarized in Table-3.1.& Table-3.2.

Table-3.1. Ambient Air Quality survey 2009-10

Sl.No	Name of the Industry	AMBIENT ug/m3

		SPM		SO_2		NO x	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**
1	**CPCL**	123	380	20	76	18	69
2	**TPL (LAB)**	133	170	15	22	18	25
3	**TPL (HCD)**	131	340	33	68	24	41
4	**TPL (ECH)**	35	118	19	60	24	45
5	**MPL -I**	230	485	20	31	23	34
6	**MPL -II**	207	468	39		41	50
7	**Cetex Petrochemical**	206	316	24	64	30	50
8	**Kothari Petrochemicals**	186	310	24	44	15	31
9	**Petro Araldite**	157	227	18	25	19	32
10	**IAL Ltd**	186	344	18	37	20	42
11	**Balmer &Lawrie**	230	413	30	53	26	58
12	**Futura polyesters**	189	323	31	61	36	68
13	**SRF**	106	334	10	22	14	34
14	**MFL**	137	163	24	38	20	32





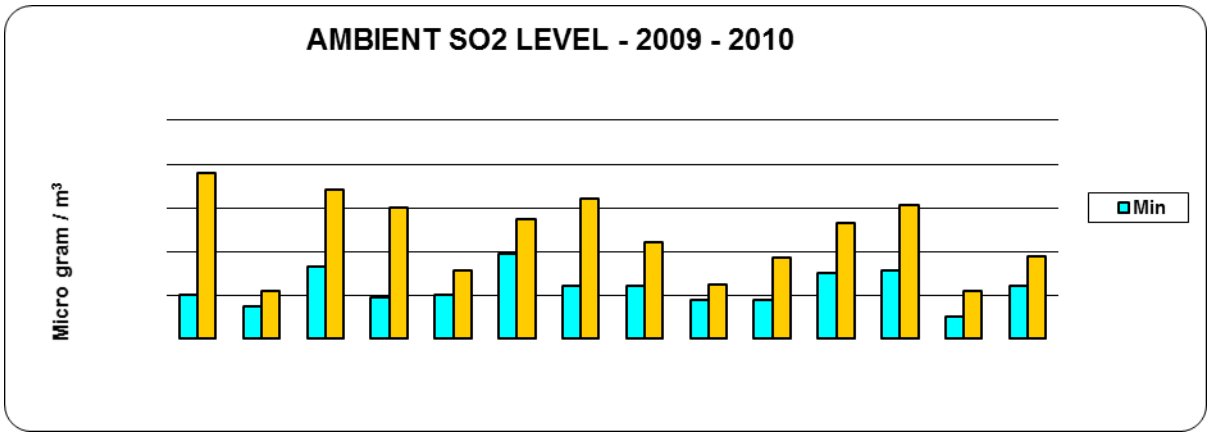
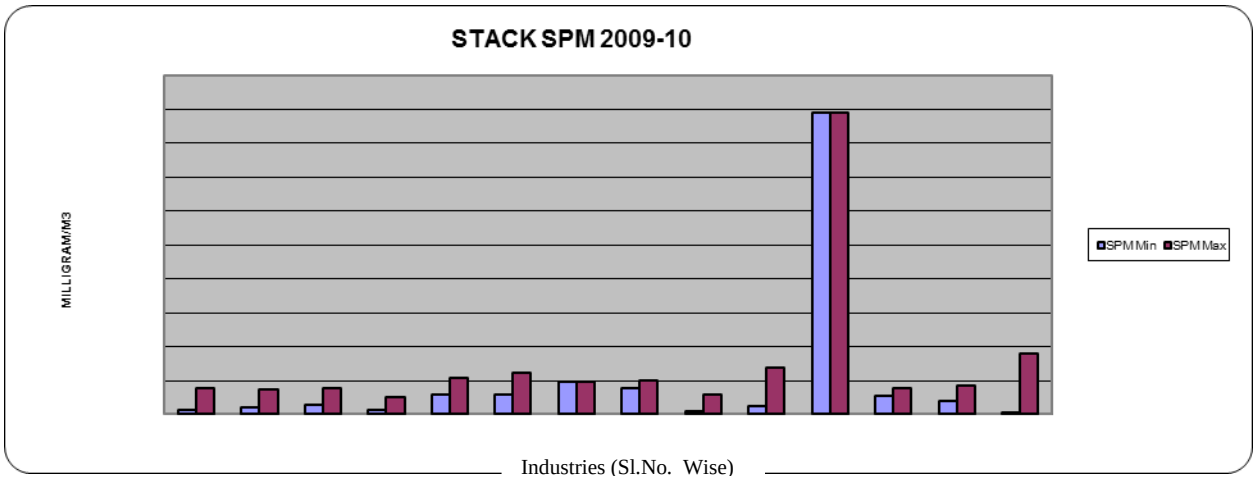
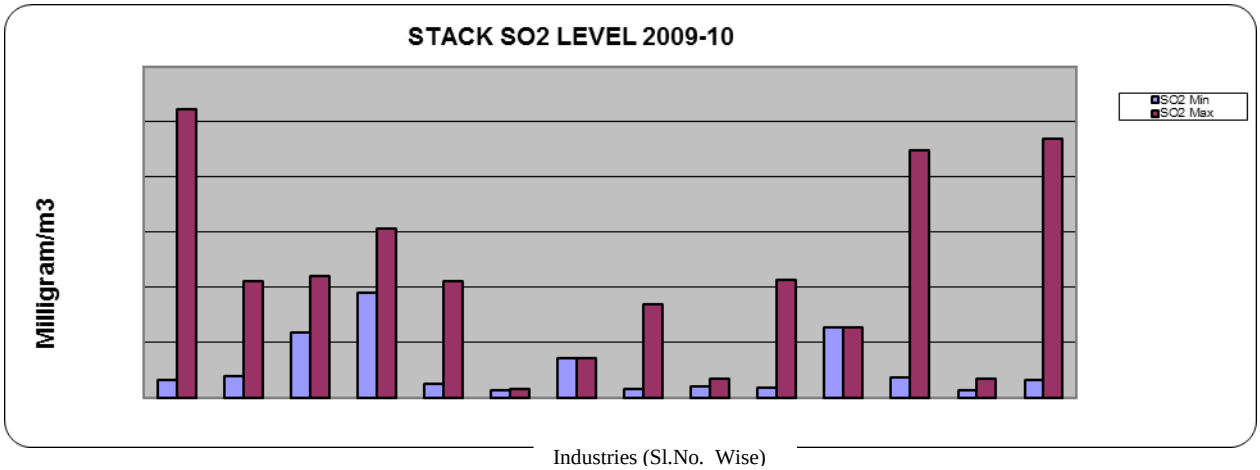
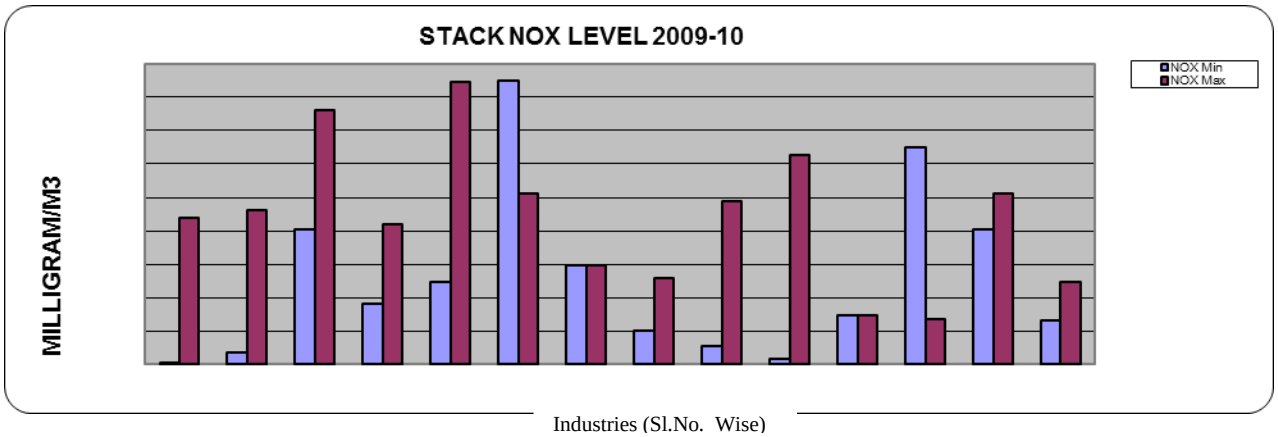


Table-3.2. Stack survey 2009-10

Sl. No	Name of the Industry	STACK mg/m3								
		SPM		SO2		NOX		NH3		NH3
		Min	Max	Min	Max	Min	Max	Min	max	
1	**CPCL**	13	79	31	523	1	88			
2	**TPL (LAB)**	21	72	40	211	7	92			
3	**TPL HCD)**	30	76	119	221	81	152			
4	**TPL(ECH)**	14	50	190	306	36	84			
5	**MPL - I**	57	108	24	211	49	169			
6	**MPL - II**	58	124	13	16	170	102			
7	**Cetex Petrochemical**	98	98	71	71	59	59			
8	**Kothari Petrochemicals**	79	99	16	169	20	52			
9	**Petro Araldite**	10	60	21	35	11	98			
10	**IAL Ltd**	23	138	18	214	3	125			
11	**Balmer&Lawrie**	892	892	127	127	29	29			
12	**Futura polyesters**	55	79	37	449	130	27			
13	**SRF**	39	84	13	34	81	102			
14	**MFL**	3	181	31	470	26	49	42	380	42







3.1.3. Predominant Sources Contributing to various pollutants.

The pollutants such as hydrocarbons, oxides of sulphur & nitrogen, carbon monoxide VOC, and Ammonia, let out through the emission sources of the industries located in this Industrial Complex are the predominant sources of air pollution

S.No	Pollutant	Sources

1	Chlorine	• Poly Iso Butyl Succinimide Reactor vent (IAL). • HCD Plant (TPL)
2	VOC	• The progressing area of the petroleum products and petro chemicals industry. • Storage area the petro chemicals. •
3	SO2	• The progressing area of the petroleum products and desulphurization plant, and from the captive power plan. •
4	NOx	• Boilers using coal, Bio mass, and Husk as fuel. • Refining Process of petroleum.
5	SPM	• Boilers using coal, Bio mass, and Husk as fuel.
6	Hydro Carbon	• Unburned hydro carbon from the refinery.
7	Ammonia.	• NPK Plant, Ammonia vent stack , Ammonia storage area.(MFL) • Ammonium chloride plant (TPL)
8	Hydrogen Sulphide.	• The progressing area of the petroleum products and petro chemicals industry and from the storage area(IAL)
9	Carbon monoxide.	• Boilers

3.2 Sources of Air Pollution. The sources of air pollution from the industry has been briefed in the item 3.1. Two municipal solid waste dumping site is located adjacent to the boundary of this Industrial Complex. The municipal solid waste dumped in the dumping site is got fired and caused air emission in this locality.

The road connecting Chennai port with National High Way (Chennai Kolkata NH-5) and Ennore port is passing through this industrial complex. Further most of the

containers fright stations are located in the surrounding area of the Industrial Complex. Hence the heavy vehicles carrying containers, and other goods are using the road and contribute significant amount of air pollutants.

3.3 Air Polluting Industries in the area.

Sl. No	Name of the Industry	Type
1.	Chennai Petroleum Corporation Ltd.	Petroleum Refinery
2.	Madras Fertilizers Ltd	Fertilizer
3.	Tamilndu Petro Products Ltd (LAB)	Petrochemical
4.	Tamilnadu Petro Products Ltd-ECH	Petrochemical
5.	Tamilnadu Petro Products Ltd-HCD	Caustic Soda
6.	Manali Petro Chemical Ltd-I	Petrochemical
7.	Manali Petro Chemical Ltd-II	Petrochemical
8.	Manali Petro Chemical Ltd-II (Captive Power Plant)	Power plant
9-10	Balmer & Lawrie & Co. Ltd	Leather Chemical
11.	Supreme Petrochemicals Ltd	Petrochemical
12.	Kothari Petrochemicals Ltd.	Petrochemical
13-14	Futura Polyesters Ltd. (Fiber division & polymer division)	Manmade fiber
15-16	SRF Ltd (IYB & EPB Plant)	Manmade fiber
17.	Indian Additives Ltd	Additives
18.	Petro Araldite (P) Ltd	Adhesives
19.	IOT Infrastructure & Energy Services Ltd	LPG Storage
20.	NATCO Organics Ltd.	Bulk Drugs
21.	CETEX Petrochemicals Ltd	Petrochemical
22.	Eveready Industries Ltd.	Battery Components

3.4. Impact of the activity of near by area on the CEPI area. The west and southern side of the CEPI area is generally occupied by the habitations of Manali & Madavaram Municipality and hence the public residing Manali Municipality only have some impact due to this industrial Complex. But the east and northern sides of the CEPI area is covered by Tiruvottiyur Municipality which spread over an extent of 21.42 Sqkms. The unit of M/s Ennore Thermal Power Plant, M/s Ashok Lay lend, M/s Eveready Industries, M/s Royal Enfield, and M/s, MRF Limited are the important industries located in this Municipality and which may cause impact on the Manali complex, CEPI Area.

