M/s. HEMANI INTERMEDIATES PVT. LTD. (UNIT-IV)
PLOT NO. E-362 , GIDC ESTATE, DAHEJ-I,
TAL: VAGRA, DIST. BHARUCH – 392 130 (GUJ)

HEMANI
Group of Industries

REVISED ENVIRONMENTAL IMPACT & RISK ASSESMENT REPORT FOR PROPOSED PESTICIDE MANUFACTURING PLANT IN DAHEJ GIDC.

Summer, 2014

Prepared By:

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company

Aqua-Air Environmental Engineers P. Ltd.
403, Centre Point, Nr. Kadiwala School, Ring Road, Surat – 395002 (Guj.)

REVISED ENVIRONMENTAL IMPACT & RISK ASSESSMENT REPORT

CLIENT	**:**	**M/s. HEMANI INTERMEDIATES PVT. LTD. (UNIT-IV)** **PLOT NO. E-362 , GIDC ESTATE, DAHEJ-I,** **TAL: VAGRA, DIST. BHARUCH – 392130 (GUJ)**
PROJECT TITLE	**:**	**REVISED ENVIRONMENTAL IMPACT & RISK ASSESMENT REPORT FOR PROPOSED PESTICIDE MANUFACTURING PLANT IN DAHEJ GIDC**
PROJECT NO.	**:**	**447000**

Prepared By:

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Aqua-Air Environmental Engineers P. Ltd.
403, Centre Point, Nr. Kadiwala School, Ring Road, Surat - 395002

INDEX

SR. NO.	TITLE	PAGE NO.
INDEX		**1**
LIST OF TABLE		**7**
LIST OF FIGURE		**9**
TOR LETTER		**10**
COMPLIANCE OF TOR		**17**
1	**CHAPTER 1: INTRODUCTION**	
1.1	BACKGROUND	1-1
1.1.1	PROMOTERS& THEIR BACKGROUND	1-4
1.1.2	REGULATORY FRAMEWORK	1-5
1.1.3	JUSTIFICATION OF PROJECT	1-5
1.2	PROJECT SETTING	1-14
1.2.1	KEY INFRASTRUCTURAL FEATURES AND SETTLEMENTS	1-15
1.2.1.1	METHOD OF DATA PREPARATION	1-15
1.2.1.2	DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE	1-15
1.2.1.3	MAP OF KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS	1-16
1.3	PURPOSE OF EIA	1-19
1.4	OBJECTIVES OF EIA	1-19
1.5	METHODOLOGY FOR EIA	1-19
1.5.1	BASE LINE ENVIRONMENTAL CONDITION	1-19
1.5.1.1	AMBIENT AIR ENVIRONMENT	1-19
1.5.1.2	GROUND AND SURFACE WATER ENVIRONMENT	1-20
1.5.1.3	NOISE ENVIRONMENT	1-20
1.5.1.4	SOIL ENVIRONMENT	1-20
1.5.1.5	BIOLOGICAL ENVIRONMENT	1-20
1.5.1.6	SOCIO-ECONOMIC ENVIRONMENT	1-20
1.5.2	IDENTIFICATION OF POLLUTION SOURCE	1-21
1.5.3	EVALUATION OF POLLUTION CONTROL AND ENVIRONMENTAL MANAGEMENT SYSTEM	1-21

1.5.4	EVALUATION OF IMPACT	1-21
1.5.5	PREPARATION OF ENVIRONMENTAL MANAGEMENT PLAN	1-21
1.6	STRUCTURE OF REPORT	1-21
2	**CHAPTER 2: PROJECT DESCRIPTION AND INFRASTRUCTURAL FACILITIES**	
2.1	BACKGROUND	2-1
2.2	MANUFACTURING ACTIVITIES	2-1 to 2-24
2.3	RAW MATERIAL CONSUMPTION, STORAGE AND HANDLING	2-25
2.4	INFRASTRUCTURE FACILITIES	2-29
2.4.1	LAND	2-29
2.4.2	TRANSPORTATION FACILITIES	2-29
2.4.3	WATER AND WASTEWATER	2-29
2.4.3.1	TREATMENT PROCESS	2-32
2.4.4	AIR POLLUTION AND CONTROL SYSTEM	2-38
2.4.5	NOISE LEVEL AND CONTROL SYSTEM	2-39
2.4.6	HAZARDOUS WASTE GENERATIONS AND DISPOSAL SYSTEM	2-39
2.5	DETAILS OF UTILITIES	2-40
2.6	ELECTRICITY REQUIREMENT	2-40
2.7	FUEL REEQUIREMENT	2-40
3	**CHAPTER 3: BASELINE ENVIRONMENTAL STATUS**	
3.1	MICRO-METEOROLOGY OF THE AREA	3-1
3.1.1	TEMPERATURE DETAILS	3-2
3.1.2	RELATIVE HUMIDITY (RH)	3-3
3.1.3	RAINFALL	3-4
3.1.4	WIND SPEED	3-5
3.2	AIR ENVIRONMENT	3-10
3.2.1	DESIGN OF NETWORK FOR AMBIENT AIR QUALITY MONITORING LOCATIONS	3-10
3.2.2	METHODOLOGY FOR AMBIENT AIR QUALITY MONITORING	3-11
3.3	NOISE ENVIRONMENT	3-16
3.3.1	METHODOLOGY FOR NOISE MONITORING	3-16
3.4	WATER ENVIRONMENT	3-21

3.4.1	RECONNAISSANCE	3-21
3.4.2	METHODOLOGY FOR WATER QUALITY MONITORING	3-21
3.5	LAND ENVIRONMENT	3-28
3.5.1	METHODOLOGY FOR SOIL MONITORING	3-28
3.5.2	SOIL CLASSIFICATIONS	3-31
3.5.2.1	METHOD OF PREPARATION	3-31
3.5.2.2	DESCRIPTION OF SOIL CHARACTERISTICS AND AREA UNDER DIFFERENT SOIL TYPES	3-31
3.5.2.3	SOIL CHARACTERISTICS MAP	3-31
3.6	GEOLOGICAL DATA	3-33
3.6.1	METHOD OF PREPARATION	3-33
3.6.2	DESCRIPTION OF GEOLOGICAL CLASSIFICATION AND AREA UNDER DIFFERENT FORMATIONS	3-33
3.6.3	GEOLOGICAL MAP	3-33
3.7	LAND USE PATTERN	3-35
3.7.1	METHOD OF DATA PREPARATION	3-35
3.8	ECOLOGICAL INFORMATION	3-40
3.8.1	PHYSIOGRAPHY	3-41
3.8.2	FOREST	3-41
3.8.3	FLORA	3-42
3.8.4	FAUNA	3-45
3.9	SOCIO-ECONOMIC ENVIRONMENT	3-46
3.9.1	SETTLEMENTS AND DEMOGRAPHIC PATTERN	3-46
3.9.1.1	METHOD OF DATA PREPARATION	3-46
3.9.1.2	DEMOGRAPHIC DATA WITHIN THE REGION	3-46
3.9.1.3	LITERACY RATE	3-50
3.9.2	VEGETATION COVER AND FOREST BOUNDRIES	3-53
3.9.3	OCCUPATIONAL STRUCTURE	3-56
3.9.4	AMENITIES	3-56
3.10	GROUND WATER HYDROLOGY	3-60
3.11	DRAINAGE PATTERN	3-64
3.12	DIGITAL TERRAIN MODEL	3-65

4	**CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES**	
4.1	IDENTIFICATION OF IMPACTS	4-1
4.2	EVALUATION AND PREDICTION OF IMPACTS	4-8
4.2.1	WATER ENVIRONMENT	4-8
4.2.2	AIR ENVIRONMENT	4-9
4.2.3	NOISE ENVIRONMENT	4-18
4.2.4	HAZARDOUS WASTE DETAILS	4-18
4.2.5	INFRASTRUCTURE AND SERVICES	4-18
4.2.6	ENVIRONMENTAL HAZARDS	4-19
4.2.7	HOUSING	4-19
4.2.8	ECOLOGY	4-19
4.3	MATRIX REPRESENTATION	4-23
4.4	CONCLUSION	4-28
5	**CHAPTER 5: ENVIRONMENTAL MONITORING PLAN**	
5.1	ENVIRONMENTAL MONITORING PLAN	5-1
5.1.1	LABORATORY FACILITIES	5-3
5.1.2	DOCUMENTS & RECORDS	5-3
6	**CHAPTER 6: RISK ASSESSMENT & DMP**	
6.1	RISK ASSESSMENT	6-1
6.1.1	INTRODUCTION	6-1
6.1.2	APPROACH TO THE STUDY	6-1
6.1.3	METHODOLOGY	6-2
6.1.4	HAZARD IDENTIFICATION	6-4
6.1.5	CONSEQUENCE ANALYSIS	6-21
6.1.6	RISK ASSESSMENT SUMMARY	6-49
6.1.6.1	PROCESS SAFETY	6-49
6.1.6.2	FOR HAZARDOUS STORAGE TANK FARM	6-50
6.1.6.3	FOR DRUM STORAGE AREA	6-51
6.1.6.4	TRANSPORTATION	6-51
6.1.7	OTHER RISK REDUCTION OPPORTUNITIES	6-52
6.1.8	RECOMMENDATION OF ALARP	6-52

6.1.9	FIRE FIGHTING SYSTEM	6-54
6.2	DISASTER MANAGEMENT PLAN	6-55
6.2.1	DEFINING THE NATURE OF EMERGENCY	6-55
6.2.2	OBJECTIVES OF EMS	6-55
6.2.3	STRUCTURE OF EMERGENCY MANAGEMENT	6-56
6.3	COMMUNICATION SYSTEM	6-65
6.4	ACTION ON SITE	6-69
6.5	OFF-SITE EMERGENCY PLAN	6-80
6.6	OCCUPTIONAL HEALTH & SAFETY	6-84
6.7	TRAINING, REHERASAL & RECORDS	6-92
7	**CHAPTER 7: ENVIRONMENTAL MANAGEMENT PLAN**	
7.1	BACKGROUND	7-1
7.2	OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN	7-1
7.3	ORGANOGRAM OF ENVIRONMENTAL MANAGEMENT PLAN	7-2
7.3.1	ENVIRONMENTAL POLICY	7-4
7.3.2	CORPORATE ENVIRONMENT RESPOSIBILITY	7-5
7.3.3	MANAGEMENT RESPONSIBILITY	7-5
7.4	ENVIRONMENTAL MANAGEMENT PLAN	7-8
7.4.1	CONSTRUCTION PHASE	7-8
7.4.2	WATER ENVIRONMENT	7-11
7.4.3	AIR ENVIRONMENT	7-12
7.4.3.1	ACTION PLAN TO CONTROL AMBIENT AIR QUALITY AS PER NAAQES STANDARDS	7-13
7.4.3.2	INFORMATION FOR CONTROL OF FUGITIVE EMISSIONS	7-14
7.4.4	NOISE ENVIRONMENT	7-16
7.4.5	LAND ENVIRONMENT	7-18
7.5	GREEN BELT DEVELOPMENT	7-20
7.6	OCCUPTIONAL HEALTH & SAFETY	7-23
7.7	INFORMATION FOR RAIN WATER HARVESTING	7-24
7.8	MEASURES FOR CONSERVATION OF ENERGY	7-24
7.9	NATURAL RESOURCES CONSERVATION	7-25
7.10	SKILLED AND TRAINED MANPOWER	7-26

7.11	SOCIO ECONOMIC DEVELOPMENT ACTIVITIES	7-26
7.12	SOLVENT RECOVERY PLAN	7-30
7.13	CAPITAL COST FOR ENVIRONMENT MANAGEMENT	7-32
8	**CHAPTER 8: EXECUTIVE SUMMARY**	
8.1	INTRODUCTION	8-1
8.2	PRODUCT AND CAPACITY	8-6
8.3	WATER CONSUMPTION, WASTEWATER GENERATION AND TREATMENT	8-7
8.4	AIR POLLUTION SOURCE AND CONTROL MEASURE	8-7
8.5	HAZARDOUS WASTE	8-8
8.6	GREEN BELT	8-9
8.7	POWER REQUIREMENT	8-9
8.8	FUEL REQUIREMENT	8-9
8.9	STORAGE DETAILS OF HAZARDOUS CHEMICALS	8-10
8.10	CAPITAL AND RECURRING COST ENMARKED FOR EMP	8-11
8.11	CONCLUSION	8-11
9	**CHAPTER 9: DISCLOSURE OF CONSULTANTS ENGAGED**	
ANNEXURES		A-1 TO A-141

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
1.1	BREAK UP OF PROPOSED PROJECT COST	1-6
1.2	BREAKUP OF DIFFERENT LAND USE OF FACTORY	1-6
1.3	LIST OF PRODUCTS ALONGWITH PRODUCTION CAPACITY	1-13
1.4	DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE	1-16
2.1	LIST OF RAW MATERIAL	2-25 to 2-28
2.2	WATER CONSUMPTION & WASTE WATER GENERATION	2-30
2.3	DETAILS OF HAZARDOUS WASTE & ITS MODE OF DISPOSAL	2-39
3.1	TEMPERATURE DETAILS	3-2
3.2	RELATIVE HUMIDITY DETAILS	3-3
3.3	RAINFALL DETAILS	3-4
3.4	WIND SPEED DETAILS	3-5
3.5	SITE SPECIFIC METEOROLOGICAL DATA	3-6
3.6	DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS	3-12
3.7	AMBIENT AIR QUALITY STATUS	3-14 to 3-15
3.8A	DETAILS OF AMBIENT NOISE QUALITY MONITORING LOCATIONS	3-17
3.8B	BACKGROUND NOISE LEVELS	3-19
3.9	NOISE LEVELS DUE TO TRANSPORTATION	3-19
3.10	SAMPLING LOCATIONS FOR MONITORING SURFACE WATER AND GROUND WATER QUALITY	3-22
3.11	WATER QUALITY- PHYSICAL PARAMETERS	3-24 to 3-27
3.12	SAMPLING LOCATIONS: SOIL QUALITY	3-28
3.13	PHYSICO-CHEMICAL CHARACTERISTICS OF SOIL	3-30
3.14	SOIL CHARACTERISTICS UNDER PROJECT AREA	3-31
3.15	GEOLOGICAL FEATURES	3-33
3.16	AREAS UNDER DIFFERENT LANDUSE	3-37
3.17	LIST OF FLORA	3-42 to 3-44
3.18	LIST OF FAUNA	3-45 to 3-46
3.19	DEMOGRAPHIC DATA	3-47
3.20	POPULATION DENSITY	3-48

3.21	LITERACY RATE	3-50
3.22	OCCUPATIONAL STRUCTURE	3-56
3.23	DETAILS OF AMENITIES AVAILABLE IN THE STUDY AREA	3-57
4.1	DETAILS OF EMISSION FROM STACK & VENTS	4-10
4.2	SUMMARY OF ISCST3 MODEL OUTPUT FOR SPM, SO_2, NOx, HCl & HBr	4-17
4.3	PREDICTED AMBIENT AIR QUALITY FOR SPM, SO2, NO_X, HCL & HBr	4-18
4.4	IMPACT IDENTIFICATION MATRIX	4-24
4.5	CONSTRUCTION & OPERATE STAGE POTENTIAL IMPACTS & MITIGATE MEASURES	4-26
4.6	ENVIRONMENTAL IMPACT MATRIX	4-27
4.7	CUMULATIVE IMPACT CHART	4-28
5.1	PROJECT ENVIRONMENT MONITORING PLAN	5-2
6.1	STORAGE DETAILS OF HAZARDOUS CHEMICALS	6-8
6.2	OTHER HAZARDS & CONTROL	6-10
6.3	HAZARDOUS PROPERTIES OF THE CHEMICALS, COMPATIBILITIES, SPECIAL HAZARD AND ATIDOTES	6-11
6.4	PROPOSED FACILITIES TO BE MAINTAINED FOR FIRE FIGHTING	6-54
7.1	ENVIRONMENT MANAGEMENT PLAN	7-10

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1.1	LOCATION OF THE PROJECT SITE	1-7
1.2	LAYOUT OF THE PLANT	1-10
1.3	PHOTOGRAPHS OF THE COMPANY	1-11
1.4	KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS	1-17
1.5	SATELLITE IMAGERY ALONG WITH PRESENT LAND USE PATTERN	1-18
1.6	ACTIVIES, SOURCES OF INFORMATION AND CONTENTS OF EIA REPORT	1-23
3.1 A	WIND ROSE DIAGRAM	3-7 to 3-8
3.2 B	STABILITY CLASS DISTRIBUTION	3-9
3.2	LOCATION OF AMBIENT AIR QUALITY MONITORING STATIONS	3-13
3.3	LOCATION OF NOISE LEVEL MONITORING STATIONS	3-18
3.4	LOCATIONS OF WATER SAMPLING STATIONS	3-23
3.5	LOCATIONS OF SOIL SAMPLING STATIONS	3-29
3.6	SOIL CHARACTERISTICS MAP	3-32
3.7	MAJOR GEOLOGICAL FEATURES	3-34
3.8	LAND USE/ LAND COVER	3-38
3.9	LAND USE/ LAND COVER WITH VILLAGES	3-39
3.10	POPULATION DENSITY	3-49
3.11	LITERACY RATE	3-52
3.12	VEGETATION CLASSIFICATION AND FOREST BOUNDARIES	3-55
3.13	GROUND WATER HYDROLOGY	3-66
3.14	DRAINAGE PATTERN	3-67
3.15	DIGITAL TERRAIN MODEL	3-68
4.1	IMPACT NETWORK ON AIR ENVIRNMENT	4-2
4.2	ISOPLETHS FOR PM, SO_2, NOx, HCl & HBr	4-12 to 4-16
6.1	QRA METHODOLOGY	6-2
6.2	FLOW CHART FOR QUANTITATIVE RISK ASSESSMENT	6-3
6.3	HAZARDOUS CHEMICALS STORAGE AREA	6-7
7.1	ORGANOGRAM OF ENVIRONMENT MANAGEMENT PLAN	7-3

TOR Letter

Term of Reference

F. No. J-11011/378/2013-IA II (I)
Government of India
Ministry of Environment and Forests

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003
E-mail: tchand2003@yahoo.co.uk
Telefax: 011- 2436 0108

Dated: 23th April 2014

To,

Shri Satish Patel,
General Manager,
M/s. Hemani Industries Ltd.,
Plot No. CH/5, Dahej-1, Dahej Ind. Area,
Tal: Vagra, Dist : Bharuch – 392130,
GUJARAT.

Sub. **Specialty Chemicals & Pesticide Manufacturing Plant (Unit-IV) of M/s. Hemani Intermediates Pvt. Ltd. at GIDC Dahej-1, Taluka:Vagra, District: Bharuch, Gujarat (TOR)**

Sir,

This is with reference to your letter No. till dated 17.10.2013 along with project documents including Form-I, Pre-Feasibility Report seeking 'Terms of Reference' (TOR) as per the EIA Notification, 2006. Based on the documents furnished, it is noted that M/s. Hemani Intermediates Pvt. Ltd. has proposed for setting up of Specialty Chemicals & Pesticide manufacturing Plant (Unit-IV) at GIDC Dahej-1, Tal: Vagra, Dist.: Bharuch, Gujarat.The GIDC Dahej-1 was established in 1994. Total 9 units of the total 60-70 units of Dahej1 are pesticide units. Dahej-II and III were established after 2006. Total plot area is 9705 m^2 of which green belt area will be developed in 2400 m^2. No national park, wildlife sanctuaries, biosphere reserve, heritage sites, parks, reserve forests etc. are located within 10 km distance. Total cost of project is Rs. 10 crores.

2. All units producing technical grade pesticides are listed at S.N. 5(b) under category 'A' and approved at Central Level.

3. The following products will be manufactured:

S.N.	Products	Quantity (in MTPM)
1	Chlorination Derivatives (e.g. MCB, DCB, ODCB, PDCB, MDCB & TCB)	3500
2	Nitration of Chlorobenzene (ONCB, PNCB & MNCB)	4000
3	Calcium Chloride	1500
4	Di-Calcium Phosphate	1500
5	2,4 DNCB	1500
6	Fungicide	
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propioconzole (T)	
d)	Mancozeb (T)	
7	Herbicide	
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Metsulfuron Methyl (T)	
d)	Pendimethalin	
8	Insecticide	

1

a)	Transfluthrin (T)	300
b)	Cyfluthrin & Beta, Isomer (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomer (T)	
e)	Chlorphyriphos (T)	
f)	Imidacloprid (T)	
	Total	**12900**

4. ESP along with stack height (50 m) will be provided to coal fired boiler (20 TPH). Venture & Packed scrubber will be provided to incinerator. Scrubber will be provided to control process emissions viz. HCl, Cl2 and SO2. Fresh water requirement from GIDC water supply will be 858 m^3/day. Quantity of effluent generation will be 437 m^3/day and treated in ETP consisting of primary, secondary and tertiary treatment units. Treated effluent will be disposed into deep sea through GIDC pipeline. Sludge and distillation residue will be sent to TSDF. Fly ash will be sent to brick manufacturers.

5. The aforesaid proposal was considered by the Reconstituted Expert Appraisal Committee (Industry) (EAC (I)) in its 16th Meeting held on 20th -21st February 2014. The project proponents gave a detailed presentation on the salient features of the project and proposed environmental protection measures to be undertaken along with the draft Term of References for the preparation of EIA-EMP. After detailed deliberations, the Expert Appraisal Committee prescribed the following TORs read with Generic TOR at Annexure-1 and additional TORs at Annexure-2 for preparation of EIA-EMP report:

(i) A clarification from GPCB whether addition of this unit would be absorbed by Dahej-I.
(ii) Toxicity Bioassay Tests also reqd. BTEX Test (VOC Test) required.
(iii) Monitoring of VOC and NMHC in addition to other AAQ parameters (PM 10, PM 2.5, SO2 and NOx).

6. The Ministry of Environment & Forests on the basis of the aforesaid recommendations hereby accords the aforesaid TORs as given in the attached Annexure for preparation of the EIA-EMP Report.

(Dr.T.Chandini)
Director

Copy to: The Chairman, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector – 10, A, Gandhinagar – 382010, Gujarat (E-mail: chairman@gpcb.gov.in; Fax No.: 079-23232156)

(Dr.T.Chandini)
Director

ANNEXURE -I

GENERIC TERMS OF REFERENCE (TOR)

1. Executive summary of the project along with justification for the project.
2. Photographs of the proposed and existing (if applicable) plant site.
3. A line diagram/flow sheet for the process and EMP.
4. In case of existing projects seeking expansion, (i) A certified copy of the Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012, on the status of compliance of the conditions stipulated in the environmental clearance and (ii) Status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB, which shall include data on AAQ, water quality, solid waste etc. shall be submitted.
5. A toposheet of the study area and site location map on Indian map of 1:10, 00,000 scale followed by 1:50,000/1:25,000 scale on an A3/A2 sheet of a circle of aradius of 10 kms and further 10 kms on A3/A2 sheets with proper longitude/latitude/heights with minimum 100/200m contours shall be included. A 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
6. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area. Present land use – agricultural land, forestland, wasteland, water bodies, settlements, etc shall be prepared based on satellite imagery.
7. Topography of the area shall be given clearly indicating whether the site requires any filling. If so, details of filling, quantity of fill material required, its source, transportation etc. shall be given. In case the site is located on a hilly terrain, a 3-dimesional view of the location vis-à-vis major landuse features and locations such as Critically Polluted Area(s) and Eco-sensitive Area(s) found within the study area, indicating shortest distance from the site shall be provided.
8. Map showing location of Eco-sensitive Areas such as National Parks/Wildlife Sanctuary/Reserve Forests within 10 km. radius (study area) shall specifically be mentioned. A map showing land use/land cover, reserved forests, wildlife sanctuaries, national parks, tiger reserve etc in 10 km of the project site and shortest (aerial) distance from critically/severely polluted area(s) and Eco-sensitive Areas.
9. Project site layout plan to scale using AutoCAD of the project site showing Plant details, raw materials, fly ash and other storage plans, ash pond and water harvesting structures, bore well or water storage, aquifers (within 1 km.), dumping, waste disposal, green belt (areas), water bodies, rivers/drainage passing through/near the project site shall be included.
10. Coordinates of the plant site with topo sheet co-ordinates shall also be included.
11. Details and classification of total land (identified and acquired) shall be included.
12. A copy of the mutual agreement for land acquisition signed with land oustees.
13. Proposal shall be submitted to the Ministry for environment clearance only after acquiring total land. Necessary documents indicating acquisition of land shall be included.
14. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department, in case the project involves forestland.
15. If the project falls within 10km of an eco-sensitive area, present status/approval from the Standing Committee on Wildlife of the NBWL shall be furnished.
16. Rehabilitation & Resettlement (R & R) shall be as per the R&R Policy of the State Govt. and a detailed action plan shall be included.
17. A list of major industries with name and type within study area (10km radius) shall be incorporated.
18. List of raw material required, analysis of all the raw materials and source along with mode of transportation shall be included. All the trucks for raw material and finished product transportation must be "Environmentally Compliant".
19. Action plan for excavation and muck disposal during construction phase.

20. Studies for fly ash, muck, slurry, sludge material disposal and solid waste generated from the plant operations and processes and environmental control measures. If the raw materials used have trace elements, an environment management plan shall also be included.
21. Manufacturing process details shall be included.
22. Mass balance for the raw material and products shall be included.
23. Energy balance data for all the components of steel plant including proposed power plant shall be incorporated.
24. One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall and AAQ data (except monsoon) shall be collected. The monitoring stations shall take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.
25. One season data for gaseous emissions other than monsoon season is necessary.
26. Ambient air quality monitoring at 8 locations within the study area of 10 km, aerial coverage from project site with one AAQMS in downwind direction shall be carried out.
27. Suspended particulate matter present in the ambient air must be analysed for source analysis – natural dust/generated from plant operations (for eg. Cement dust)/flyash/etc. The SPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM.
28. Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain/elevation, the AQIP Modelling shall be done using inputs of the specific terrain characteristics of the project for determining the potential impacts of the project on the AAQ.
29. Action plan to implement National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 shall be included.
30. Ambient air quality modelling along with cumulative impact shall be included for the day (24 hrs) for maximum GLC along with following :
    i) Emissions (g/second) with and without the air pollution control measures
    ii) Meteorological inputs (wind speed, m/s), wind direction, ambient air temperature, cloud cover, relative humidity & mixing height) on hourly basis
    iii) Model input options for terrain, plume rise, deposition etc.
    iv) Print-out of model input and output on hourly and daily average basis
    v) A graph of daily averaged concentration (MGLC scenario) with downwind distance at every 500 m interval covering the exact location of GLC.
    vi) Details of air pollution control methods used with percentage efficiency that are used for emission rate estimation with respect to each pollutant
    vii) Applicable air quality standards as per LULC covered in the study area and % contribution of the proposed plant to the applicable Air quality standard. In case of expansion project, the contribution shall be inclusive of both existing and expanded capacity.
    viii) No. I-VII are to be repeated for fugitive emissions and any other source type relevant and used for industry
    ix) Graphs of monthly average daily concentration with down-wind distance
    x) Specify when and where the ambient air quality standards are exceeded either due to the proposed plant alone or when the plant contribution is added to the background air quality.
    xi) Fugitive dust protection or dust reduction technology for workers within 30 m of the plant active areas.
31. A plan for the utilisation of waste/flue gases (if applicable) for generating power shall be presented.
32. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. The alternate method of raw material and end product transportation shall also be studied and details included.
33. An action plan to control and monitor secondary fugitive emissions from all the sources as per the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008.
34. Presence of aquifer(s) within 1 km of the project boundaries and management plan for recharging the aquifer shall be included.
35. If the site is within 1 km radius of any major river, Flood Hazard Zonation Mapping is required at 1:5000 to 1:10,000 scale indicating the peak and lean River discharge as well as flood occurrence frequency.

36. Details of water requirement, water balance chart for new unit or for existing unit as well as proposed expansion (if expansion). Measures for conservation water by recycling and reuse to minimize the fresh water requirement.
37. Source of water supply and permission of withdrawal of water from Competent Authority.
38. Water balance data including quantity of effluent generated, recycled and reused and discharged is to be provided. Methods adopted/to be adopted for the water conservation shall be included. Zero discharge effluent concepts to be adopted.
39. Source of surface/ground water level, site (GPS), cation, anion (Ion Chromatograph), metal trace element (as above) chemical analysis for water to be used. If surface water is used from river, rainfall, discharge rate, quantity, drainage and distance from project site shall also be included. Information regarding surface hydrology and water regime shall be included.
40. Ground water analysis with bore well data, litho-logs, drawdown and recovery tests to quantify the area and volume of aquifer and its management.
41. Ground water monitoring minimum at 8 locations and near solid waste dump zone, Geological features and Geo-hydrological status of the study area are essential as also. Ecological status (Terrestrial and Aquatic) is vital.
42. Ground water modelling showing the pathways of the pollutants shall be included
43. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources. Rain water harvesting and groundwater recharge structures may also be constructed outside the plant premises in consultation with local Gram Panchayat and Village Heads to augment the ground water level. Incorporation of water harvesting plan for the project is necessary, if source of water is bore well.
44. A note on the impact of drawl of water on the nearby River particularly during lean season. Permission of competent authority for withdrawl of river/groundwater.
45. Surface water quality of nearby River (60 m upstream and downstream) and other surface drains at eight locations to be provided in and around the project site.
46. A note on treatment of wastewater from different plants, recycle and reuse for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards.
47. Provision of traps and treatment plants are to be made, if water is getting mixed with oil, grease and cleaning agents.
48. If the water is mixed with solid particulates, proposal for sediment pond before further transport shall be included. The sediment pond capacity shall be 100 times the transport capacity.
49. Wastewater characteristics (heavy metals, anions and cations, trace metals, PAH) from any other source shall be included.
50. The pathways for pollution via seepages, evaporation, residual remains are to be studied for surface water (drainage, rivers, ponds, and lakes), sub-surface and ground water with a monitoring and management plans.
51. Action plan for solid/hazardous waste generation, storage, utilisation and disposal from all the sources and fly ash. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.
52. Details of evacuation of ash, details regarding ash pond impermeability and whether it would be lined, if so details of the lining etc. need to be addressed. Copies of MOU regarding utilisation of ash shall also be included.
53. End use of solid waste and its composition shall be covered. Toxic metal content in the waste material and its composition shall also be incorporated.
54. All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.
55. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated. All rooftops/terraces shall have some green cover.
56. Detailed description on flora and fauna (terrestrial and aquatic) exists in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

57. Risk Assessment and Disaster (Emergency) Preparedness and Management Plan including damage control needs to be addressed and included.

58. Occupational health:

a. Details of existing Occupational & Safety Hazards. What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,

b. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.

c. Annual report of heath status of workers with special reference to Occupational Health and Safety.

d. Action plan for the implementation of OHS standards as per OSHAS/USEPA.

e. Plan and fund allocation to ensure the occupational health & safety of all contract and sub-contract workers.

59. Corporate Environment Policy

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

60. Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

61. Impact of the project on local infrastructure of the area such as road network and whether any additional infrastructure needs to be constructed and the agency responsible for the same with time frame.

62. Environment Management Plan (EMP) to mitigate the adverse impacts due to the project along with item wise cost of its implementation. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

63. Plan for the implementation of the recommendations made for the Sector in the CREP guidelines must be prepared.

64. At least 5 % of the total cost of the project shall be earmarked for the initial 5 years towards the Enterprise Social Commitment and 2% of retain profit thereafter for life of the project towards CSR based on public hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

65. A note on identification and implementation of Carbon Credit project shall be included.

66. Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

67. A tabular chart with index for point wise compliance of above TORs.

68. The questionnaire for industry sector (available on MOEF website) shall be submitted while submitting EIA-EMP.

69. 'TORs' prescribed by the Expert Appraisal Committee (Industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. Where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the State Pollution Control Board of the concerned State for conduct of Public Hearing. The SPCB shall conduct the Public

Hearing/public consultation, district-wise, as per the provisions of EIA notification, 2006. The issues raised in the Public Hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately in EIA-EMP Report in the form of tabular chart with financial budget (capital and revenue) along with time-schedule of implementation for complying with the commitments made. The final EIA report shall be submitted to the Ministry for obtaining environmental clearance.

70. The TORs prescribed shall be valid for a period of two years for submission of the EIA-EMP reports along with Public Hearing Proceedings (wherever stipulated).

The following general points shall be noted:

i. All documents shall be properly indexed, page numbered.
ii. Period/date of data collection shall be clearly indicated.
iii. Authenticated English translation of all material in Regional languages shall be provided.
iv. The letter/application for environmental clearance shall quote the MOEF file No. and also attach a copy of the letter.
v. The copy of the letter received from the Ministry shall be also attached as an annexure to the final EIA-EMP Report.
vi. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report
vii. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry shall also be followed.
viii. The consultants involved in the preparation of EIA-EMP report after accreditation with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA-EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc.

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ANNEXURE-2

ADDITIONAL TORs FOR SYNTHETIC ORGANIC CHEMICALS INDUSTRY

1. Manufacturing process details along with the chemical reactions and process flow chart.
2. Name of all the solvents to be used in the process and details of solvent recovery system.
3. Design details of ETP, incinerator, if any along with boiler, scrubbers/bag filters etc.
4. The details of solid and hazardous wastes generation, storage, utilisation and disposal particularly related to the hazardous waste calorific value of hazardous waste and detailed characteristic of the hazardous waste. Action plan for the disposal of fly ash generated from boiler shall be included.
5. Precautions to be taken during storage and transportation of hazardous chemicals shall be clearly mentioned and incorporated.
6. Material Safety Data Sheet for all the Chemicals are being used/will be used. CAS No./RTECS No./DOT/UN etc to be mentioned against each chemicals.
7. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.
8. Risk assessment for storage for chemicals/solvents. Action plan for handling & safety system.
9. Details of occupational health programme.
   i) To which chemicals, workers are exposed directly or indirectly.
   ii) Whether these chemicals are within Threshold Limit Values (TLV)/ Permissible Exposure Levels as per ACGIH recommendation.
   iii) What measures company have taken to keep these chemicals within PEL/TLV.
   iv) How the workers are evaluated concerning their exposure to chemicals during pre-placement and periodical medical monitoring.
   v) Liver function tests (LFT) during pre-placement and periodical examination.
10. A Toxic management Plan shall be prepared.
11. A write up on "Safe Practice" followed for handling, storage, transportation and unloading of chemicals to be submitted.
12. What are onsite and offsite emergency plan during chemical disaster.
13. A write up on "Treatment of workers affected by accidental spillage of chemicals".

COMPLIENCE OF TERMS OF REFERENCES (TORs)

(ANNEXURE-I)

SR. NO.	TERMS OF REFERENCES	COMPLIENCE
1	Executive summary of the project along with justification for the project.	Executive summary of the project is referred as Chapter-8 in EIA Report. Justification for the project is referred as Section 1.1.3, Chapter-1 in EIA Report (Page No. 1-5).
2	Photographs of the proposed and existing (if applicable) plant site.	Photographs of the plant are referred as Figure: 1.3, Section 1.1, Chapter-1 in EIA Report (Page No. 1-11 to 1-12).
3	A line diagram flow sheet for the process and EMP.	A line diagram flow sheet for the process is referred as Section 2.3, Chapter-2 in EIA Report (Page No. 2-1 to 2-24). A line diagram flow sheet for the EMP is referred as Figure -7.1, Section 7.3, Chapter-7 in EIA Report (Page No. 7-1 to 7-3).
4	In case of existing projects seeking expansion, (i) A certified copy of the Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012, on the status of compliance of the conditions stipulated in the environmental clearance and (ii) Status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB, which shall include data on AAQ, water quality, solid waste etc. shall be submitted.	i) Not Applicable. This is proposed project. ii) Not Applicable. This is proposed project.
5	A toposheet of the study area and site location map on Indian map of 1:10,00,000 scale followed by 1:50,000/1:25,000 scale on an A3/A2 sheet of a circle of a radius of 10 kms and further 10 kms on A3lA2 sheets with proper longitude/latitude/heights with minimum 100/200m contours shall be included. A 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project	Please refer Figure 1.4, Section 1.2.1.3, Chapter-1 in EIA Report (Page No. 1-17).

	site and RL of nearby sources of water shall be indicated.	
6	High-resolution satellite image data having 1m-5m spatial resolution like quickbird, lkonos, IRS P-5 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area. Present land use - agricultural land, forestland, wasteland, water bodies, settlements, etc shall be prepared based on satellite imagery.	Satelite Image is referred as Figure 1.5, Section 1.2.1.3, Chapter-1 in EIA Report (Page No. 1-18). Land Use/Land Cover is referred as Section 3.7, Chapter-3 in EIA Report (Page No. 3-35 to 3-39).
7	Topography of the area shall be given clearly indicating whether the site requires any filling. lf so, details of filling, quantity of fill material required, its source, transportation etc. shall be given. ln case the site is located on a hilly terrain, a 3-dimesional view of the location vis-i-vis major landuse features and location such as Critically Polluted Area(s) and Eco-sensitive Area(s) found within the study area, indicating shortest distance from the site shall be provided.	Project Site is flat land, therefore no require for any filling.
8	Map showing location of Eco-sensitive Areas such as National Parks/Wildlife Sanctuary/Reserve Forests within 10 km. radius (study area) shall specifically be mentioned. A map showing land use/land cover, reserved forests, wildlife sanctuaries, national parks, tiger reserve etc in 10 km of the project site and shortest (aerial) distance from critically/severely polluted area(s) and Eco-sensitive Areas.	There is no any Eco-sensitive Areas such as National Parks/Wildlife Sanctuary/Reserve Forests within 10 km radius. Land Use/Land Cover is referred as Section 3.7, Chapter-3 in EIA Report (Page No. 3-35 to 3-39).
9	Project site layout plan to scale using AutoCAD of the project site showing Plant details, raw materials, fly ash and other storage plans, ash pond and water harvesting structures, bore well or water storage, aquifers (within 1 km.), dumping, waste disposal, green belt (areas), water bodies, rivers/drainage passing through/near the project site shall be included.	Plant Layout is referred as Figure 1.2, Section 1.1 and Chapter 1 in EIA Report (Page No. 1-10).
10	Coordinates of the plant site with topo sheet co-ordinates shall also be included.	Please refer Figure 1.4, Section 1.2.1.3, Chapter-1 in EIA Report (Page No. 1-17).