3.5. Quantification of the air pollution load and relative contribution by different sources.

1.M/s Madras Fertilizers Limited. Urea stack

Parameter	Year

mg/m^3	2007	2008	2009
SPM	32.5-48	30-42	35-44
NH3	47-82	64-82	69-78

Boiler 1 &2 common stack

Parameter mg/m^3	Year		
	2007	2008	2009
SPM	107-121	130-134	128-132
SO2	348-391	169-201	166-209
NOx	17.5-32	65-134	59-89

110 ata & Process condensate boiler common stack

Parameter mg/m^3	Year		
	2007	2008	2009
SPM	113-124	132-148	125-143
SO2	372-446	322-391	364-428
NOx	31-35	28-46	25-35

3. M/s Tamilnadu Petro Chemicals Limited.(ECH)

	Boiler	Propylene furnace	HCl production unit	CPP	Chlorine gas scrubber
PM, T/day	0.0096	0.0009	----	0.026	----
SO_2, T/day	1.34	0.04	----	1.2	----
NOx, T/day	0.055	0.005	----	0.445	----
CO, T/day	0.021	0.002	----	0.055	----
HCl Vapour, T/day	----	----	0.00006	----	----
Chorine, T/day	----	----	----	----	0.0000015

4. M/s Tamilnadu Petro Chemicals Limited.(HCD)

Parameter	Stack attached to					
	CPP	WAD	Boiler	HCl Unit	Fusion Plant	NH_4Cl Plant
PM, T/day	0.15	----	0.005	----	0.0017	----
SO_2, T/day	5.62	----	0.430	----	0.430	----
NOx, T/day	2.53	----	0.014	----	0.005	----
CO, T/day	0.32	----	0.011	----	0.0012	----
HCl vapour, T/day	----	----	----	0.000001	----	----
Chlorine, T/day	----	0.00011	----	----	----	----
NH3. T/day	----	----	----	----	----	0.000025

5. M/s Tamilnadu Petro Chemicals Limited.(LAB)

Load T/day	Hot oil heater	PACOL heater	Hydrobon	Boiler	CPP
PM, T/day	0.084	0.0144	0.0043	0.0104	0.119
SO_2	7.2	1.54	0.05	0.92	4.72

NOx	0.48	0.082	0.010	0.06	2.038
CO	0.18	0.0308	0.0092	0.022	0.119

6. **M/s.MPL - PLANT I.**

YEAR	DATE OF SURVEY	Stack attached Diesel Generator 1450 KVAmg/Nm3			Stack attached to Boiler mg/Nm3		
		SPM	SO2	NOX	SPM	SO2	NOX
2009-10	08.07.09	57	24	169	108	211	49

7. **M/s. MPL - PLANT II.**

YEAR	DATE OF SURVEY	Stack attached Diesel Generator 1450 KVAmg/Nm3			Stack attached to CPP mg/Nm3		
		SPM	SO2	NOX	SPM	SO2	NOX
2009-10	08.07.09	124	13	170	58	16	102

8. M/s Petro araldite.

	2007-08			**2009-10**		
	Absorbtion column	DG Stack	Incinerator	Absorbtion column	DG Stack	Incinerator
SO2	2.79	14.8	11.8	3.46	15.22	10.1
NOx	4.17	19.1	16.8	5.06	19.8	15.5
SPM	31.58	179.9	122	26.67	49.6	47.7
CO	BDL	BDL	BDL	BDL	BDL	BDL
Chlorine	BDL	BDL	BDL	BDL	BDL	BDL
ECH	BDL	BDL	BDL	BDL	BDL	BDL

9. M/s Kothari Petro Chemicals Ltd.

Stack attached to	**Stack Temp C**	**Velocity in(m/Sec)**	**Discharger rate in (Nm3/day)**	**Pollutants(mg/Nm3)**		
				SPM	**SO2**	**NOX**
Boiler 1210 Thermax	426	5.09	201518	15.9	34	4
DG-1000 KVA cummics	548	17.23	40917	0.94	0.45	1.5

10. M/s SRF Limited.

S.No.	Stack attached to	Stack Temp Deg K	Velocity in (m/sec)	Discharge rate in (N/m3/day)	SPM	SO2	NOx
		708	21.75	641741	46	13	47

1	CPP – I						
2	Husk Boiler	349	9.77	13158	80	18	32

11. M/s CETEX Limited

	Source emission (Wood fired Boiler)				
S.No.	Parameters	Year			Remarks / Suggestion
		2007	2008	2009	
1	SPM	20.0	92	98	
2	SO2	24.0	74	71	
3	NOx	16.0	61	59	

12. Supreme Petrochem Limited

Parameter	Year											
	2007				2008				2009			
	Fume Scrubber	Wet Scrubber	Boiler	DG	Fume Scrubber	Wet Scrubber	Boiler	DG	Fume Scrubber	Wet Scrubber	Boiler	DG
SPM	39.0 to 41.0	37.0 to 39.00	40.02 to 42.02	40.5 to 42.5	36.12 to 38.12	35.1 to 37.1	39.46 to 41.16	40.28 to 42.28	35.0 to 37.0	34.15 to 36.15	38.5 to 40.5	40.18 to 42.18
SOx	13.5 to 13.7	14.5 to 14.70	16.00 to 16.22	12.5 to 12.7	12.34 to 12.55	13.58 to 13.8	15.64 to 15.05	12.32 to 12.52	12.0 to 12.2	14.00 to 14.20	15.25 to 15.4	12.12 to 12.32
NOx	19.25 to 19.5	23.8 to 24.0	24.05 to 24.30	25.5 to 25.8	19.38 to 19.63	22.14 to 22.4	23.58 to 23.85	24.64 to 24.90	18.35 to 18.6	22.10 to 22.35	23.05 to 23.3	23.84 to 24.1
CO (%)	.075	.031	.058	0.06	.072	.032	.056	.054	.073	.035	.052	.054

3.6. Action Plan for compliance and control of pollution. The action plan proposed to minimize the level SO_2, SPM, VOC, NOx, H_2S, Chlorine, by installing or upgrading the air pollution control measures and the monitoring system is stated below

Parameter : SO_2	
CPCL	Use of Natural gas in place of Low sulfur Liquid fuel
TPL LAB	Upgradation of process control to reduce SO2 emission.
MPL- I	Providing scrubber
Kothari petro	Process modification to reduce SOx and SPM level from existing level.

MFL	LNG Conversion from Naphtha feed stock

Parameter : SPM	
TPL LAB	Installation of Online sensors for monitoring $PM_{2.5}$
MPL- I	Retrofit burner in the packaged oil fired boiler.
	Installation of suitable containment system in Plant area.
MPL-II	Installation of suitable containment system in Plant area.
Futura	Installation of online SPM monitor in biomass boiler
SRF TTBM	**<u>HUSK BOILER</u>**
	1. Replacing with new MDC & Bag filter
	2. To extend the shed flooring, Ash yard Fabrication, Dumping Fly Ash in new Storage Yard.
	3. Dispose the ash from new ash storage yard
Petro Araldite Private Ltd.,	Changing the filter in the gas line from 10 micron to 2.5 micron to trap all particles in transportation system
SRF LTD., (EPB)	To stop thermic fluid boiler and utilize husk boiler from sister concern
Indian Additives Ltd.	Install continuous ambient air quality monitoring station
Eveready Industries India Ltd.	Separate enclosure for Zinc ash screening & bagging

Parameter : VOC	
CPCL	Fugitive Emission inventorisation & LDAR
	Conversion of Open Surge ponds to closed tanks

	Vapor absorption system in ETPs
	In-situ Mechanical treatment of oil sludge
SUPREME Petro	Connect the existing TVOC analyser to TNPCB server
Indian Additives Ltd.	Connect online VOC analyser and install additional VOC sensor
Petro Araldite Private Ltd.,	Install online realtime connectivity from VOC analyzer to state PCB
CETEX Petro Chemicals Ltd.,	Providing on line air monitoring System with data connectivity
Parameter : NOX	
CPCL	Shift to Low- NOx Burners
MPL- I	Replacement of old DG set - 2 nos
MPL-II	Replacement of old DG set - 2 nos
Petro Araldite Private Ltd.,	Major overhaul of DG set
Parameter : H_2S	
Indian Additives Ltd.	Online real time connectivity from H_2S sensor to state PCB
Parameter : Chlorine	
TPL HCD	Modification in chlorine cylinder filling system. Online sensor for monitoring chlorine and data uploading to TNPCB server

Online monitoring	
TPL (LAB)	Online sensors for monitoring Benzene
TPL (ECH)	Online sensors for monitoring chlorin
MPL-I	Online SPM sensor provided

	2 Nos. VOC sensors installed
MPL-II	Online SPM sensor provided
	2 Nos. VOC sensors installed.
MPL POWER PLANT	Online SPM sensor provided
SUPREME Petro	Online sensors for monitoring RSPM
Kothari petro	Data uploading from existing Stack to TNPCB office
SRF TTBM	On line stack monitoring in Husk Boiler
Petro Araldite Private Ltd.,	Installation of online sensors for stack gas and SPM analysers of DG Sets
NATCO Organics Ltd.,	Continuous Ambient Air Monitoring System
	On-line VOC Monitoring System - 3 nos
	On-line Stack Monitoring System for Incinerator
MFL	Continuous Toxic gas (Ammonia) Monitoring System (One)
	Continuous Toxic gas (Ammonia) Monitoring System (Eleven)
	Stack monitoring system for 110 ATA / PC Boiler Stack (One)
	Ambient Air Continuous Monitoring Station (One)
CPCL	Ambient Air Continuous Monitoring and procurement of mobile van for AAQM

	Linking 8 AAQM/CSM with TNPCB. One AAQM station already linked thro' internet
TPL(LAB)	Installation of continuous monitoring system with data uploading for 3 stacks attached to Captive Power Plant
TPL(HCD)	Installation of continuous monitoring system for the parameters chlorine, HCl vapor, PM, SO2, NOx, and CO
SRF TTBM	To provide on line stack monitoring of SPM in boiler and heater chimney
Parameter : NH_3	
MFL	Restart of Cooling water blow down treatment plant to increase the use of treated effluents

3.6.1 Existing Infrastructure Facilities – (Ambient Air Quality Net work)

National Air Quality Monitoring Programme.: The level of pollutant in ambient air around the Manali Industrial area is being monitored by the Continuous Ambient Air Quality monitoring station situated at Manali, and in the near vicinity of Kattivakkam, and Tiruvottiyur by the Tamilnadu Pollution Control Board under the National Ambient Air Quality monitoring Programme.

Central Pollution Control Board station at Manali: The Central Pollution Control Board has installed one Continuous Ambient Air Quality Monitoring Station at Manali. This monitoring station gives the real time ambient air

quality date. The monitoring station has linked with the CPCB to down load the data from their station. (Bangalore etc)

District Environmetal Lab of Tamilnadu Pollution Control Board: The Tamilnadu Pollution Control Board have their net work for periodical monitoring the level of pollutants present in the ambient air and pollutants let out through the process stack of the industry periodically.

Ambient Air Quality monitoring Station Provided by the industry: Some of the industrial units in the Manali Industrial Complex have also installed Ambient Air Quality monitoring Station in their premises so as to measure the level of pollutants in the ambient air

3.6.2. Pollution Control Measures installed for the emission sources.

1. Chennai Petroleum Corporation Limited

- Air pollution control facilities have been provided to ensure protection of environment from the potentiallY harmful effects of refining activity.
- These facilities have been provided for minimizing the impact of pollutants on the environment by
- 8 nos. of Ambient Air Quality Monitoring stations including one Weather Monitoring Station.
- Continuous Stack Monitoring Stations in major heaters
- Low NO_X burners and DeNO_X facilities for reduction of NO_X emission
- Portable gas detection made for measuring volatile organic compounds and other toxic gases in the refinery premises

2.M/s MADRAS Fretilizers Limited.,

Sl No	Source	Stack Height (Meters)	Fuel Used	Remarks
1.	Utility Boilers (Two Nos.-50 MT/Hr each)	70	Furnace Oil	Stack height Provided as per MINAS standards
2	Solar Gas Turbine (Two Nos.)	15	High Speed Diesel	Each set is provided with a separate stack as per MINAS standards

3	DG sets (8 Nos.) (Each with 0.8 MW capacity)	12	High Speed Diesel	Each DG set is provided with 2 stacks as per MINAS standards
4	Ammonia Plant Boilers: (i)110 ATA Boiler (100 MT/ Hr) (ii) Process Condensate Boiler (70 MT/ Hr)	117	Furnace Oil	Both the boilers are provided with a common stack as per MINAS standards

2. Process Gas Emissions

Sl No	Source	Stack Height (Meters)	Fuel Used	Remarks
1	Ammonia Plant Process Vent Stack	30	Naphtha	The generation is only for a short period during plant start-ups and shutdowns. This vent is provided with adequate steam quenching to prevent formation of explosive mixture.

3. Process Vent Stack Emissions

Sl No	Source	Stack Height (Meters)	Pollutants	Remarks
1	Ammonia Plant	30	Ammonia	
2	Urea Plant	75	Ammonia	

4.Urea Plant Prill Tower Emissions

Sl No	Source	Stack Height (Meters)	Pollutants	Remarks
1	Urea Prill Tower Demister Outlet (2 Nos.)	72	Fine Urea dust and Ammonia	

NPK Plant Stack Emissions

Sl No	Source	Stack Height (Meters)	Pollutants	Remarks
1	NPK Plants (3 Trains) Process Stack (3 Nos)	42	NPK dust and Ammonia	

3.Futura Polyesters Ltd

S.No	Stack attached to equipment	Stack Dia-mm	Stack Height. Mtr	Remarks
(1) Common Stack	Liquid Dowtherm Heater-2 Nos. (30 & 15 lacs Kcal/ hr.)	750	30.5	Stand-by
(2)	Steam Boiler 8T/hr-1 No.	800	30.0	Stand-by
(3) Common Stack	Steam Boiler 32 T/hr. – 2 Nos.	1450	25.0	Stand-by
(4)	Liquid Dowtherm Heater (31 lacs Kcal/ hr.)	600	35.9	Stand-by
(5) Common Stack	DG Sets – 3 Nos. (1100 KVA each)	1270	16.9	Operated only during power failures
(6)	Gas Turbine Boiler -10 T/ hr.	1200	30.0	Stand-by
(7)	Gas Turbine 4750 KVA	1200	10.0	
(8)	Burnout Furnace	1500	19.0	APC-Wet Scrubber
(9) Common Stack	Steam Boiler – 1No. 24T/hr Liquid Dowtherm Heater- 60 Lakh Kcal	2100	33	Both the units will be online simultaneously APC - Bagfilters

Futura Polymer and Preforms Division:

S.No	Stack attached to equipment	Stack Dia-mm	Stack Height. m	Remarks
(1)	Thermax Oil Heater	500	30.5	Stand-by
(2)	Thermax Oil Heater	1000	35	Stand-by
(3)	Burnout Furnace	100	17	Electrically operated negligible emission.
(4) Common Stack	Diesel Generators (1500KVA)-3 Nos.	900	20	Operated only during power failures
(5)	Liquid Dowtherm Heater – 70 Lakh KCal/hr	1300	33	APC - Bagfilters

4.Tamil Nadu Petrochemicals – LAB

Stack attached to Control measures.