11	Details and classification of total land (identified and acquired) shall be included.	Land break up is referred as Table No. 1.2, Section 1.1, Chapter-1 in EIA Report (Page No. 1-6).
12	A copy of the mutual agreement for land acquisition signed with land oustees.	Please refer Annexure-6 in EIA Report (Page No. A-10).
13	Proposal shall be submitted to the Ministry for environment clearance only after acquiring total land. Necessary documents indicating acquisition of land shall be included.	
14	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department, in case the project involves forestland.	There is no any forest land in factory premises.
15	lf the project falls within 10km of an eco-sensitive area, present status/approval from the Standing Committee on Wildlife of the NBWL shall be furnished.	There is no any eco-sensitive area within 10 km radius.
16	Rehabilitation & Resettlement (R & R) shall be as per the R&R Policy of the State Govt. and a detailed action plan shall be included.	Rehabilitation & Resettlement (R & R) is not applicable to company because of this is private land.
17	A list of major industries with name and type within study area (10km radius) shall be incorporated.	A list of major industries is referred as Table No. 1.4, Section 1.2, Chapter-1 in EIA Report (Page No. 1-16).
18	List of raw material required, analysis of all the raw materials and source along with mode of transportation shall be included, All the trucks for raw material and finished product transportation must be "Environmentally Compliant".	The raw materials are procured from nearest sources as much as possible from Indian market. The raw materials are received in tanks, HDPE/fibre drums, HMHDPE Carboys and cylinders as well as through tankers and stored at ambient temperature. All the storage drums/tanks of hazardous flammable substances are located within premises in separate storage area i.e. solvent farm area at ambient temperature. Solvent shall be stored in drums with all precautionary process instrumentation and safety appliances. Large area shall be covered by well-designed warehouse, which is containing store office, raw material store, finished product store, etc.

		Transportation of all the raw material and products are primarily by road only.
19	Action plan for excavation and muck disposal during construction phase.	Generated excavated soil will be disposed at project site.
20	Studies for fly ash, muck, slurry, sludge material disposal and solid waste generated from the plant operations and processes and environmental control measures, If the raw materials used have trace elements, an environment management plan shall also be included'.	Details of Hazardous Waste are referred as Table No. 2.3, Section 2.4.6, Chapter-2 in EIA Report (Page No. 2-39 to 2-40).
21	Manufacturing process details shall be included'	Manufacturing process is referred as Section 2.2, Chapter-2 in EIA Report (Page No. 2-2 to 2-43).
22	Mass balance for the raw material and products shall be included'	Mass balance for the products is referred as Section 2.2, Chapter-2 in EIA Report (Page No. 2-1 to 2-24).
23	Energy balance data for all the components of steel plant including proposed power plant shall be incorporated.	Not Applicable
24	One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall data (except monsoon) shall be collected. The monitoring stations shall take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall data is referred as Section 3.1, Chapter-3 in EIA Report (Page No. 3-2 to 3-6). Village Jolva is in pre-dominant and Village Dahej is in downwind direction.
25	One season data for gaseous emissions other than monsoon season is necessary.	Monitoring season is March, 2014 to May, 2014. One season data for ambient air is referred as Table 3.7, Section 3.2, Chapter-3 in EIA Report (Page No. 3-14 to 3-15).
26	Ambient air quality monitoring at 8 locations within the study area of 10 km, aerial coverage from project site with one NAAQS in downwind direction shall be carried out.	Ambient air quality monitoring at 7 locations within the study area of 10 km is referred as Table 3.6, Section 3.2, Chapter-3 in EIA Report (Page No. 3-12). Village Jolva is in pre-dominant and Village Dahej is in downwind direction.
27	Suspended particulate matter present in the ambient air must be analyzed for source analysis – natural dust/generated from plant	Company will be analyzed Suspended particulate matter present in the ambient air for source analysis by third party

	operations (for eg. Cement dust) fly ash/etc. The SPM shall also be analyzed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM.	monitoring.
28	Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain/elevation, the AQLP Modeling shall be done using inputs of the specific terrain characteristics of the project for determining the potential impacts of the project on the MQ'	Atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features is referred as Section No. 4.2.2, Chapter-4 in EIA Report (Page No. 4-9 to 4-18).
29	Action plan to implement National Ambient Air Quality Emission Standards issued by the Ministry vide G'S.R. No' 826(E) dated 15th November, 2009 shall be included.	Action plan to implement National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 15th November, 2009 is referred as Section 7.4.3.1, Chapter-7 in EIA Report (Page No. 7-13).
30	Ambient air quality modeling along with cumulative impact shall be included for the day (24 hrs) for maximum GLC along with following : i) Emissions (g/second) with and without the air pollution control measures ii) Meteorological inputs (wind speed, m/s), wind direction, ambient air temperature, cloud cover, relative humidity & mixing height) on hourly basis iii) Model input options for terrain, plume rise, deposition etc. iv) Print-out of model input and output on hourly and daily average basis v) A graph of daily averaged concentration (MGLC scenario) with downwind distance at every 500 m interval covering the exact location of GLC' vi) Details of air pollution control methods used with percentage efficiency that are used for emission rate estimation with respect to each pollutant. vii) Applicable air quality standards as per LULC covered in the study area and %	Please refer chapter-4 in EIA Report. i) Emissions (g/s) with and without the air pollution control measures is referred as Table - 4.1, Section 4.2.2, Chapter-4 in EIA Report (Page No. 4-10 to 4-11). ii) Meteorological inputs are referred as Annexure-7 in EIA Report (Page No. A-21). iii) Model input options are referred as Meteorological inputs - Annexure -7 in EIA Report (Page No. A-21), Stack details - Table-4.1, Section 4.2.2, Chapter-4 in EIA Report (Page No.4-10 to 4-11) And Village Co-ordinate is referred as Table No. 4.2, Chapter-4 in EIA Report (Page No. 4-17) iv) Print-out of model input and output is referred as Section 4.2.2, Chapter-4 in EIA Report (Page No. 4-12 to 4-18). v) A graph of daily averaged concentration (MGLC scenario) with downwind distance at every 500 m is referred as Figure -4.1, Section 4.2.2, Chapter-4 in EIA Report (Page No. 4-12 to 4-18).

	contribution of the proposed plant to the applicable Air quality standard. In case of expansion project, the Contribution shall be inclusive of both existing and expanded capacity. viii) No. I-VII are to be repeated for fugitive emissions and any other source type relevant and used for industry ix) Graphs of monthly average daily concentration with down-wind distance x) Specify when and where the ambient air quality standards are exceeded either due to the proposed plant alone or when the plant contribution is added to the background air quality. xi) Fugitive dust protection or dust reduction technology for workers within 30 m of the plant active areas.	vi) Air pollution control methods used with percentage efficiency is referred as Table -4.1, Section 4.2.2, Chapter-4 in EIA Report (Page No. 4-12). vii) Ambient air quality is given in Table 3.7, Section 3.2, Chapter-3 in EIA Report (Page No. 3-14 to 3-15). viii) No. ix) Graphs of monthly average daily concentration with down-wind distance is referred as Figure-4.1, Section-4.2.2, Chapter-4 in EIA Report (Page No. 4-12 to 4-18) and monthly and baseline season wind rose is referred as Figure 3.1, Section 3.3, Chapter-3 in EIA Report (Page No. 3-7 to 3-8). x) Ambient Air quality standard will not go exceed. xi) Dust collector will be installed in plant premises.
31	A plan for the utilization of waste flue gases (if applicable) for generating power shall be presented.	Not Applicable
32	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. The alternate method of raw material and end product transportation shall also be studied and details included.	Please refer Point No. 18 in Compliance of TOR (Page No. 19).
33	An action plan to control and monitor secondary fugitive emissions from all the sources as per the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008.	An action plan to control and monitor secondary fugitive emissions from all the sources as per the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008 is referred as Section 7.4.3.1, Chapter-7 in EIA Report (Page No. 7-13).
34	Presence of aquifer(s) within 1 km of the project boundaries and management plan for recharging the aquifer shall be included.	There is no aquifer within 1 km of the project boundaries.
35	If the site is within 1 km radius of any major river, Flood Hazard zonation Mapping is required at 1:5000 to 1:10,000 scale	There is no any major river within 1 km of the project boundaries.

	indicating the peak and lean River discharge as well as flood occurrence frequency.	
36	Details of water requirement, water balance chart for new unit or for existing unit as well as proposed expansion (if expansion), Measures for conservation water by recycling and reuse to minimize the fresh water requirement.	Water requirement, water balance chart for new unit or for proposed is referred as Table No. 2.2, Section 2.4.3, Chapter-2 in EIA Report (Page No. 2-30). Measures for conservation water by recycling and reuse to minimize the fresh water requirement is referred as Section 7.4.2, Chapter -7 in EIA Report (Page No. 7-11).
37	Source of water supply and permission of withdrawal of water from Competent Authority.	Please refer Annexure-6 in EIA Report (Page No. A-10).
38	Water balance data including quantity of effluent generated, recycled and reused and discharged is to be provided. Methods adopted/to be adopted for the water conservation shall be included. Zero discharge effluent concepts to be adopted.	Water balance data including quantity of effluent generated, recycled and reused and discharged is referred as Table No. 2.2, Section 2.4.3, Chapter-2 in EIA Report (Page No. 2-29 to 2-37).
39	Source of surface/ground water level, site (GPS), cation, anion (lon Chromatograph), metal trace element (as above) chemical analysis for water to be used. lf surface water is used from river, rainfall, discharge rate, quantity, drainage and distance from project site shall also be included. Information regarding surface hydrology and water regime shall be included.	Company will not use the surface water. Hydrology is referred as Section 3.10, Chapter-3 in EIA Report (Page No. 3-60 to 3-64).
40	Ground water analysis with bore well data, litho-logs, drawdown and recovery tests to quantify the area and volume of aquifer and its management.	Ground water analysis is referred as Table No. 3.11, Section 3.4, Chapter-3 in EIA Report (Page No. 3-24 to 3-27).
41	Ground water monitoring minimum at 8 locations and near solid waste dump zone, Geological features and Geo hydrological status of the study area are essential as also. Ecological status (Terrestrial and Aquatic) is vital.	There is no solid waste dump zone in 10 Km radius from project site. Company is carried out ground water monitoring at 7 Locations. Geological Features is referred as Section 3.6, Chapter-3 in EIA Report (Page No. 3-33 to 3-34). Hydrology is referred as Section 3.10, Chapter-3 in EIA Report (Page No. 3-60 to 3-64).

42	Ground water modeling showing the pathways of the pollutants shall be included	Ground water modeling is referred as Table No. 3.11, Section 3.4, Chapter-3 in EIA Report (Page No. 3-24 to 3-27).
43	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources. Rain water harvesting and groundwater recharge structures may also be constructed outside the plant premises in consultation with local Gram Panchayat and Village Heads to augment the ground water level. Incorporation of water harvesting plan for the project is necessary, if source of water is bore well.	Rainwater harvesting system is referred as Section 7.7, Chapter-7 in EIA Report (Page No. 7-24).
44	A note on the impact of drawl of water on the nearby River particularly during lean season. Permission of competent authority for withdrawal of river/groundwater.	Company has not required the permission of withdrawal of water from competent authority because of quantity of water requirement will be met through GIDC Water supply.
45	Surface water quality of nearby River (50 m upstream and downstream) and other surface drains at eight locations to be provided in and around the project site.	Surface water quality is referred as Table No. 3.11, Section 3.4, Chapter-3 in EIA Report (Page No. 3-24 to 3-27).
46	A note on treatment of wastewater from different plants, recycle and reuse for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards.	Effluent treatment plant is referred as Section 2.4.3.1, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).
47	Provision of traps and treatment plants are to be made, if water is getting mixed with oil, grease and cleaning agents.	Effluent treatment plant is referred as Section 2.4.3.1, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).
48	If the water is mixed with solid particulates, proposal for sediment pond before further transport shall be included. The sediment pond capacity shall be 100 times the transport capacity.	Not Applicable.
49	Wastewater characteristics from any other source shall be included.	A wastewater characteristic is referred as Section 2.4.3.1, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).

50	The pathways for pollution via seepages, evaporation, residual remains are to be studied for surface water (drainage, rivers, ponds, and lakes), sub-surface and ground water with a monitoring and management plans.	Surface and Ground water monitoring is referred as Table No. 3.11, Section 3.4, Chapter-3 in EIA Report (Page No. 3-24 to 3-27).
51	Action plan for solid/hazardous waste generation, storage, utilization and disposal from all the sources and fly ash. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Action plan for solid/hazardous waste generation, storage, utilization and disposal from all the sources is referred as Section 2.4.6, Chapter-2 in EIA Report (Page No. 2-39 to 2-40). A measure for Energy Conservation is referred as Section 7.8, Chapter-7 in EIA Report (Page No. 7-24 to 7-25). Natural resource conservation is referred as Section 7.9, Chapter-7 in EIA Report (Page No. 7-25 to 7-26). EMP is referred as Chapter-7.
52	Details of evacuation of ash, details regarding ash pond impermeability and whether it would be lined, if so details of the lining etc. need to be addressed. Copies of MOU regarding utilization of ash shall also be included.	There shall be generated the ash (300 MT/Month) from proposed plant and it will be utilized to manufacture the bricks. Copy of MOU regarding utilization of ash will submit the during application of Consent to Operate.
53	End use of solid waste and its composition shall be covered. Toxic metal content in the waste material and its composition shall also be incorporated.	End use of solid waste and its composition is referred as Section 2.4.6, Chapter-2 in EIA Report (Page No. 2-39 to 2-40).
54	All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.	Not Applicable
55	Action plan for the green belt development plan in 33% area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated. All rooftops/terraces shall have some green cover.	The main objective of the green belt is to provide a barrier between the plant and surroundings areas. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will develop green belt within factory premises. Total 9705 m^2 land area is available at site; out of this area about 2400 sq. meter (25 %) area will cover as greenbelt and other forms of greenery.
56	Detailed description on flora and fauna (terrestrial and aquatic) exists in the study	Flora is referred as Section 3.8.3, Chapter-3 in EIA Report (Page No. 3-42 to 3-44) and

	area shall be given with special reference to rare, endemic and endangered species. lf Schedule-l fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Fauna is referred as Section 3.8.4, Chapter-3 in EIA Report (Page No. 3-45 to 3-46).
57	Risk Assessment and Disaster (Emergency) preparedness and Management Plan including damage control needs to be addressed and included.	Risk Assessment and Disaster management plan is referred as Chapter-6 in EIA Report.
58	Occupational health: a. Details of existing occupational & safety Hazards. What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). lf these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved. b. Details of exposure specific health status evaluation of worker. lf the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise. c. Annual report of heath status of workers with special reference to Occupational Health and Safety. d. Action plan for the implementation of OHS standards as per OSHAS/USEPA. e. Plan and fund allocation to ensure the occupational health & safety of all contracts and sub-contract workers.	a. Occupational & safety Hazards is referred as Section 6.6, Chapter-6 in EIA Report (Page No. 6-84 to 6-92). b. Health evaluation of worker is referred as Section 6.6.1.8, Chapter-6 in EIA Report (Page No. 6-87 to 6-89). c. Company will carry out the health evaluation every 6 month. d. Action plan for the implementation of OHS worker is referred as Section 6.6.1.8, Chapter-6 in EIA Report (Page No. 6-87 to 6-89). e. Occupational health & safety of all contracts and sub-contract workers is referred as Section 6.6, Chapter-6 in EIA Report (Page No. 6-84 to 6-92).
59	Corporate Environment Policy: i) Does the company have a well laid down Environment Policy approved by its Board	i) Environment Policy is referred as Section 7.3.1, Chapter-7 in EIA Report

	of Directors? If so, it may be detailed in the EIA report. ii) Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA. iii) What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given. iv) Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	(Page No. 7-4). ii) Environment Policy is referred as Section 7.3.1, Chapter-7 in EIA Report (Page No. 7-4). iii) The hierarchical system or Administrative order of the company is referred as Figure 7.1, Section 7.3, Chapter-7 in EIA Report (Page No. 7-3). iv) Company will prepare the system to report of the non compliances/violations of norms to the board of directors of the company.
60	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	Company will provide the infrastructure facilities such as sanitation, rest room to the labour force during construction and worker/driver during operation phase.
61	Impact of the project on local infrastructure of the area such as road network and whether any additional infrastructure needs to be constructed and the agency responsible for the same with time frame.	There will not occur any major impact on local infrastructure of the area due to proposed project.
62	Environment Management plan (EMP) to mitigate the adverse impacts due to the project along with item wise cost of its implementation, Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Environment Management plan is referred as Chapter-7 in EIA Report.
63	Plan for the implementation of the recommendations made for the Sector in the CREP guidelines must be prepared.	CREP guidelines is referred as Annexure-8 in EIA Report (Page No. A-64).
64	At least 5 % of the total cost of the project shall be earmarked for the initial 5 years towards the Enterprise social Commitment	Company will ensure that the CSR activities will do 5 % of the total cost of the project for the initial 5 years towards the Enterprise

	and 2% of retain profit thereafter for life of the project towards CSR based on public hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	social Commitment and 2% of retain profit thereafter for life of the project.
65	A note on identification and implementation of Carbon Credit project shall be included.	Not Applicable
66	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (protection) Act, 1986 or relevant Sections of Air and Water Acts? lf so, details thereof and compliance/ATR to the notice(s) and present status of the case.	There will not any litigation pending against the project and/or any direction/order passed by any Court of Law against the project.
67	A tabular chart with index for point wise compliance of above TORs.	Please refer Index for point wise compliance of TORs.
68	The questionnaire for industry sector (available on MOEF website) shall be submitted while submitting EIA-EMP.	The questionnaire for industry sector is referred as Annexure -9 in EIA Report (Page No. A-66).
	TORs, prescribed by the Expert Appraisal Committee (industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA given in Appendix lll and lllA in the EIA Notification, 2006. where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the state Pollution control board of the concerned state for conduct of the public hearing. The SPCB shall conduct the public hearing/public consultation, district wise, as per the provisions of EIA notification, 2006. The issues raised in the public hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately in EIA/EMP report in the form of tubular chart with financial budget (Capital and revenue) along with time schedule of	EIA report is prepared as per the TORs. TORs letter is referred as Annexure-10 in EIA Report (Page No. A-79). Executive Summary in English is attached as Chapter-8.

	implementation for complying with the commitments made. The final EIA Report shall be submitted to the Ministry for obtaining environmental clearance.	
70	The TORs prescribed shall be valid for a period of two years for submission of the EIA-EMP reports along with public hearing proceedings.	
General Points		
1.	All documents should be properly indexed, page numbered	All the chapters and Annexures of EIA/EMP report has properly numbered and indexed. Being complied.
2.	Period/date of data collection should be clearly indicated.	Ambient Air Quality Monitoring and Analysis Period – March to May, 2014 (Season season). Noise level Monitoring date - April 09, 2014. Ground and Surface water samples date - April 12, 2014. Soil Samples Collection date - April 10, 2014. Please Refer Chapter-3.
3.	Authenticated English translation of all material provided in Regional languages.	EIA/EMP Report summary (Hard copy and Soft Copy in CD) has provided separately in Regional Language (Gujarati).
4.	The letter/application for EC should quote the MoEF file No. and also attach a copy of the letter.	Project Proponent letter/application for EC MoEF File No. J-11011/28/2014-IA II (I) Please refer Annexure-10 in EIA Report. (Page No. A-79).
5.	The copy of the letter received form the Ministry should be also attached as an annexure to the final EIA-EMP report.	Please refer Annexure-10 in EIA Report (Page No. A-79).
6.	The final EIA-EMP report submitted to the Ministry must incorporate the issues in this letter. Then index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report.	We have incorporated all the issues as per MoEF Letter in EIA/EMP report and also given compliance of all the points. We have provided index indicated specific chapter and page no of EIA-EMP Report. Being Complied.
7.	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-10013/41/2006-IA.II (I) dated 4th August, 2009 which are available on the website of this Ministry should also be followed.	We have followed instructions as per MoEF Letter vide O.M. No. J-10013/41/2006-IA.II (I) dated 4th August, 2009. Being Complied.

8.	The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/ National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approval etc. In this regards circular no. J-11013/77/2004-IA II (I) dated 2nd December, 2009 posted on the Ministry's website http://www.moef.nic.in may be referred.	M/s. Aqua – Air Environmental Engineers Pvt. Ltd. obtained stay order against all Office Memoranda of MoEFCC, New Delhi related with QCI/NABET scheme. Stay Order is referred as Annexure -11 (Page No. A-86).
9.	'Certificate of Accreditation' issued by the QCI to the environmental consultant should be included.	

ADDITIONAL TORs FOR SYNTHESIS ORGANIC CHEMICALS INDUSTRY

(ANNEXURE-II)

SR. NO.	TERMS OF REFERENCES	COMPLIENCE
1	Manufacturing process details along with the chemicals reaction & process flow chart.	Manufacturing process details along with the chemicals reaction & process flow chart is referred as Section 2.2, Chapter-2 in EIA Report (Page No. 2-1 to 2-24).
2	Name of all solvent to be used in the process & details of solvent recovery system	Name of all solvent to be used in the process & details of solvent recovery system is referred as Section 7.12, Chapter-7 in EIA Report (Page No. 7-30 to 7-31).
3	Design detail of ETP, incinerator, if any along with the boiler, scrubber/bags filters etc.	Effluent treatment plant is referred as Section 2.4.3.1, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).
4	The details of solid & hazardous waste generation, storage, utilization and disposal particularly related to the hazardous waste calorific value of hazardous waste and details characteristics of the hazardous waste. Action plan for the disposal of fly ash generated from boiler shall be included.	Solid & hazardous waste generation, storage, utilization and disposal is referred as Section 2.4.6, Chapter-2 in EIA Report (Page No. 2-39 to 2-40).
5	Precaution to be taken during storage and transportation of hazardous chemicals shall be clearly mentioned & incorporated.	Precaution to be taken during storage and transportation of hazardous chemicals is referred as Section 6.1.4.3.1, Chapter-6 in EIA Report (Page No. 6-13 to 6-14) & Section 6.1.4.4, Chapter-6 in EIA Report (Page No. 6-15 to 6-20).
6	Material safety data sheet for all the chemicals are being used/will be used. CAS No. /RTECS No./DOT/UN etc to be mentioned against each other.	Material safety data sheet for all the chemicals are referred as Annexure-12 in EIA Report (A-91).
7	Authorization/Membership for all the disposal of solid/hazardous waste in TSDF.	Company will submit the Authorization/Membership for all the disposals of solid/hazardous waste after apply the Consent to Establish.
8	Risk assessment for storage for chemicals/solvents. Action plan for handling & safety system.	Risk Assessment is referred as Chapter-6 in EIA Report.
9	Details of occupational health programme. I. To which chemicals, workers are exposed directly or indirectly.	i) Material safety data sheet of all the chemicals will put at the storage yard to read the all worker in general

	II. Whether these chemicals are within Threshold Limit Value (TLV)/Permissible Exposure levels as per ACGIH recommendation. III. What measure company have taken to keep these chemicals within PEL/TLV. IV. How the workers are evaluated concerning their exposure to chemicals during pre-placement and periodical medical monitoring. V. Liver function tests (LFT) during pre-placement and periodical examination.	language. ii) Threshold Limit Value (TLV)/Permissible Exposure levels are referred as Section 6.6.1.9, Chapter-6 in EIA Report (Page No. 6-89). iii) Permissible Exposure levels are referred as Section 6.6.1.9, Chapter-6 in EIA Report (Page No. 6-89). iv) Health evaluation of worker is referred as Section 6.6.1.8, Chapter-6 in EIA Report (Page No. 6-87 to 6-89). v) Every six month, Liver function tests (LFT) during pre-placement and periodical will be carried out.
10	A Toxic management Plan shall be prepared.	A Toxic management Plan is referred as Annexure-13 in EIA Report (Page No. A-118).
11	A write up on "safe Practice" followed for handling, storage, transportation & unloading of chemicals to be submitted.	"Safe Practice" followed for handling, storage, transportation & unloading of chemicals is referred as Section 6.1.4.3.1, Chapter-6 in EIA Report (Page No. 6-13 to 6-14) & Section 6.1.4.4, Chapter-6 in EIA Report (Page No. 6-15 to 6-20).
12	What are onsite & offsite emergency plan during chemicals disaster.	Onsite Emergency Plan is referred as Section 6.4, Chapter-6 in EIA Report (Page No. 6-69 to 6-80) Offsite Emergency Plan is referred as Section 6.5, Chapter-6 in EIA Report (Page No. 6-80 to 6-83)
13	A write up on "Treatment of workers affected by accidental spillage of chemicals".	Treatment of workers affected by accidental spillage of chemicals is referred as Section 6.6.1.8, Chapter-6 in EIA Report (Page No. 6-87 to 6-89).

ADDITIONAL INFORMATION FOR SYNTHESIS ORGANIC CHEMICALS INDUSTRY

DATE:29/09/2015

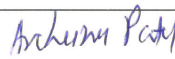
Sr. No.	TERMS OF REFERENCES	COMPLIENCE
1	One of the specific TOR was "A clarification from GPCB whether addition of this unit would be absorbed by Dahej-1". However, PP has not submitted the clarification. Copy of the recommendation of GPCB for the proposed project to be submitted.	Consent to establish from GPCB is attached as Annexure-14 (Page No.A-122).
2	Details of measures to be taken while handling NaCN.	Storage, Handling & safety precuation of Sodium Cyanide is referred as Section 6.1.4.4.3, Chapter-6 in EIA Report (Page No. 6-20).
3	Chlorine handling and management system to be provided.	Company will not use the chlorine in process.
4	Clarification regarding notification of GIDC Dahej -1 to be obtained from Industry Department.	Notification of GIDC Dahej -1 is attached as Annexure-15 (Page No.A-131).

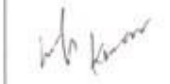
Declaration by Experts Contributing to the EIA Report of M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) is located at plant at Plot No. E-362, GIDC Dahej, Taluka Vagra, Dist. Bharuch, Gujarat, INDIA.

EIA COORDINATOR

Name	Signature
Mr. Jayeshkumar S. Patel	

FUNCTIONAL AREA EXPERTS

Sr. No.	Name of the Experts	Qualification	Involvement (Task)	Signature
1	Mr. Jayeshkumar Somabhai Patel	B.E. (Civil), M.E. (Environmental), MIE, CE	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
2	Mrs. Archana Jayeshkumar Patel	B.E. (Civil), AMIPHE	Water Pollution (WP), Noise and Vibration (NV), Hydrology, Water Conservation (HG) & Soil Conservation (SC)	
3	Mr. Chetan Ravjibhai Kabariya	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
4	Mr. Dhaval Vijay Jhaveri	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	

5	Mr. Chirag Harishchandra Lavana	B.Sc. (Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP), Noise and Vibration (NV) & Soil Conservation (SC)	
6	Mr. Rushik Harishbhai Mistry	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
7	Mr. Bhavin Dashrathlal Shah	B.Sc. (Geology), M.Sc. (Geology), M.Sc. Tech. (Geotech) (Empanelled Expert)	Landuse (LU), Hydrology, Water Conservation (HG), Geology (Geo) & Soil Conservation (SC)	
8	Mr. Mitesh Arvindbhai Patel	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Noise and Vibration (NV)	
9	Mr. Sunny Yogeshkumar Jariwala	M.E. (Environmental)	Water Conservation (HG) & Soil Conservation (SC)	
10	Mr. Ankit Gobarbhai Talaviya	B.Sc. (Chemistry), M.Sc. (Organic Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Noise and Vibration (NV)	
11	Mrs. Vaishali Yatinbhai Patel	B.Sc. (Chemistry), M.Sc. (Environmental Science)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Ecology and Bio-diversity (EB)	
12	Ms. Rutu Dashrathbhai Patel	B.Sc. (Biotech), M.Sc. (Environmental Science)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Ecology and Bio-diversity (EB)	

CHAPTER - 1

INTRODUCTION

1.1 BACKGROUND

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) proposes Pesticide Manufacturing Plant at Plot No E-362, GIDC Estate, Dahej-I, Ta: Vagra, Dist: Bharuch – 392 130, Gujarat.

The Unit shall maintain the quality of its product, Environment, Safety & House Keeping of the site. This project will generate additional employment and secondary business opportunity in this region. This unit would cater to the domestic market and there by reducing dependencies on Import. Proposed Project Cost will be Rs. 15 Crores.

INTRODUCTION & COMPANY PROFILE

The Hemani Group is highly advanced, adaptable and attuned to the evolving needs of today's basic chemicals for Organic Pigment and Dyestuff industry with big capacities like world class players, catering to the whole world. The group is a dynamic enterprise targeting its specialized expertise to the development and production of high quality products for Pigments and Dyestuffs Industry. Hemani group is well known in the International as well as Domestic market for manufacturing and marketing in specialized product range as under:

- Dyes and Dyes Intermediates
- Organic Pigment Intermediates
- Pesticides and Pesticides Intermediates
- Other Specialty Chemicals

Hemani Group is a multi-company, multi-product set up at different locations in the Gujarat state of India. Hemani Group has consistently expanded its facilities and product mix investing in increasingly advanced installations and at the same time in the ongoing development and upgradation of products and processes that comply with the international standards and demands. The Hemani Group started its manufacturing activities in 1977 with Dyes Intermediates. With time, 3 Private Limited Companies were started and new products launched which are in great demand in International as well as Domestic markets. Today with over 80% of the USD 20 Million turnover coming from exports, they are all set to

achieve the 40% export growth that they have been achieving over the past 3 years in spite of a sluggish world economy. Mr. Premji Hemani and Mr. Mohan Hemani are the main promoters and think tank of the Group. In the year 1983, Hemani Group commenced its commercial production of 3, 3 Dichloro Benzidine Di Hydrochloride [3, 3 DCB]. Today, Hemani Group is one of the largest manufacturers and exporters of 3, 3 DCB.

Group Companies

Ideal Dye Chem Industries

Ideal Dye Chem was started in March, 1977 to manufacture dyes and dye intermediates in a very small capacity. They expanded their capacity in 1982 for the same product range. In the year 1984, Ideal Dye Chem Industries started the production of 3, 3 DCB in a very small capacity. As demand grew the capacity was expanded to 10 TPM (tons per month) in 1988 and was further expanded to 16 TPM in 1990. The major milestones thereon include commencement of manufacturing of 4 B acids in 1991, 2 B acids in 1993. In 1994 4 B acid capacity was expanded to 15 TPM and later again expanded to 40 TPM in 2000. Ideal Dye Chem Industries started exports in 1993 for the first time of dye intermediates to Japan and has not looked back since then. Also due to the success of Ideal Dye Chem Industries, the promoters acquired land and machinery to setup Hemani Intermediates Private Limited in December, 1993.

Hemani Organics & Chemicals Pvt. Ltd.

The plant was started in the year 1992 with a small capacity to cater to the diverse needs of the market. This initiative yielded immediate success and the capacity was increased to 16 TPM (tons per month) in 1996. Today the plant hires more than a 110 people with an installed capacity of 100 TPM. The main products being manufactured and marketed include Meta Phenoxy Benzaldehyde.

Hemani Intermediates Pvt. Ltd.

After the success of Hemani Organics and Chemicals Private Limited, Hemani Group acquired land and machinery in December, 1993 to setup a world-class plant and setup under the aegis of Hemani Intermediates Private Limited. Today housing state-of-the-art machinery, Hemani Intermediates Pvt. Ltd. is a Govt. recognized export house catering to the demanding needs of the industry in terms of quality and capacity. With a team of more

than 90 people, the plant is looking for ISO certification in the near future. They have already won accolades from clients with regard to their systems and quality processes.

Premonit International Eximp & Hemani International

Due to the growing demand in the international market for their products, a separate firm: Premonit International Eximp was setup in 1994 to manage the exports of products manufactured by the Hemani Group. Having met with success in the same, Hemani International was setup in 2000 for trading and development of new businesses such as pharmaceuticals and textiles. Today a dedicated team of 25+ people manages the export demand for products of the Hemani Group and looks into emerging markets to trade in newer products.

FUTURE PLANS

An ISO 9001 certification is on the anvil soon since everything is in place for the certification. Their international clientele is a proof of their quality systems and standards already. Almost 5% of the turnover is invested back in research and development every year. It is their endeavor to develop new specialty products, benzene based derivatives, pesticides, specialty pigment intermediates with the current manufacturing facility itself.

They keep themselves abreast of the latest machinery across the world and on the basis of the same upgrade themselves from time to time to provide their valued customers with the very best of quality. Hemani Group will continue to expand its capacity and capability through innovations, strategic alliances and acqusitions.

RESEARCH & DEVELOPMENT

Their research and development facility is well equipped with advanced equipment for chemical analysis, process design and quality control. Quality research is the foundation on which their production capitalizes. Every aspect of purchase, manufacturing and marketing revolves around the performance of the product and they follow the "Zero Defect policy". Their R & D focuses on new product and the process development and enhancing quality of the existing products. They are planning to introduce new products evolved by them in the near future. They have the most modern plant at Vapi and Ankleshwar with state-of-the-art technology. The laboratory is well equipped with latest equipments viz. GC, HPLC, TLC and

also an intensive R & D Lab with Pilot plant facility wherein they develop new specialty products as per requirements and demand.

ENVIRONMENT

Their respect for the environment is reflected in their efforts at ensuring best practices followed at all levels. They not only adhere to the statutory norms but have a holistic approach towards environmental protection. The major environmental issues addressed are:

- Ongoing manufacturing processes are studied in detail with a view to minimize generation of liquid/gaseous waste streams as a part of continuous improvement.
- A specially constituted Pollution Control Cell at their R&D centre is actively engaged in developing technologies for environment protection at their manufacturing plants. Their Pollution Control Cell in fact also helps out smaller industrial units that do not have capabilities and infrastructure for such jobs. The efforts of their team are not aimed at just pollution minimization but also to conserve energy, improve process yields and product quality.

At their manufacturing sites they ensure a clean environment by:

- Continuously operating Effluent Treatment Plants
- Burning of waste gases
- Controlling NOx emission
- Monitoring of ambient air quality
- Monitoring of effluents and emission quality
- Safely disposing solid waste
- A regular review of the Safety measures and HAZOP study is undertaken to ensure that the plants and those working there are protected.

The above practices help in achieving strict compliance with statutory standards laid down by Gujarat Pollution Control Board for plant effluent and emission quality.

1.1.1 PROMOTERS AND THEIR BACK GROUND

The main promoters and the think tank of Hemani Group are:

Mr. Premjibhai Hemani - Technical Director

Mr. Mohanbhai Dama - Commercial Director

Mr. Ramesh Bapat - Executive Director

Mr. D.N. Rai - Technical Director

Mr. Jayesh Dama - Administrative Head

1.1.2 REGULATORY FRAMEWORK

For proposed project; following assumptions has been considered:

a. Capacity of Plant 900 MT/Month

b. Total working days in a year 330

c. Raw material storage facility for one month

d. Finished product storage for 300 MT

e. Solvent Storage facility for 30 days

1.1.3 JUSTIFICATION OF PROJECT

The demand for products intended to be manufacture is increasing in the country. By setting up this unit M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will be able to meet the demand of various products locally. The project will save forex as certain products import will be reduced. This will also generate direct and indirect employment opportunity for various levels of people. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will also utilize the by-products of this unit as well as sister concern unit.