Boiler	Automatic Built in Air / Fuel Ratio control
Hot oil heater	Online sensors available (PM, SO2, Nox, CO)
PACOL heater	Online sensors available (PM, SO2, Nox, CO)
Hydrobon heater	Automatic Built in Air / Fuel Ratio control
Startup heater	Automatic Built in Air / Fuel Ratio control
CPP	Scrubber, Automatic Built in Air / Fuel Ratio control
Flare	Temperature indication

5.Tamil Nadu Petrochemicals – ECH

Stack attched to	Control measures
Boiler	Automatic Air / Fuel Ratio control
Prpylene furnace	Low sulphur fuel (off-gas) is burnt
Hydrochloric acid unit	Automatic pH control and On-line sensor for HCl vapour is provided.
Vent gas scrubber	Automatic pH control and On-line sensor for Cl2 is provided.
Captive Power Plant	Automatic Air / Fuel Ratio control

6.Tamil Nadu Petrochemicals – HCD

Stack attached to	Control measures
WAD Plant	Scrubber and on-line sensor for chlorine is provided.
Hydrochloric acid plant	Scrubber and On-line sensor for HCl vapour is provided
Ammonium chloride plant	Scrubber provided.
Caustic Fusion plant	Automatic Built in Air / Fuel Ratio control
Captive Power Plant	Automatic Built in Air / Fuel Ratio control and On-line sensor provided for SPM< NOx, SO_2, CO
Boiler	Automatic Built in Air / Fuel Ratio control

7.MANALI PETRO CHEMICAL – I

1. All the hydrocarbon safety valve discharge are connected to flar system.
2. All the process and product tanks blanketed with Nitrogen.
3. In the MOL Plant a dust scrubber / heat absorption system has been installed.
4. Dust recovery plant for lime loading is being designed. Within a year it will be implemented.
5. Boiler burner up gradation or scrubber will be installed in the FO fired boiler to control SO2, SPM levels, within a year.

7.MANALI PETRO CHEMICAL – II

1. All the hydrocarbon safety valve discharge are connected to flare system.
2. All the process and product tanks blanketed with Nitrogen.
3. In the MOL Plant a dust scrubber / heat absorption system has been installed.
4. Dust recovery plant for lime loading is being designed. Within a year it will be implemented.
5. Boiler burner up gradation or scrubber will be installed in the FO fired boiler to control SO2, SPM levels, within a year.

8. Balmer & Larwrie Co Ltd.,

1. Stack for Thermic Fluid heater in Grease Plant
2. Stack for LDO-Boiler in LCD

9.Kothari Petrochemicals Ltd.,

1) Common Stack with height 35 mts. Is provided for Boiler & two Thermic fluid heaters. Control of Pollution by operational control.

2) Off gas from atmospheric flash column receiver is being used as secondary fuel in Boiler through an off gas recovery system.

10. SRF Ltd., - TTBM

Existing	Source of Emission	Control Measure	Stack Height
1	Melter	Scrubber	1.12
2	Spinning Section	Scrubber	10
3	Chip Treatment Section (VS Silo)	Cyclone Separator	23
4	Boiler 6.0 T/hr	Air Pre Heater	24
5	Boiler 3.5 T/hr	Air Pre Heater	24
6	Fuel oil Boiler	Air Pre Heater	28
7	Diesel Generator set 2000 KVA	Air Pre Heater	6.5
8 - 11	Spinning Extruder	-	10
12	Spain draw	Closed Circuit	10
13 - 15	Burn out Furnace	Filter Media	7.2
16	Depoly Cracker	Not in Use	10
17	Captive power plant 6.3 MW	Waste Heat Recovery Boiler	60
18	Captive power plant 6.3 MW	Waste Heat Recovery Boiler	60
19-20	Dryer 1A	Filter Media	36
21-22	Dryer 1B	Filter Media	36
23-26	Dryer 1,2,3,4	Filter Media	23 (each)
27	Fuel oil Boiler	Air Pre Heater	35
28	Lactam Charging Hopper	Scrubber	10
29	Spinning Machines	Scrubber	13
30	Salt Bath Packed column	Exhaust Blower	13
31	Biomass Boiler 12.0 T / hr	Air Pre Heater, Spark Arrestor, Bag Filter and MDC	30.5

10. SRF Ltd., - EPB

S.NO	Details	Cracker Area / Under Water Gran.	EP Scr.	Vapour Vent	FOB	16M^2 Dryer

1.	Stack Number	1	2	3	4	5
2.	Material of construction of Stack	SS	M.S	M.S	M.S	M.S
3.	Stack attached to	Exhaust Blower	Scrubber Blower	Vent	Exhaust Chimney	Exhaust Pipe
4.	Stack Height (in Meters) (a) Above the roof (b) Above the ground level	--- 12.5	--- 16	-- 16	--- 31	--- 14
5.	Stack Top (a) Round or Circular Inside dimension of the stack at top	R ∅ 150 mm	R ∅ 450 mm	R ∅ 80 mm	R ∅ 300 mm	R ∅ 100 mm
6.	Gas quantity – M^3/hr	72,474	410386	165268	7704.0	10805
7.	Flue Gas temperature – ^0C	60.0`	82.0	156.0	40.0	44.0
8.	Exit Velocity of the gas m/sec	10.4	8.4	11.8	4.4	4.0
9.	Sample Point High	12.5 mtr	12mtr	16 mtr	10 mtr	5 mtr

3.6.3 Technological Intervention:

3.6.3.1. Inventorisation of prominent industries with technological gaps

- Reduction of SO_2 by introducing advanced process control of optimizing the use of raw materials of petroleum feed stock by M/s Tamilnadu Petro products Limited (LAB Project) .

- Reduction of SO_2 and RSPM in furnace oil emission by mixing the by products light polymer with furnace oil as it contain nil sulphur and as content proposed by M/s Kothori Petrochemicals Limited.

3.6.3.2 Identification of low cost and advanced cleaner technology for air pollution control.

3.6.3.3 Introduction and switch over to cleaner fuel.

- Furnace oil is replaced by husk as boiler in M/s SRF Limited & M/s Futura Polyesters Ltd.
- Use of natural gas in place of liquid fuel by M/s Chennai Petroleum Corporation Limited.
- LNG Conversion from Naphtha feed stock is proposed by M/s Madras Fertilizers Limited.

3.6.4 Need for infrastructure renovation

3.6.4.1 Development of roads: The special purpose vehicle Board formed with comprising of NHAI, Chennai Port Trust, Ennore Port and Govt. of TamilNadu for implementation of Chennai- Ennore Port connectivity Road project. The Scope of the work are as follows

a. Short term project for overlaying top layer in the existing road for the Madras Oil Refinery Road and Inner ring road at the cost of Rs.8Crores. Duration of work is 6 months starting from May2010 and is under progress

b. Strengthening the following four stretches of road at the cost of Rs 269 Crores, Duration of project is 2 years.

i. Ennore Express Highway 7.537 Kms
ii. Madras Oil Refinery 5.600 Kms
iii. iii. Tirvottiyur Ponneri Road 9 Kms
iv. iv. Inner ring road 7.5 kms.

3.6.5 Impact on CEPI score after installation / commissioning of full fledged air pollution control system

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	5	5	25	6	3	3	12	3	4	0	12	15	64
During 2009-10	3	5	15	7.5	3	0	10.75	3	4	5	17	15	57.75
After Shorterm & Longterm Measure	5	5	25	1	0	0	1	3	1	5	8	10	44

3.6.6 Managerial and Financial aspects – cost and time estimate,

3.6.6.1: Cost and Time Schedule.

- Industrial association and Local body will effect green belt development with the annual budgeting provision of Rs 25 lakes.

3.6.7 Self monitoring system in Industries (Stacks & APCDs)

- High volume samplers are installed by major units to monitor ambient air quality.

- VOC monitors are provided by the following units in the ambient air.
- Online stack monitoring by the industrial units as listed in table -
- Continuous ambient air quality monitoring by M/s Chennai Petroleum Corporation Limited in eight stations

3.6.8. Data Linking to SPCB/CPCB.

The TNPCB has established and commissioned a CARE AIR Centre with project cost of 10 lakes (Centre for Assessing Real Time Air (Quality) Information Reports) at its Head Office at Guindy, Chennai on 21.06.2010. This CARE AIR Centre is the first of its kind in the country. The online data of the source emissions and ambient air quality data has been linked to a data acquisition system and routed through a static Broad Band connection to IP address of the Tamil Nadu Pollution Control Board. This in turn is connected to a workstation through a server, which saves the data generated from the industry. The data is then validated by software and represented to the Management for decision-making and to take up mitigation work. All instances of Exceedance of norms will trigger off an alarm in the system. A provision for immediate SMS alerts to the nodal officer and to the CEO of the unit concerned has been made.

The following industries have linked their online data of the source emissions and ambient air quality to a data accusation system at the CARE AIR CENTRE of TNPCB.

Sl. No	Name of the Industry
1.	Chennai Petroleum Corporation Ltd.
2.	Tamilndu Petro Products Ltd (LAB).
3.	Tamilnadu Petro Products Ltd-ECH.
4.	Tamilnadu Petro Products Ltd-HCD.
5.	Manali Petro Chemical Ltd-I.
6.	Manali Petro Chemical Ltd-II.

7	Supreme Petrochemicals Ltd.
8	Kothari Petrochemicals Ltd.
9	Indian Additives Ltd.
10	Petro Araldite (P) Ltd.
11	SRF Ltd.

CONTRIBUTION OF POLLUTION BY M/s Chennai Petroluem Corporation Limited

Sl. No.	PL NO	Name of Stack	Stack attached to	Air Pollution Control measures	Stack Dia., m	Stack Height, m	Stack Temp. (Exist Gas), C	Stack Velocity, m/s	FLUE GAS CONC MG/NM3SOX	NoX	SPM	Fluegas m3/day	Sox kg/day	Nox kg/day	SPM kg/day
1	1	1F1A	ADU	Low NOx burner	2.60	63.4	180	18.37	103	6	7	1907388	118	7	13.35
2		1F1B	ADU	Low NOx burner	1.46	60	216	9.44	380	84	25	865195	184	41	21.63
3		1F2	VDU	Low NOx burner	1.20	55.58	260	29.57	164	8	75	1722860	145	7	129.21
4		1F3	VDU	Low NOx burner	1.20	55.58	226	29.57	444	71	43	2888000	702	112	124.18
5	2	3F1	Unifiner		0.80	15.85	588	7.23	16	36	10	111537	1	1	1.12
6		3F3/4/5	Platfomer		1.04	15.2	450	10.48	190	2	41	331763	24	0	13.60
7	3	4F1	Kero ATF		1.26	37.8	430	6.53	116	29	11	307058	14	3	3.38
8	5	8F1	Lube extraction unit	Low NOx burner	0.90	22.17	381	5.87	124	30	6	325356	17	4	1.95
9		8F2	Lube Extraction unit	Low NOx burner	1.66	41.01	423	2.45	554	4	29	457895	100	1	13.28
10	6	9F201	DWO mix	Low NOx burner	1.48	47.93	220	8.65	172	59	38	813262	77	27	30.90
11		9F301	Slack wax mix	Low NOx burner	1.02	36.4	240	6.84	82	23	18	482658	21	6	8.69
12	7	10F101	Lube Hydro-finishing	Low NOx burner	1.19	42.7	218	6.74	433	18	20	405567	98	4	8.11
13	9	13F1	Vac. Distillate		0.84	23.01	650	12.97	380	36	37	209142	24	2	7.74
14	10	14F1	Foots oil mix	Low NOx burner	1.24	32.38	220	6.70	55	77	34	440773	13	19	14.99
15		14 F 101			1.24	36	590	7.24	792	78	52	272091	68	7	14.15
16	11	15F1A	ADU	Low NOx burner	2.60	63.41	270	20.71	124	6	24	5350961	334	16	128.42
17		15F1B	ADU	Low NOx burner	1.70	60	210	8.56	111	88	13	1076886	68	54	14.00

18		15F2 A	VDU	Low NOx burner	1.45	32	246	22.11	158	2	15	1858926	154	2	27.88
19	12	16F1	FCCU	Low NOx burner	1.80	35	299	13.18	77	35	42	1574738	58	26	66.14
20		16F3	FCC CO boiler	Low NOx burner	1.78	56.22	270	19.05	16	0.9	18	2306960	19	1	41.53
21	13	71 F1	PDA Feed		1.78	58.22	270	10.00	523	87	30	1321868	348	58	39.66
22	14	73F101	NMP 1	Low NOx burner	1.62	53.38	220	2.50	29	72	13	1153509	19	46	15.00
23		73 F102	NMP 2		1.66	48.85	240	2.70	37	45	26	1495537	29	36	38.88
24	15	76F1	NMP Fractionator	Low NOx burner	0.81	30.9	233	1.20	24	50	22	214808	3	6	4.73
25		76F11	Naphtha Refomer	Low NOx burner	1.50	30	178	14.50	11	15	5	849937	6	8	4.25
26	16	77 F1	DHDS		0.50	60	647	8.00	470	65	18	135648	19	3	2.44
27	17	78F1	DHDS-SRU Furnace	Low NOx burner	0.50	60	455	31.40	341	51	10	116101	15	2	1.16
28	18	201F1/F2	Ref-III ADU/VDU	Low NOx burner & DeNOx technology	3.45	70	212	2.60	55	1.07	27	2098915	65	1	56.67
29	19	204F1	VBU	Low NOx burner & DeNOx technology	3.45	70	166	5.00	29	90	7	4036376	73	226	28.25
30	20	205 F1	HGU	Low NOx burner & DeNOx technology	1.78	70	443	5.00	8	3	31	1074468	3	1	33.31
31		205 F2	HGU	Low NOx burner & DeNOx technology	1.78	70	155	11.00	31	4	72	1656773	33	4	119.29
32	21	206 F1	CRU Feed	Low NOx burner & DeNOx technology	1.80	100	497	6.00	8	64	2	1318499	4	30	2.64
33		206 F2	CRU	Low NOx burner & DeNOx technology	1.80	100	483	6.00	108	37	6	1318499	51	18	7.91

34		207 F2	OHCU Fractionator	Low NOx burner & DeNOx	1.72	70	210	4.10	77	0.77	59	822667	36	0	48.54
35	23	210 F1	SRU	Low Nox Burner	1.96	70	300	7.38	16	0.44	17	1922879	15	0	32.69
36	24	Gas Turbine	HRSG 1	Low Nox Burner	1.80	100	179	5.21	210	55	3	779548	99	26	2.34
37		Gas Turbine	HRSG 2	Low Nox Burner	1.80	100	186	8.00	18	61	3	1757998	19	64	5.27
38		Boiler-3	Old Power House		3.00	30	207	4.00	137	96	48	1541970	120	84	74.01
39		Boiler-5	Old power house		3.00	30	190	6.39	140	66	49	2143257	177	83	105.02
40		Boiler-1	Cogeneration plant	Low Nox Burner	1.80	100	171	18.00	319	57	88	2675735	525	94	235.46
41		Boiler-2	Cogeneration plant	Low Nox Burner	1.80	100	180	19.80	335	67	106	4351045	878	176	461.21
42		Boiler-3	Cogeneration plant	Low NOx burner & DeNOx technology	1.80	100	179	11.00	234	3.51	156	2417247	342	5	377.09

CHAPTER – 4

LAND ENVIROMENT

(Soil and Ground Water)

4. LAND ENVIRONMENT (Soil and Ground Water)

4.1. Soil Contamination

4.1.1.Present status of land environment supported with minimum one year analytical data: Nearly about 80% of the land area of the Manali Industrial Complex, is is occupied by industrial establishment and the remaining area is occupied by the infrastructure facilities such as road etc. The Soil sampling data collected during 2008 presented in EIA study for CPCL by NEERI is presented in table 4.1. The physical properties, water holding capacity, chemical characteristic, sodium adsorption ratio, are summarized in table 4.2 to 4.5.

Table :4.1 Sampling Location.

S.NO	Village Name	Location		Direction	Distance (km)
		Latitude	Longitude		
1	Chinnasekkadu	13º 9' 36"	80º 15' 30"	284º	2.67
2	Manali	13º 10' 15"	80º 15' 47"	313º	2.8
3	Madhavaram	13º 9' 19"	80º 14' 28"	274º	4.4
4	Ammullavoyal	13º 10' 36"	80º 15' 36"	218º	9.55
5	Kadapakkam	13º 11' 30"	80º 15' 15"	334º	4.1
6	Vichur	13º 12' 52"	80º 14' 43"	327º	8.2
7	Edayanchavadi	13º 12' 45"	80º 16' 38"	354º	6.4
8	Puzhal	13º 9' 43"	80º 12' 8"	277º	8.5
9	MRC, near lagoon	13º 9' 19"	80º 16' 55"	135º	0.5
10	MRC, Bioremeditation site	13º 9' 23"	80º 16' 59"	135º	1

4.1.1.2 Physical properties of soil in study area

Table :4.2

S. No	Name of the Village	Colour	Compaction	Bulk density g/cm3	Natural Moisture content (%)	Particle size distribution			Soil Texture
						Sand (%)	Silt (%)	Clay (%)	
1	Chinnasekkadu	Dark brown	Low	1.31	18.17	27.70	68.2	4.1	Silty Loam
2	Manali	Brown	Low	1.33	15.32	29.70	67.0	3.3	Silty Loam
3	Madhavaram	Light grey	Low	1.32	10.48	36.70	60.5	2.8	Silty Loam
4	Ammullavoyal	Brown	Low	1.34	14.72	48.40	48.6	3.0	Sandy Loam
5	Kadapakkam	Dark brown	High	1.36	22.30	15.30	67.7	17.0	Silty Loam
6	Vichur	Dark brown	High	1.38	16.57	18.70	66.4	14.9	Silty Loam
7	Edayanchavadi	Light grey	Low	1.30	14.80	47.20	50.4	2.4	Sandy Loam
8	Puzhal	Dark brown	Low	1.33	16.94	28.10	66.6	5.3	Silty Loam
9	MRC, near lagoon	Light brown	Medium	1.36	10.76	27.10	64.9	8.0	Silty Loam
10	MRC, Bioremeditation site	Brown	Medium	1.35	13.33	22.20	69.2	8.6	Silty Loam

4.1.1.3 Water holding capacity (WHC) of soils in the study area:

Table :4.3

S.No	Sampling Locations	WHC (%)
1	Chinnasekkadu	24.7
2	Manali	20.5
3	Madhavaram	18.0
4	Ammullavoyal	18.5
5	Kadapakkam	26.8
6	Vichur	28.4
7	Edayanchavadi	19.2
8	Puzhal	18.4
9	MRC, near lagoon	21.9
10	MRC, Bioremeditation site	20.7

4.1.1.4 Chemical Characteristics of soil in the study area:

Table :4.4

S.No	Sampling Locations	Parameters, meq/100g							
		pH	EC dS/m	Na	Ca	Mg	CO_3	Cl	SO_4
1	Chinnasekkadu	7.54	1.68	7.83	4.99	10.69	25.9	6.77	2.29
2	Manali	7.88	1.41	5.65	3.99	9.87	18.33	7.05	2.91
3	Ammullavoyal	7.67	1.56	7.83	5.49	8.23	25.99	4.79	1.87
4	MRC, near lagoon	7.90	1.38	5.65	6.986	6.58	20.66	5.64	2.29
5	MRC, Bioremeditation site	8.10	1.37	6.09	4.49	7.40	17.99	6.21	3.123

4.1.1.5 Sodium Adsorption Radio (SAR) of Soils in the Study Area

S.No	Sampling Locations	SAR
1	Chinnasekkadu	2.78
2	Manali	2.14
3	Ammullavoyal	2.98
4	MRC, near lagoon	2.16
5	MRC, Bioremeditation site	2.48

4.1.1.6 Heavy metal analysis and Soil sampling in the study area:

Soil texture is silty loam, the water holding capacity of the soil ranges of 18% to 28.4% chemical properties of soil. The pH in the range of 7.54 to 8%. EC are in the range of 1.38 to 1.68 ds/m and sodium absorption radio of soil indicates the soils are generally saline. The data on the concentration levels of heavy metal in the soil indicates that heavy metal concentrations are in acceptable levels as per NEERI study report for M/s CPCL during 2008.

4.1.2 Critical location for land / soil pollution assessment and ground water monitoring Suggested:

S.No	Company Name /Village	Critical Location
1.	Chennai Petroleum Corporation Limited	Hazardous waste storage area ETP Area
2.	Madras Fertilizers Limited	Treated Effluent storage lagoon as Hazardous waste storage area, Fertilizers storage shed area.
3.	Tamil Nadu Petro Products – LAB Plant	Hazardous Waste Storage pits. ETP area
4.	Tamil Nadu Petro Products – HCD Plant	Mercury bearing sludge storage pits. Brine sludge storage area. ETP area
5.	Tamil Nadu Petro Products – ECH Plant	Lime sludge temporary storage area. ETP area.
6.	Manali Petrochemicals Limited – Plant I	Lime Sludge storage area. ETP area
7.	Manali Petrochemicals Limited – Plant II	Lime Sludge storage area
8.	Balmer & Lawrie Co. Ltd.,	ETP – Solar Evaporation Site
9.	Supreme Petrochemicals Ltd.,	ETP Area
10.	Futura Polyesters Ltd.,	ETP Area
11.	SRF Limited – TTBM	ETP Area Hazardous Waste Storage Area
12.	Indian Additives Ltd.,	ETP Area Hazardous Waste Storage Area
13.	Cetex Petrochemicals Ltd	ETP Area
14.	Kothari Petrochemicals Ltd.	ETP Area
15.	Petro Araldite Private Ltd	ETP Area Hazardous Waste Storage Area
16.	NATCO Organics Ltd.,	ETP Area Hazardous Waste Storage Area
17.	Residential Area	Manali, Amulavoyal and Chinnasekkadu Village

4.1.3 Present Level of Pollutants: Soil texture is silty loam, the water holding capacity of the soil ranges of 18% to 28.4% chemical properties of soil. The pH in the range of 7.54 to 8%. EC are in the range of 1.38 to 1.68 ds/m and sodium absorption radio of soil indicates the soils are generally saline. The data on the concentration levels of heavy metal in the soil indicates that heavy metal concentrations are in acceptable levels as per NEERI study report for M/s CPCL during 2008.

4.1.4. Predominant Sources:

S.No.	Industry Name	Predominant Source
1.	TPL – ECH Plant	Solid waste temporary Storage area
2.	TPL – HCD Plant	Hazardous Waste Storage Area
3.	TPL – LAB Plant	Hazardous Waste Storage Area
4.	CPCL	Hazardous Waste Storage Area
		Hazardous waste oil reclaimation area
5.	Indian Additives Ltd	Hazardous Waste Storage Area
6.	Madras Fertilizers Ltd	Hazardous Waste Storage Area
7.	SRF Ltd	Hazardous waste Storage Area

4.1.5. Sources of Soil Contamination: The following industries listed below may be the sources of soil pollution.

S.No.	Industry Name	Source
1.	TPL – ECH Plant	ETP lime Sludge
2.	TPL – HCD Plant	Mercury bearing sludge in
		Hazardous waste storage pit
3.	TPL – LAB Plant	Hazardous Waste Storage
4.	Chennai Petroleum Corp Ltd	Oil Spillage and Hazardous Waste Spillage
5.	Indian Additives Ltd	Hazardous Waste Storage
6.	Manali Petrochemicals Ltd – I	Lime Sludge Handling
7.	Manali Petrochemicals Ltd – II	Lime Sludge Handling
8.	Petro Araldite P Ltd	Hazardous Waste storage and handling
9.	NATCO Organics	Hazardous Waste storage and handling
10.	Balmer & Lawrie Co.,	Effluent Storage in Solar Evaporation Pan

4.1.6. Types of existing Pollution :

Non Hazardous waste of high volume lime sludge from unit of MPL,TPL are utilized for beneficial purpose such as road embankment formation/brick industries, taking steps to control spillage into ground, no adverse impact of pollution noticed. In MPL – II, lime sludge stored previously is stored in huge dump. Adequate storage for hazardous solid waste are installed in Manali Industrial Complex.

4.1.7. Remedies for abatement, treatment and restoration of normal quality:

Revamping of non hazardous waste storage sites are proposed by TPL / MPL so as to avoid any leakages of lime sludge. Proposed transportation is planned in covered vehicle to avoid dust emission spreading sink own land. TPL is revamping of existing mercury bearing sludge storage pit is proposed to avoid any leakages from the storage pit. TPL is planned to store the sludge in a container storage shed.

4.2. Ground Water Contamination

4.2.1 Present Status /quality of ground water. NEERI has carried out ground water study for M/s CPCL during 2008 and in different locations as in Table 4.9. The parameters of ground water analyzed such as Physical parameter, Inorganic parameter, nutrient and organic parameter, heavy metals and Bacteriological quality in their location is given in Table 4.10 to 4.15.

Bore well water analysis report 2009-10 avg values

Parameters	R&D Bore Well	Admin Open Well	ETP-3 EAST	ETP-3 WEST	hazardous waste fill area	bio remediation 1	RO Reject	Bio remediation 2	REF III storm water area
pH	No sample	7.87	7.00	6.24	6.55	6.68	6.49	No sample	No sample
Oil		3.51	1.73	1.30	2.43	1.57	1.37		
Sulfides		0.50	0.21	0.69	1.41	0.65	0.16		
Suspended solids		58.91	50.75	150.25	139.50	112.75	50.14		
BOD		362.90	570.55	11.17	14.17	9.43	11.25		
COD		208.08	356.42	115.88	157.50	161.25	135.88		
Chlorides		1787.50	29032.50	21337.50	7440.00	69382.50	13750.00		
M.Alkalinity		410.83	357.50	215.00	522.50	532.50	375.00		
Total Hardness		805.00	5957.50	6075.00	4318.75	10465.00	5610.00		
Ca. Hardness		1040.00	3219.67	8286.25	6110.00	5665.00	6798.75		
Mg. Hardness		1868.00	7438.36	12388.75	10193.75	11865.00	11536.25		

All values are in PPM except pH

Table :4.9 Sampling Locations for Monitoring Ground Water Quality

S.No	Sampling Locations
1	Thiruvottiyur
2	Mathur
3	Manali Panchayat

4	ETP III – Manali Refinery
5	R & D- Manali Refinery
6	Chinnasekkadu
7	Manali
8	Administration block – Manali Refinery

Table :4.10 (A) - Ground Water Quality – Physical Parameters

S. No	Sampling Location	pH	Temperature (° C)	Turbidity (NTU)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Conductivity (µS/cm)
BOREWELL							
1	Thiruvottiyur	7.4	29	2	20	4376	6470
2	Mathur	7.5	28	3	17	954	1450
3	Manali Panchayat	6.9	31	3	17	820	1230
4	ETP III–Manali Refinery	7.1	30	2	337	68279	135500
5	R & D- Manali Refinery	7	30	2	263	19623	67500
DUG WELL							
6	Chinnasekkadu	7.5	30	11	16	1450	2210
7	Manali	7.1	30	15	35	990	1580
8	Administration block – Manali Refinery	8.3	29	8	82	3412	5930

Table :4.10(B) -Ground Water Quality – Inorganic Parameters

S. No	Sampling Locations	Total alkalinity (mg/l as $CaCO_3$)	Total Hardness (mg/l as $CaCO_3$)	Calcium hardness (mg/l as $CaCO_3$)	Chloride (mg/l)	Sulphate (mg/l)	Sodium (mg/l)	Potassium (mg/l)
BOREWELL								
1	Thiruvottiyur	130	460	288	510	750	800	64
2	Mathur	48	82	64	110	150	113	160
3	Manali Panchayat	22	186	123	230	120	150	19
4	ETP III – Manali Refinery	58	9450	438	10981	5400	6560	32
5	R & D- Manali Refinery	58	3350	352	7332	2400	2800	28
DUG WELLS								
6	Chinnasekkadu	80	242	169	310	260	350	74
7	Manali	66	236	164	240	150	140	27
8	Admin block – Manali Refinery	52	390	122	424	200	1040	12

Table :4.11

Ground Water Quality – Nutrient, Demand and Organic Parameters

S. No	Sampling Location	Total Nitrate as N	Total Phosphate as P	Dissolved Oxygen	Chemical Oxygen Demand	Oil & Grease	Hydro Carbons
		(mg/l)					(µg/l)
BOREWELL							
1	Thiruvottiyur	14.8	0.06	3.0	8	3.2	2.2
2	Mathur	17.6	0.32	2.2	5	BDL	BDL
3	Manali Panchayat	10.8	0.07	3.0	8	4.5	17.1
4	ETP III – Manali Refinery	1.0	0.2	Nil	22	BDL	25
5	R & D- Manali Refinery	2.0	0.8	Nil	16	BDL	16
DUG WELL							
6	Chinnasekkadu	36	0.16	1.1	25	BDL	BDL
7	Manali	28	BDL	0.8	10	4	24.1
8	Administration block – Manali Refinery	1.2	0.2	7.9	8.0	BDL	43