TABLE 1.1

BREAK-UP OF PROJECT COST

SR. NO.	PARTICULARS	ESTIMATED COST (INR IN LAKHS)
1	Land and Site Development	150
2	Building	300
3	Plant and Machineries	800
4	Environment protection measures (includes cost of ETP, Tree Plantation, Evaporator System and Rain Water Harvesting etc.)	250
Total		**1500**

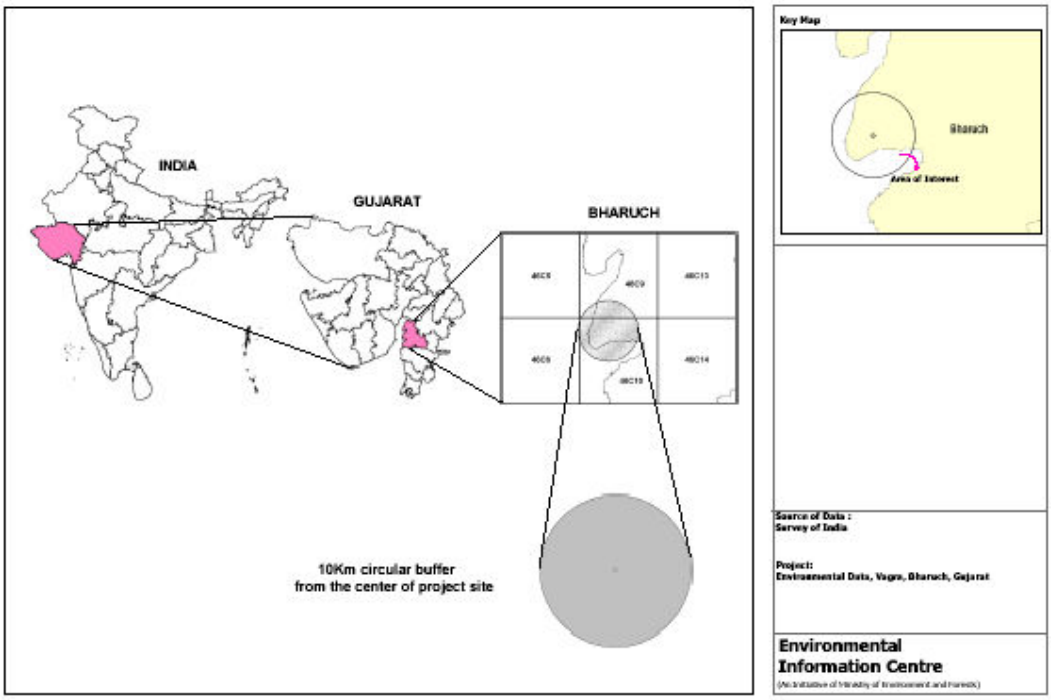
TABLE 1.2

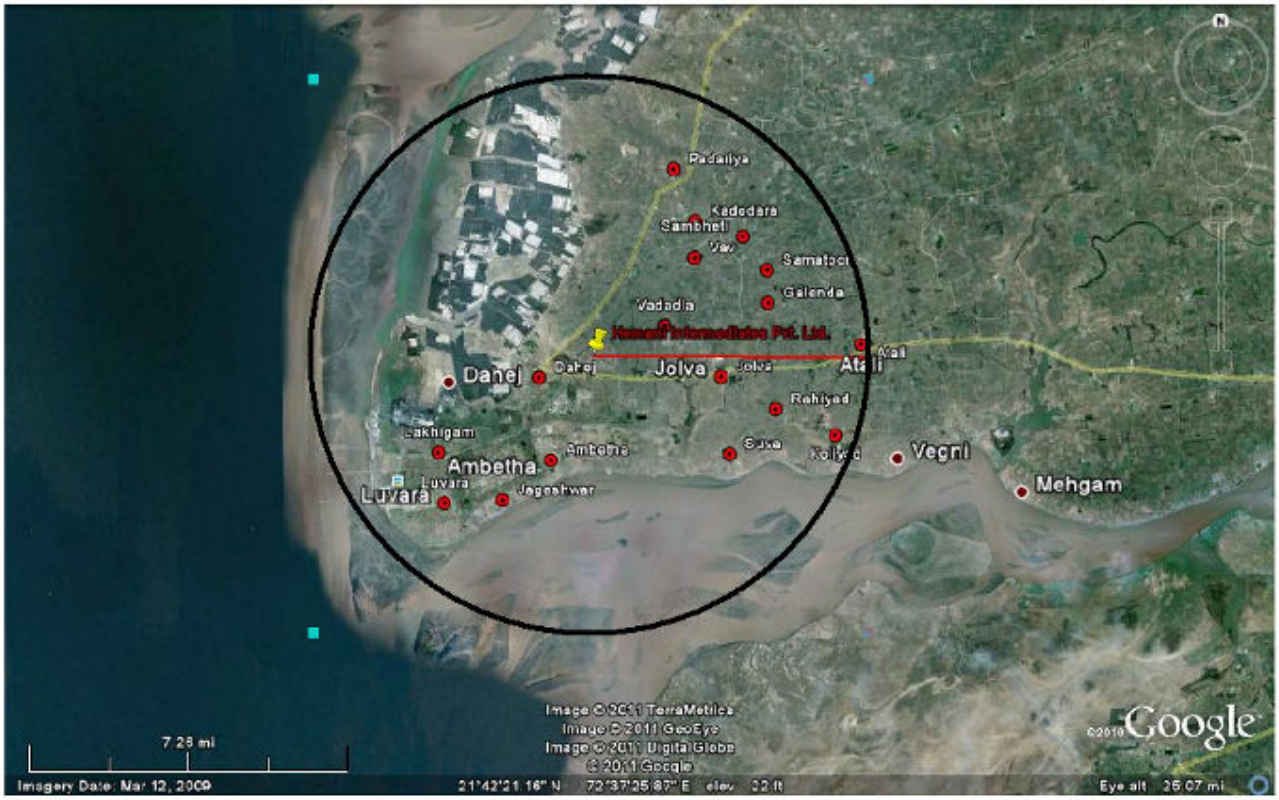
BREAK UP OF DIFFERENT LAND USE OF FACTORY

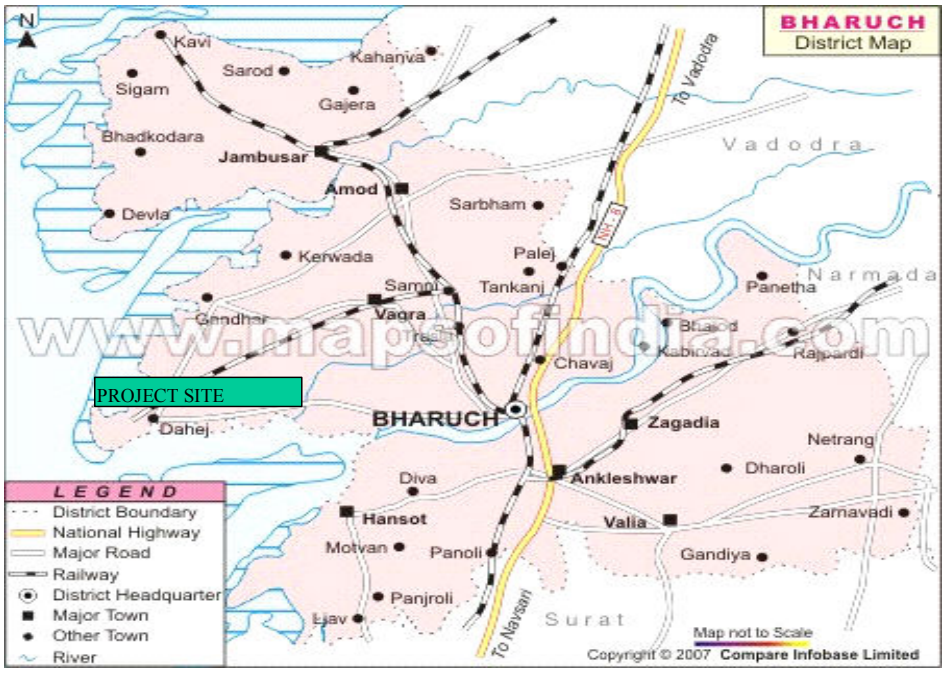
SR. NO.	LAND USE	PROPOSED AREA (SQ. MT.)
1	Production Plants	5450
2	Parking	40
3	Security Building	10
4	Effluent Treatment plant	300
5	Utility	750
6	Raw Material and Finished Products Storage	100
7	Gas Tonner Storage	80
8	Tank Farm Area	225
9	Green Belt	2400
10	Road	350
	Total	**9705**

FIGURE - 1.1

LOCATION OF THE PROJECT SITE







BHARUCH
District Map
N
Kavi
Sarod
Kahanva
Sigam
Gajera
Bhadkodara
Jambusar
Amod
Sarbham
Devla
Kerwada
Palej
Tankanj
Samni
Vagra
Gandhar
Panetha
Narmada
Vadodra
To Vadodra
Bhalod
Kabirvad
Rajpardi
Chavaj
PROJECT SITE
BHARUCH
Dahej
Zagadia
Netrang
Dharoli
Ankleshwar
Diva
Hansot
Valia
Zarnavadi
Motvan
Panoli
Gandiya
Panjroli
Ljav
Surat
To Navsari
LEGEND
District Boundary
National Highway
Major Road
Railway
District Headquarter
Major Town
Other Town
River
Map not to Scale
Copyright © 2007 Compare Infobase Limited

Dahej
Ambetha
Luvara
Jageshwar
Google
Imagery Date: Mar 1, 2009

Hemani Intermediates Pvt. Ltd.
Google
Imagery Date: Mar 1, 2009
Eye alt 8444 ft

Dahej, Gujarat, India
Hemani Intermediates Pvt. Ltd.
Bharuch
Ankleshwar
45.13 km
Image © 2010 DigitalGlobe
© 2010 Google
Image © 2010 TerraMetrics
Image © 2010 GeoEye
Google
Eye alt 41.01 mi

FIGURE - 1.2

LAYOUT OF THE PLANT

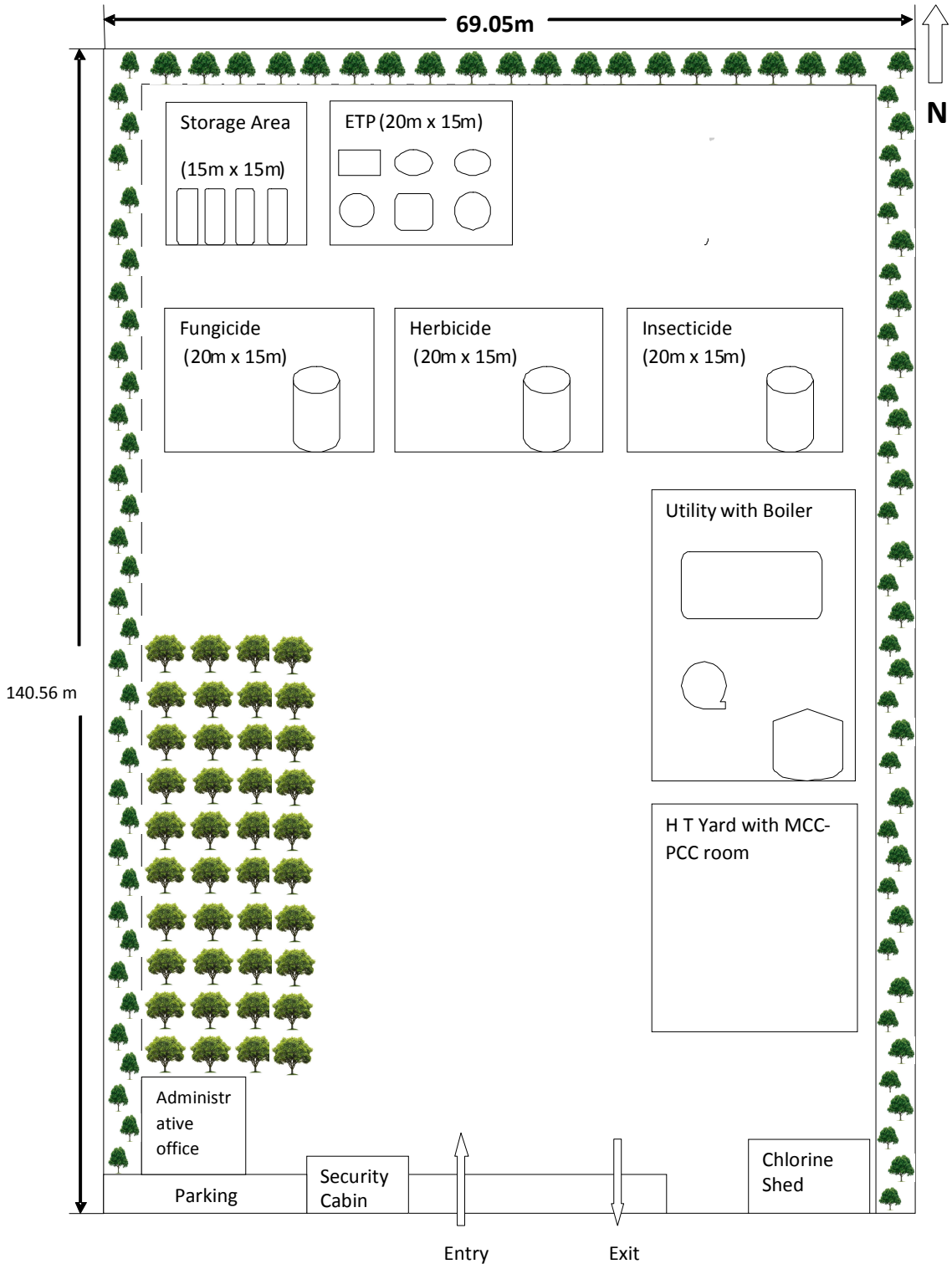


FIGURE 1.3 PHOTOGRAPH OF THE SITE:

TABLE 1.3

LIST OF PRODUCTS ALONG WITH PRODUCTION CAPACITY

Sr. No.	Name of the Products	Quantity in MT/Month
		Proposed
1. Fungicides		
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propioconzole (T)	
2. Herbicides		
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Pendimethalin (T)	
3. Insecticides		
a)	Transfluthrin (T)	300
b)	Cyfluthrin & Beta Isomers (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomers (T)	
e)	Imidacloprid (T)	
Total		**900**

LIST OF BY PRODUCTS

Sr. No.	Name of the Products	Quantity in MT/Month
		Proposed
1.	HCl (32%)	250
2.	Sodium Sulphate Solution (30% to 35%)	2000
3.	Aluminum Chloride (25%)	1000
4.	Potassium Chloride Solution	860
5.	H_2SO_4 (70%)	100
6.	Sodium Sulfite Solution (20%)	600

1.2 PROJECT SETTING

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will be located in Dahej Industrial Estate at longitude 72° 36'45.60" E and latitude 21° 43' 13.8" N. Detailed Layout map of the plant is shown in Figure – 1.2.

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) located near Bharuch and Vadodara which are important industrial and commercial centers of Gujarat and India. The nearest railway station is Bharuch on broad gauge section of Western Railway Line. Railway station is located at about 50 km from the project site. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) is well connected from Bharuch-Dahej highway by road transport. Nearest Airport is at Vadodara, which is located at a distance of about 75 km from project site.

The nearest large city is Vadodara, which is about 75 km away and has population of 18,22,532. Water for industrial purpose shall be available from GIDC water supply. Development of Communication systems is good in the region due to proximity to Bharuch and Vadodara. The treated effluent shall be collected in central collection tank before it is discharged in to deep sea via GIDC pipeline. Secured landfill site and Common Incineration Facility operated by M/s. Bharuch Enviro Infrastructure Ltd. is located at Ankleshwar, about 60 km away from the project site.

The salient features of the site are as under:

1. Minimum distances:
   - a) From City : Vadodara 75 km
   - b) Village : Dahej 2.10 km South-West
   - c) Historical Site : None
   - d) Sanctuaries : None
   - e) Highway : State highway No. 64
   - f) Sea coast : 11.5 km
   - g) Secured landfill site : 60 km
2. Use of forest land : None
3. Use of prime agricultural land: None
4. Planned submergence : None
5. Displacement of population : None

1.2.1 KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS

1.2.1.1 METHOD OF DATA PREPARATION

Key infrastructure features have been extracted from Survey of India (SoI) topographical maps of 1:50,000 scale. The features have been updated using satellite data and have been verified with ancillary information derived from TTK maps and guide maps. The locations of the settlement have been extracted from Census of India (CoI) maps and verified by using SoI topographical maps and satellite data.

1.2.1.2 DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE

The distance of railways and National and State highways are presented in Table 1.4 below.

TABLE 1.4

DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE

Sr. No.	Nearest Infrastructure Feature	Distance from Project Area
1	Village Dahej	2.10 Km in South-West Direction
2	NH-8	43.7 Km in East Direction
3	NH-8E	44.7 Km in West Direction
4	SH-6	0.44 Km in North Direction
5	SH-37	33.87 Km in West Direction
6	Railway line	0.09 Km in North-East Direction
7	Dahej, Nearest Railway Station	0.45 Km in South-West Direction
8	Narmada River	3.5 Km in South Direction
9	Bhavnagar Airport	28.29 Km in North-West Direction
10	Meghmani Organics Pvt. Ltd.	1.2 Km away from Project Site
11	Reliance Industries Ltd.	3.5 Km away from Project Site
12	Birla Copper Ltd.	2.7 Km away from Project Site
13	Universal Chemical Ltd.	0.8 Km away from Project Site
14	Insecticides India Ltd.	1.1 Km away from Project Site
15	Dahej SEZ	1.5 Km away from Project Site
16	GACL	1.6 Km away from Project Site

1.2.1.3 MAP OF KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS

A map depicting administrative boundaries up to Taluka level, showing locations of towns and villages along with National and State highways, major and medium roads and railways is presented as Figure 1.4. The map also shows the water bodies for better understanding of project area. The map marks the area within 10 km with the project site as the center.

FIGURE – 1.4

KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS

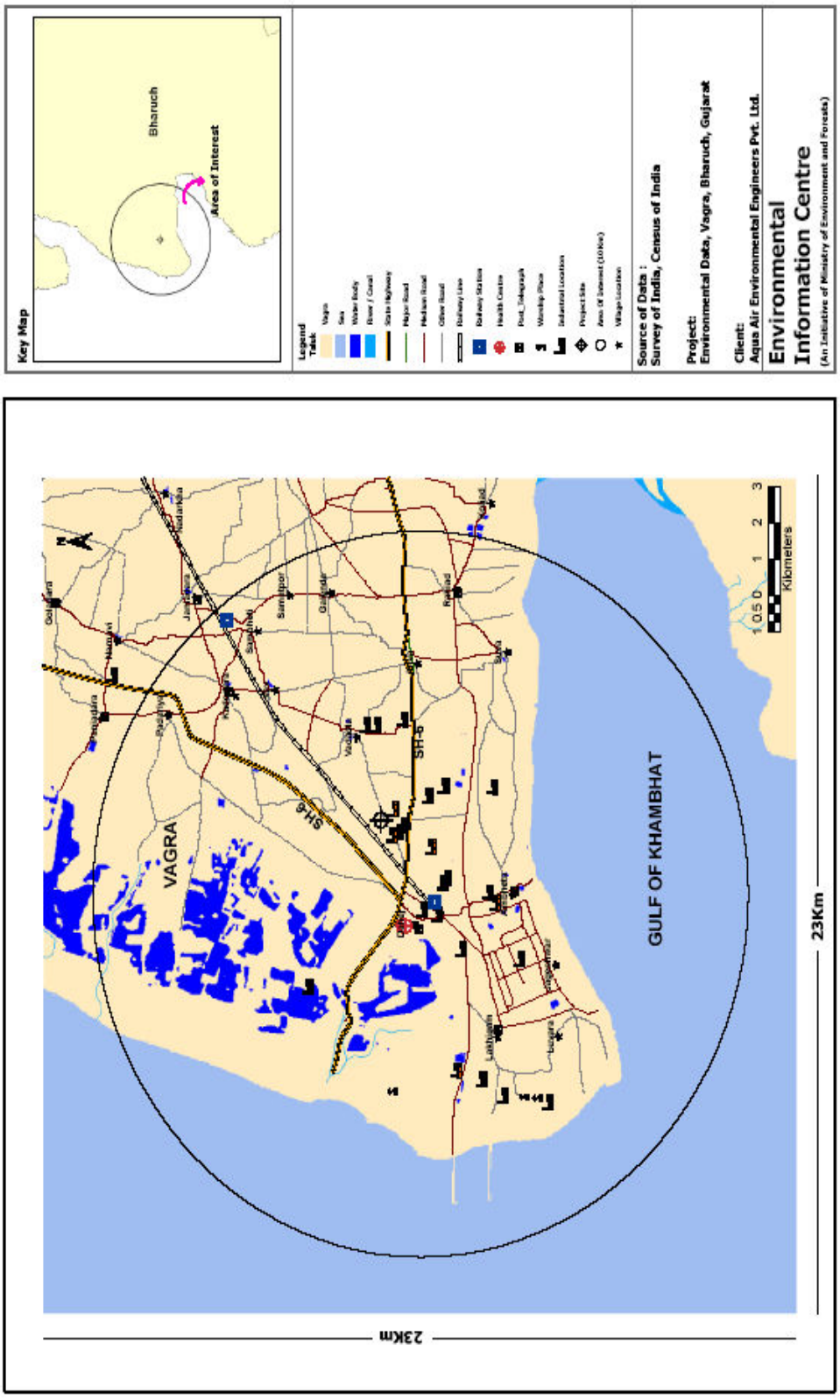
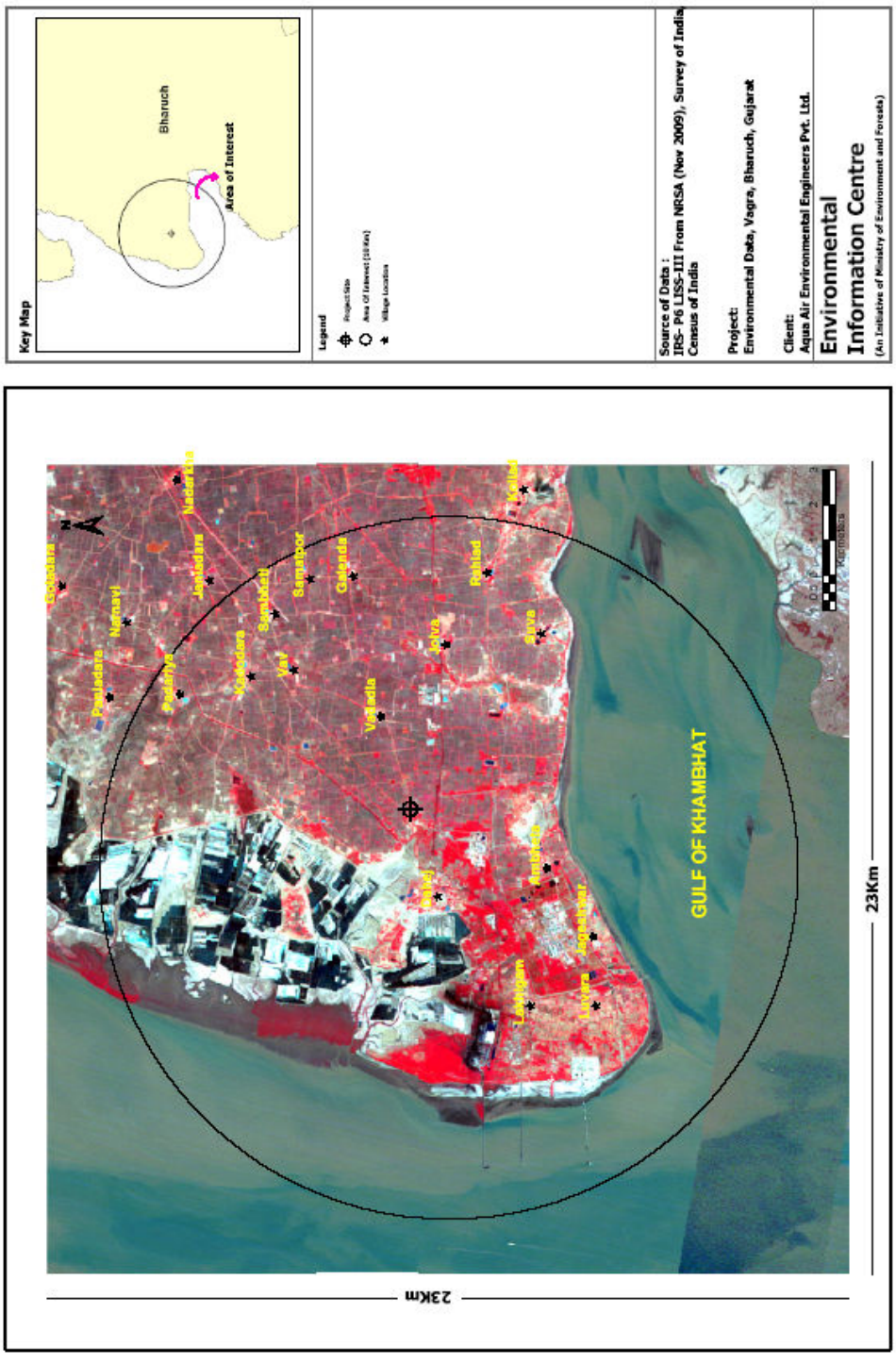


FIGURE – 1.5

SATELLITE IMAGERY



1.3 PURPOSE OF EIA

The EIA study is carried out to assess the pollution potential and evaluate the adequacy and efficiency of proposed Pollution Control & Environmental Management System.

1.4 OBJECTIVES OF EIA

The main objectives of the study are

1) To assess the background environmental status,
2) To identify potential sources of pollution,
3) To predict and evaluate the impact on environment along with pollution control measures taken and
4) To prepare a comprehensive Environment Management Plan and Disaster Management Plan.

1.5 METHODOLOGIES FOR EIA

Taking into consideration proposed project activities and guidelines, an area of 10 km radius from the center of the project has been selected and is designated as the study area for the purpose of EIA studies.

1.5.1 Base Line Condition

The samples of ambient air, ground and surface water and soil are collected and analyzed as per the standard methods for establishing the baseline data and to determine the impact of proposed activity on the same.

1.5.1.1 Ambient Air Environment

The air environment around the plant was studied by setting up seven locations within the study area of 10 km radius from the project site and collection and monitoring the site specific meteorological data, viz. wind speed, wind direction, humidity, rainfall and ambient temperature was carried out. Design of network for ambient air quality monitoring locations is based on guidelines provided by CPCB. The ambient air samples were collected and analyzed for SPM, PM_{10}, $PM_{2.5}$, SO_2, NO_X, HCl, Cl_2, O_3, Pb, CO, NH_3, C_6H_6, Benzo (a) Pyrene (BaP), Arsenic (As), Nickel (Ni) & VOCs for identification, prediction, evaluation and assessment of potential impact on ambient air environment.

1.5.1.2 Ground And Surface Water Environment

The water required for domestic and industrial use is being made available from surface water. Hence, to assess the physico-chemical quality of the water, a number of water samples were collected and analyzed for pollution parameters viz., pH, TDS, Turbidity, BOD_3, COD, Fluorides, Chlorides, Sulphates, Nitrates, Ammonical Nitrogen, Hardness, Alkalinity, Oil & Grease and some heavy metals in order to find out the contamination, if any.

1.5.1.3 Noise Environment

Noise pollution survey was conducted in the study zone. The anticipated noise sources were industrial activities, which are likely to be increased due to proposed activity. Noise levels were also recorded in surrounding villages for evaluating general scenario of the study area. Hourly equivalent sound levels (Leq) were also recorded for calculating Day and Night noise levels in the surrounding villages.

1.5.1.4 Soil Environment

Soil sampling and analysis was carried out to assess physico-chemical characteristics of the soils and delineate existing cropping pattern, existing land use and topography, within the study area.

1.5.1.5 Biological Environment

Keeping in view, the importance of biological component of total environment due to the proposed project, biological characterization of terrestrial and aquatic environments, changes in species diversity of flora and fauna in terrestrial as well as aquatic systems were studied for impact analysis due to proposed project activity, if any.

1.5.1.6 Socio-economic Environment

Demographic and related socio-economic data was collected from census handbook to assess socio-economic status of the study area. Assessment of impact on significant historical, cultural, and archeological sites/places in the area and economic and employment benefit arisen out from the project is given special attention.

1.5.2 Identification of Pollution Source

Detailed study of manufacturing process for proposed scenario is carried out along with input and output of materials, water, and wastewater as well as infrastructure facilities available.

1.5.3 Evaluation of Pollution Control and Environmental Management System

The qualitative and quantitative analysis of various pollution sources as well as evaluation of pollution control system is carried out.

1.5.4 Evaluation of Impact

A comprehensive evaluation of environmental impact with reference to proposed activities is carried out.

1.5.5 Preparation of Environmental Management Plan

A comprehensive Environmental Management Plan has been prepared covering all the aspects of pollution prevention measures, Air and Water Pollution Control measures, Hazardous Waste Management, Environmental Surveillance and Environmental Management Plan.

The present report is an EIA conducted during Summer season of 2014 (March, 2014 to May, 2014). The baseline environmental conditions have been established through field monitoring and literature survey. The contents of EIA report, details of data collection and source of secondary data are presented in Figure 1.6.

1.6 STRUCTURE OF REPORT

The objective of the EIA study is preparation of Environment Impact Assessment (EIA) report based on the guidelines of the Ministry of Environment, Forest & Climate Change (MoEFCC), CPCB and GPCB. It incorporates the following.

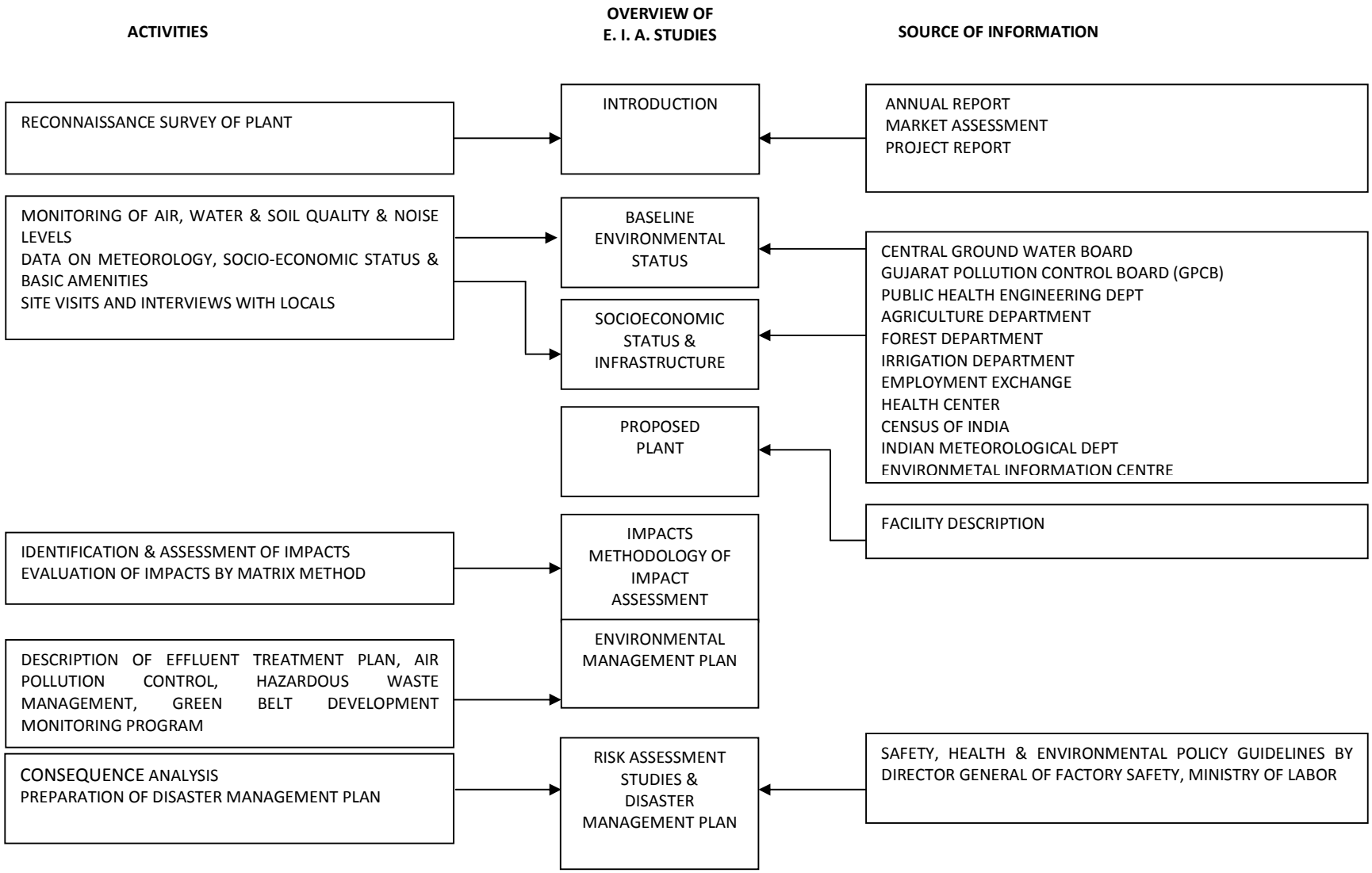
- Chapter 1 is an Introduction to the Industry, their premises and surrounding areas. It also expresses the basic objectives and methodologies for EIA studies and work to be covered under each Environmental component.
- Chapter 2 presents a Project Description and Infrastructure facilities including all industrial and environmental aspects of M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) as well as manufacturing process details. This chapter also gives information about raw material storage and handling, water and wastewater quantitative details, air pollution and control system, Hazardous Waste generation, storage facility and disposal and utilities for proposed plant capacity. It also provides information about proposed Environmental Management Facilities available at the project site.
- Chapter 3 covers Baseline Environmental Status including meteorological details, Identification of baseline status of Environmental components of the surrounding area covering air, water and land environment. Also presents a study of land use pattern, Biological Environment & Socio-Economic Environment giving details about District Bharuch, Taluka Vagra and the study area in terms of land use pattern, biological environment, and socio-economic environment.
- Chapter 4 deals with Anticipated Environmental Impacts and Mitigation Measures, which provides quantification of significant impacts of the proposed activities of plant on various environmental components. Evaluation of the proposed pollution control facilities has been presented.
- Chapter 5 deals with Environmental Monitoring Plan
- Chapter 6 describes Risk Assessment and Disaster Management Plan that shall be adopted by the company.
- Chapter 7 describes Environment Management Plan (EMP) to be adopted for mitigation of anticipated adverse impacts if any and to ensure acceptable impacts.
- Chapter 8 describes Executive Summary of the Project.
- Chapter 9 describes Details of Consultants Engaged.

HEMANI INTERMEDIATES PVT. LTD. (UNIT-IV)

REVISED ENVIRONMENT IMPACT & RISK ASSESSMENT REPORT

FIGURE 1.6

ACTIVITIES, SOURCES OF INFORMATION AND CONTENTS OF EIA REPORT



CHAPTER - 2

PROJECT DESCRIPTION AND INFRASTRUCTURAL FACILITIES

2.1 BACKGROUND

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) proposes Pesticide Manufacturing Plant at plot no. E-362, GIDC Estate, Dahej-I, Ta: Vagra, Dist: Bharuch – 392 130, Gujarat.

2.2 MANUFACTURING ACTIVITIES

Manufacturing activities proposed in the project include various processes. The activities shall also include operation of various utilities. The manufacturing process is described in details in following sections. The list of products and their capacity is given in Table 1.1.

PROCESS DESCRIPTION

1) Fungicides

a. Hexaconzole (T)

Process Description:

Step -1

1,3-Dichloro benzene reacted with Pentanoyl chloride in presence of Aluminum chloride and Solvent - Ethylene Di Chloride to get 2,4-Dichloro Valerophenone.

Step -2

2,4-Dichloro Valerophenone further reacted with Methylene-Triphenylphosphorane in presence of Solvent - THF to get 2-(2,4-Dichloro Phenyl)-n-hex-1-ene.

Step -3

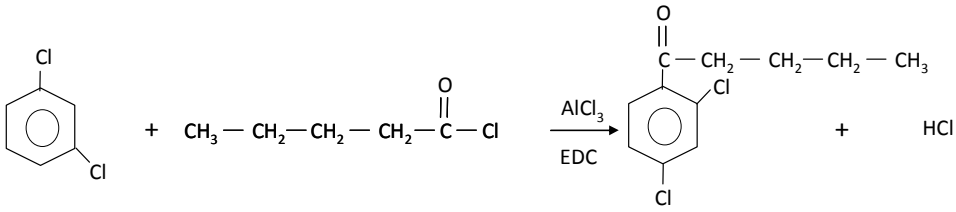
2-(2,4-Dichloro Phenyl)-n-hex-1-ene reacted with Bromine and Hydrogen Peroxide in presence EDC to get 1-Bromo-2-(2,4-Dichlorophenyl)-hexane-2-ol.

Step -4

1-Bromo-2-(2,4-Dichlorophenyl)-hexane-2-ol further reacted with 1,2,4-Triazole in presence of Potassium hydroxide and Solvent DMF to get final product HEXACONAZOLE.

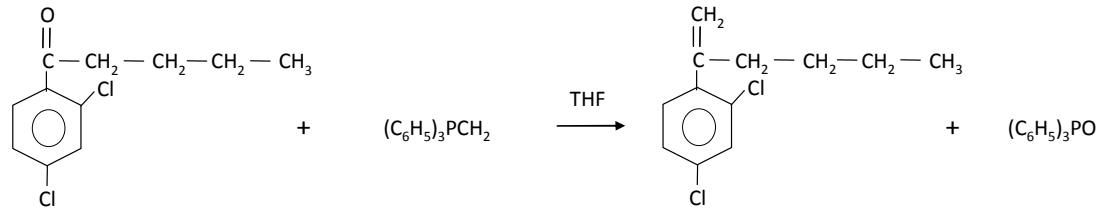
Chemical Reaction

STEP:1



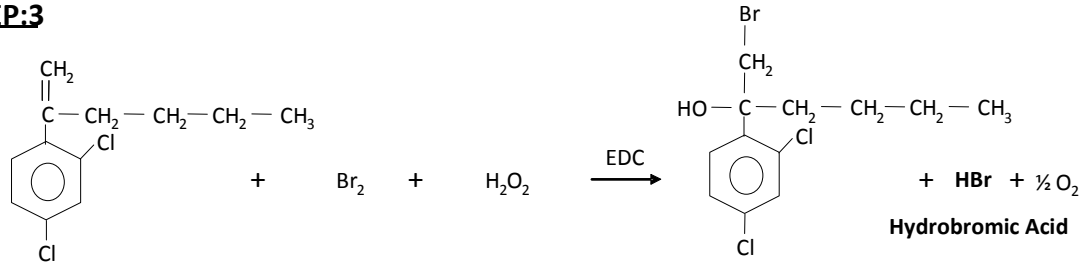
1,3 – Dichloro Benzene	Pentanoyl Chloride	2,4 – Dichloro Valerophenone	Hydrochloric Acid
147	120.5	231	36.5

STEP:2



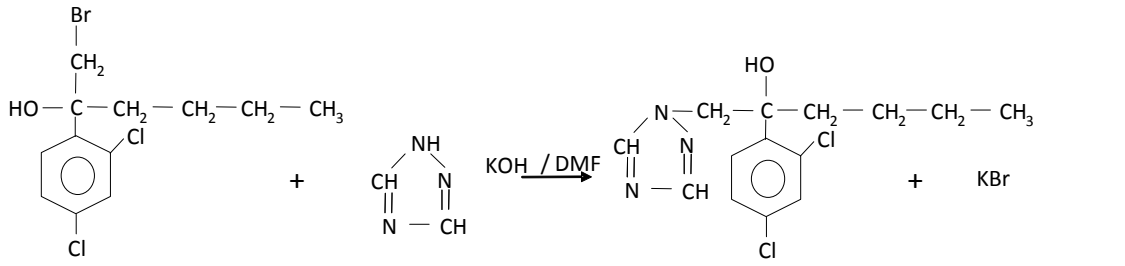
2,4 – Dichloro Valerophenone	Methylene-Triphenyl Phosphorane	2-(2,4–Dichloro Phenyl)-n-hex-1-ene	
231	276	229	278

STEP:3



2-(2,4–Dichloro Phenyl)n-hex-1-ene	Bromine	Hydrogen Peroxide	1-Bromo-2-(2,4-Dichlorophenyl) hexane-2-ol		Hydrobromic Acid	
229	2 x 80	34	326		81	½ 16

STEP:4



1-Bromo-2-(2,4-Dichlorophenyl) hexane-2-ol	1,2,4-Triazole	HEXACONAZOLE	Potasssium Bromide
326	69	314	

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	1,3 Di Chloro Benzene	510		Hexaconazole	1000
2	Pentanoyl Chloride	417		Recovered Solvent - EDC	1810
3	Alumimun Chloride	632		Solvent Loss EDC	40
4	Solvent - EDC	1850		20 % Aluminum Chloride	3160
5	Methylene Triphenyl Phosphorane	944		30 % Hydrochloride Solution	421
6	Bromine	540		Recovered Solvent - THF	1150
7	Solvent - THF	1200		Solvent loss - THF	50
8	Hydrogen Peroxide	116		Potassium Bromide	410
9	Potassium Hydroxide	195		Tri Phenyl Phosphanone	966
10	1,2,4 - Triazole	220		Recovered Solvent - DMF	1065
11	Solvent – Dimethyl Formamide	1100		Solvent Loss - DMF	35
12	Water	3875		28 % Hydrobromic Acid	1005
13				Aqueous Layer to ETP	468
				Distillation Residue	19
	Total	**11599**			**11599**

b) Tebuconzole (T)

Process Description:

Step -1

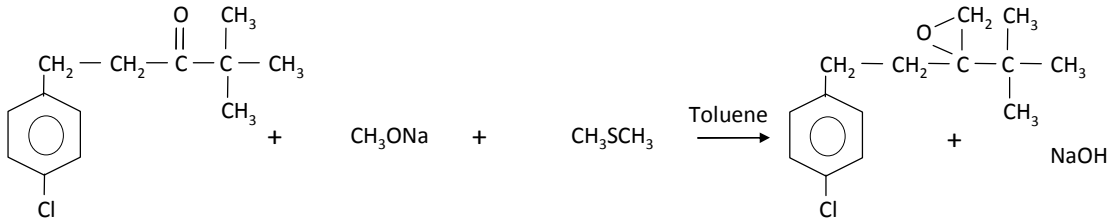
1-(4-Chlorophenyl)-4,4-Dimethyl-3-Pentanone reacted with Sodium Methoxide & Dimethyl Sulfide in presence of Toluene to get 2- [2-(4- Chlorophenyl)ethyl]-2-(1,1 – Di methyl ethyl) Oxirane.