Table :4.12 Ground Water Quality – Heavy Metals

S. No	Sampling Locations	Al	As	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn
		(mg/l)										
BORE WELL												
1	Thiruvottiyur	BDL	BDL	0.005	0.009	BDL	0.053	0.058	0.503	BDL	BDL	8.739
2	Mathur	BDL	BDL	BDL	BDL	BDL	BDL	0.144	0.002	BDL	BDL	0.080
3	Manali Panchayat	0.087	BDL	BDL	BDL	BDL	0.031	0.057	0.143	BDL	BDL	0.433
4	ETP III – Manali Refinery	0.058	BDL	0.010	0.011	0.006	0.010	0.237	1.390	BDL	BDL	0.033
5	R & D- Manali Refinery	2.126	BDL	0.006	BDL	0.007	0.047	2.108	0.489	BDL	BDL	0.026
DUG WELL												
6	Chinnasekkadu	BDL	BDL	BDL	BDL	BDL	0.006	0.055	0.016	BDL	BDL	0.369
7	Manali	BDL	BDL	BDL	BDL	BDL	BDL	0.041	0.032	BDL	BDL	0.082
8	Admin block – Manali Refinery	0.534	BDL	BDL	BDL	0.032	BDL	0.231	0.141	BDL	BDL	0.018
BDL-Below Detection Limit												

Table :4.13 Bacteriological Quality of Ground Water

S.No	Sampling Location	MPN/100 ml		
		HPC	Fecal Coliforms	E.Coli
BORE WELL				
1	Thiruvottiyur	8.9×10^5	2.1×10^3	390
2	Mathur	TNTC	3.18×10^5	19.6×10^3
3	Manali Panchayat	1.9×10^4	4.2×10^2	260
DUG WELL				
4	Chinnasekkadu	TNTC	8.9×10^5	2.4×10^3
5	Manali	TNTC	4.3×10^6	8.3×10^3

4.2.2. Source identification (Existing Sources of Ground Water Pollution)

Handling of Non Hazardous /hazardous solid waste from ETP during collection, storage, transportation and disposal system may get spills Which are the sources. Manali Industrial Area is located in the coastal region, sea water intrusion is the predominant source of ground water contamination. Handling of chemical raw material spillage on ground will leach during rains also the cause for ground water pollution.

4.2.3. Ground Water Quality monitoring:

Industries those who are having test Bore Well such as TPL, MPL, CPCL, SRF, MFL are self monitoring ground water quality periodically in their premises.

4.2.4. Action Plan for control of pollution including cost/time aspects:

Name of the unit	Critical Pollutants	Action Point	cost in lakhs	Target
CPCL	Oily sludge	In-situ Mechanical treatment	25	Dec'10
		Co-processing of Hazardous waste in cement Kilns	200	Dec'10
		Provision of additional sludge pit	200	Aug-10
		Sludge treatment	100	Sep-10
TPL LAB	Calcium Fluoride Sludge generation	Advance process control to reduce CaF2 sludge generation.	11	Mar-11
	Accumulated hazardous waste	Transport of HW	10	Mar-11
TPL ECH	ETP Sludge	Modification of ETP to reduce sludge generation	2	Sep-10
TPL HCD	Mercury compound bearing storage pit	Construct containment wall below ground level To provide protective LDPE top layer with drain facility	84	Mar-11

SRF Ltd., (EPB)	Hazardous Waste Storage Yard	Increasing the capacity of Hazardous waste storage shed	20	Sep'2010
Petro Araldite Private Ltd	HW	Co incinerating the solid hazardous wastes in the cement kiln	8	Oct'2010

4.2.5.Treatment and management of contaminated ground water bodies:

Rain water harvests and recharging the rain water into ground water may dilute the presence of any unwanted pollutants and reduce the sea water intrusion.

4.3. Solid Waste Generation and Management

4.3.1 Waste classification and Quantification

All the industries in Manali generating hazardous and non hazardous waste and the details of generation of hazardous waste are stated in Tables below.

4.3.1.1 Hazardous Waste

1. TPL – ECH PLANT

Hazardous Waste (2009 – 2010)				
Name	Authorised Quantity MT/Annum	Waste generation Tons/year 2009-10	Treatment & disposal mechanism	Accumulated Qty As on 31.03.10 (Tons)
Used Oil	2.0	0.0	Sold to SPCB authorised vendor	0.0
Waste Oil	140	53.2	Used as fuel in TPL heater	0.0
ETP Sludge	300	93.0	Disposed to TSDF	93.0

2. TPL – HCD PLANT

Name	Authorised Quantity MT/Annum	Waste generation Tons/year 2009-10	Treatment & disposal mechanism	Accumulated Qty As on 31.03.10 (Tons)
Used Oil	30.0	17.01	Sold to SPCB authorised vendor	0.0
Waste Oil	300	173.4	Used as fuel in TPL heater	42.0
ETP Sludge	1.0	0.0	Disposed to TSDF	0.0
Brine sludge containing mercury	-----	No generation after 20.05.1998	Stored in LDPE lined impervious pits with in factory premises.	6908.627 MT till 20.05.1998

3.TPL – LAB PLANT

Hazardous Waste (2009 – 2010)				
Name	Authorised Quantity MT/Annum	Waste generation Tons/year 2009-10	Treatment & disposal mechanism	Accumulated Qty As on 31.03.10 (Tons)
Used Oil	10.0	1.228	Sold to SPCB authorised vendor	5.634
Spent Catalyst	20.0	14.387	Sent to UK for recovery of precious metal.	3.681
Molecular Sieve	154.75 MT / 10 Year	135.38	Disposed to TSDF	0.0
Spent Catalyst from Hydrobon		17.72	Disposed to TSDF	0.0
Slop Oil	1100	369.44	Used as fuel in TPL heater	0.0
ETP Sludge	5.0	1.3	Disposed to TSDF	11.80
CaF2 Sludge	43.0	5.86 / 456.265	Disposed to TSDF	456.265
Oil skimming residue	1.0	0.0	Used as fuel in TPL heater	0.0

4.CETEX PETROCHEMICALS LTD

Hazardous (2009 – 2010)				
Name	Authorised Quantity MT/Annum	Waste generation Tons/year 2009-10	Treatment & disposal mechanism	Accumulated Qty As on 31.03.10 (Tons)
Spent lubricating oil	800 Lts// year	1060 Lts.	Disposed to the TNPCB authorized reclaimers.	310 Lts.
Spent catalyst	500 Kg/ 5 Years	Nil	Disposed to common hazardous waste management facility	238 Kg.
Salts from Solar evaporation Ponds	1000 Kg/ Year	760 kg	Disposed to common hazardous waste management facility	3,470 Kg

5.CHENNAI PETROLEUM CORPORATION LTD.

Hazardous		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Recovered oil	5000	Reprocessed within the premises and converted to Petroleum products
Oily sludge	1000	Chemical Mechanical/Bio remediation and land fill
Spent catalyst	100	Partly sent to Authorized recyclers & partly sent to TNWML
Used insulation	10	Disposed in TNWML
Chemical sludge, Date expired chemicals	10	TNWML, incineration (Facility to be commissioned)

M/S.CPCL -Item wise hazardous waste as of 30.06.2010.

	S. No	**Name**	**Quantity**	**disposal**	**Methodolgy**	**material**		
			M3			**kept at**		
4.1	1	oily sludge	**10250**	Mech treatment at CPCL		Haz Pit		
	2	Meachanically treated sediment	50			Bio remediation pit		
		under bio remediation						
		Total sludge +sediments						
			Quantity	**disposal**	**Methodolgy**	**material**		
4.2	3	**Spent catalyst**	**MT**			**kept at**		
	a	spent Activated Carbon	10	TNWML	incineration	Near R&D		
	b	Rock salt	4.9	TNWML	landfill			
	c	Chloriguard Plt 205	2.8	TNWML				
	d	Spent Catalyst Plt 205	28	TNWML				
	f	FCCU E catatalyst	60	being despatched to Haldia Refinery				
		Sub total	130					
4.5		Chemical sludge	10	TNWML	incineration	ETP 3	incinerator not ready at TNWML site	
33		**Discarded containers**						
		FeCl3 carbuyos	200 nos	tender process	near ETP 3	Being sold after cleaning		

6.INDIAN ADDITIVES LTD.

Hazardous			
Name	**Authorized quantity**	**Waste generation (Tons/year) Jan'09 to Dec'09**	**Treatment & disposal mechanism**
20.3 Distillation residue	800	306.453	Sent to disposal through PCB authorized agency
5.1 Used/ Spent oil	100	64.0	Sent for recycling through PCB authorized agency.
5.2 Wastes/ residues containing oil	7.0	5.325	Sent to disposal through PCB authorized agency
4.5 Chemical sludge from waste water treatment	10	8.4	Collected & stored. Applied for disposal authorization.
34.2 Toxic metal containing Residue from used ion exchange material in water purification	0.5	0.5	Collected & stored. Applied for disposal authorization.
33.3 Discarded Containers	2500 Nos	1909	Sent for recycling through PCB authorized agency.

7.KOTHARI PETROCHEMICALS LTD

Non-Hazardous	**HAZARDOUS**			
Not Applicable	**Name**	**Waste generation** (Tons / Year) **JAN-08—DEC-08**	**Waste generation** (Tons / Year) **JAN-09—DEC-09**	**Treatment & disposal mechanism**
	Used / Spent oil	0.573	1.11	Collection, Storage & disposal to TNPCB Authorised parties

8. MADRAS FERTILIZERS LTD

Hazardous

Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Spent catalyst(18.1) (actual stock as on 31.03.2010) Spent oil (5.1) (actual stock as on 31.03.2010) Oil soaked cotton(5.2) Stock (actual stock as on 31.03.2010) HW empty drums(33.3) (actual stock as on 31.03.2010)	100 MT 119.6 MT 40 MT NIL 1.5 MT NIL 100 barrel NIL	Stored in ear marked location in steel drums with lid in impervious ground without causing pollution to Air, Water and soil and Sold to vendors authorised by CPCB thru' MSTC As per HW act.

9.MANALI PETROCHEMICALS LTD – PLANT II

Spent oil – 5.1 , Maximum 4000 Liters /annum. Collected from various drives from Industrial activity

Hazardous			
Name	**Waste Generation (Tons/year) 2009 – 2010**	**Treatment & Disposal Mechanism**	**Accumulated Qty. (MT) as on 30.06.2010**
5.1 Used / Spent Oil	2770 Liters	Only given to TNPCB approved re-claimers	1821 Liters

10. MANALI PETROCHEMICALS LTD – PLANT I

Spent oil – 5.1 , Maximum 2000 Liters /annum. Collected from various drives from Industrial activity

Hazardous			
Name	**Waste Generation (Tons/year) 2009 – 2010**	**Treatment & Disposal Mechanism**	**Accumulated Qty. (MT) as on 30.06.2010**
5.1 Used / Spent Oil	1610 Liters	Only given to TNPCB approved re-claimers	330 Liters

11. PETRO ARALDITE LTD.

Non-Hazardous	Hazardous

Not Applicable	**Name**	**Waste generation (Tons/year) Apr – 09 to Mar - 10**	**Treatment & disposal mechanism**	**Accumulated qty (MT) as on 30.04.2010**
	5.1 Used/spent oil	5.000	Sent to Authorized lube oil recyclers like M/s Quality lube products Ltd, Chennai	1.508
	20.2. Spent solvents	20.000	Sent to Authorized recycler for spent solvents like M/s East coast organics, Chennai	14.403
	23.1. Wastes/residues (not made with vegetable or animal materials)*	60.000	Authorized by Board to dispose in cement kilns.	34.947
	35.1. Filter and filter material with organic compounds	70.000	Authorized by Board to dispose in cement kilns.	26.292
	33.3. Discarded containers / barrels / liners used for hazardous waste / chemicals	11000 Nos. 205 Ltrs barrels. 3000 Nos. 25 / 35 ltrs container per year	Sent to Authorized recycler for discarded barrels and containers like M/s Muthu trading company, Chennai.	8407 Nos. 205 Ltrs barrels. 1500 Nos. 25 / 35 ltrs container
	36.1. Ash from incineration of hazardous waste,flue gas cleaning residue	1.881	Disposal to TNWML, Gummidipoondi	1.881
	15.1. Asbestos containing residue	1.460	Disposal to TNWML, Gummidipoondi	1.460

12. SRF LIMITED.

Hazardous		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Spent Oil	14	Disposed to authorized recyclers
Wasted residue containing oil	4	Disposed to authorized recyclers
Tarry Residue Depoly Cracker	36	Stored
Waste residue from Dipping plant	60	Stored
Chemical Sludge from ETP including RO Reject	30	Disposed to TSDF

4.3.1.2 Biomedical Waste

The details of Bio Medical waste generation from the industry are stated in the table.

Sr No	Name of the Industry.	Quantity of bio Medical waste	Disposal
1	Chennai Petroleum Corporation Limited.	19.7 Kg/M	Segregated at sources and given to authorized BMW disposal facility.
2	Indian Additives Ltd.,	10-12 Kg/A	Sent to near by tie-up hospital.
3	Petro Aradite.	6-7 KG/A	Sent to near by tie-up hospital.
4	TPL – ECH PLANT	1.0 Kg / month	Segregated at sources and given to authorized BMW disposal facility
5	TPL – HCD PLANT	1.0 Kg / month	Segregated at sources and given to authorized BMW disposal facility
6	TPL – LAB PLANT	1.0 Kg / month	Segregated at sources and given to authorized BMW disposal facility

4.3.1.3 Electronic Waste:

Electronic waste such as components 100 Nos/ year are collected by CPCL & sent to authorized recycler. Madras Fertilizers Ltd, Petro Araldite Pvt Ltd, India Additives Ltd are also sent the e-waste to authorized recycler.

4.3.1.4 Municipal solid waste/Domestic Waste/Sludges from ETPs /CETPs / STPs and other industrial sources.

TPL – ECH PLANT

ETP sludge is disposed to Brick Manufacturers and STP bio sludge is used as manure.

Non Hazardous (2008-09)		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Lime sludge	3135 MT	Taken by brick manufacturer.

TPL – HCD PLANT

ETP sludge is disposed stored in pits.

Non Hazardous		
Name	Waste generation (Tons/year) in 2008 -09	Treatment & disposal mechanism
Brine sludge	1500 MT	Stored in pits and landfill

CHENNAI PETROLEUM CORPORATION LTD

Non Hazardous		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Paper waste	10	Collected in warehouse bin & Disposed by tendering
Dust Bin collections	10	Disposed to Manali Municipal yard
Scrap iron etc	100	Disposed by tendering
Used containers of HDPE/Plastic	10	Disposed by Tendering

MADRAS FERTILIZERS LTD

Domestic waste from Canteen are buried in composting pits and after sufficient period for composting these materials are used as manure for our gardens.

Lime Softner Sludge from TTP of about 2000 MT /Annum – Disposed through land filling inside the premises. Bio Sludge of about 5 T/annum from sewage clarifiers are dried & used as Manure.

Non Hazardous		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Wood scrap	-	By auction
Spent lime	Total quantity	Dumped in ear marked impervious land area inside factory
Metal scrap	May be around 4 MT/day	By auction
Wet garbage	All put together	By composting in pits
Stationery		Shredding & selling

MANALI PETROCHEMICALS LTD – PLANT II

Non hazardous Waste collected from

A. Milk of Lime plant rejects. 846 MT/Annum

B. Sludge collected from PO Plant waste water prior to waste water treatment plant 1406.86 MT/Annum

Above rejects and sludge used for Brick manufacturing, Low-lying area land filling for green development.

Non-Hazardous			
Name	**Waste Generation (Tons/year) 2009 – 2010**	**Treatment & Disposal Mechanism**	**Accumulated Qty. (MT) as on 30.06.2010**
Milk of Lime Plant Rejects (Dry Basis)	994	Given to brick manufacturers, filling low lying areas for green belt development.	9 Tons
PO Plant Sludge form Solid separation unit (RVDF Dry Basis)	1586	Given to brick manufacturers, filling low lying areas for green belt development.	50 Tons.

MANALI PETROCHEMICALS LTD – PLANT I

Non hazardous Waste collected from

a) Milk of Lime plant rejects. 1744MT/Annum
b) Sludge collected from PO Plant waste water prior to waste water treatment plant 748 MT/Annum

Above rejects and sludge used for Brick manufacturing, Low-lying area land filling for green development

Non-Hazardous

Name	Waste Generation (Tons/year) 2009 – 2010	Treatment & Disposal Mechanism	Accumulated Qty. (MT) as on 30.06.2010
Milk of Lime Plant Rejects (Dry Basis)	7785	Given to brick manufacturers, filling low lying areas for green belt development.	6 Tons
PO Plant Sludge form Solid separation unit (RVDF Dry Basis)	765	Given to brick manufacturers, filling low lying areas for green belt development.	40 Tons.

SRF LIMITED ; The waste is recycled in their unit itself

Non Hazardous		
Name	Waste generation (Tons/year)	Treatment & disposal mechanism
Polymer	12	Recycled in Depoly
Yarn Waste	90	Recycled in Depoly
Cord Waste	110	Recycled in Depoly

4.3.1.5 Plastic Waste:

No plastic waste generation from Industries since all the industries are banned the use of plastic inside the industrial complex.

4.3.1.6. Quantification of wastes and relative contribution from different sources.

S. No	Type of Waste	Quantity / year
1.	Hazardous Waste **1.** Reprocessable (Fuel) **2.** Incinerable /co-processable in cement kiln **3.** Landfillable. **4.** Recyclable	 6000 MT/Annum 1634 MT/Annum 3875 MT/Annum 812 MT/Annum
2.	Bio Medical Waste	
3.	Electronic Waste	1.2 T/Y
4.	Plastic Waste	Nil

4.3.2. Identification of waste minimization and waste exchange options.

1. TPL – ECH PLANT

A trial run is being done by using an environment friendly coagulant in place of Ferric chloride in the Flocculation tank of ETP to improve colour and reduce COD level. Based on the trial run being carried out in ETP, the generation of ETP sludge will also get reduced.

2. TPL – LAB PLANT

Advance process control' up gradation ensures more stable operation resulting in minimization of CaF2 sludge generation

3.CHENNAI PETROLEUM CORPORATION LTD

Adoption of new Technology for sludge minimization

4. INDIAN ADDITIVES LTD

- Usage of High Reactive Poly Iso Butylene in place of conventional Poly Iso Butylene as raw material has resulted in more yield of product and less solid waste generation.

- Usage of high purity lime reduced solid waste generation and better yield of product.

- Process technology up gradation reduces process sediment which in turn improves filtration yield per run. This has resulted in reduction of solid wastes generation by around 30%.

5. MADRAS FERTILIZERS LTD

By optimizing operational parameters the life of Catalyst has been increased thus increasing the life of Catalyst which in turn reduced the Hazardous Waste spent Catalyst generation.

The spent Catalyst generated are sold to co – processors for recycle.

6. MANALI PETROCHEMICALS LTD – PLANT II

Identified and implemented / Indigenous lime having purity of 60 to 65%. We are using imported lime with high purity of 90%.In this way waste minimization and waste reduction done in MPL

7. MANALI PETROCHEMICALS LTD – PLANT I

Identified and implemented/ Indigenous lime having purity of 60 to 65%. We are using imported lime with high purity of 90%.In this way waste minimization and waste reduction done in MPL

4.3.3 Reduction/Reuse/Recovery/Recycle options in the co-processing of wastes.

TPL – ECH PLANT: Waste oil is used as fuel in heaters at LAB plant.

TPL – HCD PLANT: Waste oil is used as fuel in heaters

TPL – LAB PLANT :Waste oil is used as fuel in heaters ,Slop oil is used as fuel in heaters & Spent catalyst is sent for recovery of precious metal.

CETEX PETROCHEMICALS LTD: By products are sold as value added products & Spent catalyst is sent for recovery of precious metal.

CHENNAI PETROLEUM CORPORATION LTD: Use of sludge in cement kiln is proposed

INDIAN ADDITIVES LTD: Trial plans made for co-incinerating incinerable hazardous wastes in cement industries for recovering energy and mass.

KOTHARI PETROCHEMICALS LTD:STP sludge is being reused as manure.

4.3.4. Infrastructure facilities;-

4.3.4.1 Existing TSDF / Incineration facilities

About 25 kms from Manali complex a common Hazardous waste Treatment Storage and disposal Facility (CHWTSDF) has been established at the site identified in SIPCOT Industrial complex, Gummidipoondi , Thiruvallur District in 26 acres extent of land at the cost of Rs.45 crores as per CPCB Guidelines. The landfill facility of one Lakh ton per year capacity is under operation from January 2008. The Incineration facility of 1 ton per hour capacity has just been installed and it is under Trial Run.

4.3.4.2.Present Status / Performance and Need of upgaradation of existing facility including enhancement of facility

The cell 1 of the Phase-I of the existing Landfill facility at CHWTSDF, Gummidipoondi has been exhausted its capacity of 50 thousand tons in last April 2010 and capping of the cell 1 is to be undertaken. The cell 2 of phase-I has been established and is in operation now. Commercial operation of Incineration facility is to be carried out.

4.3.4.3.Treatment and Management of contamination of waste disposal site

No contaminated waste disposal site is identified and required decontamination in Manali Industrial Complex.

4.3.4.4 – Impact on CEPI score after proper management of Solid Wastes.

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	2	5	10	7.75	3	3	13.75	3	4.75	5	19.25	15	58
During 2009-10	2	5	10	2	3	0	5	3	1	5	8	15	38
After Shorterm & Longterm Measure	3	5	15	1	0	0	1	3	1	5	8	10	34

CHAPTER – 5

PPP MODEL

5. PPP Model

5.1 Identification of project proposals (for both the options i.e., technology intervention and infrastructure renewal) for implementation under the PPP mode under the Action Plan.

- Adequate storm water drains to be provided with in the Manali Industrial Complex with proper disposal facility.
- The road facility connecting the Manali Industrial Complex has to be strengthened and widened to by considering the present traffic condition.
- The road connecting Manali service road to be repaired and maintained.
- The lighting all along the roads of Manali Industrial Complex .
- The ponds located in the surrounding area of the industrial complex has to be de silted in order to preserve the water sources.
- The Buckingham canal has to be preserved.
- Reduction of SO_2 by introducing advanced process control of optimizing the use of raw materials of petroleum feed stock by M/s Tamilnadu Petro products Limited (LAB Project) .
- Reduction of SO_2 and RSPM in furnace oil emission by mixing the by products light polymer with furnace oil as it contain nil sulphur and as content proposed by M/s Kothori Petrochemicals Limited.

5.2 Identification of stakeholders / agencies to be involved and to evolve financial and managerial mechanisms for implementation of PPP projects.

The existing infrastructure facilities provided by the industrial units for their own use has to be maintained by the concern industries and hence the cost involving for the monitoring, and revamping of the same has to be beard by them. The cost required to up grade the common existing infrastructure such as lighting of roads, strengthening of roads , desilting of ponds, and other water resources has to be provided by the concern authority of the State Government.

CHAPTER – 6

OTHER INFRASTRUCTURAL RENEWAL MEASURES

6. Other Infrastructural Renewal measures:

6.1 Green belt: Statement showing the details of green belt developed, and proposed to be developed in Manali Industrial Complex is given below.

S. No.	Name of the Industry	No of green belt developed, total area
1.	Cetex Petrochemicals Ltd	Existing - 45 acres
2.	Chennai Petroleum Corporation Ltd	6000 trees are existing. Proposed to develop additional trees.
3.	Futura Polyesters Ltd	100 acres
4.	Indian Additives Ltd	10 acres. Continuous focus is being made on green belt development.
5.	Kothari Petrochemicals Ltd	2.5 hectares, further development is under progress.
6.	Madras Fertilizers Ltd	30 acres, 7000 trees are available at present and 310 saplings will be planted during Sep-Oct,2010.
7.	Manali Petrochemicals Ltd-Plant I	Total saplings planted inside and outside the premises is 2280 up to March,2011.
8.	Manali Petrochemicals Ltd-Plant II	Total saplings planted inside and outside the premises is 1765 up to March,2011.
9.	Petro Araldite Ltd	Proposed to develop additional green belt in and around the factory premises
10.	SRF Ltd	Proposed to develop additional green belt in and around the factory premises.

11.	Tamilnadu Petrochemicals Ltd-ECH	Proposed to develop additional green belt in and around the factory premises.
12.	Tamilnadu Petrochemicals Ltd-HCD	Proposed to develop additional green belt in and around the factory premises.
13.	Tamilnadu Petrochemicals Ltd-LAB	Proposed to develop additional green belt in and around the factory premises.

6.2 . Development of Industrial Estate: This is an existing industrial complex, new industries and expansion activities are planned in undeveloped areas systematically.

6.3. Shifting of Industries: Manali Industrial area is classified as Industrial Estate developing petro chemical industries, with CEPI rank 76.32.

CHAPTER – 7

SPECIFIC SCHEMES

7. Specific Schemes

7.1 GIS-GPS system for pollution sources monitoring:

GIS – GPS system for pollution source monitoring has not been implemented. But CPCL is planned to introduce GPS monitoring for AAQM station TNPCB is also planned to introduce GPS system for hazardous waste vehicle moments.

7.2 Hydro-geological fracturing for water bodies rejuvenation

CPCL discharging 100 KLD of RO reject into Buckingham canal runs adjacent to the manali industrial area running parallel to the Coromandel Coast of South India for 420 km. The first segment of the canal was constructed in 1806, from Chennai north to Ennore. The canal was formerly used to convey goods up and down the coast to Chennai.

Within the city of Chennai the Buckingham Canal is badly polluted from sewage and industrial effluent, and the silting up of the canal has left the water stagnant.
Five industries are discharging their treated effluent to the Bay of Bengal at two location Kathivagam & Thiruvottiur respectively through two individual pipelines laid by manali petrochemicals. After conducting a detailed EIA studies, MPL is planned to renew the existing pipelines and to discharge the treated effluent in single point at bay of Bengal near Thiruvottiur.

7.3 In-site remediation of sewage: Sewage effluent of 1940 KLD generated from industries is treated in their In-site treatment plant and the treated sewage is reused in green belt and in process.

7.4 Utilization of MSW inert by gas based brick kilns: There is no specific scheme in this regard.

7.5 Co-processing of wastes in cement industries

M/S.CPCL, M/S.IAL, M/S.Petro Araldite Private Limited, M/S.SRF Limited are generating incinerable hazardous solid waste. All industries are proposed to send their waste for co-process in cement kilns as fuel/ raw mix for which trial runs are be carried out.

CHAPTER – 8

PUBLIC AWARENESS AND TRAINING PROGRAMMES

8. Public Awareness and training program

In Manali Industrial complex, public awareness and training program are conducted regularly by various industries. Training is imparted to the employees of industries. Further off site, on site emergency preparedness plans and mock drills are regularly conducted in Manali Town periodically. Awareness on environment protection has also educated to the school children,

Environment Training Institute of the Tamil Nadu Pollution Control Board is conducting various training programme in the field of environmental issues, such as Hazardous waste management, Air quality monitoring, Water quality monitoring, Bio Medical Waste, Municipal solid waste Management, etc. The employees in Manali industries are regularly participated in such training programme.

CHAPTER – 9

OVERALL IMPACT - CEPI SCORE

9. Overall Impact of installation/commissioning of pollution control equipment Measures on the CEPI Score.

The consolidated report arriving the CEPI Score for the Water Environment, Air Environment, and for the solid waste management are stated below.

Impact on CEPI score after installation /commissioning of full fledged air pollution control system

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	5	5	25	6	3	3	12	3	4	0	12	15	64
During 2009-10	3	5	15	7.5	3	0	10.75	3	4	5	17	15	57.75
After Short-term & Long - term Measures	5	5	25	1	0	0	1	3	1	5	8	10	44

Impact on CEPI score after installation /commissioning of full fledged Water pollution control system

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	3	5	15	8	3	3	14	3	5	5	20	10	59
During 2009-10	3	5	15	8	3	0	11	3	5	5	20	10	56
After Short-term & Long -term Measures	3	5	15	1	0	0	1	3	1	5	8	10	34

Impact on CEPI score after proper management of Solid Wastes.