Step -2

2- [2-(4- Chlorophenyl)ethyl]-2-(1,1 – Di methyl ethyl) Oxirane. is reacted with 1,2,4-Triazole in presence of DMF to give final product TEBUCONAZOLE

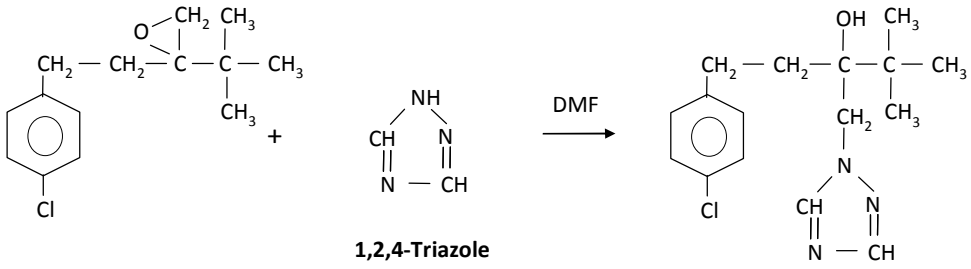
Chemical Reaction

STEP:1



1-(4-Chlorophenyl)-4,4-Dimethyl-3-Pentanone **224.5** | **Sodium Methoxide** **54** | **Dimethyl Sulfide** **62** | **Intermediate-I** **238.5** | **40.0**

STEP:2



238.5 | **1,2,4-Triazole** **69** | **TEBUCONAZOLE** **307.5**

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	1-(4 – Chlorophenyl) 4-4-Dimethyl -3- Pentanoate	675		Tebuconazole	1000
2	Sodium Methoxide	162		Recovered Solvent - Toluene	1360
3	Di Methyl Sulfide	186		Solvent Loss - Toluene	40
4	Solvent - Toluene	1400		Methanol	95
5	1,2,4 - Triazole	206		20 % Sodium Methyl Sulfide	1048
6	Solvent - DMF	1100		Recovered Solvent – DMF	1070
7	Water	1690		Solvent loss - DMF	30
				Aqueous Layer to ETP	768
				Distillation Residue	14
	Total	**5419**			**5419**

c) Propioconzole (T)

Process Description

Step -1

1,3-Dichloro benzene is reacted with Acetyl chloride in presence of Aluminum Chloride and Solvent - Ethylene Di Chloride to get 2,4-Dichloro Acetophenone.

Step -2

2,4-Dichloro Acetophenone further reacted with bromine in presence of Solvent - Ethylene Di Chloride to get 2,4-Dichloro Phenacyl Bromide.

Step -3

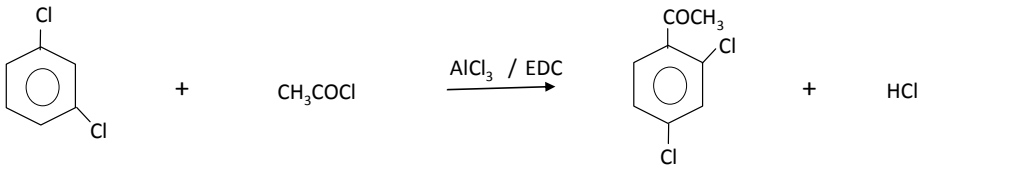
2,4-Dichloro Phenacyl bromide reacted with 1,2-Pentanediol in presence of Toluene to get 4-(2-Bromomethyl-4-Propyl-1,3-Dioxolane-2-yl)-1,3-Dichlorobenzene.

Step - 4

4-(2-Bromomethyl-4-Propyl-1,3-Dioxolane-2-yl)-1,3-Dichlorobenzene further reacted with 1,2,4-Triazole in presence of Potassium hydroxide and Solvent DMF to get final product PROPICONAZOLE.

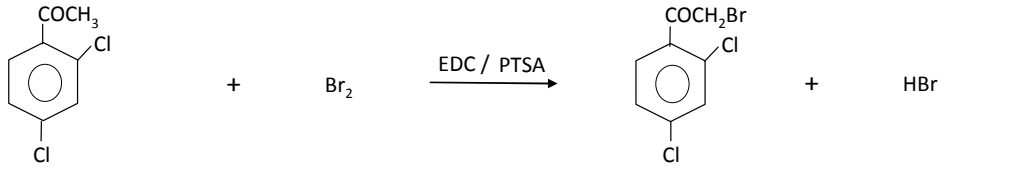
Chemical Reaction

STEP:1



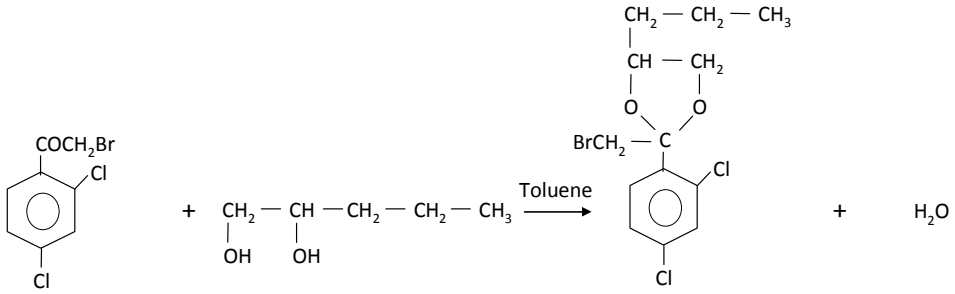
1,3 – Dichloro Benzene	Acetyl chloride	2,4 – Dichloro Acetophenone	Hydrochloric Acid
147	78.5	189	36.5

STEP:2



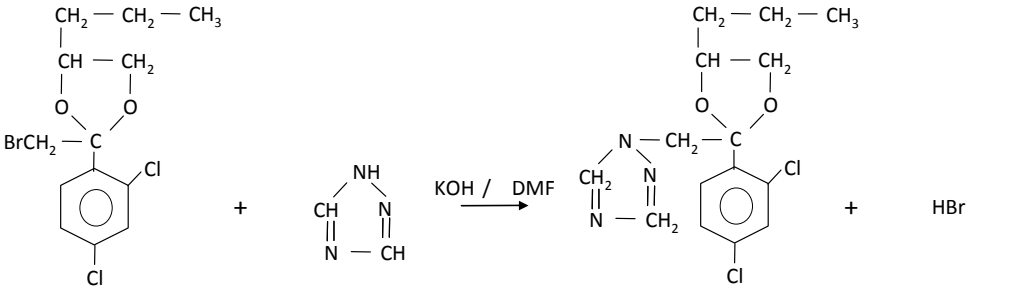
2,4 – Dichloro Acetophenone	Bromine	2,4 – Dichloro Phenacyl bromide	Hydrobromic Acid
189	2 x 80	268	81

STEP:3



2,4 – Dichloro Phenacyl bromide	1,2-Pentanediol	4-(2-Bromomethyl-4-Propyl-1,3-dioxolane-2-yl)-1,3-Dichlorobenzene	
268	104	354	18

STEP:4



4-(2-Bromomethyl-4-Propyl-1,3-dioxolane-2-yl)-1,3-Dichlorobenzene	1,2,4-Triazole	PROPICONAZOLE	Hydrobromic Acid
354	69	342	81

Material Balance / Mass Balance (All Quantities are in Kg)

IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	1,3 Di Chloro Benzene	452		Propiconazole	1000
2	Acetyl Chloride	238		Recovered Solvent - EDC	1570
3	Alumimun Chloride	558		Solvent Loss EDC	30
4	Solvent - EDC	1600		20 % Aluminium Chloride	2786
5	Bromine	553		30 % Hydrochloride Solution	375
6	Catalyst	10		Recovered Solvent - DMF	970
7	1,2 - Butanediol	320		Solvent loss - DMF	30
8	Solvent - Toluene	1000		Potassium Bromide	390
9	Potassium Hydroxide	166		Recovered Catalyst	10
10	1,2,4 - Triazole	210		Recovered Solvent - Toluene	975
11	Solvent – Dimethyl Formamide	1000		Solvent Loss - Toluene	25
12	Water	3672		28 % Hydrobromic Acid	890
13				Aqueous Layer to ETP	714
14				Distillation Residue	14
	Total	**9779**			**9779**

2) Herbicides

a) Dicamba (T)

Process Description:

Step-1

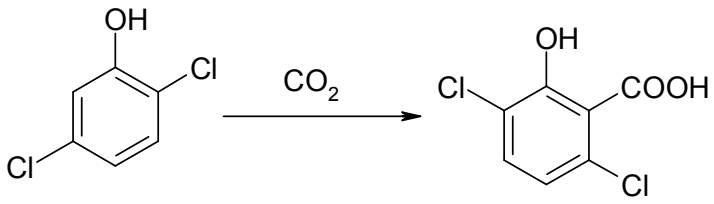
2,5-Dichloro Phenol reacts with carbon Dioxide under pressure to get 3,6-Dichloro-2-Hydroxy Benzoic Acid

Step-2

3,6- Dichloro-2-Hydroxy Benzoic Acid reacts with Dimethyl Sulphate in presence of Sodium Hydroxide to get 3,6-Diclhloro-2-Methoxy Benzoic Acid (Dicamba)

Chemical Reaction:

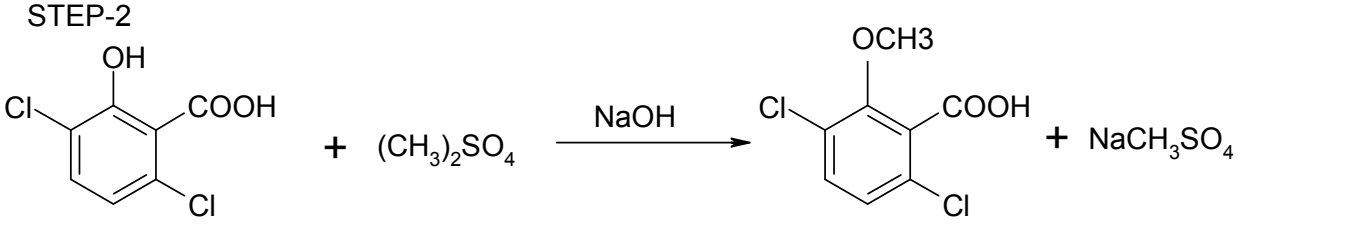
STEP-1



2,5-Dichloro Phenol
M.Wt=163

3,6-Dichloro,2-Hydroxy Benzoic Acid
M.Wt=207

STEP-2



3,6-Dichloro,2-Hydroxy Benzoic Acid
M.Wt=207

Methyl Sulfate
M.Wt=126

3,6-Dichloro,2-Hydroxy Benzoic Acid
M.Wt=233

Sodium Methyl Sulfate
M.Wt=134

Material Balance/Mass Balance (All Quantities are in Kg)

Dicamba (3,6 Dichloro-2-methoxy benzoic acid)					
IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	2,4-dichloro phenol	820		Dicamba	1000
2	carbon dioxide	260		Recovered Solvent- Methanol	1345
3	dimethyl sulfate	320		Solvent Loss -methanol	55
4	sodium hydroxide	205		Recovered Solvent- Toluene	1540
5	Solvent -Methanol	1400		Solvent loss - Toluene	60
6	Solvent -Toluene	1600		Distillate water	110
7	Water	1100		Unreacted CO2	40
				Sodium Methyl Sulfate	740
				Aqueous Layer To E.T.P.	793
				Distillation Residue	22
	Total	**5705**		**Total**	**5705**

b) Metribuzine (T)

Process Description:

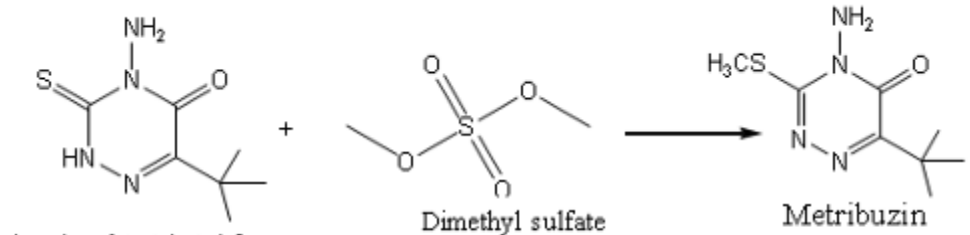
Step -1

Metribuzine is a 1,2,4-Triazinone class of herbicide. It is manufactured by the reaction of 4-Amino-6-Tert-Butyl-3-Mercapto-1,2,4-Triazin-5(4H)-one (ATMT) with Dimethyl Sulphate

Step – 2

Reaction of 4-Amino-6-Tert-Butyl-3-Mercapto-1,2,4-Triazin-5(4H)-one (ATMT) with Dimethyl Sulphate (DMS) in presence of Sulphuric Acid to give Metribuzine.

Chemical Reaction



Material Balance/Mass Balance (All Quantities are in Kg)

Metribuzine					
IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	ATMT	1000		Metribuzine	1000
2	Di Methyl Sulphate	652		Sodium Sulphate	2130
3	Sulfuric Acid	1274		Organic Impurities	512
4	Soda Ash	1600		Carbon Dioxide gas	664
5	Caustic Soda Flakes	30		Aqueous Layer to ETP	4750
6	Water	4500		Distillation Residue	0
	Total	**9056**		**Total**	**9056**

c) Pendimethalin (T)

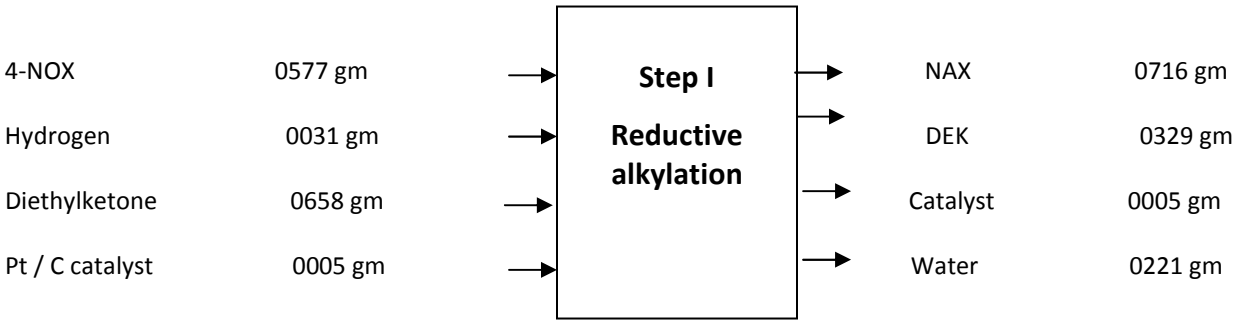
Step I: Reductive alkylation of 4 NOX

4-Nitro-1, 2-xylene (4 –NOX) is reacted with hydrogen with Pt / C as a catalyst in presence of diethylketone when N-alkyl xylidine is formed**.**

Chemical Reaction

M.W. 151 M.W.86 M.W. 191

Material Balance :



Step II: Nitration of NAX

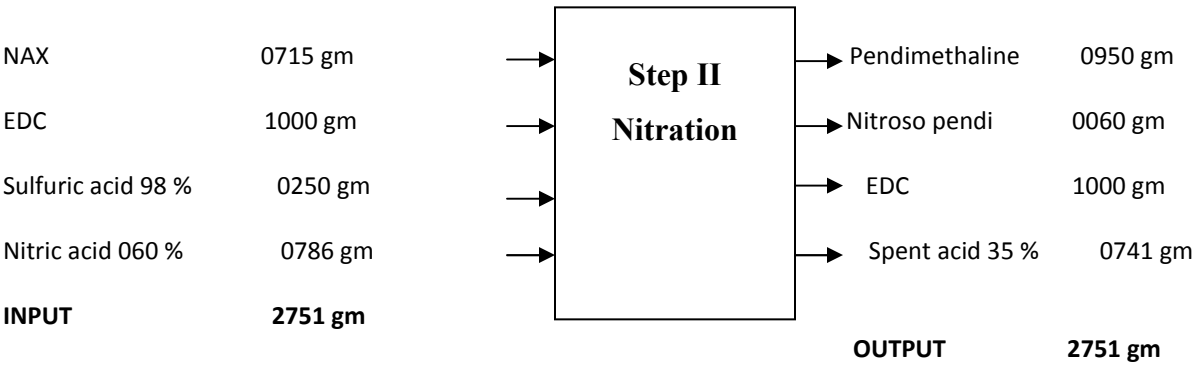
NAX is nitrated using sulfuric acid and nitric acid to PENDIMETHALINE.

Chemical Reaction

M.W. 201

M.W. 281

Material Balance :



3) Insecticides (T)

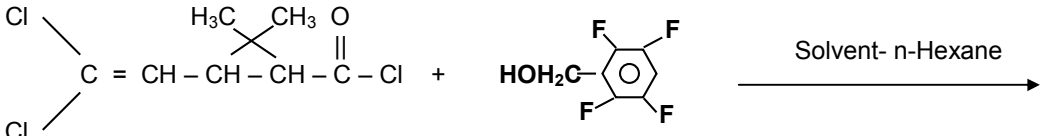
a) Transfluthrin (T)

Manufacturing Process:

2,3,5,6 - Tetra Fluoro Benzyl Alcohol is reacted with R –Trans Cypermethric Acid Chloride (R-Trans CMAC) in presence of Solvent n-Hexane to give the Tefluthrin mass. Hydrochloric acid gas is generated during the reaction which is scrubbed in water to get 30% solution of hydrochloric acid.

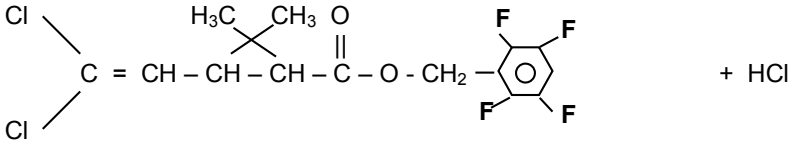
The resulting mass is then washed by Soda Ash solutions as well as water. Finally solvent is stripped off to recover it & to get the pure Transfluthrin Tech.

B) CHEMICAL REACTIONS:



R- Trans CMAC
M.W. 227.5.0

2,3,5,6 Tetra Fluoro Benzyl Alcohol M.W. 180



TRANSFLUTHRIN
M.W. 371.3

HYDROCHLORIC ACID
M.W. 36.5

Material Balance / Mass Balance (All Quantities are in Kg)

TRANSFLUTHRIN (TECH)					
IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	2,3,5,6 Tetra Fluoro Benzyl Alcohol	500		Transfluthrin	1010
2	R- Trans Cypermethric Acid Chloride	631		Recovered Solvent - n Hexane	1950
3	Catalyst	12		Solvent Loss n - Hexane	50
4	Solvent- Hexane	2000		30 % HCl Solution	337
5	Water for HCl Solution	237		Aqueous Layer to ETP	533
6	5 % Soda Ash Solution	250			
7	Water for Washing	250			
	Total	**3880**			**3880**

b) Cyfluthrin & Beta Isomers (T)

Brief Manufacturing Process :-

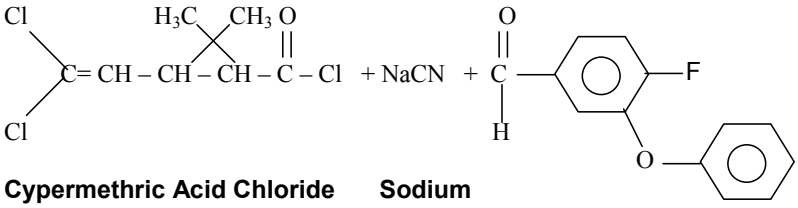
3- Phenoxy 4- Fluoro Benzaldehyde is reacted with Sodium Cyanide to form 3-Phenoxy 4-Fluoro Benzaldehyde Cyanohydrin as an intermediate. This on reaction with Cypermethric Acid Chloride (CMAC) forms the final Product Cyfluthrin. In this process n.- Hexane is used as solvent along with phase transfer Catalyst.

The reaction mass of Cyfluthrin is washed by Soda Ash solution & Water.

Finally n-Hexane is stripped off to get pure Cyfluthrin.

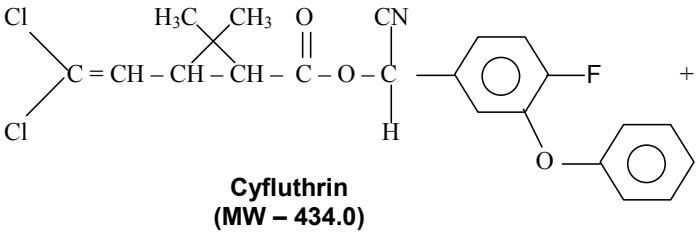
Aqueous layers which content traces of Sodium Cyanide is detoxified by the treatment of Sodium Hypochlorite 8 - 10% Solution to < 0.2 ppm Level.

B) CHEMICAL REACTIONS :-



Cypermethric Acid Chloride (MW 227.5) **Sodium Cyanide** **3- Phenoxy 4- Fluoro Benzaldehyde M.W.- 216.0**

N. Hexane
Catalyst



Cyfluthrin (MW – 434.0) **Sodium Chloride M.W. -58.5**

Material Balance / Mass Balance (All Quantities are in Kg)

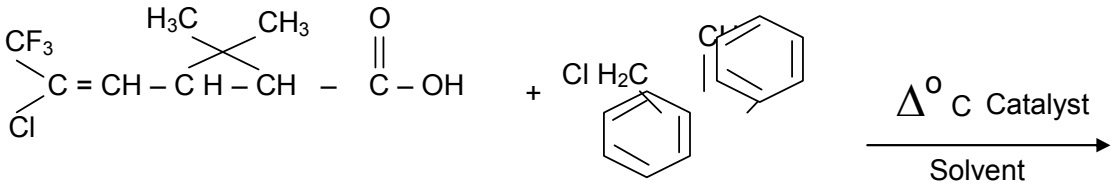
CYFLUTHRIN (TECH)					
IN- PUT				**OUT- PUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	3- Phenoxy -4- Fluoro Benzaldehyde	523		Cyfluthrin	1030
2	CMAC- Cypermethric Avid Chloride	578		Recovered Solvent – n - Hexane	2850
3	Water for Reaction	500		Solvent Loss n - Hexane	150
4	Sodium Cyanide	136		Aqueous Layer to ETP	2817
5	Solvent –n- Hexane	3000		NaCl	200
6	Catalyst	10			
7	5 % Soda Ash Solution	500			
8	5 % Acetic Acid Solution	500			
9	Water for washing	500			
10	8-10 % Sodium Hypochorite Solution	800			
	Total	**7047**			**7047**

c) Bifenthrin (T)

Brief Manufacturing Process :-

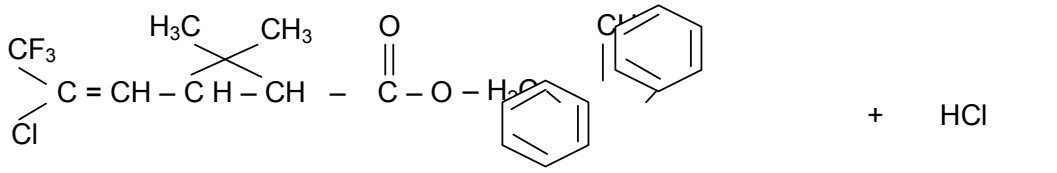
TFP Acid (Lambda Acid) is reacted with 3-Phenyl 2-Methyl Benzyl Chloride (PMBC) in presence of Solvent & catalyst to give the product Bifenthrin.

B) CHEMICAL REACTIONS :-



$C_8H_9O_2F_3Cl$
M.W. 229.5

$C_{14}H_{13}Cl$
M.W. 216.5



M.W. 36.5

$C_{22}H_{21}ClF_3O_2$
Bifenthrin
M.W. 409.5

Material Balance / Mass Balance (All Quantities are in Kg)

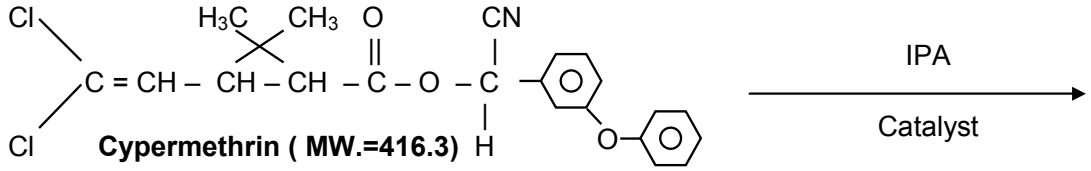
BIFENTHRIN (TECH)					
IN- PUT				OUT- PUT	
Sr No	Raw Materials / Items	Kg/Batch		Product / Bi Product	Qty/Batch
1	Lambda Acid	585		Bifenthrin	1030
2	3-Phenyl -2-Methyl Benzyl Chloride	558		Recovered Solvent - n Hexane	560
3	Catalyst	25		Solvent Loss n - Hexane	40
4	Solvent- Hexane	600		30 % HCl Solution	315
5	Water for HCl Solution	220		Distillation Residue	20
6	Water for Washing	500		Aqueous to ETP	523
	Total	**2488**		**Total**	**2488**

d) Cypermethrin (T) & Beta, Zeta, Theta etc Isomers (T)

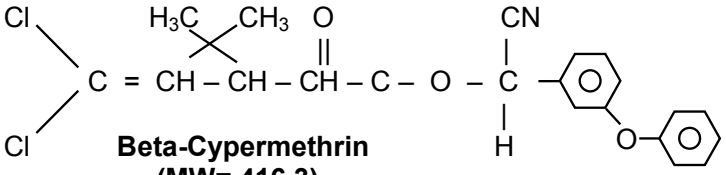
Brief manufacturing process:

Cypermethrin (Tech) of 50:50 Cis:Trans ratio of the purity >92% is treated with Epimerising Catalyst in pressure of Iso Propyl Alcohol – solvent to give Beta – Cypermethrin crude material which on recrystallisation from Iso Propyl Alcohol gives the pure product Beta – Cypermethrin

B) CHEMICAL REACTIONS:



Cypermethrin (MW.=416.3)



Beta-Cypermethrin
(MW= 416.3)

Material Balance / Mass Balance (All Quantities are in Kg)

BETA – CYPERMETHRIN (TECH)					
INPUT				**OUTPUT**	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	Cypermethrin Tech	1430		Beta Cypermethrin	1010
2	Solvent –IPA for Reaction	1430		Recovered Solvent – IPA + Catalyst	2436
3	Catalyst - 1	143		Solvent + Catalyst Loss	252
4	Solvent –IPA for washings	1100		Cypermethrin Isomer	405
	Total	**4103**		**Total**	**4103**

e) Imidacloprid (T)

Brief manufacturing process:

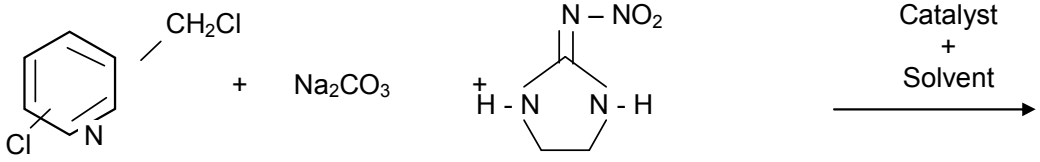
2 – Chloro, 5 – Chloromethyl Pyridine (CCMP) is reacted with N – Nitro Imino Imidazolidine (N-NII) in present of catalyst and solvent.

The Hydrochloric acid, which is formed during the reaction, is scavenged by putting Sodium carbonate as acid scavenger. The resulting mass is diluted by water & filtered to remove the salts of Sodium Chloride (NaCl) & Sodium bicarbonate.

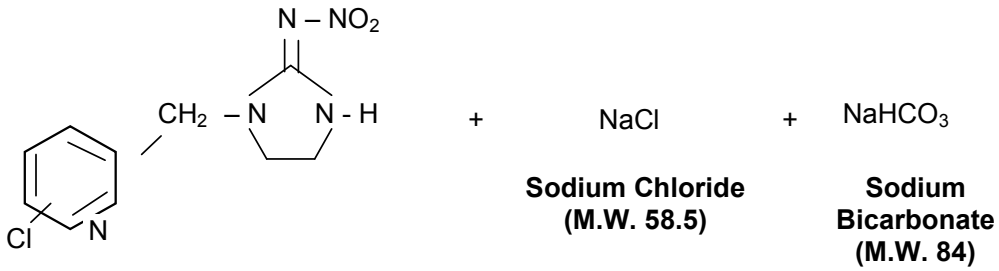
The organic mass is then treated with water and finally solvent is removed by distillation. The concentrated mass is then crystallized to get pure product – Imidacloprid (Tech)

Finally Toxic Effluent which contains traces of Pesticides is taken to Hydrolysis stage for detoxification. Where Aq. Mass is treated at high temp. by Alkali for the rapid hydrolysis of pesticides to simpler non-toxic compounds.

B) CHEMICAL REACTIONS:



CCMP (M.W. 162) | **Sodium Carbonate (M.W. 106)** | **N-NII (M.W. 130)**



Imidacloprid (M.W. 255.7) | **Sodium Chloride (M.W. 58.5)** | **Sodium Bicarbonate (M.W. 84)**

Material Balance / Mass Balance (All Quantities are in Kg)

IMIDACLOPRID (TECH)					
IN- PUT				OUT- PUT	
Sr No	**Raw Materials / Items**	**Kg/Batch**		**Product / Bi Product**	**Qty/Batch**
1	2- Chloro -5- Chloromethyl Pyridine	900		Imidacloprid	1030
2	N- Nitro N- Methyl Imidazolidine	850		Recovered Solvent DMF	2110
3	Sodium Carbonate	705		Solvent Loss DMF	90
4	Catalyst -1	10		Recovered Solvent Methanol	370
5	Solvent - DMF	2200		Solvent Loss Methanol	30
6	Water for Washings	1000		Aqueous Layer to ETP	2360
7	Caustic Lye 47 %	50		Distillation Residue	25
8	Solvent - Methanol	400		Inorganic Salt	100
	Total	**6115**		**Total**	**6115**

2.3 RAW MATERIAL STORAGE AND HANDLING

The raw materials shall be received in M.S. tank, HDPE/fibre drums, Carboys and cylinders as well as through tankers. All the storage tanks of hazardous flammable substances shall be located within premises in separate storage area i.e. Tank farm area shall be stored in MS/SS tank with all precautionary process instrumentation and safety appliances. Large area is covered by well-designed warehouse, which shall be containing store office, raw material store, finished product store, etc. The personnel protective equipments like hand gloves, safety shoes, goggles, helmet, clothing, etc. are provided to those handling hazardous chemicals as per requirement. All the motors and electrical connections are flame proof. List of raw materials are given in Table-2.1.

TABLE – 2.1

LIST OF RAW MATERIALS

Sr. No.	Name of Raw Materials	Quantity (MT/Month)
1) Fungicides		**Quantity (MT/MT)**
a) Hexaconzole (T)		
1.	1,3 Di Chloro Benzene	0.51
2.	Pentanoyl Chloride	0.417
3.	Alumimun Chloride	0.632
4.	Solvent - EDC	1.85
5.	Methylene Triphenyl Phosphorane	0.944
6.	Bromine	0.54
7.	Solvent - THF	1.2
8.	Hydrogen Peroxide	0.116
9.	Potassium Hydroxide	0.195
10.	1,2,4 - Triazole	0.22
11.	Solvent – Dimethyl Formamide	1.1
b) Tebuconzole (T)		
1.	1-(4 – Chlorophenyl) 4-4- Dimethyl -3- Pentanoate	0.675

2.	Sodium Methoxide	0.162
3.	Di Methyl Sulfide	0.186
4.	Solvent - Toluene	1.4
5.	1,2,4 - Triazole	0.206
6.	Solvent – DMF	1.1
c) Propioconzole (T)		
1.	1,3 Di Chloro Benzene	0.452
2.	Acetyl Chloride	0.238
3.	Alumimun Chloride	0.558
4.	Solvent - EDC	1.6
5.	Bromine	0.553
6.	Catalyst	0.010
7.	1,2 - Butanediol	0.32
8.	Solvent - Toluene	1.0
9.	Potassium Hydroxide	0.166
10.	1,2,4 - Triazole	0.21
11.	Solvent – Dimethyl Formamide	1.0
2) Herbicides		
a) Dicamba (T)		
1.	2,4-dichloro phenol	0.820
2.	Carbon dioxide	0.260
3.	Dimehtyl sulfate	0.320
4.	Sodium hydroxide	0.205
5.	Solvent -Methenol	1.4
6.	Solvent -Toluene	1.6
b) Metribuzine (T)		
1.	ATMT	1.0
2.	Di Methyl Sulphate	0.652
3.	Sulfuric Acid	1.274
4.	Soda Ash	1.6
5.	Caustic Soda Flakes	0.03
c) Pendimethalin (T)		

1.	Hydrogen	0.032
2.	Diethylketone	0.692
3.	EDC	1.000
4.	Sulfuric acid 98 %	0.263
5.	Nitric acid 60 %	0.826
3) Insecticides		
a) Transfluthrin (T)		
1.	2,3,5,6 Tetra Fluoro Benzyl Alcohol	0. 5
2.	R- Trans Cypermethric Acid Chloride	0.62
3.	Catalyst	0.012
4.	Solvent- Hexane	2.0
5.	5 % Soda Ash Solution	0.25
b) Cyfluthrin & Beta Isomers (T)		
1.	3- Phenoxy -4- Fluoro Benzaldehyde	0.51
2.	CMAC- Cypermethric Avid Chloride	0.56
3.	Sodium Cyanide	0.132
4.	Solvent –n- Hexane	2.9
5.	Catalyst	0.01
6.	5 % Soda Ash Solution	0.49
7.	5 % Acetic Acid Solution	0.49
8.	8-10 % Sodium Hypochorite Solution	0.78
c) Bifenthrin (T)		
1.	Lambda Acid	0.57
2.	3-Phenyl -2-Methyl Benzyl Chloride	0.54
3.	Catalyst	0.024
4.	Solvent- Hexane	0.58
d) Cypermethrin (T) & Beta/Zeta/Theta Isomers (T)		
1.	Meta Phenoxy Benzaldehyde	0.463
2.	CMAC- Cypermethric Acid Chloride	0.542
3.	Sodium Cyanide	0.463
4.	Solvent –n- Hexane	0.126
5.	Catalyst	2.78

6.	4 % Soda Ash Solution	0.009
7.	5 % Acetic Acid Solution	0.463
8.	8-10 % Sodium Hypochorite Solution	0.74
e) Imidacloprid (T)		
1.	2- Chloro -5- Chloromethyl Pyridine	0.88
2.	N- Nitro N- Methyl Imidazolidine	0.83
3.	Sodium Carbonate	0.68
4.	Catalyst -1	0.01
5.	Solvent - DMF	2.14
6.	Caustic Lye 47 %	0.05
7.	Solvent - Methanol	0.39

2.4 INFRASTRUCTURE FACILITIES

2.4.1 LAND

Total Plot Area is of 9,705 m^2 out of which 2,400 m^2 (approx.) i.e. 25% of land shall be utilized for the green belt area.

2.4.2 TRANSPORTATION FACILITIES

Transportation of all the raw material and products shall be primarily by road only.