Detail	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Score
As per CPCB Notification	2	5	10	7.75	3	3	13.75	3	4.75	5	19.25	15	58
During 2009-10	2	5	10	2	3	0	5	3	1	5	8	15	38

After Short-term & Long-term Measures	3	5	15	1	0	0	1	3	1	5	8	10	34

Overall Impact of Installation / commissioning of pollution control equipment / measures on the CEPI Scores

Sl. No	Details	Air	Water	Land	CEPI Score
1	As per CPCB Notification	64	59	58	76.32
2	During 2009-10	57.75	56	38	66.74
3	After Shor term & Long term Measures	44	34	34	50.74

As per the analyses made, it is inferred that, on implementation and commissioning of full fledged air pollution control system , Water pollution control system, proper solid waste management, and improving & revamping the exiting infrastructural system the **CEPI score will be reduced to 50.74.**

CHAPTER – 10&11

ASSESSMENT OF TECHNO ECONOMICAL FEASIBILITY OF POLLUTION CONTROL SYSTEM IN THE CLUSTERS OF SMALL/MEDIUM SCALE INDUSTRIES

10. Assessment of Techno- economical feasibility of pollution control system in the clusters of small/medium scale industries.

The manufacturing activities of petroleum and petrochemical products, are complex process and such activities can not be carried in small scale. Further no small scale industry is located in the Manali Industrial Complex.

CHAPTER – 11

BIO COMPOST AND

BIO FERTILIZER

11. Efforts shall be made to encourage use of Bio Compost and bio fertilizer along with the chemical fertilizer in the state to minimize the unutilized chemical fertilizer run-off in to the natural water resources from the agriculture fields (through Govt Policy)

There is no agricultural activity carried out even in the impact zone around the Manali Industrial Complex. Further no such steps mentioned have been taken to minimize the unutilized chemical fertilizer run-off in to the natural water resources from the agriculture fields.

CHAPTER – 12

SUMMARY OF PROPOSED ACTION POINTS

12.1 Short Term Action Points. The detailed action points in all three matrices are elaborated industries wise in table 12.1

Table 12.1

1. Chennai Petroleum Corporation Limited(CPCL)

S.No	Action Points (including source & mitigation measures)	Responsible Stack Holders	Time limit	Cost Rs Crore
1	Zero discharge of Effluent to Buckingham canal	CPCL	Aug 2011	2
2	Consistency in Effluent quality as per New MINAS Revamp of DAF unit in ETP-2	CPCL	Dec'10	15
3	Conversion of open surge pond in ETP-1 and ETP-2 to closed tanks conversion ETP-2 surge pond to closed tanks	CPCL	Sept' 11	15
4	In-situ sludge treatment in crude tanks	CPCL	Dec' 10	1
5	Mobile Ambient Air Quality monitoring station AAQ monitoring & Control as per new schedule	CPCL	Dec'10	10
6	Linking AAQM/CSM with TNPCB one AAQM station already linked thro' internet	CPCL	Dec' 11	0.5
7	Provision ACF for VOC adsorption ETP-2 and 3	CPCL	Sept' 11	2
8	Fugitive emission inventory	CPCL	Nov' 10	0.25
9	Oil Sewage system identification & rectification	CPCL	Dec' 10	1
10	Provision of additional sludge pit	CPCL	Sep' 10	3
11	Use of GPS / GIS for air quality monitoring	CPCL	Dec' 10	1

2. Madras Fertilizers Limited

Sl. No.	Action Points (including source & mitigation measures)	Responsible Stake Holders	Time limit	Cost Rs in lacs
1	Installation of Ammonia sensors with uploading facility to TNPCB server	MFL	One sensor before Oct 2010. Eleven sensors before Dec 2010.	80
2	Installation of one Stack Monitor with uploading facility to TNPCB server	MFL	Before March 2011.	100

3.Tamilnadu Petrol Products – ECH

S.No	**Action points (including source & mitigation measure)**	**Responsible stake holder**	**Time limit**	**Cost**
1	Online sensors for monitoring chlorine is provided and monitoring data has been uploaded to TNPCB server from 15.07.2010	TPL – ECH Plant	Completed.	4.0 Lakhs
2	Decided to conduct AAQ survey as per the new AAQS for the parameters specific to the unit	TPL – ECH Plant	Sep 2010	1.0 lakhs
3	Apart from the unit's internal periodic monitoring, environmental monitoring frequency will be enhanced through accredited laboratory	TPL – ECH Plant	2010-11	2.5 Lakhs
4	As advised by TNPCB, the marine impact study will be conducted either jointly with M/s. MPL or stand-alone.	TPL – ECH Plant	Dec-2010.	5.0 Lakhs
5	A trial run is being done by using an environment friendly coagulant in place of Ferric chloride in the Flocculation tank of ETP to improve colour and reduce COD level.	TPL – ECH Plant	Sep-2010	2.0 Lakhs

6	Based on the trial run being carried out in ETP, the generation of ETP sludge will also get reduced.	TPL – ECH Plant	Sep-2010	2.0 Lakhs / annum
7	Proposed to develop additional Green belt in and around the factory premises	TPL – ECH Plant	March 2011.	2.5 Lakhs

4. Tamilnadu Petrol Products – HCD

S.No	Action points (including source & mitigation measure)	Responsible stake holder	Time limit	Cost
1	By effecting a modification in chlorine cylinder filling system.	TPL – HCD	March 2011.	30.0 lakhs
2	Continuous monitoring system for the parameters chlorine in WAD stack, HCl vapor in HCl production Unit and, PM, SO_2, NOx, and CO in CPP will be provided and data will be uploaded to TNPCB server.	TPL - HCD	Sep 2010	5.5 lakhs
3	Decided to conduct AAQ survey as per the new AAQS for the parameters specific to the unit and based on the report further action will be taken.	TPL - HCD	Sep 2010	1.0 lakhs
4	Apart from our periodic monitoring, environmental monitoring will be carried out through accredited laboratory also.	TPL -HCD	March 2011	2.5 Lakhs/Yr
5	Entire quantity of treated effluent is used in TPL – ECH plant process, thus by achieving zero discharge.	TPL -HCD	Continuous	----

6	As per SCMC observations and subsequent directive from TNPCB, integrity assessment study of Mercury bearing sludge storage pit has been conducted by Prof. Dr.S.Mohan of M/s. NITTTR, Chennai & has advised the following measures to strengthen the sludge storage pit: 1) To construct the containment wall below ground level on the western side to evade ground water flow. 2) Brick retaining wall to be constructed at the suggested locations. 3) Protective LDPE top layer with drain facility to be provided to prevent water stagnation. The recommendations specified in the report, will be implemented during the financial year 2010-11.	TPL -HCD	March 2011	84.0 Lakhs
7	To confirm classification under 'Non-Hazardous' category, Brine sludge generated from the existing Membrane cell process has been sent to Centre for Environmental Management, NITTTR, Chennai for analysis, the report of which will be submitted upon receipt.		Sep 2010	Financial investment 1.5 Lakhs

5.Tamilnadu Petrol Products – LAB

S.No	Action points (including source & mitigation measure)	Responsible stake holder	Time limit	Cost
1	Online sensors for monitoring $PM_{2.5}$ will be provided and monitoring data will be uploaded to TNPCB server.	TPL – LAB Plant	Sep 2010	6.0 Lakhs

2	Online sensors for monitoring Benzene will be provided and monitoring data will be uploaded to TNPCB server.	TPL – LAB Plant	Sep 2010	12 lakhs
3	'Advance process control' up gradation ensures reduction in fuel oil consumption and consequent reduction in SO2 emission.	TPL – LAB Plant	2010 – 2011	11.0 lakhs
4	Continuous monitoring system along with data uploading facility for 3 stacks attached to Captive Power Plant will be provided and data will be connected to TNPCB server	TPL – LAB Plant	Sep 2010	25 lakhs
5	Decided to conduct AAQ survey as per the new AAQS for the parameters specific to the unit and based on the report further action will be taken.	TPL – LAB Plant	July 2010	1.0 lakhs
6	Apart from the unit's internal periodic monitoring, environmental monitoring frequency will be enhanced through accredited laboratory.	TPL – LAB Plant	March 2011	2.5 Lakhs / annum
7	Entire quantity of treated effluent is used in TPL – ECH plant process, thus achieving zero discharge.	TPL – LAB Plant	Continuo us	
8	'Advance process control' up gradation ensures more stable operation resulting in reduction in CaF2 sludge generation.	TPL – LAB Plant	March 2011	11.0 lakhs
9	Hazardous waste is being transported to the authorized Landfill facility for permanent disposal.	TPL – LAB Plant	March 2011	10.0 Lakhs
10	Proposed to develop additional Green belt in and around the factory premises	TPL – LAB Plant	March 2011.	2.5 Lakhs

6. Manali Petro Chemicals – I

S. No	Action Points (including source & mitigation measures)	Responsible stake Holders	Time limit	Cost
1	To reduce SPM level in the boiler stack Retrofit burner	MPL	Within a year	Rs 25 lakhs
2	To reduce SO2 level in the boiler stack.	MPL	With in a year	Rs 20 lakhs
3	- Discuss with oil companies - Provide scrubber	MPL MPL	With in a year	Rs 25 lakhs
4	Ambient Air quality SPM levels	MPL	With in a six months	Rs 1.0 crore
5.	Renewal of DG sets	MPL	With in a year	Rs 6.0 to 8.0 crores
6.	Treated effluent Disposal line to sea		With in a year	Rs 3.0 lakhs
7.	Rain Water collection system at Solid waste collection area and route the rain water to Bio – reactor system. Installation of Ambient Chlorine , SPM, Two VOC monitoring system and data uploading to TNPCB		With in a year	Rs 10. lakhs

7. Manali Petro Chemicals – II

S. No	Action Points (including source & mitigation measures)	Responsible stake Holders	Time limit	Cost

1	Ambient Air quality SPM levels	MPL	With in a year	Rs 25 lakhs
2	Renewal of DG sets	MPL	Installed	Rs 1.0 crore
3	Treated effluent Disposal line to sea	MPL	With in a year	Rs 6.0 to 8.0 crores
4	Rain Water collection system at Solid waste collection area and route the rain water to Bio – reactor system.	MPL	With in a six months	Rs 3.0 lakhs
5	Installation of Ambient Chlorine , SPM, Two VOC monitoring system and data uploading to TNPCB	MPL	With in a year	Rs 10. Lakhs
6	Provision of landscape green belt on accumulated sludge	MPL	With in a year	Rs 10. Lakhs

8.Balmer & Lawrie & Co Ltd.,

S. No	Action Points (including source & mitigation measures)	Responsible stake Holders	Time limit	Cost
1	Effluent Treatment Plant: We are taking action for refurbishing of Sewage treatment plant to the tune.	B&L	One year	Rs 6 Lacs
2	Stack monitoring station We would be installing one No of stack emission monitoring station by end of June 2010	B&L	June 2010	June 2010
3	We have got the authorization from TNPCB for disposal. We will be disposing the accumulated ETP Sludge of 22000 Kgs	B&L	within one year.	

9. Supreme Petrochemicals Ltd.,

	Action Plan	Category	Target date	
1	Connect the existing TVOC analyser to TNPCB	SPL	July 10	Financial investment – Rs 6 Lakhs
2	Connect the existing analyser to TNPCB	SPL	July 10	Financial investment – Rs 14 lakhs
3	Existing practice - Trade effluent of 250 KLD recycled as per enclosed H2O balance Study for further improvements is under progress	SPL	Completed Dec 10	Financial investment – Rs 50 lakhs
4	Separate space is provide to store hazardous waste Study for further reduction in hazardous waste generation is under progress	SPL	completed Dec 10	Financial investment – Rs 5 lakhs Technology intervention
5	Rain water harvesting is being done in the plant to collect rain water and recharge it in to the ground	SPL	completed	Financial investment – Rs 2 lakhs
6	Planted 600 trees and the company is proposing to increase greenery coverage by planting 300 more trees on the road side along near highway	SPL	Continuous	Financial investment – Rs 20 lakhs

10. Kothari Petrochemicals Ltd.,

S. No	Action points(Including source mitigation measures)	Responsible stakeholders	Time limit	Cost	Remarks
1	For further reduction of SOx and SPM from boiler stack from existing level	Unit head	Nov-2010	0.5 Lakhs	

11. Futura Polyesters Ltd.,

S. No	Action points(Including source mitigation measures)	Responsible stakeholders	Time limit	Cost
1	Install online SPM monitor in biomass boiler and linking with PCB. Bag filters cleaning frequency will be increased	Futura Polyesters	Jul-10	Investment - Rs.4 lakhs
2	Make sure all effluents to ETP goes only through separate pipes to avoid land contamination.	Futura Polyesters	Sep-10	-
3	Energy audit will be conducted to bring down the power and other utility consumption	Futura Polyesters	May-11	-
4	To provide closed sheds for all wood chippers to bring own the ambient noise level	Futura Polyesters	Oct-10	

12. SRF Limited – TTBM

S. No	Action Plan	Responsible stakeholders	Time limit	Cost
1	1. To shift the MDC before bag filter in boiler 2. To extend the shed flooring, Ash yard Fabrication, Dumping Fly Ash In new Storage Yard. 3. Dispose the ash from new ash storage yard, make the agreement with ash disposal vendor, Shed to cover the entire Husk Storage area.	SRF	Jul-2010	Rs 1.3 Lacs Rs. 9.5 Rs. 5 Lacs
2	To provide on line stack monitoring of SPM in boiler and heater chimney	SRF	Jul-2010	Rs. 3.5 Lacs