2.4.3 WATER AND WASTEWATER

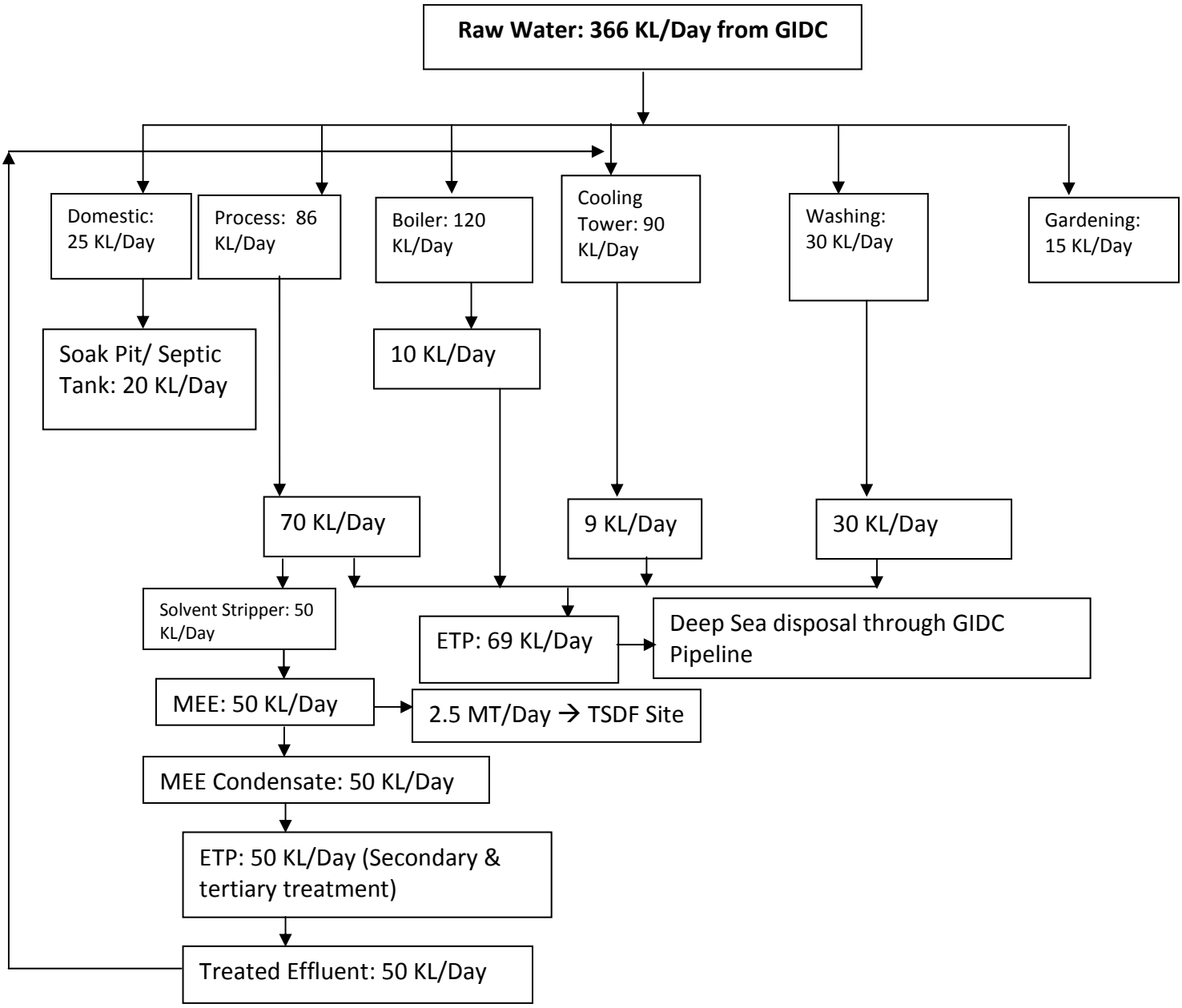
Daily water consumption shall be 366 m^3/ day and daily wastewater generation shall be 139 m^3/ day (119 m^3/day: Industrial & 20 m^3/day: Domestic). Water requirement for the proposed project shall be met through GIDC water supply. GIDC water supply authority is ready to supply the required water to M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV). Wastewater from Industrial Operations will be treated in effluent treatment plant. The final treated effluent (69 m^3/day) will be discharged through GIDC pipeline line to deep sea. And MEE Condensate (50 m^3/day) will be resued in plant premises. Details of water consumption and wastewater generation are given in Table 2.2.

TABLE - 2.2

WATER CONSUMPTION AND WASTEWATER GENERATION

Sr. No.	Category	Proposed Scenario (m^3/day)	
		Water Consumption	**Waste Water Generation**
1. Industrial			
	Process	86	70
	Boiler	120	10
	Cooling	90	9
	Washing	30	30
2.	Gardening	15	-
3.	Domestic	25	20
Total (Industrial)		**326**	**119**
Total		**366**	**139**

WATER BALANCE DIAGRAM



2.4.3.1 TREATMENT PROCESS

ETP DETAILS

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall have an Effluent treatment plant consisting of primary, secondary and tertiary treatment units. The effluent confirming the GPCB standards shall be disposed into deep sea through GIDC pipeline. The details of ETP are as follows.

ETP (EFFLUENT TREATMENT PLANT)

PROCESS DESCRIPTION:

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall have an Effluent treatment plant consisting of primary, secondary and tertiary treatment units. The effluent confirming the GPCB standards shall be disposed into deep sea through GIDC pipeline. The details of ETP are as follows.

1) First all non-toxic, biodegradable streams of wastewater shall be collected in Collection cum Equalization Tank (CET). Pipe grid will be provided at bottom of the CET to keep all suspended solids in suspension and to provide proper mixing. Air Blowers (B-01) shall supply air through pipe grid to diffusers.
2) Then after, equalized wastewater shall be pumped to Neutralization Tank (NT) where the continuous addition and stirring of lime solution is done to maintain neutral pH of wastewater from Lime Dosing Tanks (LDT) as per requirement by gravity. Then after, neutralized wastewater shall go to Flash Mixer (FM). Alum shall be dosed from Alum Dosing Tank by gravity into FM to carry out coagulation by using a Flash Mixer. Then effluent shall be collected in Flocculator (FL) where Polyelectrolyte shall be dosed from Polyelectrolyte Dosing Tank (PEDT). Then after, coagulated wastewater shall be settled in Primary Clarifier (PCL). Clear supernatant from Primary Clarifier shall be passed in Aeration Tanks in series (AT-01/02).
3) Domestic, Boiler and Cooling wastewater shall be added to AT-01. Here, biodegradation of organic matter of the wastewater shall be carried out by bacteria (suspended growth) in the AT. The aeration tank provides proper mixing and supplies oxygen to the microorganisms in the dissolved form through the fine bubble diffusers. A constant feed rate shall be maintained in the aeration tank. A sludge percentage of around 25 to 30 % by volume shall be maintained in the aeration tank. Also MLSS and MLVSS ratio shall be

maintained to ensure active microorganisms growth. Various nutrients like Urea and DAP shall be added from Nutrient Dosing Tanks regularly so as to ensure proper growth of the microorganisms. Overflow from AT-01 shall be sent to Aeration Tank-02 for biodegradation of remaining organic matter. Oxygen shall be supplied by air blowers (B-02) through diffusers. Air blowers also keep MLSS in suspension.

4) Then the overflow of the Aeration Tank-02 shall be diverted into the Secondary Clarifier (SCL) for biomass separation. An appropriate retention time is given to the effluent to ensure proper settling. The sludge settles down into the bottom of the SCL and required amount of settled sludge shall be recycled back into the aeration tank to maintain desired concentration of biomass. Excess biomass shall be pumped to sludge sump.
5) Then after, overflow (clear supernatant) of SCL shall collect in Intermediate Sump (IS). Then effluent from the IS shall be pumped to the Pressure Sand Filter (PSF) and Activated Carbon Filter (ACF) for tertiary treatment. The effluent shall enter into the sand filter from the top and the filtered effluent shall be further passed to the Activated Carbon Filter for color & COD removal. Auto back wash facility shall be provided to the sand filter and carbon filter to wash out the suspended solid at regular interval. For backwash, the effluent from the Intermediate Sump shall be pumped from bottom of the sand filter (and / or carbon filter) and the discharge of the sand filter (and / or carbon filter) shall be diverted into the Collection cum Equalization Tank.
6) The outlet of the carbon filter shall be collected into the Treated Effluent Sump (TES). The treated effluent from the treated effluent tank shall be finally pumped to GIDC underground drainage through magnetic flow meter and recorder system. Treated effluent will meet all the norms laid by Gujarat Pollution Control Board.
7) The primary and secondary sludge from the sludge sump shall be pumped to the filter press (FP) for sludge dewatering. The sludge cake shall be collected and packed into the plastic bags and stored in the HWSA and ultimate disposal to TSDF. The leachate from the filter press shall be diverted to the collection cum equalization tank for further treatment.

Stream-II: High COD & High TDS

All High COD streams of wastewater shall be collected in Collection cum Equalization Tank-2 (CET-02). Then effluent shall be pumped to Neutralisation tank-02 (NT-02) where caustic/Acid shall be added from Caustic/Acid Dosing tanks as per requirement to maintain neutral pH of waste water. Then after, neutralized wastewater shall be sent to Flash Mixer-02 (FM-02) where Alum and poly shall be added from Alum Dosing Tank and Poly Dosing Tank respectively. Then after, coagulated wastewater shall be settled in Primary Tube Settler-02 (PTS-02). Sludge settles in PTS-02 shall be sent to Sludge sump (SS-01) and then pumped to Filter Press (FP) for dewatering.

Clear effluent from PTS-2 shall be collected in Holding Tank (HT-01) before pumped to strippers. Effluent from stripper shall be then collected in MEE Feed Tank and then pumped to Multiple Effect Evaporator(MEE-01) followed by Agitated Film Dryer(ATFD-01). Condensate from MEE shall be reuse. Solids from Agitated Thin Film Dryer (ATFD) shall be collected and stored in HWSA for disposal in TSDF.

DETAILS OF UNITS OF ETP (Low COD & Low TDS Stream)

S.N.	Name of unit	Size (m x m x m) L x B x (LD+FB)	No.	MOC/ Remark
Stream I (Low COD & TDS Stream) 70 m^3/D				
1	Screen Chamber (SC-01)	3.0 X 0.7 X (0.1+0.5)	1	RCC M25+A/A Bk. Lining
2	Collection cum Equalization Tank-1 (CET-01)	4.0 X 3.0 X (2.5+0.7)	1	RCC M25+A/A Bk. Lining
3	Neutralization Tank-1 (NT-01)	1.0 X 1.0 X (2.0+0.5)	1	RCC M25+A/A Bk. Lining
4	Flash Mixer-1 (FM-01)	1.0 X 1.0 X (2.0+0.5)	1	RCC M25
5	Primary Tube Settler-1 (PTS-01)	3.0 X 1.7 X (2.0 + 1.0 +0.3)	1	RCC M25
6	Moving Bed Bio Reactor Tank (MBBR-01)	7.0 X 3.5 X (4.0+0.5)	1	RCC M25
7	Secondary Settling Tank-1 (SST-01)	3.0 X 2.0 X (2.5+0.5)	1	RCC M25
8	Moving Bed Bio Reactor Tank (MBBR-02)	4.5 X 3.5 X (4.0+0.5)	1	RCC M25
9	Secondary Settling Tank-1 (SST-02)	3.0 X 2.0 X (2.5+0.5)	1	RCC M25
10	Treated effluent Sump (TES-01)	4.0 X 2.5 X (3.0+0.7)	1	RCC M25
11	Sludge Sump(SS-01)	2.0 X 2.0 X (3.0+0.7)	1	RCC M25
12	Filter Press(FP-01)	5.0 X 4.0 X (2.5+0.7)	1	PP
13	Acid Dosing Tank (ACDT-01)	1000 lit	1	HDPE
14	Alum Dosing Tank (ADT-01)	1000 lit	1	HDPE
15	Poly Dosing Tank (PDT-01)	100 lit	1	HDPE
16	Nutrient Dosing Tank(NDT-01)	1000 lit	1	HDPE

LD = Liquid depth
FB = Free Board
SWD = Side Wall Depth

EXPECTED CHARACTERISTICS OF WASTEWATER BEFORE & AFTER TREATEMENT

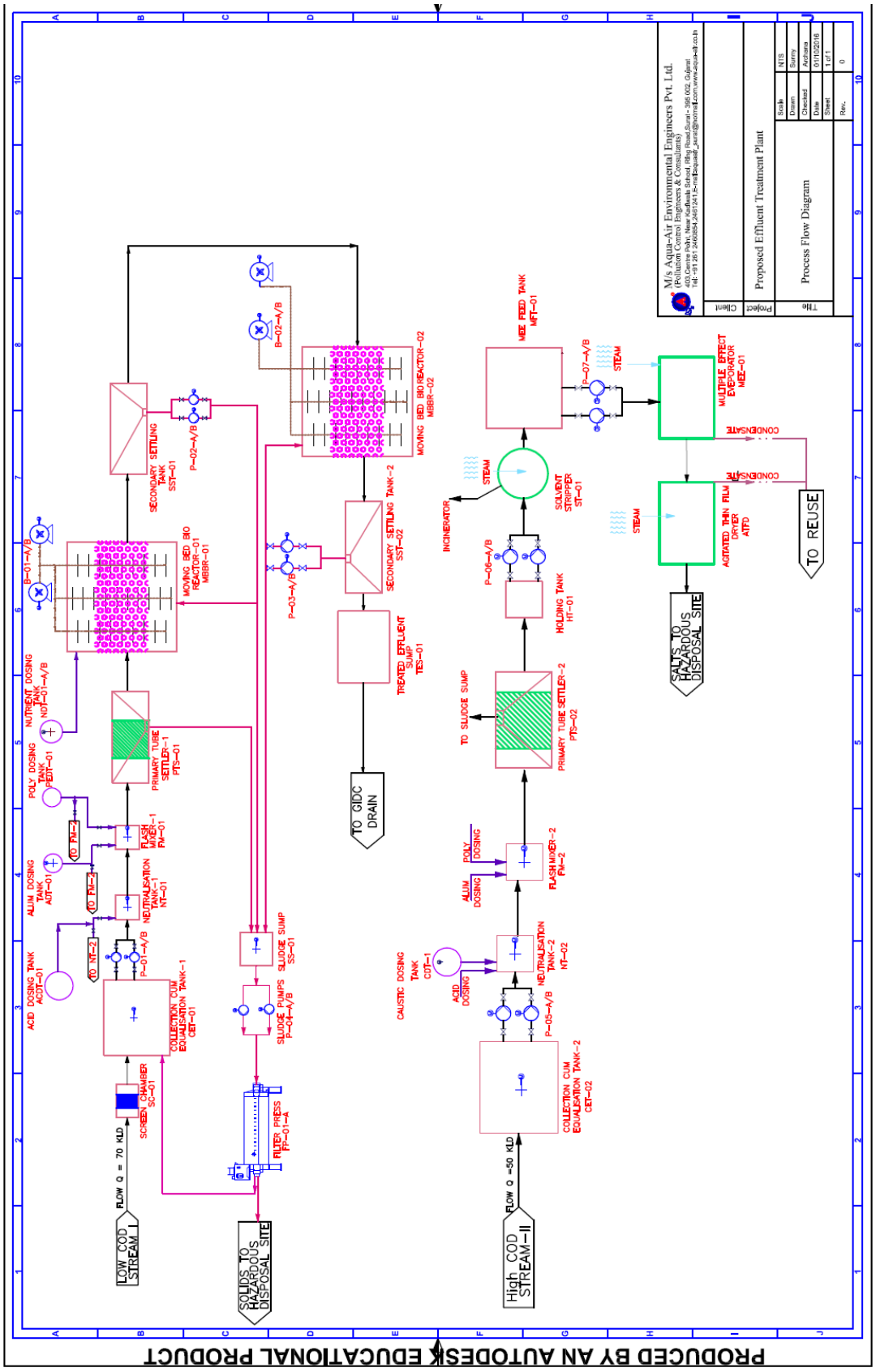
Sr. No.	Category of Wastewater	Before Treatment	After Treatment
1	pH	3.5-6.5	6.5-8.0
2	COD (mg/L)	8000 - 10000	250
3	BOD_3 (mg/L)	2500-3500	100
4	SS (mg/L)	800	100
5	Ammonical Nitrogen (mg/L)	20	10

Stream II High COD Stream(50 KLD)				
1	Collection cum Equalization Tank-2 (CET-02)	3.0 x 2.0 x (2.5+0.5)	1	RCC M25+A/A Bk. Lining
2	Neutralization Tank-2 (NT-02)	1.0 x 1.0 x (2.0+0.5)	1	RCC M25+A/A Bk. Lining
3	Flash Mixer-2(FM-02)	1.0 x 1.0 x (1.8+0.5)	1	RCC M25
4	Primary Tube Settler-2 (PTS-02)	2.0 x 1.5 x (2.0LD+0.5)	1	RCC M25
5	Holding Tank (HT-01)	3 x 3 x (3.0+0.5)	1	RCC M25
6	Strippers (ST-01)	50 m3/day	1	SS
7	MEE Feed Tank (MFT-01)	5.0 x 3.0 x (2.5LD+0.5 FB)	1	RCC M25
8	Four Stages Multiple Effect Evaporators with ATFD (MEE, ATFD)	50 m3/day	1	SS
9	Caustic Dosing Tank (CDT-01)	1000 lit	1	HDPE

EXPECTED CHARACTERISTICS OF WASTEWATER BEFORE & AFTER TREATEMENT

Sr. No.	Category of Wastewater	Before Treatment	After Treatment
1	pH	2-10	6.5-8.0
2	COD (mg/L)	80000 - 100000	100
3	BOD_3 (mg/L)	20000-25000	300
4	TDS (mg/L)	85000	100
5	Ammonical Nitrogen (mg/L)	200	10

ETP DRAWING:


M/s Aqua-Air Environmental Engineers Pvt. Ltd.
Proposed Effluent Treatment Plant
Process Flow Diagram
LOW COD STREAM I
High COD STREAM-II
SOLIDS TO HAZARDOUS DISPOSAL SITE
SALTS TO HAZARDOUS DISPOSAL SITE
TO GIDC DRAIN
TO REUSE
MOVING BED BIOREACTOR-02 MBBR-02
MOVING BED BIO REACTOR-01 MBBR-01
SECONDARY SETTLING TANK SST-01
SECONDARY SETTLING TANK-2 SST-02
PRIMARY TUBE SETTLER-1 PTS-01
PRIMARY TUBE SETTLER-2 PTS-02
TREATED EFFLUENT SUMP TES-01
COLLECTION CUM EQUALISATION TANK-1 CET-01
COLLECTION CUM EQUALISATION TANK-2 CET-02
NEUTRALISATION TANK-1 NT-01
NEUTRALISATION TANK-2 NT-02
FLASH MIXER-1 FM-01
FLASH MIXER-2 FM-2
SCREEN CHAMBER SC-01
SLUDGE SUMP SS-01
SLUDGE PUMPS P-04-A/B
FILTER PRESS FP-01-A
MEE FEED TANK MFT-01
MULTIPLE EFFECT EVAPORATOR MEE-01
AGITATED THIN FILM DRYER ATFD
SOLVENT STRIPPER ST-01
INCINERATOR
HOLDING TANK HT-01
TO SLUDGE SUMP
NUTRIENT DOSING TANK NDT-01-A/B
POLY DOSING TANK PDT-01
ALUM DOSING TANK ADT-01
ACID DOSING TANK ACDT-01
CAUSTIC DOSING TANK CDT-1
POLY DOSING
ALUM DOSING
ACID DOSING
STEAM
CONDENSATE
FLOW Q = 70 KLD
FLOW Q =50 KLD
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

2.4.4 AIR POLLUTION AND CONTROL SYSTEM

Flue Gas Emission

Sr. No.	Type Of Stack	Air Pollution Control Measure	Height (M)	Diameter (M)	Air Emission	
					Pollutant	Conc.
1.	Thermic Fluid Heater & Boiler (8 MT/hrs)	ESP	50	1.0	SPM SO2 NOX	150 mg/NM3 100 ppm 50 ppm
2.	Incinerator	Venture & Packed Scrubber	30	1.0	SO_2 NOx PM HCl CO CO TOC HF Total dioxine and furan Cd+/h+their Compound	40 mg/Nm^3 20 mg/Nm^3 50 mg/Nm^3 50 mg/Nm^3 100 mg/Nm^3 50 mg/Nm^3 20 mg/Nm^3 4 mg/Nm^3 0.1 ng TEQ/Nm^3 0.05 mg/Nm^3
3.	D.G. Set (1000 KVA)	--	11	200 MM	SPM SO2 NOX	150 MG/NM3 100 PPM 50 PPM

Details of Process Vent

Sr.No.	Stack attached to	Stack Height	Air Pollution Control System	Parameter	Permissible Limit
1	Herbicide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm^3 40 mg/Nm^3 15 mg/Nm^3 05 mg/Nm^3
2	Fungicide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm^3 40 mg/Nm^3 15 mg/Nm^3 05 mg/Nm^3
3	Insecticide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm^3 40 mg/Nm^3 15 mg/Nm^3 05 mg/Nm^3

2.4.5 NOISE LEVEL AND CONTROL SYSTEM

Extensive oiling and lubrication and preventive maintenance shall be carried out to reduce noise generation at source to the permissible limit. However, at place where noise levels can exceed the permissible limit, Earplugs and Earmuffs are provided to those working in such area.

2.4.6 HAZARDOUS WASTE GENERATIONS AND DISPOSAL SYSTEM

Fifteen Categories of Hazardous/Solid Wastes shall be generated from this Unit. Type of hazardous waste, Quantity (MT/Month), Hazardous waste category & Mode of disposal are given in Table-2.3.

TABLE-2.3

DETAILS OF HAZARDOUS WASTE AND ITS MODE OF DISPOSAL

SR. NO.	TYPE OF HAZARDOUS WASTE	HAZARDOUS WASTE CATEGORY	QUANTITY (MT/MONTH)	STORAGE, COLLECTION & DISPOSAL
1.	ETP Sludge	37.3	120	Collection, Storage, Transportation & Disposal to nearest TSDF at Dahej
2.	Used Oil/Spent Oil	5.1	200 Lit/Month	Collection, Storage, Transportation & Sell to GPCB Authorized Reprocessor
3.	Empty Drums/Container	34.1	500 Nos./Month	Collection, Storage, Transportation & Sell to GPCB Authorized Vendor
4.	Empty Bags	34.1	1000 Nos./Month	Collection, Storage, Transportation & Sell to GPCB Authorized Vendors
5.	Distillation Residue	29.1	50	Collection, Storage, Transportation & Disposal at nearest Incinerator Site, Dahej or incineration within premises or co-processing in cement industries
6.	HCl (32%)	29.6	250	HCl (32%) will be sold to end user.
7.	Off specification of batch	29.3	3.0	Collection, Storage, Transportation & Disposal at nearest Incinerator Site, Dahej or incineration within premises or co-processing in cement

				industries.
8.	Incineration Ash	37.2	10	Collection, Storage, Transportation & Disposal to nearest TSDF at Dahej.
9.	Fly Ash	B2050	300	Collection, storage & sell to brick manufactures
10.	Sodium Sulphate Solution (30% to 35%)	B2120	2000	Collection, Storage, Transportation & Sell to end user
11.	Aluminum Chloride (25%)	B2120	1000	Collection, Storage, Transportation & Sell to end user
12.	Potassium Chloride Solution	B2120	860	Collection, Storage, Transportation & Sell to end user
13.	H_2SO_4 (70%)	29.6	100	Collection, Storage, Transportation & Sell to end user
14.	Sodium Sulfite Solution (20%)	29.6	300	Collection, Storage, Transportation & Sell to end user

2.5 DETAILS OF UTILITIES

Various utilities required for proper functioning of manufacturing plants. These utilities include Boiler, Cooling Plant, Cooling Tower, DM water plant, Chilling Plant & Brine Unit, Air Compressor, High Vacuum System, etc.

2.6 ELECTRICITY REQUIREMENT

Sr. No.	**DGVCL**	**DG sets (As Standby)**
Proposed		
1	1000 KVA	1000 KVA (1000 KVA *1)

2.7 FUEL REQUIREMENT

SR. NO.	**FUEL**	**Quantity**
1	Coal	35 MT/Day
2	LDO	10 KL/Day
3	HSD	50 lit/Hour

CHAPTER – 3

BASELINE ENVIRONMENTAL STATUS

The baseline status of environmental quality in the vicinity of project site serves as the basis for identification, prediction and evaluation of impacts. The baseline environmental quality is assessed through field studies within the impact zone for various components of the environment, viz. air, noise, water, land and socio-economic. The baseline environmental quality has been assessed in the Summer Season of 2014 (March, 2014 to May 2014) in a study area of 10 km radial distance from the project site.

3.1 MICRO-METEOROLOGY OF THE AREA

The climate of Gujarat is varied, as it is moist in the southern districts and dry in the northern region. The Arabian Sea and the Gulf of Cambay in the west and the forest-covered hills in the east soften the rigours of climatic extremes, consequently reducing the temperature and render the climate more pleasant and healthy. Bharuch lies along the southern part of the state and experiences a climate with aridity index of 15 to 20 per cent indicating adequate moisture availability in the soils for most part of the year. **(Courtesy: Environmental Information Centre, New Delhi)**

3.1.1 TEMPERATURE DETAILS

Minimum, Maximum and Average Temperatures for Dahej Station of the year 2013 are given in Table 3.1.

TABLE 3.1

TEMPERATURE DATA

Month (2013)	Minimum Temperature (^{0}C)	Maximum Temperature (^{0}C)	Average Temperature (^{0}C)
January	10	33	21
February	9	38	20
March	11	37	25
April	22	39	29
May	23	40	28
June	21	36	26
July	20	34	27
August	23	38	29
September	21	36	26
October	18	36	28
November	15	34	25
December	11	33	22

3.1.2 RELATIVE HUMIDITY (RH)

Minimum, Maximum and Average Monthly Relative Humidity for Dahej Station of the year 2013 are given in Table 3.2.

TABLE 3.2

RELATIVE HUMIDITY DATA

Month (2013)	Minimum R.H.%	Maximum R.H.%	Average R.H.%
January	18	99	53
February	20	99	52
March	8	96	43
April	15	99	59
May	18	94	70
June	39	98	82
July	42	99	80
August	39	99	83
September	33	99	79
October	18	98	57
November	22	99	57
December	21	88	52

The Relative Humidity values for Dahej station was recorded & Relative Humidity is generally high during the period from June to September. The diurnal variations are least during monsoon season. The diurnal variation is highest during summer period.

3.1.3 RAINFALL

Rainfall data for Dahej Station of the year 2013 is presented in Table 3.3.

TABLE 3.3

RAINFALL DATA

Month (2013)	Monthly Total (mm)	Numbers of Rainy Days
January	00	00
February	00	00
March	00	00
April	00	00
May	00	00
June	17.3	02
July	334.6	25
August	70.9	07
September	52.9	03
October	25.4	01
November	4.7	02
December	00	00
Total	**505.8**	**40**

Total rainfall, during the monsoon period, has been recorded as 505.8 mm.

3.1.4 WIND SPEED

Wind speed for Dahej Station of the year 2013 is given in Table 3.4.

TABLE 3.4

WIND SPEED DATA

Sr. No.	Month (2013)	Average Wind speed (KMPH)
1.	January	4
2.	February	5
3.	March	4
4.	April	6
5.	May	10
6.	June	8
7.	July	3
8.	August	6
9.	September	6
10.	October	4
11.	November	6
12.	December	5
Average		**5.58**

Site-specific mean meteorological data is given in Table-3.5.

A meteorological station was installed in Dahej to know temperature, relative humidity, hourly wind speed, direction, and rainfall at the project site during the study period:

TABLE - 3.5

SITE SPECIFIC METEOROLOGICAL DATA

(PERIOD – MARCH' 14 TO MAY' 14)

METEOROLOGICAL PARAMETER	MONTH		
	MARCH' 14	APRIL' 14	MAY' 14
Temperature (^{0}C)			
Min.	12	21	22
Max.	36	40	42
Avg.	26	30	29
Relative Humidity (%)			
Min.	10	18	19
Max.	95	99	96
Avg.	42	57	71
Wind Speed (km/h)			
Min.	0	0	0
Max.	22	19	25
Avg.	4.8	7	9.6

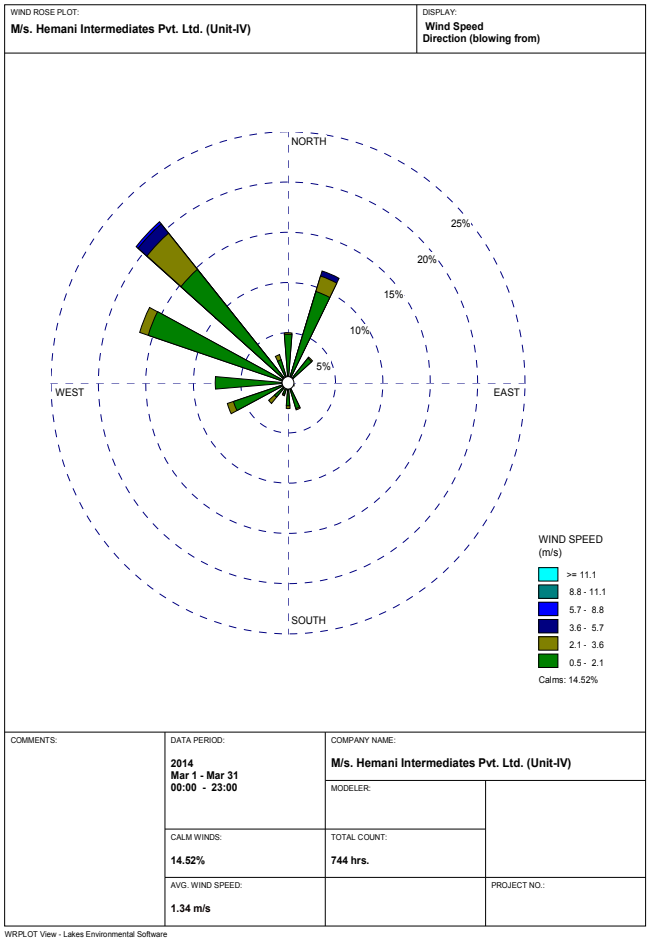
There was no rainfall during the study period.

The wind direction is predominantly from NW to SE. Diurnal shift in wind direction was not observed during study period. The wind rose diagram prepared from data collected at site is shown in Figure 3.1A, while stability class diagram is shown in Figure 3.1B

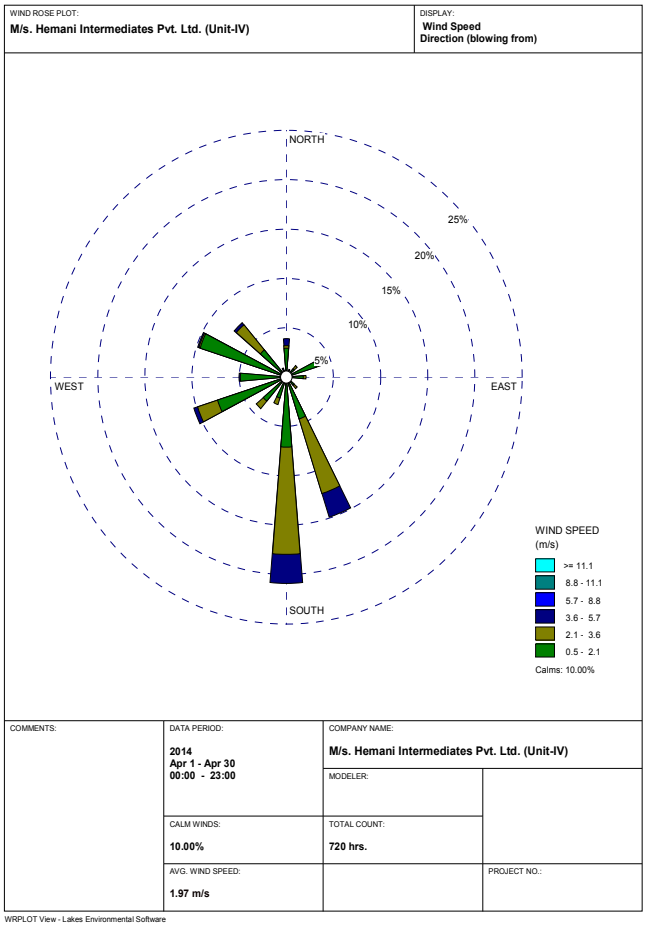
FIGURE-3.1A

WIND ROSE DIAGRAM

March, 2014



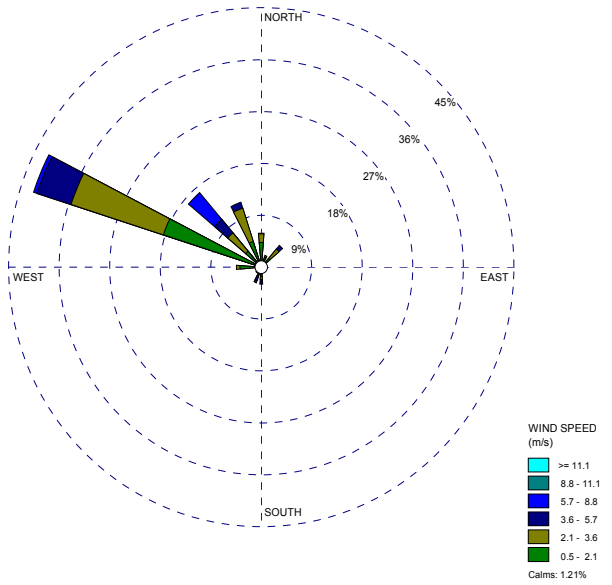
April, 2014



May -2014

March, 2014 to May, 2014

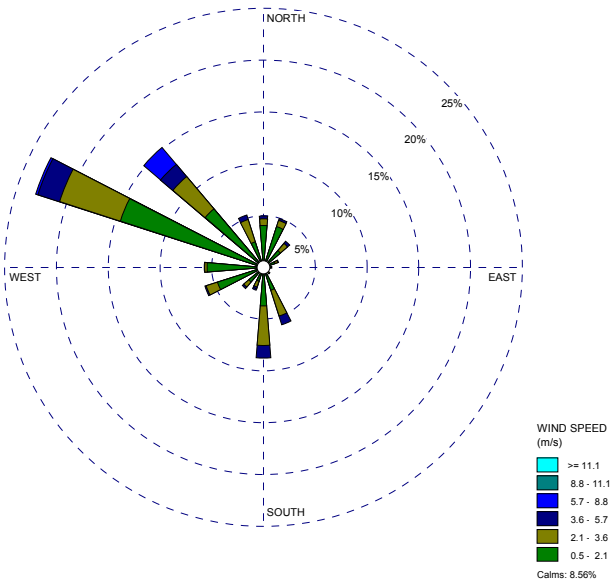
WIND ROSE PLOT:	DISPLAY:
M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV)	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2014 **May 1 - May 31** **00:00 - 23:00**	**M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV)**	
		MODELER:	
	CALM WINDS: **1.21%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **2.69 m/s**		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:	DISPLAY:
M/s. HEMANI INTERMEDIATES PVT. LTD. (UNIT-IV)	**Wind Speed** **Direction (blowing from)**

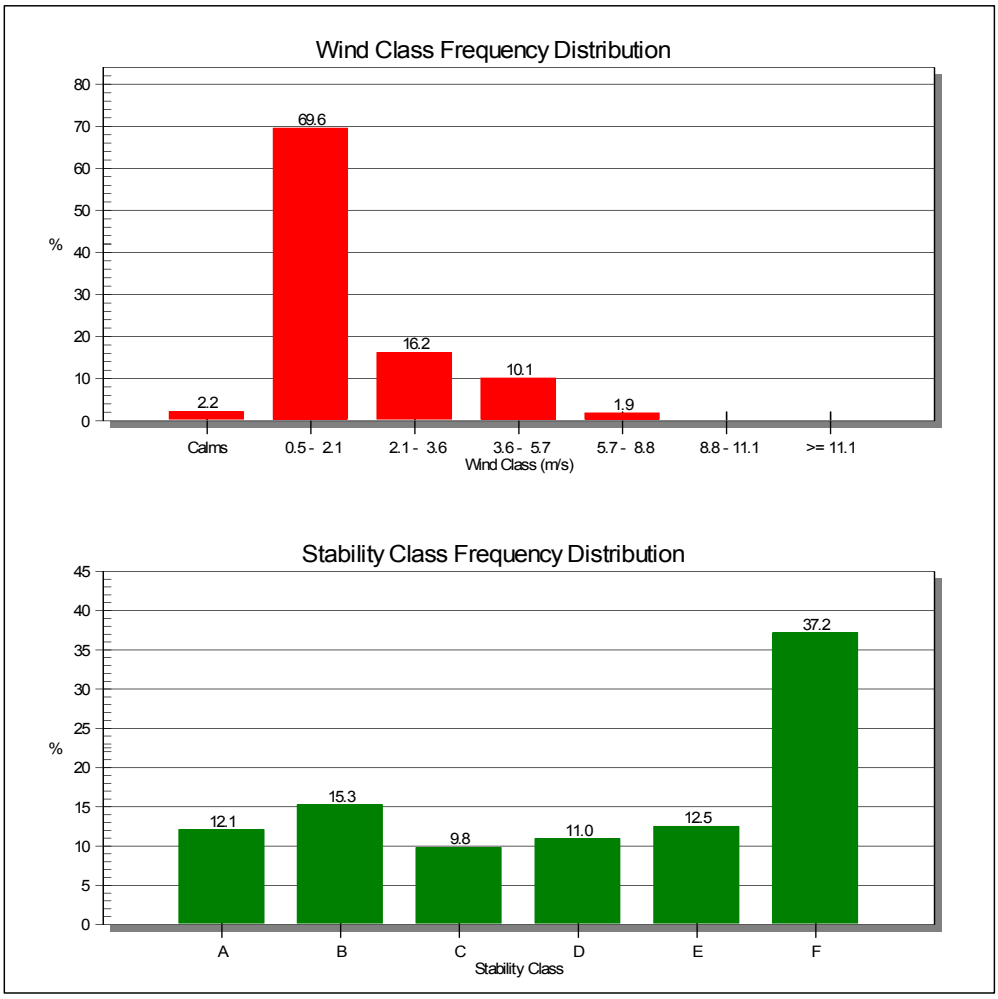


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2014 **Mar 1 - May 31** **00:00 - 23:00**	**M/s. HEMANI INTERMEDIATES PVT. LTD. (UNIT-IV)**	
		MODELER:	
	CALM WINDS: **8.56%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **2.03 m/s**		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

FIGURE-3.1B

STABILITY CLASS DISTRIBUTION



3.2 AIR ENVIRONMENT

3.2.1 DESIGN OF NETWORK FOR AMBIENT AIR QUALITY MONITORING LOCATIONS

The air quality status in the impact zone is assessed through a network of ambient air quality monitoring locations. The tropical climatic conditions mainly control the transport and dispersion of air pollutant emissions during various seasons.

The baseline studies for air environment include identification of specific air pollutants prior to implementation of the project. The Environmental Impact Assessment (EIA) study requires monitoring of baseline ambient air quality during one season. Accordingly, ambient air quality monitoring was carried out in the pre-monsoon season from March 1, 2014 to May 31, 2014. The main sources of air emissions in the study area are industrial operations, vehicular emission, dust from paved and unpaved tracks, fuel burning for domestic purpose, and wind blown dust from open land.

Seven Ambient Air Quality Monitoring (AAQM) locations were selected based on guidelines of ambient air quality network siting criteria of CPCB. All AAQM locations were selected within the study area of 10 km radial distance from the project site covering all zones i.e. industrial, residential, rural & other area as per NAAQS and keeping in mind local topography and meteorology of the area.

3.2.2 METHODOLOGY FOR AMBIENT AIR QUALITY MONITORING

The ambient air quality monitoring was carried out in accordance with National Ambient Air Quality Standards (NAAQS) of CPCB. Ambient Air Quality Monitoring (AAQM) was carried out at ten locations during the study period. The locations of the different stations with respect to its distance and direction from project site are shown in Table-3.6 and Figure-3.2 respectively.

The conventional and project specific parameters such as Suspended Particulate Matter, Respirable Suspended Particulate Matter (RSPM-PM_{10}), Respirable Suspended Particulate Matter (RSPM-$PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (O_3), Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene (C_6H_6), Benzo (a) Pyrene (BaP), Arsenic (AS), Nickel (Ni), Chlorine (Cl_2), HCl, Br_2 & VOCs were monitored at site.

The values for mentioned concentrations of various pollutants at all the monitoring locations were processed for different statistical parameters like arithmetic mean, minimum concentration, and maximum concentration and percentile values. The existing baselines levels of Suspended Particulate Matter, Respirable Suspended Particulate Matter (RSPM-PM_{10}), Respirable Suspended Particulate Matter (RSPM-$PM_{2.5}$), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (O_3), Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene (C_6H_6), Benzo (a) Pyrene (BaP), Arsenic (AS), Nickel (Ni), Chlorine (Cl_2)), HCl, Br_2 & VOCs are expressed in terms of various statistical parameters as given in Tables-3.7 National ambient air quality standards are enclosed as Annexure-1.

TABLE - 3.6

DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)	TYPE OF AREA
1	Project-site (A1)	---	---	Industrial
2	Kadodara (A2)	NE	5.76	Residential
3	Jolva (A3)	ESE	4.48	Residential
4	Dahej (A4)	WSW	3.20	Residential
5	Vadadla (A5)	ENE	2.56	Residential
6	Lakhigam (A6)	WSW	7.04	Residential
7	Luvara (A7)	SW	8.16	Residential

FIGURE - 3.2

LOCATION OF AMBIENT AIR QUALITY MONITORING STATIONS

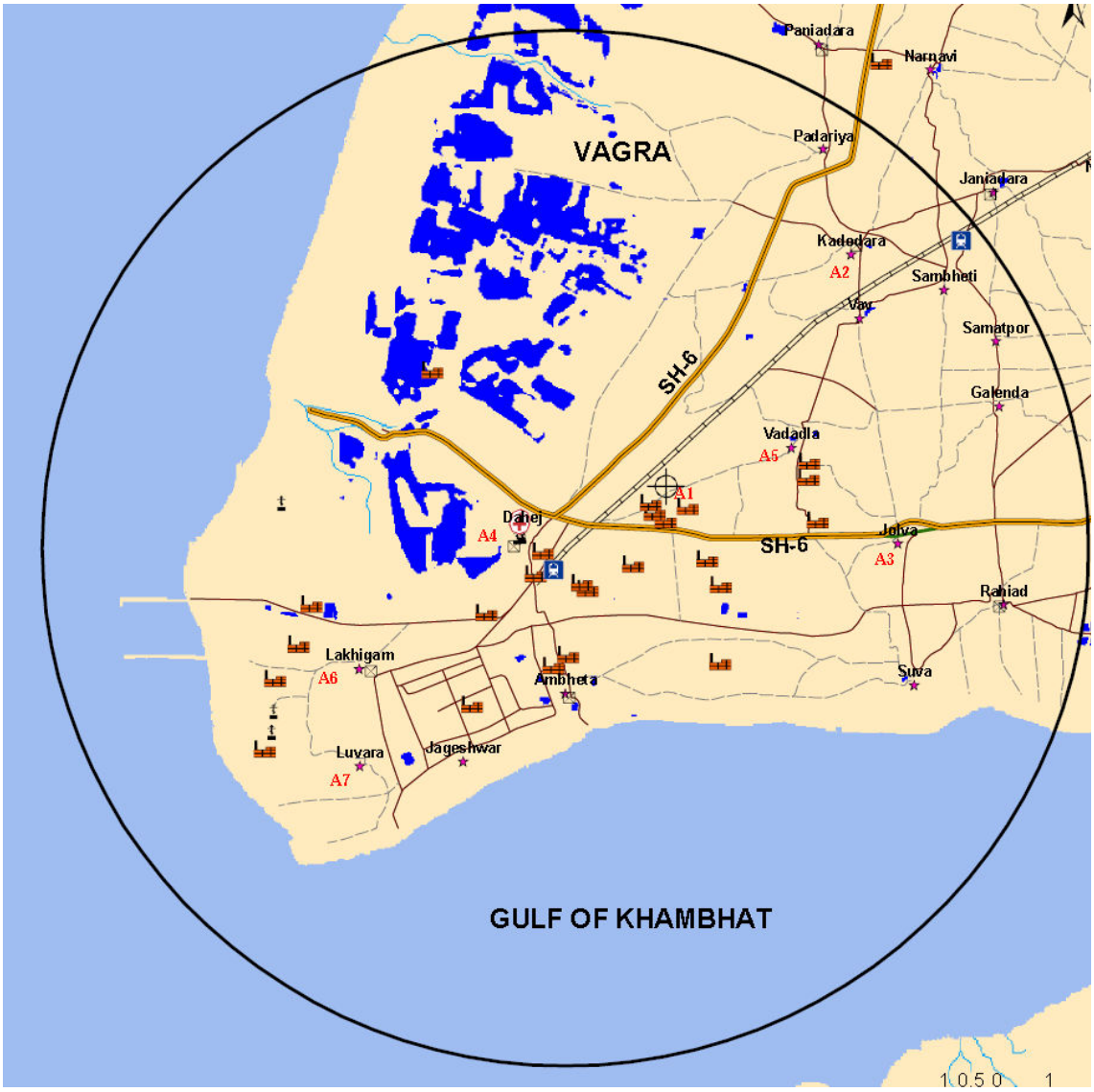


TABLE 3.7

AMBIENT AIR QUALITY STATUS (March, 2014 to May, 2014) **Unit: μg/m^3**

SR. NO.	SAMPLING LOCATION	SPM	PM_{10}	$PM_{2.5}$	SO_2	NOx	O_3
		AVERAGE					
1	Project-site (A1)	164	72	32	13	16	11
2	Kadodara (A2)	116	81	39	23	29	11
3	Jolva (A3)	109	70	40	25	33	13
4	Dahej (A4)	93	69	42	29	38	15
5	Vadadla (A5)	80	55	38	19	22	13
6	Lakhigam (A6)	116	85	49	26	31	14
7	Luvara (A7)	107	79	39	24	32	15

TABLE 3.7 (CONTD.)

AMBIENT AIR QUALITY STATUS (March, 2014 to May, 2014) **Unit: μg/m^3**

SR. NO.	SAMPLING LOCATION	Pb	NH_3	CO (mg/m^3)	C_6H_6	BaP (ng/m^3)	As (ng/m^3)	Ni (ng/m^3)
		AVERAGE						
1	Project-site (A1)	0.6	6.0	BDL	3.2	0.60	BDL	10.19
2	Kadodara (A2)	BDL	BDL	BDL	2.8	0.52	BDL	10.54
3	Jolva (A3)	BDL	BDL	BDL	3.8	0.50	BDL	13.00
4	Dahej (A4)	BDL	BDL	BDL	4.0	0.77	BDL	16.46
5	Vadadla (A5)	BDL	BDL	BDL	3.4	0.51	BDL	15.20
6	Lakhigam (A6)	BDL	BDL	BDL	3.1	0.70	BDL	13.97
7	Luvara (A7)	BDL	BDL	BDL	4.0	0.62	BDL	14.90

Note: BDL = Below Detectable Limit

TABLE 3.7 (CONTD.)

AMBIENT AIR QUALITY STATUS (March, 2014 to May, 2014) **Unit: µg/m^3**

SR. NO.	SAMPLING LOCATION	HCl	Cl_2	HC (ppm)	VOCs (Isobutylene Equivalent) (ppm)	HBR
		AVERAGE				
1	Project-site (A1)	BDL	BDL	1.01	0.7	BDL
2	Kadodara (A2)	BDL	BDL	1.20	0.2	BDL
3	Jolva (A3)	BDL	BDL	1.48	0.4	BDL
4	Dahej (A4)	BDL	BDL	1.65	0.4	BDL
5	Vadadla (A5)	BDL	BDL	1.27	0.2	BDL
6	Lakhigam (A6)	BDL	BDL	1.68	0.3	BDL
7	Luvara (A7)	BDL	BDL	1.41	0.4	BDL

Note: BDL = Below Detectable Limit

Note:

PARAMETER	TEST METHOD
Particulate Matter (PM_{10})	IS 5182 (PART 23):2006 (Cyclonic Flow Technique) Gravimetric
Particulate Matter ($PM_{2.5}$)	Gravimetric
Sulphur Dioxide (SO_2)	IS 5182 (PART-2):2001
Nitrogen Dioxide (NO_2)	IS 5182 (PART-6):2006
Ozone (O_3)	IS 5182 (PART-9) :1974
**Lead (Pb)	AAS APHA 3030 E
Ammonia (NH_3)	Indophenol Blue Method
*Carbon Monoxide (CO)	Digital CO Analyzer
**Benzene (C_6H_6)	Adsorption extraction followed by GC/GCMS
**Benzo (α) Pyrene (BaP)	Solvent extraction followed by GC/GCMS
**Arsenic (As)	AAS APHA 3114 B- C
**Nickel (Ni)	AAS APHA 3030 E
**Hydro Carbon (HC)	Digital Gas Analyzer
Hydrogen Sulphide (H_2S)	IS 5182 (PART-7):1973
*Hydrochloric Acid(HCl)	Titrametric Method
Chlorine (CL_2)	IS:5182:(PART-19):1982
*Hydrogen Fluoride (HF)	IS:5182:(PART-13):1991
Carbon Disulphide (CS_2)	IS:5182:(PART-20):1982

VOC – Aeroqual Series 300 (Sensor 0 – 25 ppm)
Minimum Detectable Limit – 0.1 ppm

Minimum Detection Limit:					
**Lead (as Pb)	:	0.5 µg/m^3	**Benzo (α) Pyrene (BaP)	:	0.5 ng/m^3
Ammonia (NH_3)	:	1 µg/m^3	**Arsenic (as As)	:	2 ng/m^3
Carbon Monoxide(as CO)	:	1.14 mg/m^3	**Nickel (as Ni)	:	10 ng/m^3
**Benzene (as C_6H_6)	:	2 µg/m^3	**Hydrocarbon(HC)	:	1 ppm

*Not in our NABL Scope
**Analysed by Sub Contractor

3.3 NOISE ENVIRONMENT

The objective of the noise pollution survey around the project site was to identify existing noise sources and to measure background noise levels. Major noise sources in the study area are industries, commercial, and vehicular movements. The noise monitoring locations are given in Table-3.8A and shown in Figure-3.3 while the results of noise monitoring are given in Table 3.8B.

3.3.1 METHODOLOGY FOR NOISE MONITORING

The noise monitoring was carried out at ten locations in day time during (6 am to 9 pm) and at night time (9 pm to 6 am) in the study area covering all the areas i.e. industrial, commercial, residential and silence zones as mentioned in Noise (Pollution and Control) Rules, 2000. CPCB Recommendations for community noise exposure are attached as Annexure – 3. Hourly Equivalent noise levels Leq (day) and Leq (night) were measured at each monitoring locations. One day monitoring on April 9, 2014 during day and night time was carried out at all the locations. Besides, damage risk criteria for hearing loss given by Occupational Safety & Health Administration (OSHA) are enclosed as Annexure - 2.

The noise level measured in study area at different locations is given in Table 3.8. The noise sources identified around the site are vehicular traffic, industrial and commercial activities. CPCB recommendation for community noise exposure in different category of area (i.e. residential, commercial, industrial and silence zone) is enclosed as Annexure - 3 while Damage risk criteria for hearing loss given by occupational safety & health administration (OSHA) is enclosed as Annexure - 2. The noise levels were below the stipulated standards of CPCB.

Noise levels due to transportation were also measured at three different locations. The equivalent noise level Leq (60 min average) measured at a distance of 10 m and 20 m from the edge of the road at each of the locations are presented in Table 3.9. The communities close to the project site are not exposed to major noise sources. The commercial activities and transport apart from natural sources contribute to community noise levels.

TABLE - 3.8A

DETAILS OF AMBIENT NOISE QUALITY MONITORING LOCATIONS

SR. NO.	NAME OF VILLAGE	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1	Project-site (N1)	---	---
2	Kadodara (N2)	NE	5.76
3	Jolva (N3)	ESE	4.48
4	Dahej (N4)	WSW	3.20
5	Vadadla (N5)	ENE	2.56
6	Lakhigam (N6)	WSW	7.04
7	Luvara (N7)	SW	8.16

FIGURE - 3.3

LOCATION OF AMBIENT NOISE LEVEL MONITORING STATIONS

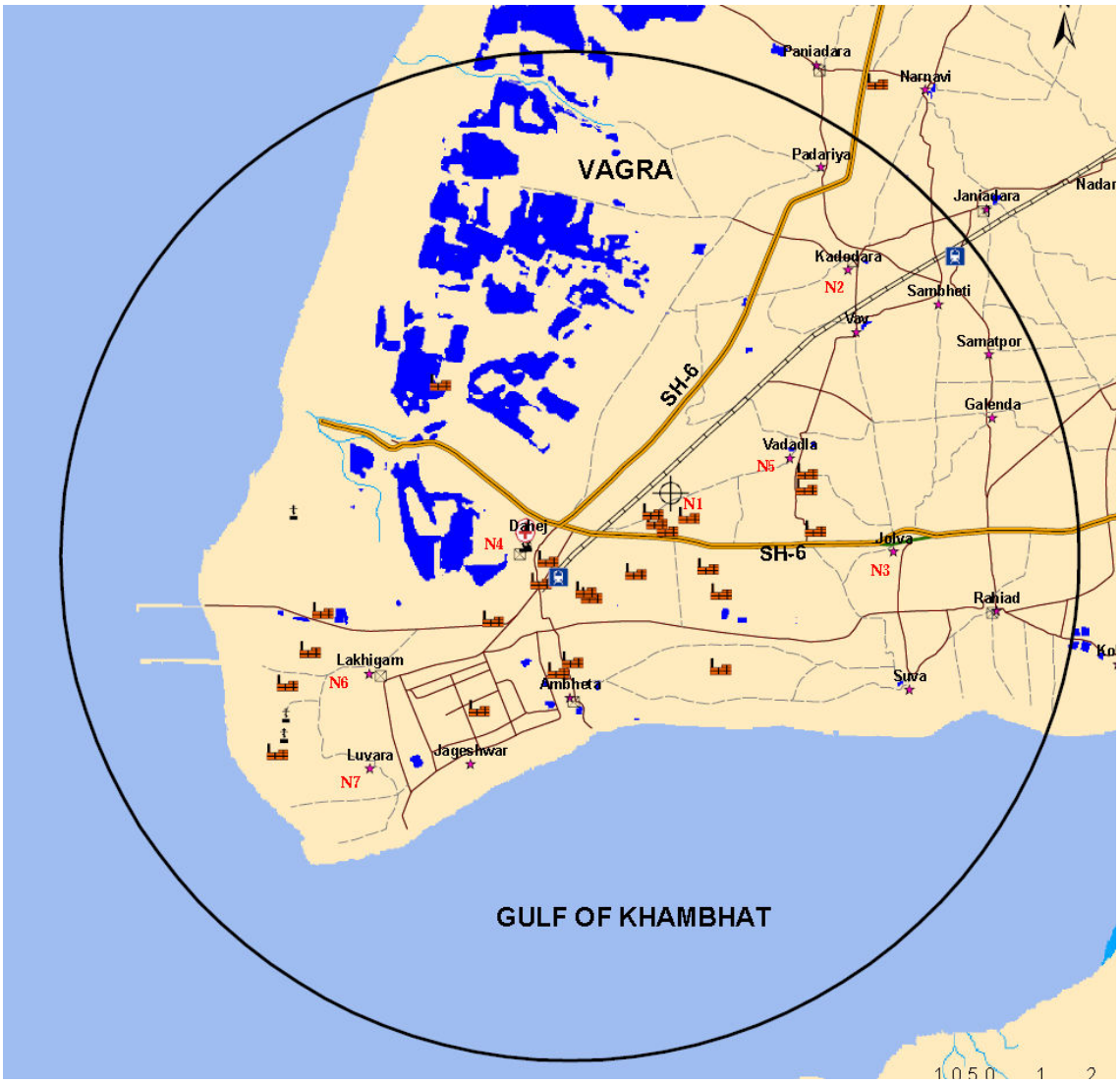


TABLE - 3.8B

BACKGROUND NOISE LEVELS

SR. NO.	LOCATION	NOISE LEVEL IN dB(A)	TIME
1	Project-site (N1)	64-66 54-58	Day Night
2	Kadodara (N2)	50-53 41-43	Day Night
3	Jolva (N3)	49-54 42-44	Day Night
4	Dahej (N4)	51-54 40-43	Day Night
5	Vadadla (N5)	50-53 38-41	Day Night
6	Lakhigam (N6)	50-54 42-45	Day Night
7	Luvara (N7)	48-51 40-42	Day Night

TABLE - 3.9

NOISE LEVELS DUE TO TRANSPORTATION

SR. NO.	SAMPLING LOCATION	NOISE LEVEL IN dB(A)	TIME
1.	N1(T): Near GACL Chokdi	69-72 65-68	Day Night
2.	N2 (T): Near Dahej Bus Stand	66-70 62-65	Day Night
3.	N3 (T): Near GFL Chokdi	65-68 61-63	Day Night

TABLE - 3.9 (CONTD.)

INDUSTRIAL NOISE LEVELS

SR. NO.	SAMPLING LOCATION	NOISE LEVEL IN dB(A)	TIME
1.	Nr. Hemani Intermediates Pvt. Ltd. (GIDC Dahej – Existing Unit)	68-70 61-63	Day Night
2.	Nr. Gujarat Alkalies & Chemical Ltd.	62-65 59-62	Day Night
3.	Nr. Gujarat Fluoro Chemicals Ltd.	64-68 60-63	Day Night
4.	Nr. Luna Chemical Industries (P) Ltd.	62-66 58-60	Day Night
5.	Nr. Universal Chemicals Ind. (P) Ltd.	66-69 61-64	Day Night
6.	Nr. Meghmani Finechem Ltd.	65-68 60-62	Day Night

3.4 WATER ENVIRONMENT

3.4.1 RECONNAISSANCE

The average annual rainfall in the region is about 505.8 mm. The baseline water quality status in the region is established by analyzing surface water and ground water. Water requirement at site would be met through GIDC water supply.

3.4.2 METHODOLOGY FOR WATER QUALITY MONITORING

Ten nos. of ground water and three nos. of surface water samples were collected from the study area. These samples were analyzed for physic-chemical parameters to ascertain the baseline status in the existing surface water and ground water bodies. Samples were collected once, on April 12, 2014, during the study period and analyzed as per standard methods of water and wastewater analysis (APHA). The Indian standard specification for drinking water IS: 10500-1993 and CPCB water use criteria are enclosed as Annexure – 5 & 6 respectively. The details of surface and ground water sampling locations are given in Table 3.10. And sampling locations of water quality monitoring are shown in Figure 3.4**.** The Indian standard specification for drinking water is enclosed as Annexure – 5. The physico- chemical characteristics of the different water samples are presented in the Tables 3.11.

TABLE – 3.10

SAMPLING LOCATIONS FOR MONITORING SURFACE AND GROUND WATER QUALITY

SR. NO.	SAMPLING LOCATIONS	BEARING W. R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1	Project-site (GIDC Water)	---	---
2	Kadodara (GW1)	NE	5.76
3	Jolva (GW2)	ESE	4.48
4	Dahej (GW3)	WSW	3.20
5	Vadadla (GW4)	ENE	2.56
6	Lakhigam (GW5)	WSW	7.04
7	Luvara (GW6)	SW	8.16
8	Jageshwar Jetty (SW1)	SSW	6.88
9	Dahej Port (SW2)	WNW	8.16
10	Jolva Pond (SW3)	ESE	4.48

GW= Ground water, SW= Surface water

FIGURE - 3.4

LOCATIONS OF WATER SAMPLING STATIONS

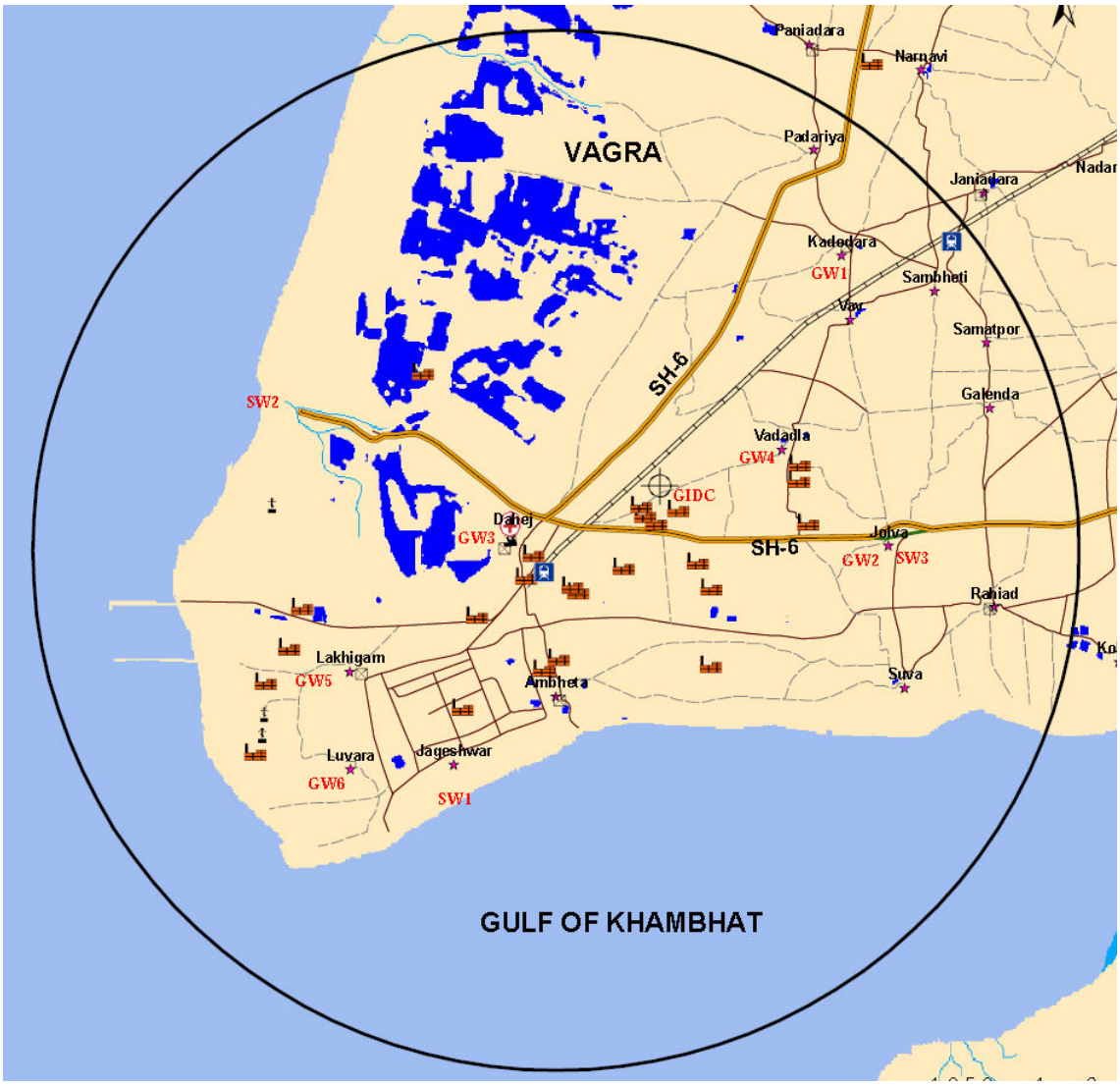


TABLE - 3.11

WATER QUALITY- PHYSICAL PARAMETERS

SR. NO.	SAMPLING LOCATION	pH	TEMPERATURE (^{0}C)	TURBIDITY (NTU)	T.D.S. (mg/L)	T.S.S. (mg/L)
1	Project-site (GIDC Water)	7.48	25.3	<0.1	183	Nil
2	Kadodara (GW1)	8.08	24.9	6.1	3091	65
3	Jolva (GW2)	7.93	24.8	1.1	3304	28
4	Dahej (GW3)	8.0	25.1	1.0	2676	20
5	Vadadla (GW4)	7.99	24.6	1.8	3270	28
6	Lakhigam (GW5)	7.47	25.1	1.6	239	8
7	Luvara (GW6)	7.78	25.3	1.1	1220	18
8	Jageshwar Jetty (SW1)	8.04	25.1	61	22980	275
9	Dahej Port (SW2)	8.13	25.1	98	45440	644
10	Jolva Pond (SW3)	8.31	25.2	2.9	315	34

GW= Ground water, SW= Surface water

TABLE - 3.11 (CONTD.)

WATER QUALITY - NUTRIENTS, OXYGEN DEMAND AND ORGANIC PARAMETERS

SR. NO.	SAMPLING LOCATION	NITRATE	TOTAL PHOS-PHATE	DO	COD	BOD_3[27]	OIL & GREASE
		(mg/L)					
1	Project-site (GIDC Water)	8.3	0.95	6.64	<10	<1	BDL
2	Kadodara (GW1)	3.1	0.46	6.05	14.2	<0.1	BDL
3	Jolva (GW2)	3.4	0.39	6.09	6.22	0.7	BDL
4	Dahej (GW3)	2.4	0.46	6.7	4.1	<0.1	BDL
5	Vadadla (GW4)	3.4	0.40	6.12	5.1	<0.1	BDL
6	Lakhigam (GW5)	4.5	0.46	6.2	4.3	<0.1	BDL
7	Luvara (GW6)	16.2	0.34	6.3	7.1	<0.1	BDL
8	Jageshwar Jetty (SW1)	13.6	1.05	6.9	244.9	51	BDL
9	Dahej Port (SW2)	11.4	0.91	7.01	79.4	11	BDL
10	Jolva Pond (SW3)	5.1	0.21	7.14	18.2	<0.1	BDL

GW= Ground water, SW= Surface water, BDL=Below Detectable Limit

TABLE - 3.11 (CONTD.)

WATER QUALITY - INORGANIC PARAMETERS

SR. NO.	SAMPLING LOCATION	TOTAL ALKALINITY (AS $CACO_3$)	T.H. (AS $CACO_3$)	C.H. (AS $CACO_3$)	Cl^-	SO_4^{-2}	Ca	Mg
		(mg/L)						
1	Project-site (GIDC Water)	110	172.3	124.4	14.8	5.0	29.7	13.6
2	Kadodara (GW1)	1324.1	264.3	108.1	1014.4	357.1	33.84	37.1
3	Jolva (GW2)	1504.5	540.5	98.1	1375.3	215	34.2	117.4
4	Dahej (GW3)	304.3	271.3	115.4	1508.3	160.3	30.4	48.3
5	Vadadla (GW4)	2504.3	281.3	56.1	997.1	385	26.1	67
6	Lakhigam (GW5)	750.1	121.3	75.1	30.3	14.3	24.9	10
7	Luvara (GW6)	749.1	337.9	148.3	280.6	121	58.9	67.1
8	Jageshwar Jetty (SW1)	221.4	5320.4	1061.3	16345.7	1818.1	413.6	1043.1
9	Dahej Port (SW2)	296.4	12315.4	2174.6	39215.6	4997.4	812.6	2159
10	Jolva Pond (SW3)	215.6	128.1	64.6	69	19.6	21.6	12.3

GW= Ground water, SW= Surface water, T.H. =Total Hardness, C.H. =Calcium Hardness

TABLE - 3.11 (CONTD.)

WATER QUALITY - HEAVY METALS

SR. NO.	SAMPLING LOCATION	Na	T-Cr^{+3}	Cu	Pb	Fe	Zn	K	Ni	S^{-2}	CN
		(mg / L)									
1	Project-site (GIDC Water)	0.04	BDL	BDL	BDL	0.23	0.06	3.5	0.023	BDL	BDL
2	Kadodara (GW1)	1.3	BDL	BDL	BDL	0.39	0.051	40	0.064	BDL	BDL
3	Jolva (GW2)	1.3	BDL	BDL	BDL	0.13	0.018	74	0.031	BDL	BDL
4	Dahej (GW3)	1.2	BDL	BDL	BDL	0.34	0.02	37.5	0.052	BDL	BDL
5	Vadadla (GW4)	1.4	BDL	0.026	BDL	0.29	0.05	62	0.049	BDL	BDL
6	Lakhigam (GW5)	0.36	BDL	BDL	BDL	0.055	0.014	39	0.02	BDL	BDL
7	Luvara (GW6)	0. 24	BDL	BDL	BDL	0.24	0.028	293	0.036	BDL	BDL
8	Jageshwar Jetty (SW1)	6.3	0.015	0.032	BDL	0.46	0.042	150	0.272	BDL	BDL
9	Dahej Port (SW2)	24	0.197	0.148	BDL	1.60	0.077	750	1.18	BDL	BDL
10	Jolva Pond (SW3)	0.094	BDL	BDL	0.029	0.213	BDL	8.8	0.145	BDL	BDL

GW= Ground water, SW= Surface water, BDL=Below Detectable Limit

3.5 LAND ENVIRONMENT

3.5.1 METHODOLOGY FOR SOIL MONITORING

Soil samples were collected from ten different locations during study on April 10, 2014 in the study area (0-20 cm depth). The locations selected for collection of soil samples are shown in Figure 3.5 and presented in Table 3.12. The analysis results of soil samples are given in Table 3.13.

TABLE - 3.12

SAMPLING LOCATIONS: SOIL QUALITY

SR. NO.	SAMPLING LOCATION	BEARING W.R.T. PROJECT SITE	APPROXIMATE RADIAL DISTANCE FROM PROJECT SITE (KM)
1	Project-site (S1)	---	---
2	Kadodara (S2)	NE	5.76
3	Jolva (S3)	ESE	4.48
4	Dahej (S4)	WSW	3.20
5	Vadadla (S5)	ENE	2.56
6	Lakhigam (S6)	WSW	7.04
7	Luvara (S7)	SW	8.16

FIGURE - 3.5

LOCATIONS OF SOIL SAMPLING STATIONS

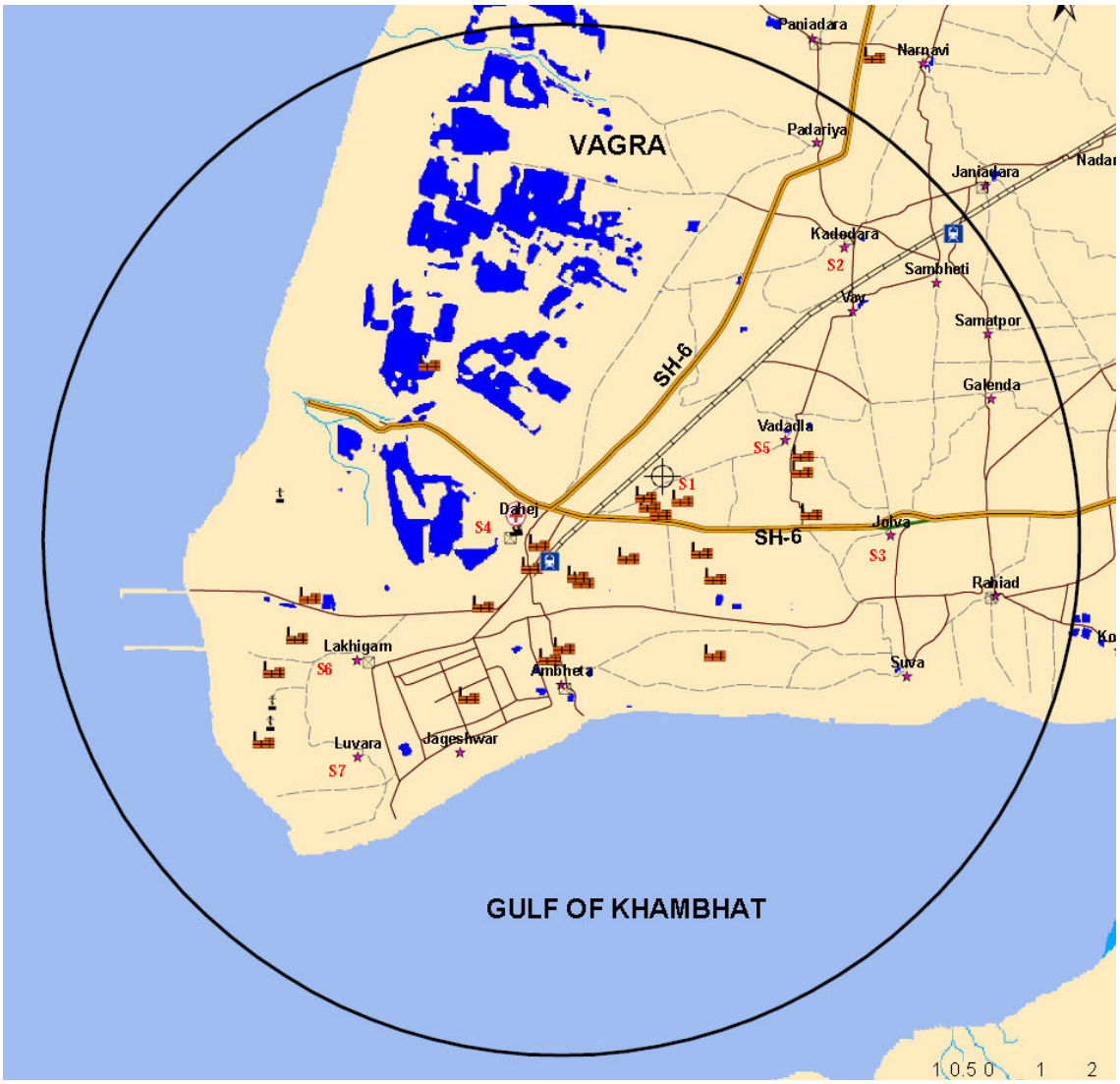


TABLE - 3.13

PHYSICO-CHEMICALS CHARACTERISTICS OF SOIL

Sr. No.	Parameter	Project Site (S1)	Kadodara (S2)	Jolva (S3)	Dahej (S4)	Vadadla (S5)	Lakhigam (S6)	Luvara (S7)
1.	pH	7.26	8.05	8.13	8.44	8.52	8.99	8.48
2.	Temperature (^{0}C)	25.1	26.3	26.1	26.4	27	25.3	26.8
3.	Moisture (%)	11.98	4.94	7.84	5.12	4.34	8.12	5.76
4.	Leachate (%)	10	10	10	10	10	10	10
5.	SO_4^{-2} (mg/kg)	2370	213.3	128	72.64	39.80	264.48	151.12
6.	Chloride (mg/kg)	70216	47.6	46.7	9.5	9.6	9.4	9.5
7.	Total hardness (mg/kg)	271.5	243	241	95.8	54.3	895.4	165.4
8.	Calcium Hardness (mg/kg)	180.2	238.4	136.7	76.9	39.1	270.6	155.4
9.	Bulk density (g/cm^3)	1.02	1.32	1.11	1.20	1.11	1.32	1.23
10.	Calcium (mg/kg)	2046.8	86.5	46.1	29.3	15.1	108.6	61.2
11.	WHC (%)	55.61	39.5	54.5	61.2	50.4	32.8	41.5
12.	Porosity (%)	53.2	44.6	41.85	42.6	44.8	41.3	48
13.	Grain Size (%)							
	Gravel	03	00	00	00	00	00	00
	Coarse sand	03	00	00	03	00	03	04
	Medium sand	04	02	00	04	05	03	04
	Fine sand	04	08	06	05	07	04	05
	Silt + Clay	86	90	94	88	88	90	87

TABLE - 3.13 (CONTD.)

PHYSICO-CHEMICALS CHARACTERISTICS OF SOIL (HEAVY METALS)

Sr. No.	Parameter (mg/kg)	Project Site (S1)	Kadodara (S2)	Jolva (S3)	Dahej (S4)	Vadadla (S5)	Lakhigam (S6)	Luvara (S7)
1.	Na	912	455	651	439	494	767	297
2.	Cu^{+2}	32.9	49.60	47.91	61.90	50.19	80.8	80.72
3.	Fe^{+3}	8.6	33.9	34.2	3.70	3.20	2.90	3.40
4.	Zn	57.11	60.82	54.08	67.46	60.49	54.03	68.79
5.	K	45	39	47	56	45	26	51
6.	Ni^{+2}	26.8	38.18	39.01	42.75	38.85	32.17	38.56
7.	Pb^{+2}	2.82	4.77	4.26	4.41	3.84	3.97	4.75

3.5.2 SOIL CLASSIFICATIONS

3.5.2.1 METHOD OF PREPARATION

The soil classification map has been prepared by extracting the areas under different soil categories from the 1:50,000 scale maps prepared by National Bureau of Soil Survey and Land use Planning (NBSS & LUP). The maps were scanned and geo-referenced before taking out the information for the desired area. The study area, towns and village locations have been added for ease of spatial reference. Locations of towns and villages have been extracted from Census of India (CoI) maps, Survey of India (SoI) topographical maps and confirmed with satellite data.

3.5.2.2 DESCRIPTION OF SOIL CHARACTERISTICS AND AREA UNDER DIFFERENT SOIL TYPES

Table 3.14 provides the soil type and area under different soils within the area of interest.