3	To dispose cracker Residue and Latex.	SRF	Jun' 2010	-
4	Revamping of ETP sludge pit	SRF	Dec'2010	Rs. 1.24 Lacs

13.Indian Additives Ltd.,

S.No	Action Points (including source & mitigation measures)	Responsible Stake Holders	Time limit	Cost
1	Implementing dry cleaning methods in plant area for minimizing oil & grease levels in effluent	Industry	Continuous	Nil
2	Installation and running of vacuum pump instead of ejectors for minimizing high COD effluent generation from process.	Industry	Aug'10	Rs.50 lakhs
3	Installation of additional oil skimmer in effluent treatment plant for minimizing the oil content in effluent	Industry	Nov'10	Rs.5 lakhs
4	Installation of additional aspirator in ETP for improving outlet water BOD	Industry	Oct'10	Rs.6 lakhs
5	Provide online connectivity of H2S sensor and ambient VOC analyser to TNPCB	Industry	Jul'10	Rs.10 lakhs
6	Install continuous ambient air quality monitoring station for effective monitoring and control of ambient air quality levels as per new standards	Industry	Nov'10	Rs.80 lakhs
7	Provide analyzers for continuous monitoring of SO2 & NOx in thermic fluid heater and boiler stacks and connect it online to TNPCB	Industry	Nov'10	Rs.20 lakhs
8	Installation of ground water monitoring piezometers at specified depth within the factory area.	Industry	Nov'10	Rs.1 lakh

9	Increase covered hazardous wastes storage space area within factory	Industry	Dec'10	Rs.10 lakhs

12.2 Long Term Action Points (more than 1 year) The detailed action points in all three matrices are elaborated industries wise in table 12.2

Table 12.2

1. Chennai Petroleum Corporation Limited.

S.No.	Action Points (including source & mitigation measures)	Responsible Stake Holders	Time limit	Cost Rs. crore
1	Provision of disposing RORR reject in sea	CPCL	2012	3
2	Linking CSM to TNPCB		2011	2
3	Use on Natural gas in place of Low sulfur fuel oil		2012	5
4	Co-processing of Haz waste in cement plant		2012	2

2. Madras Fertilizers Limited

Sl. No	Action Points (including source & mitigation measures)	Responsi-ble Stake Holders	Time limit	Cost
1	Installation of one AAQMS with uploading facility to TNPCB server	MFL	Oct 2011	Rs 100 lacs
2	Installation of Four AAQMS with uploading facility to TNPCB server	MFL	Two in 2012 & Two in 2013.	Rs 400lacs
3	Installation of TWO Stack Monitors with uploading facility to TNPCB server	MFL	One in 2012 & One in 2013.	Rs 200 lacs

4	Installation of TWO Flare Monitors with uploading facility to TNPCB server	MFL	One in 2011 & One in 2012.	Rs 200 lacs

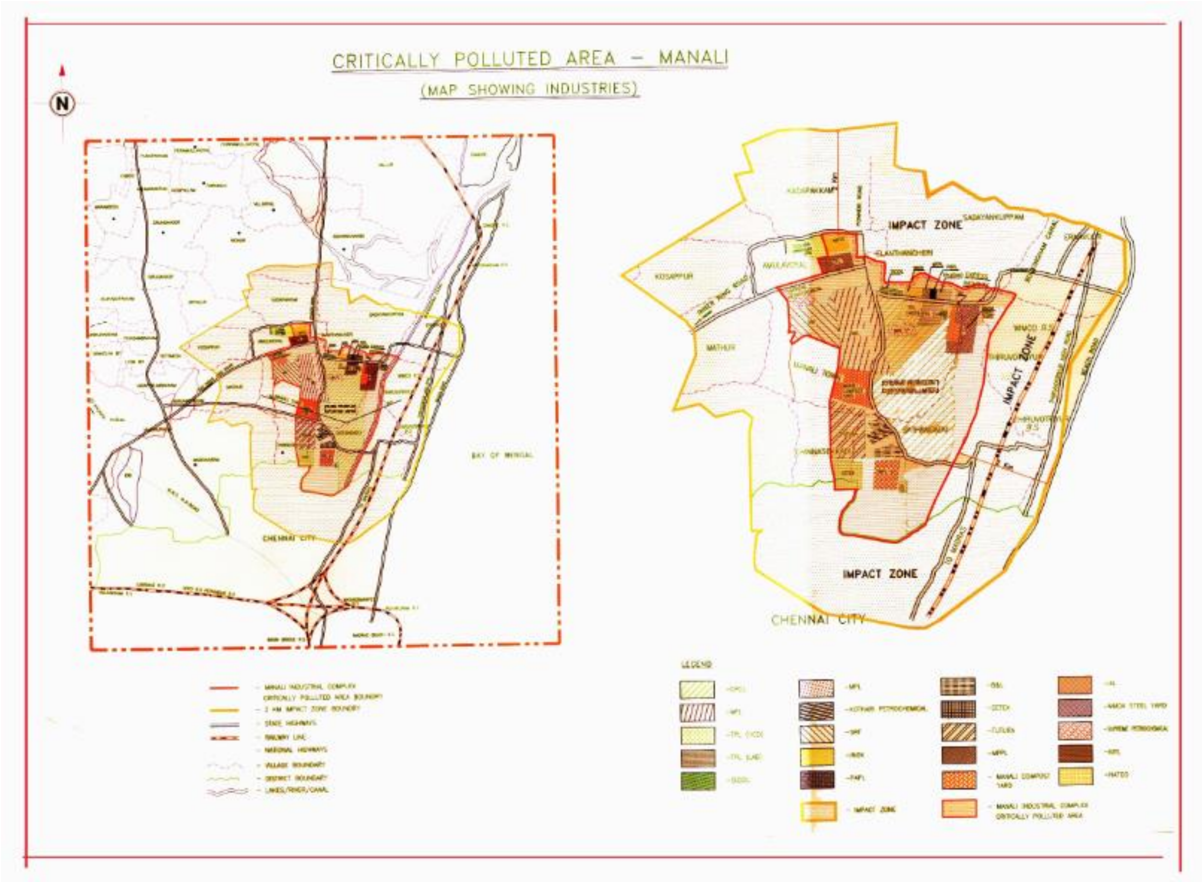
S.No	Action Points (including source & mitigation measures)	Responsible Stake Holders	Time limit	Cost
1	Installation of RO cum evaporation system for treating effluent water and reusing it for process	Industry	Sep'11	Rs.150 lakhs
2	Additional Greenery development in and around factory area	Industry	Mar'12	Rs. 2 lakhs
5	Conversion to LNG from Naptha feed stock	MFL	Before 2012	Rs 300 lacs.

3.Indian Additives Ltd.,

Cost Estimate for the Action Plan:

The cost estimate for action plan(short-term / long-term) prepared by the industrial units located in the Manali Industrial Complex is stated below.

Sl No.	Industry Name	Cost Estimate		
		Short-term Plan (Rs. in Crores)	Long-term Plan (Rs. in Crores)	Total (Rs.in Crores)
1	Chennai Petroleum Corpn. Ltd	50.75	12.0	62.75
2	Madras Fertilizers Limited	1.8	11.0	12.80
3	TPL – ECH	0.19	-	0.19
4	TPL - HCD	1.25	-	1.25
5	TPL – LAB	0.81	-	0.81
6	MPL- I	9.83	-	9.83
7	MPL – II	9.48	-	9.48
8	Balmer Lawrie & Co. Ltd.,	0.06	-	0.06
9	Supreme Petrochemicals Ltd.,	0.97	-	0.97
10	Kothari Petrochemicals Ltd.,	0.005	-	0.005
11	Futura Polyesters Ltd.,	0.004	-	0.006
12	SRF Limited	0.20	-	0.20
13	Indian Additives Ltd	1.82	1.52	3.34
	Total Cost	**77.17**	**24.52**	**101.69**



CRITICALLY POLLUTED AREA – MANALI
(MAP SHOWING INDUSTRIES)
N
IMPACT ZONE
IMPACT ZONE
IMPACT ZONE
CHENNAI CITY
LEGEND

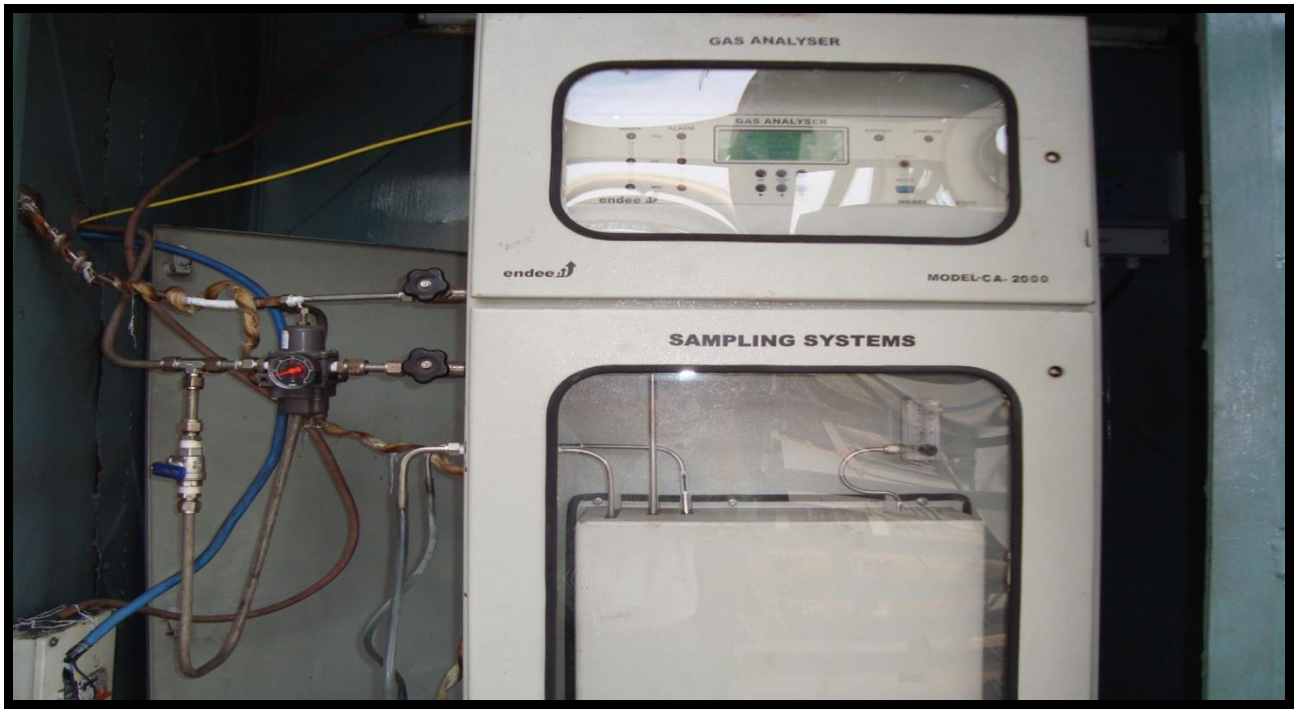
Photograph of Ambient Air Quality Station - Manali, Chennai

Pollution parameters monitored:

1. NH_3
2. NOx
3. SO_2
4. CO
5. H_2S
6. CH_4
7. Chlorine
8. TS
9. Wind Speed
10. Wind Direction
11. Temperature
12. Humidity

AMULAVOYAL CANAL

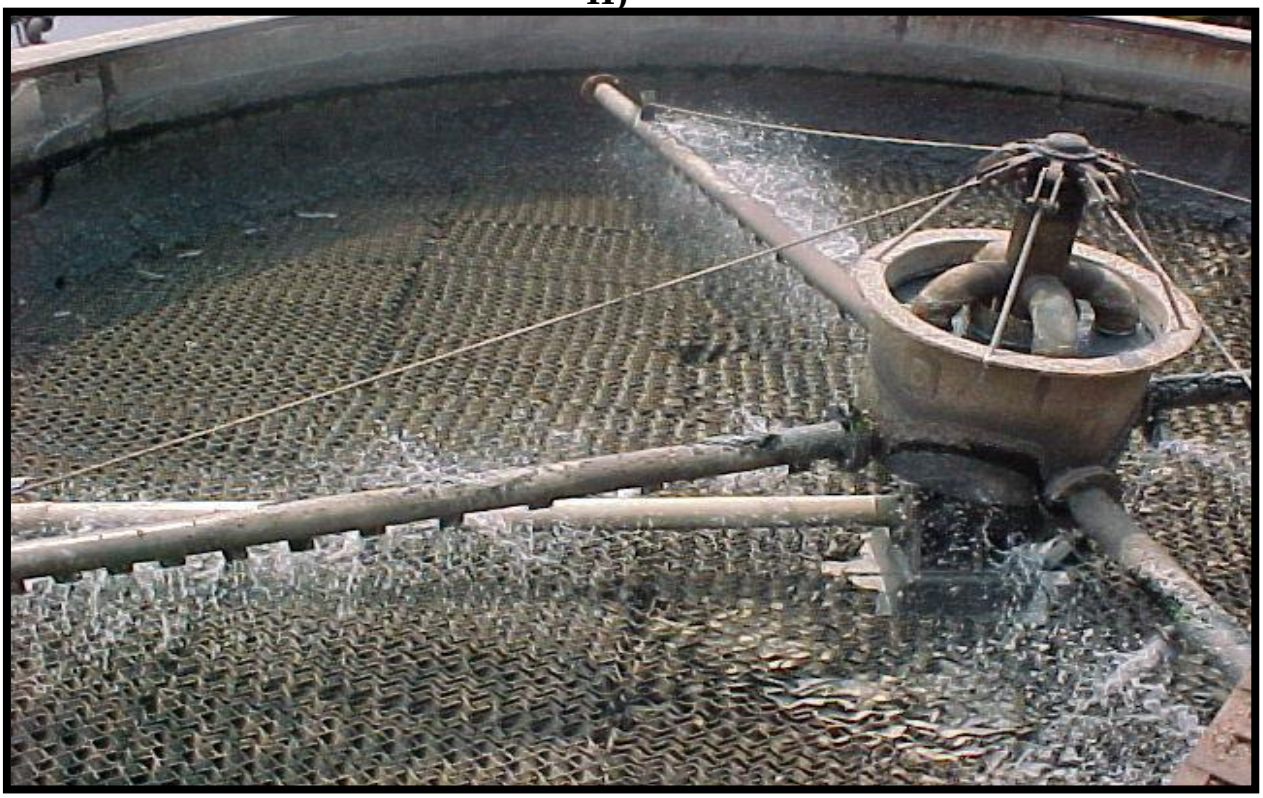
BUCKINGHOM CANAL



BOILER STACK CONTINOUS MONITORING SYSTEM AT MPL Plant-I

Stack Emission Monitoring online at M/s SRF Polymers

EFFLUENT SYSTEM - MANALI PETRO CHEMICALS LTD (PLANT – II)



VIEW OF NAAQM STATION AT MANALI

VIEW OF NAAQM STATION AT MANALI