3.5.2.3 SOIL CHARACTERISTICS MAP

A map depicting the characteristics of major soil categories in the project area is presented in Figure 3.6. The map also marks the area within 5 km with project site as a centre. Town and village locations are also depicted to facilitate ease of reference.

TABLE 3.14

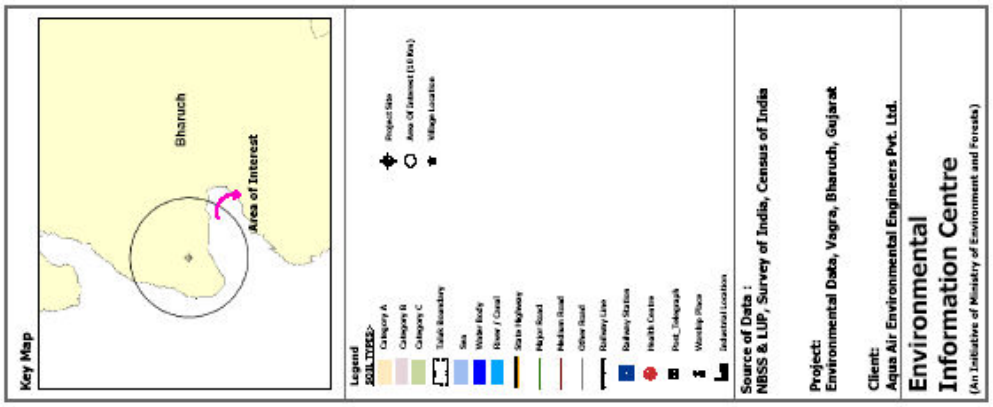
SOIL CHARACTERISTICS UNDER PROJECT AREA

CATEGORY	AREA_ SQ KM	DESCRIPTION	TAXONOMY1	TAXONOMY2	CLASS	SUB_CLASS
A	88.93	Very deep, moderately well drained, calcareous, fine soils on very gently sloping alluvial plain with slight erosion and moderate salinity; associated with very deep moderately well drained, calcareous, fine soils with moderate erosion.	Fine, montmorillonitic (calcareous), hyperthermic Typic Chromusterts	Fine, montmorillonitic (calcareous) hyperthermic Udic Chromusters	Soils of west coast (soils of Gujarat plain)	Soils of alluvial plains
C	108.64	Very deep, poorly drained, calcareous fine-loamy soils on very gently sloping coastal plain with moderate erosion and strong salinity; associated with very deep , imperfectly drained, calcareous, fine soils with severe erosion and strong salinity.	Fine-loamy, mixed (calcareous), hyperthermic Aeric Halaquepts	Fine, mixed (calcareous), hyperthermic Typic Halaquepts	Soils of west coast (soils of Gujarat plain)	Soils of coastal plains
-	116.43	Sea	-	-	-	-

(Courtesy: Environmental Information Centre, New Delhi)

FIGURE-3.6

SOIL CHARACTERISTICS MAP



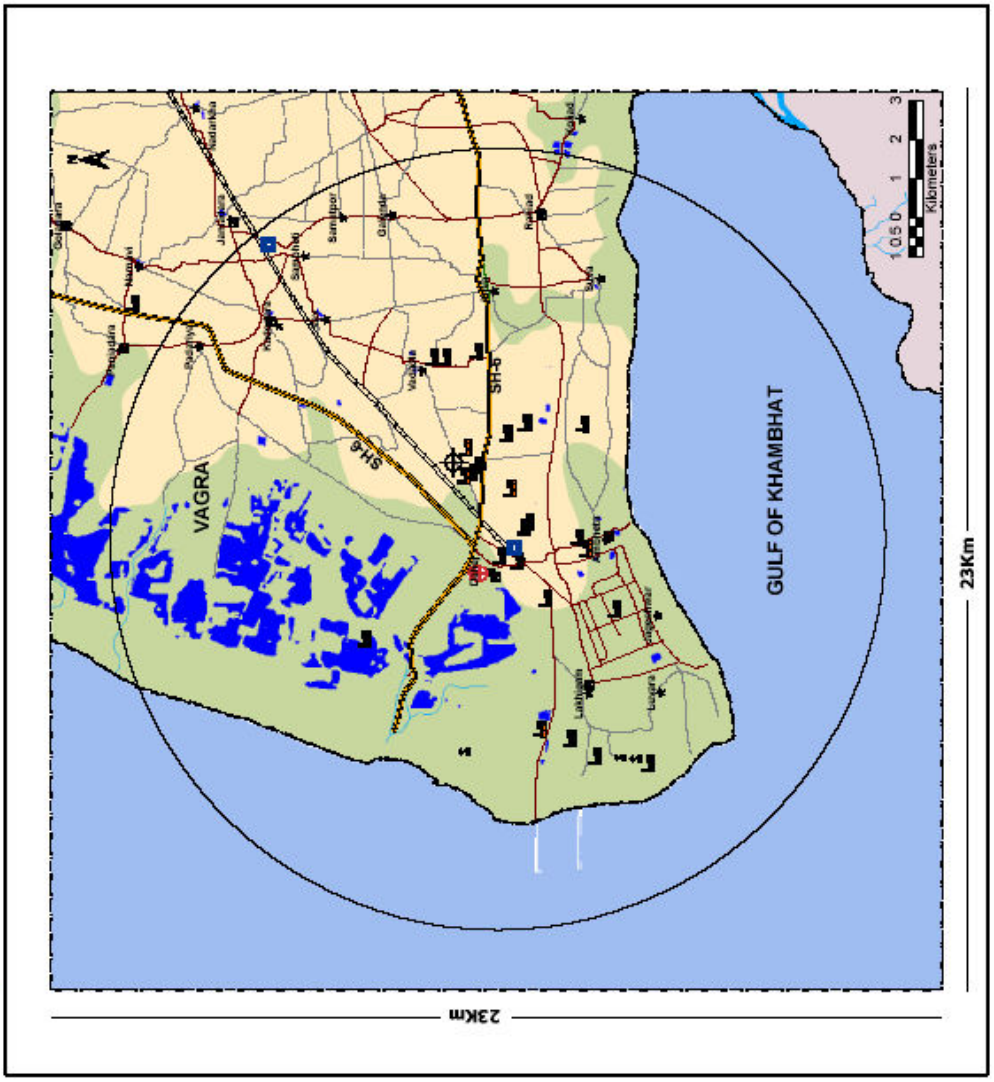


FIGURE-3.6 SOIL CHARACTERISTICS MAP

3.6 GEOLOGICAL DATA

3.6.1 METHOD OF PREPARATION

The geological classification map has been prepared by extracting the areas under different geological classification from the 1:2 million scale maps prepared by Geological Survey of India (GSI) for the **Dahej, Taluka Vagra, District: Bharuch of Gujarat.** The map text has been modified in consultations with the Department of Geology, University of Delhi. The project area, towns and village locations have been added for ease of spatial reference. Locations of towns and villages have been extracted from CoI maps, SoI topographical maps and confirmed with satellite data.

3.6.2 DESCRIPTION OF GEOLOGICAL CLASSIFICATION AND AREA UNDER DIFFERENT FORMATIONS

Table 3.15 provides the major geological features and area under different formations.

3.6.3 GEOLOGICAL MAP

A map depicting the major geological features in the project area is presented in Figure 3.7. The map also marks the area within 10 km with project site as a centre. Town and village locations are also depicted to facilitate ease of reference.

TABLE – 3.15

GEOLOGICAL FEATURES

AREA_SQKM	INDEX	AGE	DESCRIPTION
197.58	Q = Undifferentiated fluvial/ Aeolian/ coastal sediments.	Holocene in Quaternary period (1 million year to recent) Some gypsum deposits are found in these Quaternary sediments. High potential for yielding significant quantities of ground water.	Holocene in Quaternary period (1 million year to recent) Some gypsum deposits are found in these Quaternary sediments. High potential for yielding significant quantities of ground water.
116.38	Sea Area	-	-

(Courtesy: Environmental Information Centre, New Delhi)

FIGURE-3.7

MAJOR GEOLOGICAL FEATURES

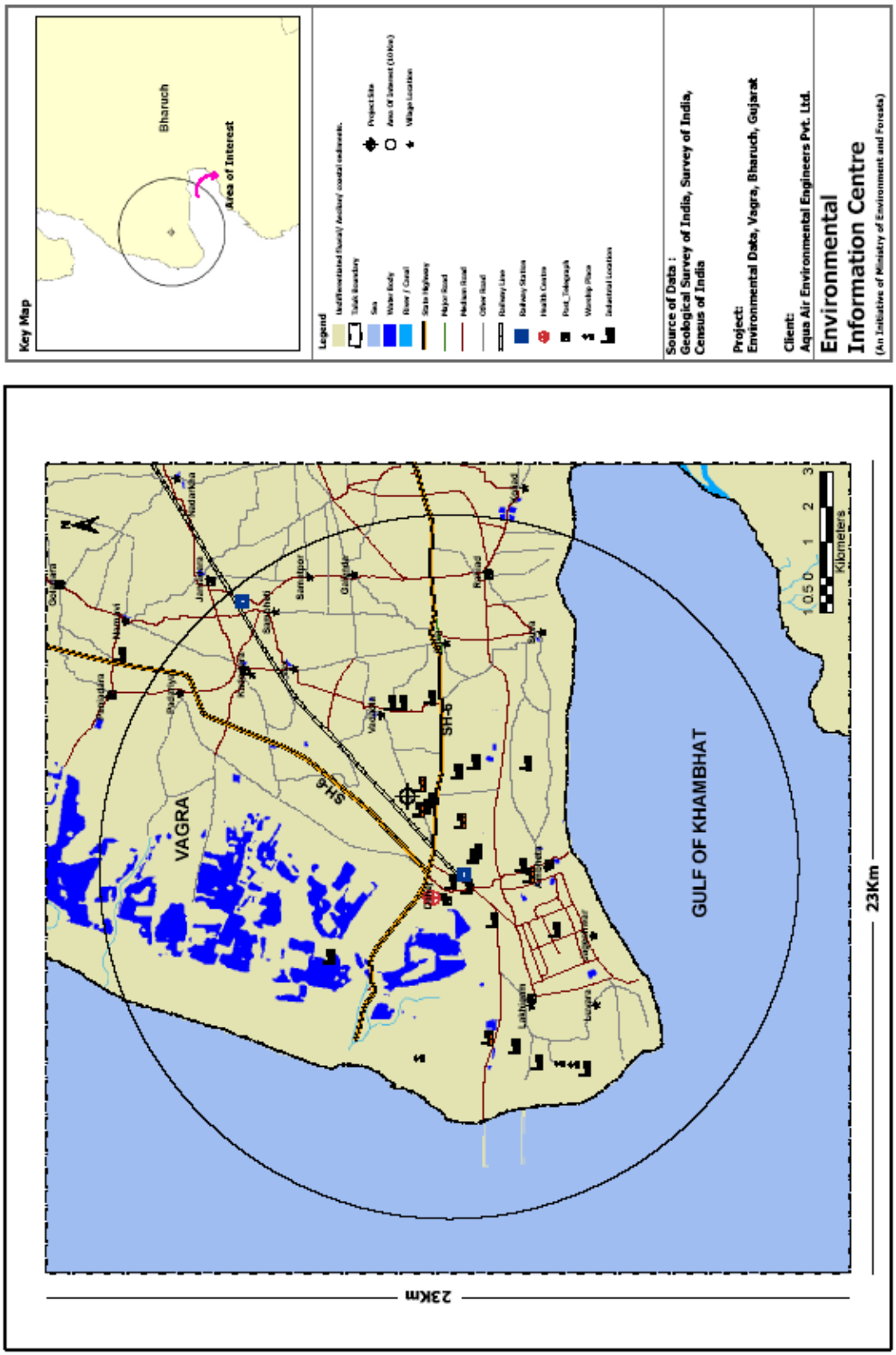


FIGURE - 3.7 MAJOR GEOLOGICAL FEATURES

3.7 LAND USE PATTERN

Land use, in general, reflects the human beings activities on land, whereas the word land cover indicates the vegetation, agricultural and artificial manmade structures covering the land surfaces. Identification and periodic surveillance of land uses and vegetation covers, in the vicinity of any developmental activity is one of the most important components for an environmental impact assessment, which would help determine the impact of the project development activity on the land use pattern.

3.7.1 METHOD OF DATA PREPARATION

The land use / land cover has been presented in the form of a map prepared by using IRS P6 LISS-III (10-NOV-2009) and procured from the National Remote Sensing Agency (NRSA), Hyderabad. The satellite data has been processed using ERDAS Imagine software supported with ground checks and ground truth verification. Area and distance calculations have been carried out using GIS software after geo-referencing the interpreted data with the help of Survey of India (SoI) topographical maps of the scale 1:50,000.

A map depicting major land use/ land cover classes comprising lands under agriculture, fallow land, open/degraded vegetation; lands falling under water bodies, scrub and lands under inhabitations is presented at Figure 3.8. The map also marks the area within 10 km of the project site as the area of interest. Land use and Land Cover with Towns and Village Locations
A map depicting major land use/ land cover classes along with the village locations in the area of coverage is presented at Figure 3.9. The land use classification within a distance of ten kilometers from the project location and the areas falling under the respective classifications are as per the following:

Process Methodology

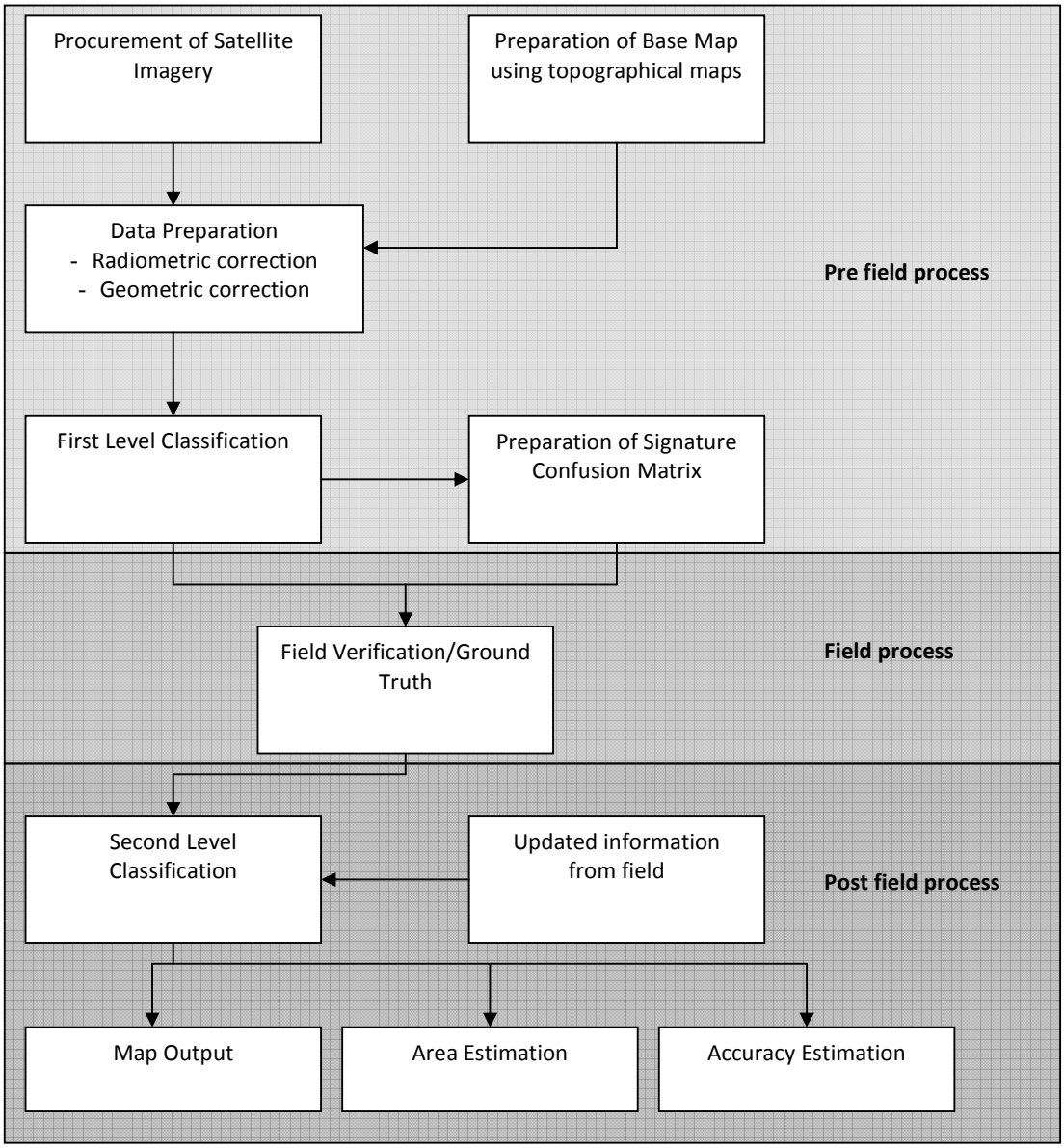


TABLE – 3.16

AREAS UNDER DIFFERENT LANDUSE

Area Statistics of Landuse / Landcover Map				
Sr. No.	**Class Names**	**Area (In Hectares)**	**Area (In Sq.Km.)**	**Area %**
1	Water Body	1363.73	13.64	4.34
2	Open/Barren Land	5076.01	50.76	16.17
3	Agriculture Land	1159.56	11.60	3.69
4	Fallow Land	6291.40	62.91	20.04
5	Open/Degraded Vegetation	412.59	4.13	1.31
6	Vegetation Medium Density	397.40	3.97	1.27
7	River & Canal	23.25	0.23	0.07
8	Marshy Land	919.33	9.19	2.93
9	Salt Affected Land	128.45	1.28	0.41
10	Settlement & Habitation	324.50	3.25	1.03
11	Mud Flat	863.17	8.63	2.75
12	Jetty	32.91	0.33	0.10
13	Salt Pans	2083.03	20.83	6.63
14	Mangrove(Sparse)	117.30	1.17	0.37
15	Mangrove(Dense)	223.00	2.23	0.71
16	Marshy Vegetation	46.55	0.47	0.15
17	Industrial Area	290.32	2.90	0.92
18	Sea	11589.46	115.89	36.91
19	Seasonal Water Body	59.04	0.59	0.19
	Total	**31400.99**	**314.01**	**100.00**

(Courtesy: Environmental Information Centre, New Delhi)

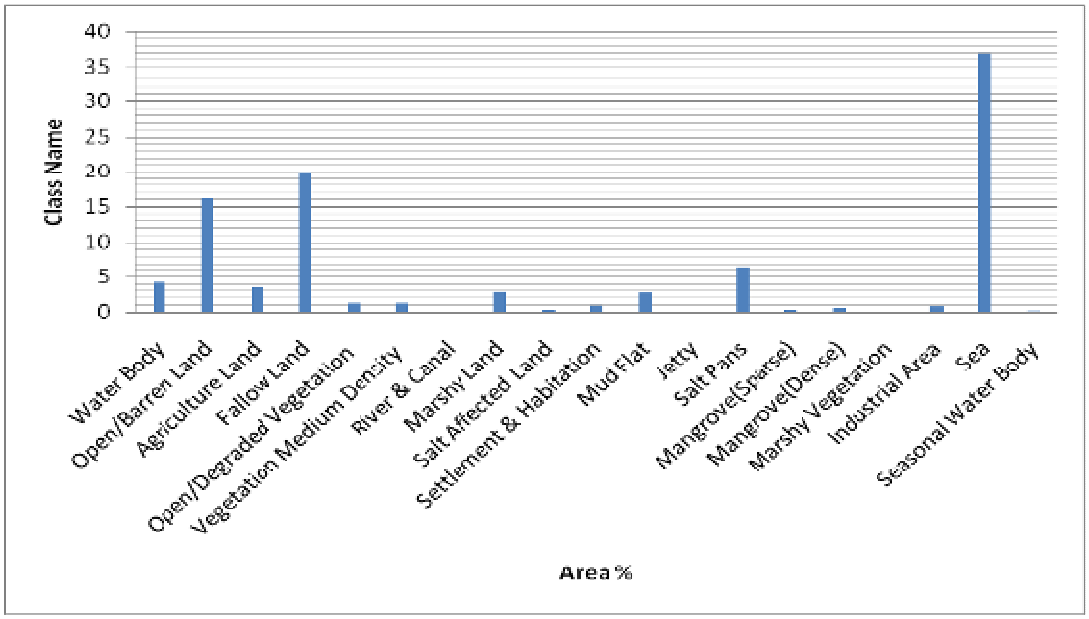


FIGURE – 3.8

LANDUSE / LANDCOVER

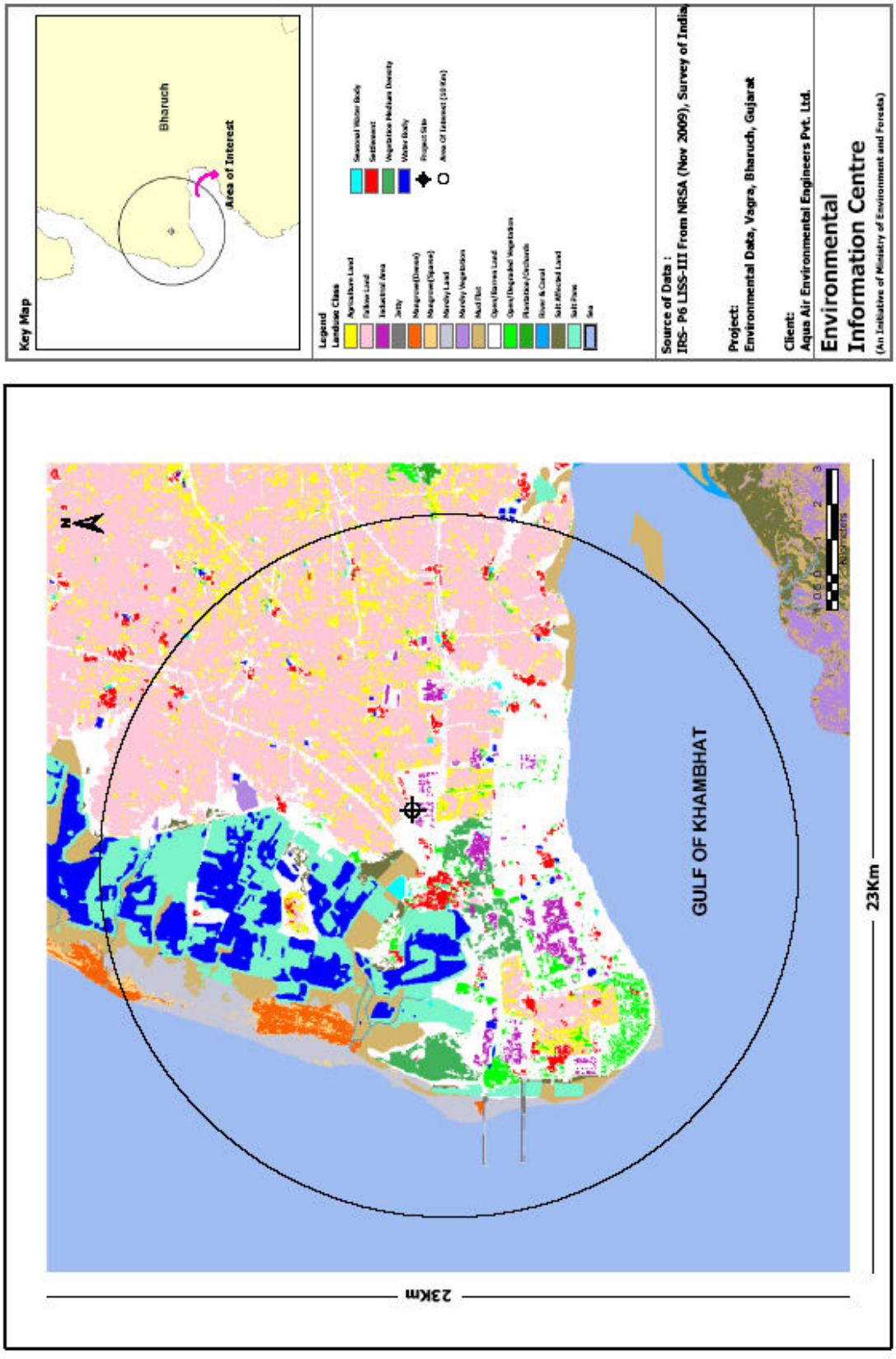


FIGURE-3.8 LANDUSE / LANDCOVER MAP

FIGURE – 3.9

LANDUSE / LANDCOVER WITH VILLAGE LOCATIONS

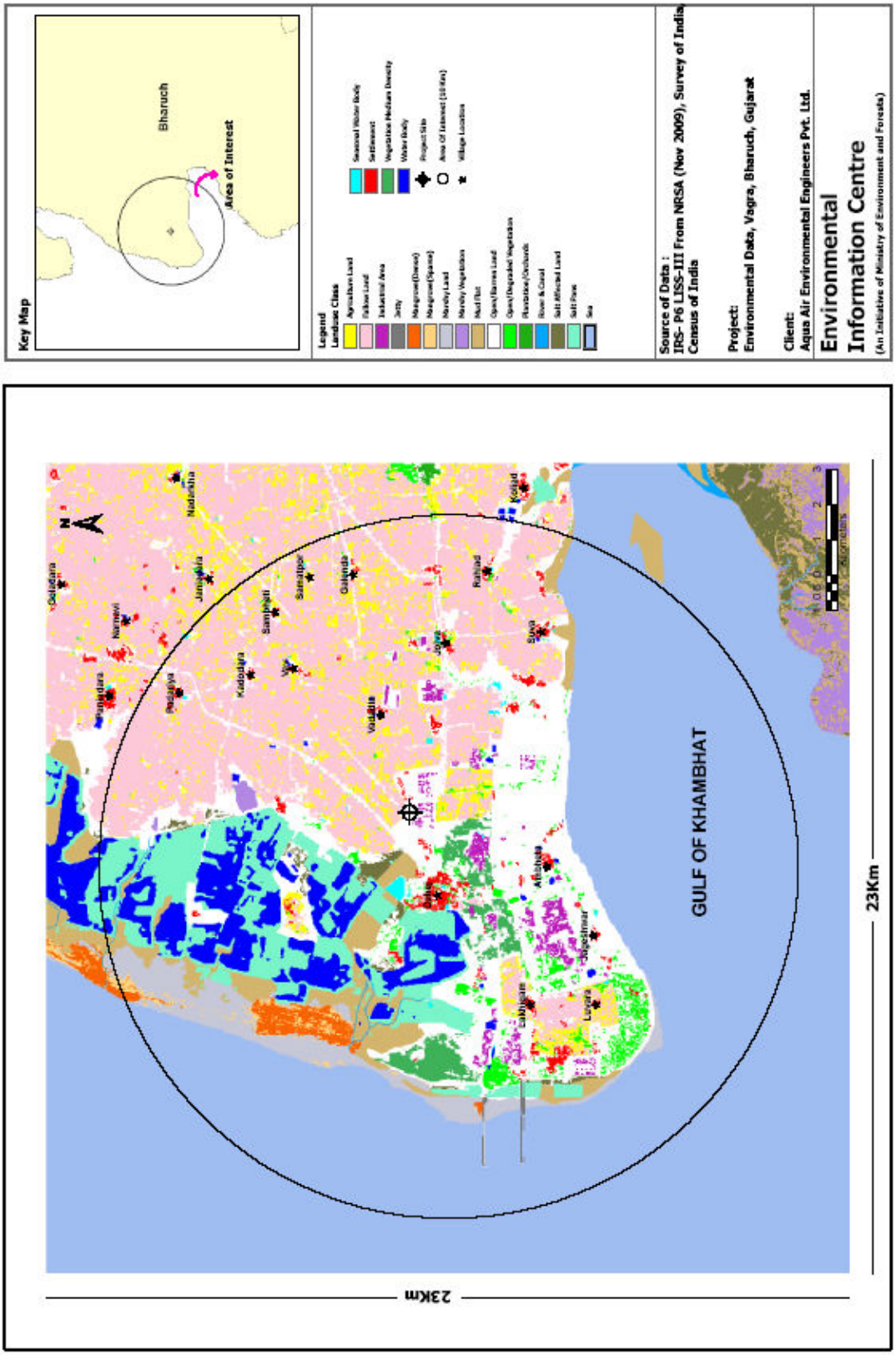


FIGURE-3.9 LANDUSE / LANDCOVER MAP WITH VILLAGE LOCATION

3.8 ECOLOGICAL INFORMATION

Introduction

Bharuch (formerly commonly known as Broach) in India, is a district in the southern part of the Gujarat peninsula on the west coast of state of Gujarat with a size and population comparable to that of Greater Boston. The Narmada River outlets into the Gulf of Khambhat through its lands and that shipping artery gave inland access to the kingdoms and empires located in the central and northern parts of the sub-continent of India. The geographical location of the district is 21.30° to 22.00° N Latitude and 72.45° to 73.15° E Longitude. The district has eight Talukas, Bharuch (District Headquarter), Ankleshwar, Valia, Jhagadia, Vagra, Aamos, Hansot and Jambusar. The total area of the district is 5,253 sq km, as per the census of 2001; the population is 1.3 million, with 261 persons per sq. km. The district is situated at the mouth of River Narmada. The major rivers flowing through the district are: Narmadha, Dhadhar, Kim and Kaveri.

Climate

The weather of Bharuch district is hot and dry-starting from mid-march till mid-June, mid-during summer season weather remains hot and dry. While from mid-June till end of September weather remains humid and can be considered pleasant. From October-November weather is bit hot. From December to February climate remains cool

Rainfall

The average rainfall of the district is 800 mm.

Biogeography

According to Rodgers and Panwar (1988), Gujarat has parts of four biogeographic zones:

Zone 3.	The Indian Desert
	Province 3A - Kutch
Zone 4.	The Semi-arid Zone:
	Province 4B - Gujarat – Rajputana
Zone 5.	The Western Ghats:
	Province 5A - Malabar Coast
	Province 5B - Western Ghat Mountains

Zone 10. The Coast of India:

Province 10A - West Coast

The **project area** falls at **Zone 4**: The Semi-arid zone, Province 4B – Gujarat-Rajputana.

3.8.1 PHYSIOGRAPHY

The region provides a combination of most of the geo-environmental features for the development of favorable ecosystems. The alluvial sediments and reasonable water resources have provided impetus towards developing human induced ecosystems of agricultural cropping agro-forestry and horticulture. The elevation range of the region is about 20 m showing a very gentle flat gradient of 1:800 to 1:1000. The region shows more or less a flat topography with a series of sections cut by deeply incised channels of rivers flowing across the region. The riverbanks are generally marked by levee deposits, creating a ridge type banks with higher elevations than the general ground level. The flat topography is dotted by low height sandy mounds of stabilized dunes. Formation of ravine landscape is quite common on most of the riverbanks due to deep gully erosion. The rivers are prone to heavy floods and land erosion.

3.8.2 FOREST

Bharuch area is characterized by tropical dry deciduous forests. The total forest area of district is 1449.68 sq.km. That accounts for 0.73 % of the total geographical area of the district. **(Courtesy: Environmental Information Centre, New Delhi)**

3.8.3 FLORA

Some of the flora found in Bharuch area is listed below:

TABLE – 3.17

LIST OF FLORA

Sr. No.	Scientific Name	Common Name	Family
I	**Trees**		
1	Acacia aurriculifarmis	Bangali Babool	Mimoceae
2	A. leucopholia	Aniar	Mimoceae
3	A. catechu	Khair	Mimoceae
4	A. ferrungula	Pandhara Khair	Mimoceae
5	A. nilotica	Babul	Leguminoceae
6	A. lebbeck	Siris	Leguminoceae
7	A. procera	Siris	Leguminoceae
8	A. polycantha	Garad	Mimoceae
9	Adina cordifolia	Hed	Rubiaceae
10	Aegle marmelos	Bela	Rutaceae
11	Ailanthus excelsa	Maharukh	Simaroubaceae
12	Alangium salvifolium	Ankol	Alangiaceas
13	Albizia odoratissimus	Siris	Leguminoceae
14	Annogeissus latifolia	Dhavda	Combritaceae
15	Annona squamosa	Sitafal	Annonaceae
16	Azardirachta indica	Nim	Moraceae
17	Bahuania purpurea	Kachamar	Leguminosae
18	Bombax ceiba	Semal	Verbenaceae
19	Bridelia retusa	Asta (Kathmohli)	Leguminosae
20	B. squamosa	Asan	Leguminoceae
21	Buchanania lanzan	Charoli	Anacardiaceas
22	Butea monospesma	Palas	Leguminoceae
23	Callistemon lancealatus	Bottlebrush	Mytraceas
24	Casuarina equisetifoier	Sura	Casuarineae
25	Careya arborea	Kumbh	Mytraceae
26	Casearia elliptica	Manjo	Symydaceae
27	Caesearia graveoiens	Dedak manio	Samidacea
28	Cassia fistula	Sunari	Leguminoceae
29	Cestrum noctusnum	Ralkirani	Solana ceae
30	Cochiospermum religiosun	Ganeri	Cochlospermaceds
31	Cocas nicifera	Nariyal	Palmeae
32	Cordia dichotoma	Gundi	Boranginacea
33	Dalbergia paniculata	Dhobin	Leguminoceae
34	D. latifolia	Sisso	Leguminoceae
35	Murraya koenigii	Karlilimb	Rata ceae
36	Ixora parviflora	Kara	Rubiaceae
37	I. nigricans	Kukeri	Rubiaceae
38	Delonix elala	Gulmohar	Leguminoceae
39	Diosphyros melanoxylon	Tendu	Ebenaceae
40	Dolichandrone falcate	Mallar sing	Bignoniaceae
41	Elaeodendron roxburghii	Alinar	Ceiastracea
42	Eucalyptus globules	Safeda	Eucalyptaceae

43	Emblica officinalis	Aonla	Euphobiaceae
44	Erithina uliginosa	Pungara	Leguminoceae
45	Eramphis uliginosa	Almi	Rubiaceas
46	Ficus. Religiosa	Pipal	Moraceae
47	F. rumphii	Pilari	Moraceae
48	F. benghalensis	Bara	Moraceae
49	Flacourtia indica	Rankdi	Bixaceae
50	Garua pinnata	Kakad	Burseraceae
51	Griwia teliaefolia	Dhaman	Tiliaceae
52	Haidwickia bipinnata	Aniar	Caesalpiniacea
53	Holoptelia intigrifolia	Valva	Uticaceae
54	Kydia calycina	Bhindi	Malvaceae
55	Lagerstroemia lanceolata	Nano	Leguminoceae
56	L. parviflora	Sidha	Leguminoceae
57	Michellia champaca	Champa	Bignoneaceae
58	Lannea caromadalica	Modad	Anacardiaceae
59	Madhuca indica	Mahua	Sapotaceae
60	Mangifera indica	Amm	Anacardiaceae
61	Miliusa tomentosa	Gulambh	Annonacea
62	Milligntonia hortensis	Indian Coral Tree	Bignoniaceae
63	Mitragyna parvifolia	Kalam	Rubiaceae
64	Michelia Champaca	Champa	Magnoliaceae
65	Moringa oliefera	Shevga	Moringaceae
66	Musa paradisiacea	Kela	Musaceae
67	Oroxyium indicum	Tetu	Bignoniaceae
68	Phoenix sylvestris	Shindi	Palminae
69	Prosopis juliflora	Babul	Mimoceae
70	P. cinerarea	Babul	Mimoceae
71	Pithecelobium ducle	Chisbalai	Leguminoceae
72	Pongamia pinnata	Karanja	Leguminoceae
73	Pisidium guajava	Guava	Mutraceae
74	Pterocarpus marsupium	Bija	Leguminoceae
75	Punica grantalum	Anar	Pomegrannatae
76	Sapindus emerginatus	Aritha	Sapindaceae
77	Soymida febrifuga	Rohan	Meliaceae
78	Poleathia langifolia	Ashok	Apoctnaceae
79	Saraca indica	Ashok	Apoctnaceae
80	Thevetia neirifolia	Pilakanton	Apoctnaceae
81	Sterculia urens	Kodaya	Sterculiaceae
82	Syzygium cuminii	Jamun	Myrtaceae
83	Terminalia crenulata	Sadad	Leguminoceae
84	T. bellirica	Behada	Combretaceae
85	T. arjuna	Arjun	Combretaceae
86	T. caltapa	Jangli badam	Combretaceae
87	Tamarindus indica	Tentuli	Leguminoceae
88	Tecoma stans	Nellow bell	Bisgnonia ceae
89	Tectona grandis	Sag	Verbanaceae
90	Trema orientalis	Gol	Ulmaceae
91	Wrightia tinctoria	Kudo	Apocynacea
92	Zizyphus xylocarpus	Ghatbor	Rhamnaceae
93	Z. mauritiana	Bordi	Rhamnaceae
	Shrubs		
1	ARGEMONE MEXICANA	Darudi	Papaveraceae
2	CARANTHUS RESUS	Sudufuli	Apocyanaceae

3	C. CALATROPIS	Mundar	Asclepiadaceae
4	CALATOPIS GIGANTEAN	Rui	Asclepiadaceae
5	CARRISSA CARANDAS	Karvand	Apocyaninnae
6	CLERODENDRUM MULTYFOLIUM	Multaiforum	Verbenaeae
7	GYMNOSPORIA SPINOSA	Spinosa Rekii	Leguminoceae
8	LANTANA CAMERA	Ghaneri	Verbanaceae
9	OPUNTIA DILLENII	Nivdang	Cactacealea
10	EUPHORBIA NERIFOLIA	Wavding	Celastraceae
11	OCIUM GRATISSIUM	Rantulro	Labiateae
12	HELICTERIES ISORA	Atai	Sterculiaceae
13	FICUS HISPIDA	Tet umaro	Moraceae
14	DATURA FASTUASA	Dhotara	Solanaceae
15	VITEX NEGUNDO	Nirgudi	Verbaceae
16	CASSIA TORA	Tarota	Leguminoceae
17	ZIZYPHUS NUMMULARIA	Beri	Rhannaceae
18	EUPHORBIA TIRUCOLLI	Thor	Euphorbiaceae
	Bamboos		
1	DENDROCALAMUS STRICTUS	Manvel	Grammineae
2	ABRUS PRECATORIUS	Gunj	Leguminoceae
3	CAPPARIS SEPIRARIA	Lamtjar	Cappariaceae
4	COCCULUS HIRRUTUS	Asanwel	Menispermaceae
5	COMBRETUM OVALIFOLIUM	Jal	Combratae
6	CAYRATIA CARNOSA	Khatumbo	Vitaceae
	Grasses		
1	ANDROPOGON PUMILUS	Kusal	Gramineae
2	CENCHRUS SETGERUS	Dhramnu	Gramineae
3	CYNODON DACTYLON	Durva	Gramineae
4	CYMBOPOGEN MARINIL	Rosha	Gramineae
5	HETEROPOGON CONTORTUS	Gawat	Gramineae
6	SORGHUM HALEPENSE	Baru	Gramineae
7	THEMEDA TRIANDRA	Bhathdu	Gramineae
	Crops		
1	RICINUS COMMUNIS	Arand	Euphorbiaceae
2	SACCHARUM OFFICINARUM	Ganna	Gramineae
3	SORGHUM VULGAE	Jowar	Gramineae
4	ZEA MAYS	Makea	Gramineae
5	ARACHIS HYPOGAEA	Ground nut	Logumin
6	ORYZA SATIVA	Chawar	Gramineae
	Macrophytes		
1	EICHHORNIA CRASSIPES	Jalkumbhi	Pontederiace
2	IPOMEA AQUALICA	Kalmisay	Volvulaceae
3	TRAPA LATIFOLIA	Water chestnual	Volvulaceae
4	NELUMBO NUCIFERA	Lotus	Nymphaceae
5	AZOLLA PINNATA	Common duckweed	Lemnaceae

Source: Vegetation survey and data from State Forest Dept., Bharuch, Gujarat

3.8.4 FAUNA

TABLE – 3.18

LIST OF FAUNA

Sr. No.	Scientific Name	Common Name	Family
1	Acridothers tristis	Common myna	Sturnidae
2	A. ginginianus	Bank myna	Sturnidae
3	Athene brama	Spotted owlet	Striginae
4	Aegithina tiphia	Common Lora	Lrenidae
5	Ardeola grayee	Pond Heron	Ardeidae
6	Amaurornis phoenicurus	Whitebrested Waterhen	Phasinidae
7	Babulcus ibis	Cattle Egret	Ardeidae
8	Centropus cinensis	Crow-phesant	Cuculidae
9	Columba livia	Blue Rock Pigeon	Columidae
10	Corvus splendens	House Crow	Carvidae
11	Coracious benghalensis	Indian Roller	Coracidae
12	Dicrurus adsimilis	Black Drongo	Dieruridae
13	Dinophum benghalense	Goldenbacked Woodpecker	Picidae
14	Eudynamys scolopacea	Koel	Cuculidae
15	Fracolinus francollinus	Black partiridge	Pharianidae
16	Halcyon rustica	Whitebrested Kingfisher	Aicenidae
17	Hirundo rustica	Common swallow	Hirundinidae
18	Lanius exubitor	Grey Shrike	Daniidae
19	Launchura malabarica	Whitethroated munia	Estrildinae
20	Megalaima rubricapilla	Smallgreen barbet	Capilonidae
21	M. malabarica	Crimsonbrestwd Barbet	Capilonidae
22	Merops orientalis	Littlegreen Bea-eater	Miropidae
23	Milvus migrans	Patih Kite	Accipitridae
24	Motacilla maderatensis	Large pied wagtail	Motacillidae
25	Nactarinia asiatica	Purplerumpled sunbird	Nectarinidae
26	Nectarinia minima	Small sunbird	Nectarinidae
27	Oriolus oriolus	Golden Oriole	Oriolidae
28	Orthotomus sutorius	Tailor Bird	Pachycephaline
29	Passer domesticus	House Sparrow	Passerinae
30	Psittacula cyanocephala	Blossamheaded parakeet	Psittacidae
31	Pycnonotus caffer	Redvented bulbul	Pycnonotidae
32	Ploceus philipinensis	Weaver bird	Plocidae
33	Sexicoloides fulicate	Indian Robin	Corvidae
34	Sopsychus saularis	Magpie Robin	Corvidae
35	Streptopelia chinensis	Spotted dove	Columbidae
36	S. senegalensis	Little brown dove	Columbidae
37	Sternus pagodramus	Brahiminy myna	Sternidae
38	Turdoides caudatus	Common Babbler	Muscicapidae
39	Upupa epops	Hoopoe	Upupidae
40	Vanellus indicus	Redwattled Lapwing	Jacanidae
41	Metopidius indicus	Brongewinged jacana	Jacanidae
42	Ardea alba	Large egrd	Ardeidae
43	A. cinerea	Grey Heron	Ardeidae
44	Falica atra	Coot	Rallidae
45	Phalacrocorax niger	Little cormorant	Phalacrocoracidae
46	MUNTIACUS MUNTJAK	Barking deer	Bovidae

47	FALIS CHAUS	Jungle cat	Falidae
48	MYAENA HYAENA	The striped hyana	Canidae
49	PRESBYTIS ENTELLUS	Hanuman langur	colobinae

Source: Survey of Avifauna under the study area.

3.9 SOCIO - ECONOMIC ENVIRONMENT

An assessment of socio - economic environment forms an integral part of an EIA study. Therefore, baseline information for the same was collected during the study period. The baseline socio - economic data collected for the study region, before the proposed expansion is operational, has been identified for the four major indicators viz. demography, civic amenities, economy and social culture. The baseline status of the above indicators is compiled in forthcoming sections.

3.9.1 SETTLEMENTS AND DEMOGRAPHIC PATTERN

3.9.1.1 METHOD OF DATA PREPARATION

The land use/land cover has been presented in the form of a map prepared by using the IRS-P 6 LISS-III, procured from the National Remote Sensing Agency (NRSA), Hyderabad. The satellite data has been processed using ERDAS Imagine software supported with ground checks and ground truth verification wherever required. Area and distance calculations have been carried out using GIS software after geo-referencing the interpreted data with the help of SoI topographical maps of 1:50,000 scale.

3.9.1.2 DEMOGRAPHIC DATA WITHIN THE REGION OF INTEREST

Table 3.19 provides the data on inhabitations falling within 10 km distance from the project site.

On an average, Taluka: Vagra has population density of about 94 persons per sq. km. (2001 Census data), 114 persons per sq. km. (2011 Census data), compared to the Bharuch District, which has a population density of about 210 persons per sq. km. (2001 Census data), 238 persons per sq. km. (2011 Census data). Population density within 10 km radius of the site is only 103 persons per sq. km. (2011 Census data), while population density within 5 km radius of site is 324 persons per sq. km. (2011 Census data). The population details (i.e. population distribution and population density) of the Taluka Vagra, District Bharuch and

the study area within 10 km radius and 5 km radius are given in Table 3.20. And their graphical representations are shown in Figure 3.10.

TABLE – 3.19

DEMOGRAPHIC DATA

Sr. No.	Village Name	CD Block Name	No. of Household	Total Population	Total Male	Total Female	Population <06 years	Male<06 years	Female<06 years
1	Ambheta	Vagra	347	1552	807	745	167	89	78
2	Dahej	Vagra	3426	13495	8345	5150	1604	840	764
3	Galenda	Vagra	120	611	314	297	70	46	24
4	Jageshwar	Vagra	383	1571	818	753	155	80	75
5	Jolva	Vagra	338	1442	807	635	210	105	105
6	Kadodara	Vagra	420	1995	1018	977	233	113	120
7	Lakhigam	Vagra	1217	4938	3144	1794	566	296	270
8	Luvara	Vagra	385	1663	873	790	202	112	90
9	Rahiad	Vagra	355	1694	862	832	252	132	120
10	Suva	Vagra	413	1920	973	947	238	126	112
11	Vadadla	Vagra	201	822	419	403	105	54	51
12	Vav	Vagra	155	727	378	349	75	44	31

TABLE – 3.19 (CONTD.)

DEMOGRAPHIC DATA

Sr. No.	Village Name	CD Block name	Population Schedule caste	Male Schedule caste	Female Schedule caste	Population Schedule tribe	Male Schedule tribe	Female Schedule tribe
1	Ambheta	Vagra	67	37	30	261	137	124
2	Dahej	Vagra	542	279	263	2090	1097	993
3	Galenda	Vagra	05	03	02	91	47	44
4	Jageshwar	Vagra	18	08	10	146	73	73
5	Jolva	Vagra	239	137	102	199	98	101
6	Kadodara	Vagra	48	23	25	511	258	253
7	Lakhigam	Vagra	87	52	35	584	308	276
8	Luvara	Vagra	109	56	53	963	488	475
9	Rahiad	Vagra	105	51	54	104	51	53
10	Suva	Vagra	63	28	35	354	193	161
11	Vadadla	Vagra	76	37	39	341	166	175
12	Vav	Vagra	28	15	13	163	90	73

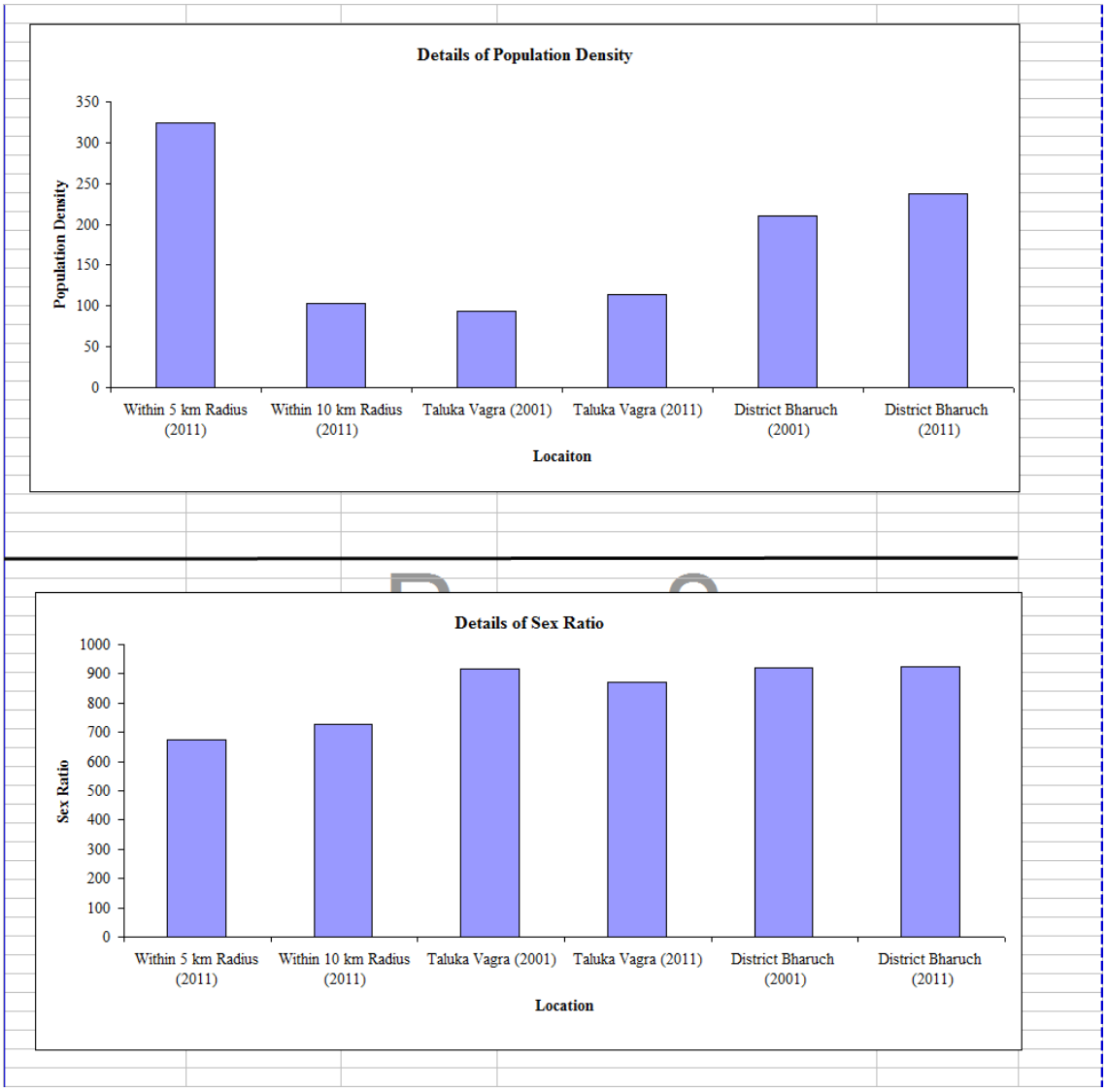
TABLE – 3.20

POPULATION DENSITY

Name	Population (Persons)	Population Density (Person / sq. km.)	Sex ratio (No. of females per 1000 males)
Within 5 km Radius (2011)	25483	324	675
Within 10 km Radius (2011)	32430	103	728
Taluka Vagra (2001)	82569	94	916
Taluka Vagra (2011)	100044	114	870
District Bharuch (2001)	1370104	210	920
District Bharuch (2011)	1551019	238	925

FIGURE-3.10

POPULATION DENSITY & SEX RATIO



3.9.1.3 LITERACY RATE

The literacy rate is a major factor, which influences the socio-cultural condition of a particular place. Details of literacy rate in District Bharuch, Taluka Vagra and within 10 km radius and 5 km radius of project site are given in Table 3.21 while their graphical representation is shown in Figure 3.11. It is observed that the literacy rate in Bharuch District as per 2001 Census data is 72.09 as percentage of literate population to the total population, with 83.43 % among male and 65.42% among female. Literacy rate in Bharuch District, as per 2011 Census data is 72.09%, with 77.32% among male and 66.44% among female. Literacy rate in Taluka Vagra as per 2001 Census data is 73.41% with 84.24% among males and 61.48% among females. Literacy rate in District Bharuch as per 2011 Census data is 70.47% with 77.56% among males and 62.32% among females.

Within 10 km radius of the study area, the literacy rate is observed 75.83% having 81.55% among males and 67.35 % among females, whereas literacy rate within 5 km radius of study area is 75.44 % having 81.28 % among males and 67.42 % among females.

TABLE 3.21

LITERACY RATE

Name	Male Literacy (%)	Female Literacy (%)	Total Literacy (%)
Within 5 km Radius	81.55	67.35	75.83
Within 10 km Radius	81.28	67.42	75.44
Taluka Vagra (2001)	84.24	61.48	73.41
Taluka Vagra (2011)	77.56	62.32	70.47
District Bharuch (2001)	83.43	65.42	74.79
District Bharuch (2011)	77.32	66.44	72.09

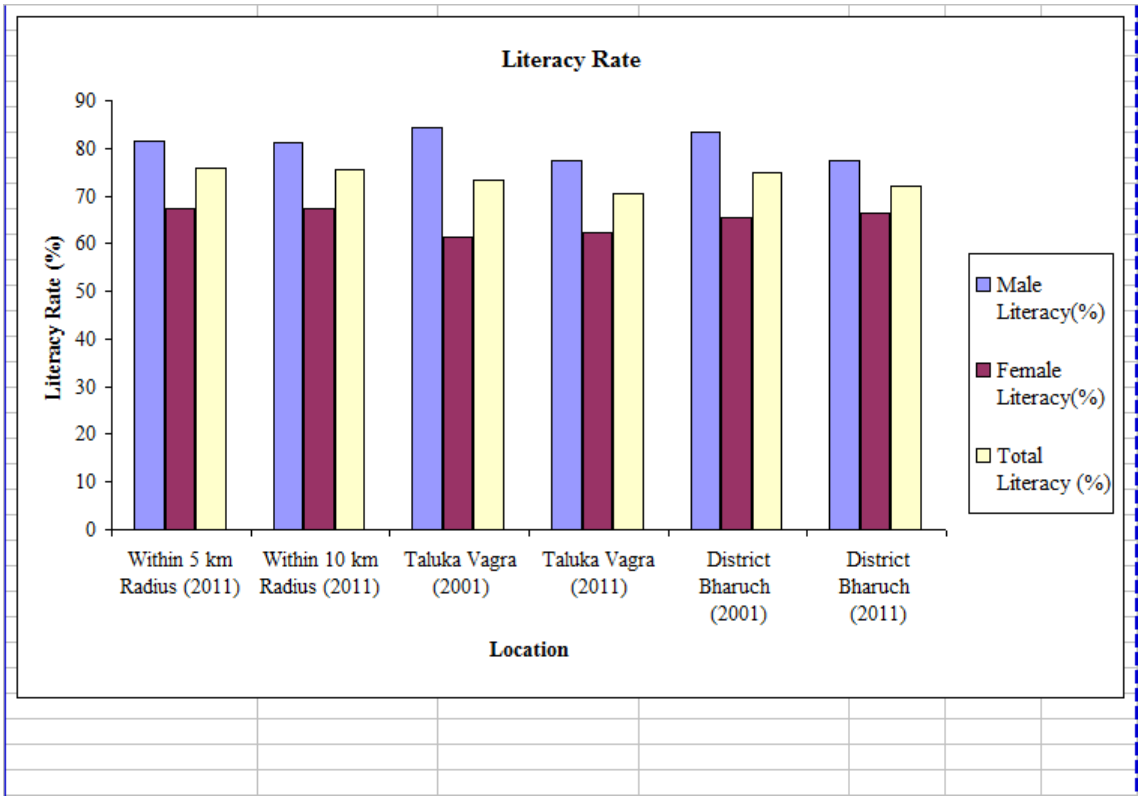
TABLE 3.21 (CONTD.)

LITERACY RATE

Sr. No.	Village Name	CD Block name	Population Literate	Male Literate	Female Literate	Population Illiterate	Male Illiterate	Female Illeterate
1	Ambheta	Vagra	1214	677	537	338	130	208
2	Dahej	Vagra	9970	6704	3266	3525	1641	1884
3	Galenda	Vagra	462	243	219	149	71	78
4	Jageshwar	Vagra	1300	683	617	271	135	136
5	Jolva	Vagra	1075	661	414	367	146	221
6	Kadodara	Vagra	1369	801	568	626	217	409
7	Lakhigam	Vagra	3966	2679	1287	972	465	507
8	Luvara	Vagra	1197	672	525	466	201	265
9	Rahiad	Vagra	1310	690	620	384	172	212
10	Suva	Vagra	1427	783	644	493	190	303
11	Vadadla	Vagra	602	331	271	220	88	132
12	Vav	Vagra	575	324	251	152	54	98

FIGURE-3.11

LITERACY DATA



3.9.2 VEGETATION COVER AND FOREST BOUNDARIES

3.9.2.1 METHOD OF PREPARATION

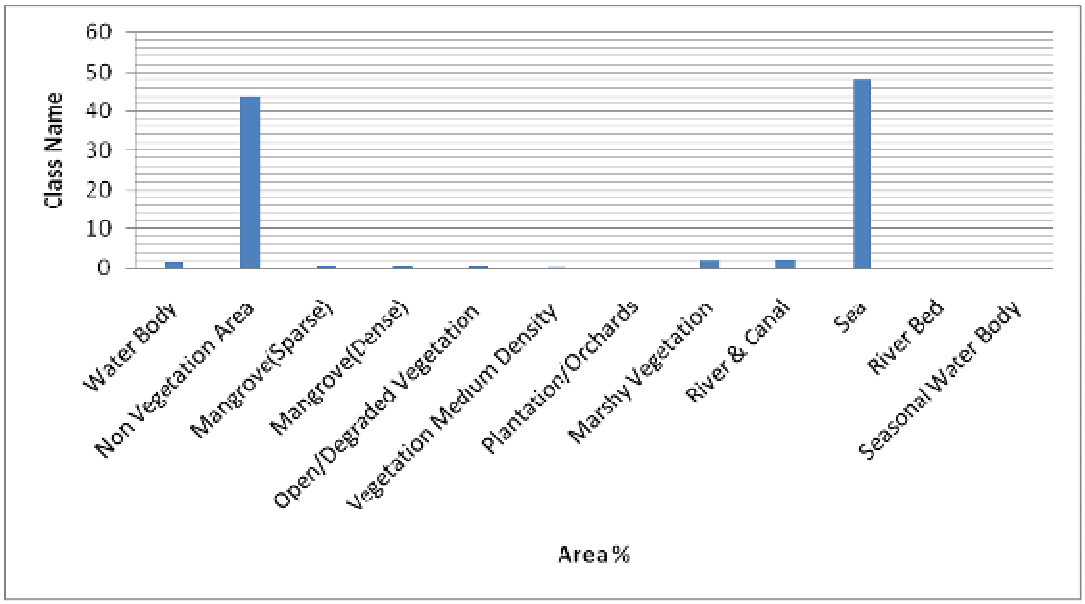
The vegetation cover for the area of interest has been prepared by extracting the areas under fou-ID LISS III data for the past two years for the State of Gujarat. There is no Reserved Forests and Protected Forests within the 25 km radius area from project site. The project site and area of interest have been added for ease of spatial reference.

The vegetation classification criterion used for this study area is given as follows:
The forest cover is classified based on Forest Survey of India into Dense (> 40% crown density r different vegetation classification provided by the Forest Survey of India (FSI) based on IRS), open (between 10 to 40 % crown density) and Scrubs (shrubby bush of less than 10 % crown density). The vegetation classification criterion used for this study area is given as follows:

Dense Vegetation is the lands with forest cover with canopy density of equal or more than 40 percent.
Medium Vegetation is the land with forest cover with canopy density of 10 to 40 percent.
Open Vegetation is the land with forest cover with canopy density less than 10 percent.
Scrubs are the lands generally in and around forest areas, having bushes and/or poor tree growth chiefly of small or stunted trees with a canopy density less than 10 percent.

3.9.2.2 AREA UNDER DIFFERENT VEGETATION CLASSIFICATION

Area Statistics Forest Map				
Sr.No.	**Class Names**	**Area (In Hectares)**	**Area (In Sq.Km.)**	**Area %**
1	Water Body	3054.94	30.55	1.56
2	Non Vegetation Area	86509.19	865.09	44.13
3	Mangrove(Sparse)	1095.81	10.96	0.56
4	Mangrove(Dense)	1468.63	14.69	0.75
5	Open/Degraded Vegetation	1284.38	12.84	0.66
6	Vegetation Medium Density	648.63	6.49	0.33
7	Plantation/Orchards	169.31	1.69	0.09
8	Marshy Vegetation	3495.94	34.96	1.78
9	River & Canal	4143.19	41.43	2.11
10	Sea	93914.75	939.15	47.91
11	River Bed	157.50	1.58	0.08
12	Seasonal Water Body	99.31	0.99	0.05
	Total	**196041.56**	**1960.42**	**100.00**



3.9.2.3 MAP OF VEGETATION CLASSIFICATION AND FOREST BOUNDARIES

A digital map comprising layers of vegetation classification, forest boundaries and town and village locations to facilitate reference is attached as Figure – 3.12.

FIGURE – 3.12

VEGETATION CLASSIFICATION AND FOREST BOUNDARIES

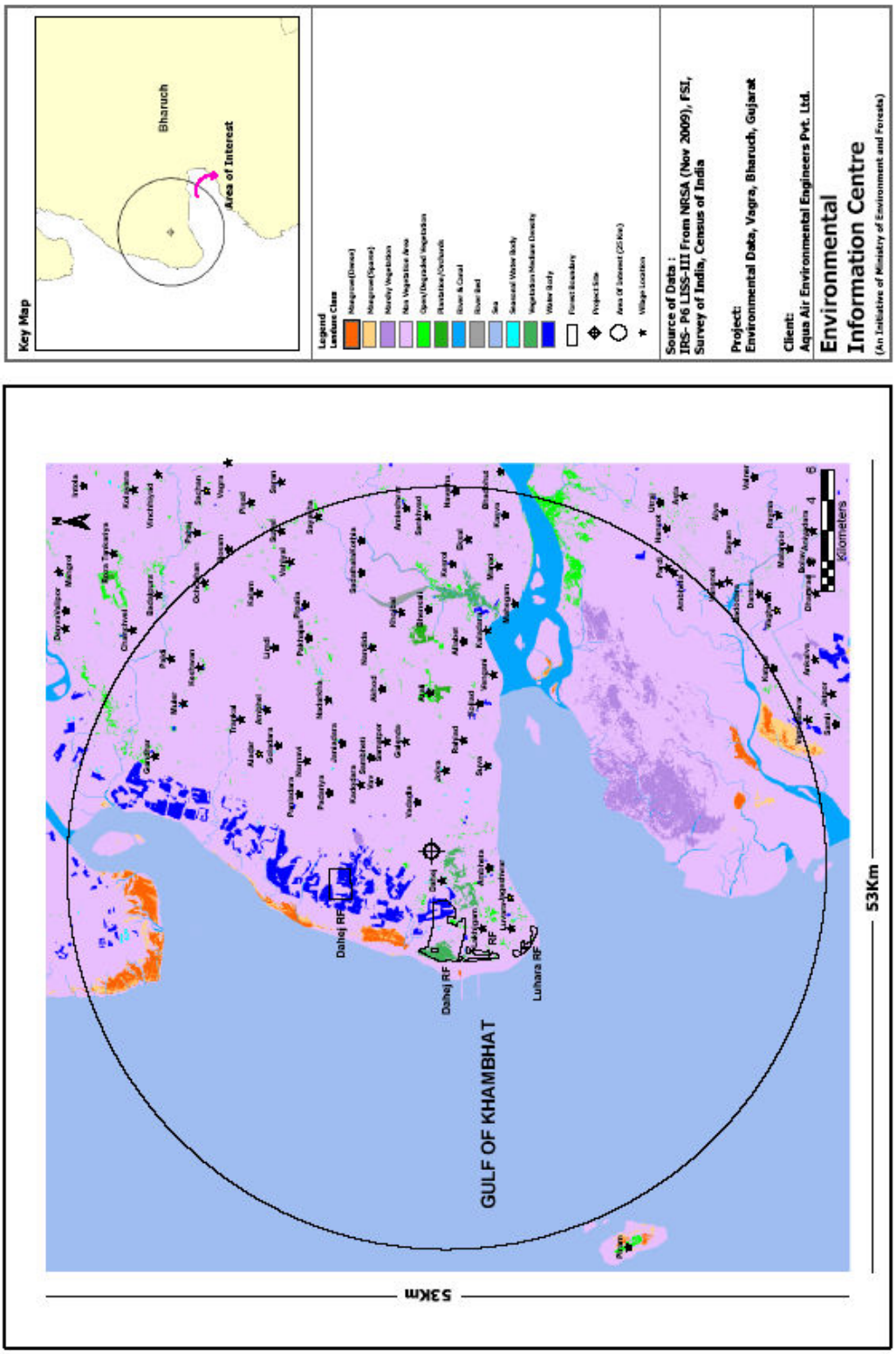


FIGURE-3.12 FOREST MAP

3.9.3 OCCUPATIONAL STRUCTURE

In economic development of the region its geographical location, natural resources, business and employment, industries and manpower play vital role. Table 3.22 provides the occupational patterns in all villages falling within the area of interest.

TABLE 3.22

OCCUPATIONAL STRUCTURE

Sr. No.	Village Name	CD Block name	Total Work Population	Mainworker Population	Main Cultivator Population	Main Agriculture Population	Main Household Population	Main Other Population	Marginal Worker Population	Non Worker Population
1	Ambheta	Vagra	482	234	06	00	53	175	248	1070
2	Dahej	Vagra	5163	4476	113	14	12	4337	687	8332
3	Galenda	Vagra	177	142	69	31	00	42	35	434
4	Jageshwar	Vagra	479	465	03	05	00	457	14	1092
5	Jolva	Vagra	569	489	48	60	02	379	80	873
6	Kadodara	Vagra	887	579	225	107	06	241	308	1108
7	Lakhigam	Vagra	2309	2177	49	22	13	2093	132	2629
8	Luvara	Vagra	655	637	10	26	01	600	18	1008
9	Rahiad	Vagra	519	391	125	22	10	234	128	1175
10	Suva	Vagra	523	303	38	10	01	254	220	1397
11	Vadadla	Vagra	337	303	27	76	02	198	34	485
12	Vav	Vagra	257	238	126	23	00	89	19	470

3.9.4 AMENITIES

Infrastructure resource base of the surveyed villages with reference to education, medical, water resources, post and telegraph, communication, power supply is presented in Table 4.8.There are 16 villages within study area of 10 km radius of plant site. Significant observations with respect to availability of amenities in study area are as follows.

All of the villages have primary schools, 3 villages have both primary and secondary education schools. 14 villages have adult education facility. 4 villages have other education institution. 13 villages in the impact zone have community health workers,3 villages have primary health sub centre, 12 villages have registered private practitioners while 3 villages have family planning center, 1 village have primary health center. In the study area drinking water facilities are good as well water is available almost in all the villages, 4 villages have

tap water, 1 village have hand pumps, 1 villages have river water. Tank water is available in 15 villages.

Post office facility is available in 9 villages while 1 village has post and telegraph facility. Telephone facility is available in 1 village. Almost all villages are well connected through a network of Pucca road and Kachcha approach road. Bus is the main mode of transportation and is available in all villages. All the villages get electricity for all purpose i.e. domestic, agriculture and industrial.

TABLE 3.23

DETAILS OF AMMENITIES AVAILABLE IN STUDY AREA

Taluka	Village	Educational	Medical	Drinking Water	Post & Telegraph	Communication	Approach to Village	Nearest Town	Power Supply
Vagra	Galenda	P(2),Ac,O	RP,CHW	T,W,TK	PO	BS	PR,KR	Bharuch	EA
	Samatpor	P(2),Ac	RP,CHW	W,TK	-(-5 Kms)	BS	PR,KR	Bharuch	EA
	Vav	P(2),Ac	RP,CHW	T,W,TK,HP	-(-5 Kms)	BS,RS	PR,KR	Bharuch	EA
	Jolva	P(2),Ac,O	PHS,FPC,RP,CHW	W,TK	-(-5 Kms)	BS,NW	PR,KR	Bharuch	EA
	Vadadla	P(2),Ac	CHW	W,TK	PO	BS	PR,KR	Bharuch	EA
	Dahej	P(4),H,Ac(4),O	PHC,D,FPC,RP,CHW	T,W,TK	PTO, Phone	BS,RS,NW	PR,KR	Bharuch	EA
	Lakhigam	P(2)	PHS,RP,CHW	W,TK	po	BS,NW	PR,KR	Bharuch	EA
	Luvara	P(2),Ac	RP,CHW	W,TK	-(-5 Kms)	BS,NW	PR,KR,NR	Bharuch	EA
	Jageshwar	P(2),Ac,H	RP,CHW	W,TK	PO	BS,NW	PR,KR,NR	Bharuch	EA
	Ambheta	P(2),Ac	CHW	T,W,TK	PO	BS,NW	KR,NR	Bharuch	EA
	Suva	P(2),Ac	-(5-10 Kms)	W,TK,R	-(-5 Kms)	BS,NW	PR,KR,NR	Bharuch	EA
	Rahiad	P(2),Ac(2),O	RP,CHW	W,TK	PO	BS,NW	PR,KR.NR	Bharuch	EA
	Harinagar			Un inhabited					
	Padariya	P(2),Ac	RP,CHW	W,TK	PO	BS	PR,KR	Amod	EA
	Kadodara	P(2),Ac(2),H	PHS,FPC, RP,CHW	W,TK	PO	BS	PR,KR	Bharuch	EA
	Sambheti	P(2),Ac	-(10+Kms)	W,TK	PO	BS,RS	PR,KR	Bharuch	EA

ABBREVIATIONS

1. Education

P-Primary Elementary School

H-Matriculation or Secondary

O-Other Educational Institution

PUC-Higher Secondary/Intermediate/pre-University/junior Collage

Ac- Adult Literacy Class

Tr-Training School

2. Medical Facilities

RP-Registered Private Practitioner

PHS-Primary Health Sub-Centre

FPC-Family Planning Centre

PHC-Primary Health Centre

D- Dispensary

CHW - Community Health Worker/Health Worker

H - Hospital

NH - Nursing Home

MH - Maternity Home

PHC - Public Health Centre

CWC - Child Welfare Centre

TB - T.B Clinic

O – Others

3. Drinking Water

T-Tap Water

HP-Hand Pump

TK-Tank Water

W-Well Water

R-River Water

C-Canal

N - Nallah

S – Spring

TW- Tube well Water

4. Post & Telegraph

PO-Post Office

PTO-Post & Telegraph

Phone-Telephone Communication

5. Communication

BS-Bus Station

NW-Navigable Waterway

6. Approaches to Village

PR-Pucca Road

KR-Kuchcha Road

7. Power Supply

EA-Electricity for all purposes

EAG - Electricity for Agriculture

ED - Electricity for domestic

EO - Electricity for other purpose like Industrial, Commercial etc.

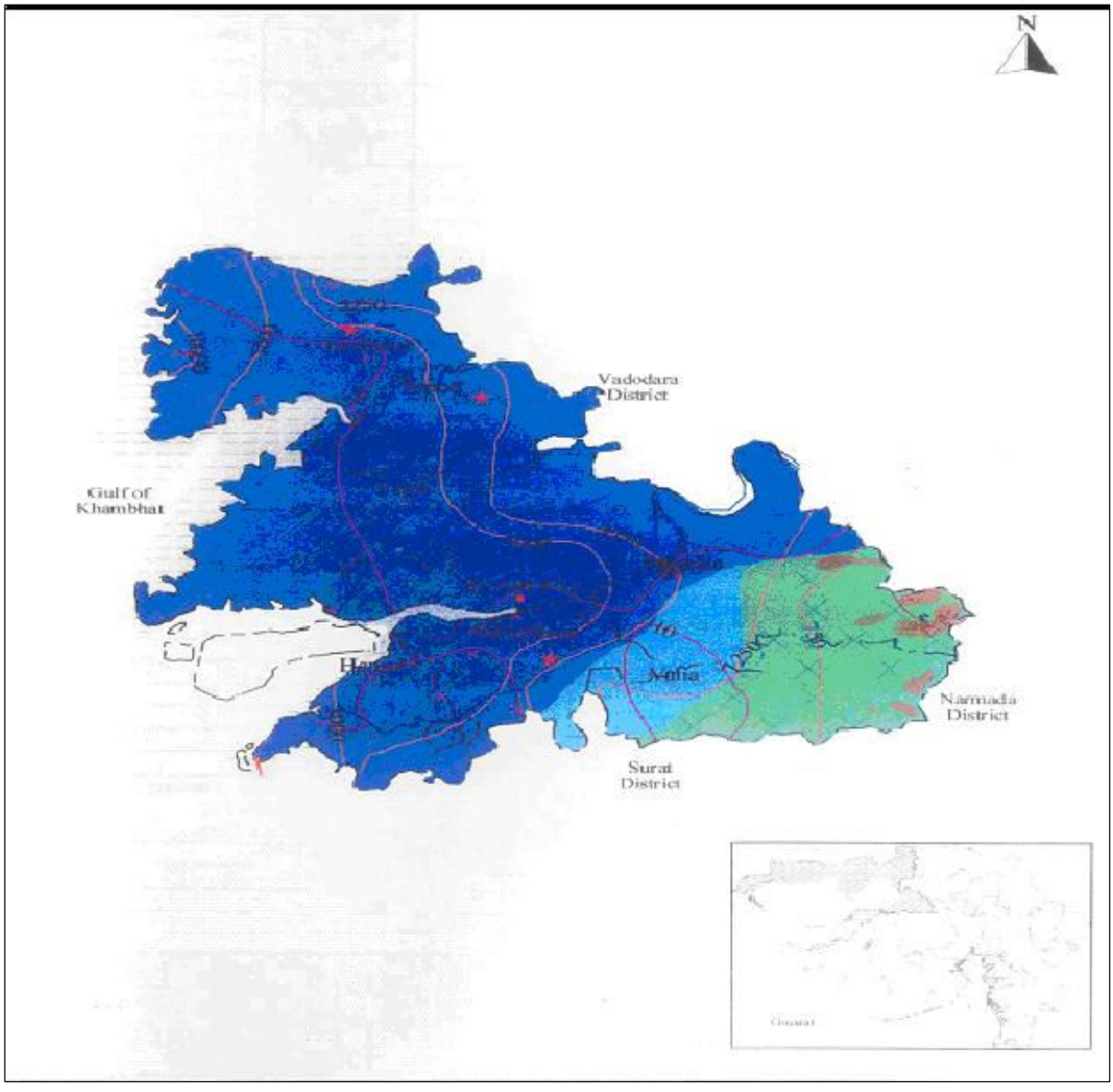
3.10 GROUND WATER HYDROLOGY

Introduction

The district is mainly grounded with alluvial rock formation. The tube well has been constructed significantly in the depth of 65 to 230m. The state ground water Level ranges from 2 to 35m bgl (below ground level). The tube well discharge ranges from 325 to 3400 litters per minute for duration ranges of 3 to 14 meters.

District: Bharuch

GROUND WATER MAP



Legend

	Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Artificial Recharge Structure Suitable
Soft Rock Aquifer	Dug Well	Manual	10-25	200-300	Percolation Tanks/ Ponds, Recharge Wells,
	Tubewell	Direct Rotary, Reverse Rotary	50-100	400-60	
Soft Rock Aquifer	Dug Well	Manual	15- 30	200-300	Percolation Tanks/ Ponds, Recharge Wells, Recharge Shaft
	Tubewell	Direct Rotary Reverse Rotary	100-200	600-1200	
Hard Rock Aquifer	Dug Well	Manual	10-25	60-150	Percolation Tanks/ Ponds, Recharge Wells, Check Dams, Nalla Bunds.
	Borewell	Down the Hole Hammer (DTH)	100-200	100-300	
Hilly Areas	Not Suitable				Check Dam, Nalla Bund, Gully Plug
Saline Area	Not Suitable except localised fresh water pockets				
20	Pre-monsoon Decadal mean (1993-2000) Depth to Water Level (mbgl)		2000	Electrical Conductivity (µS/cm at 25° C)	
×	Fluoride > Maximum Permissible Limit (1.5 mg/l)		△	Nitrate > Maximum Permissible Limit (100 mg/l)	
★	Over Exploited Taluka				
	Drainage		■/□	District/Taluka HQ	

Other Information

Geographical Area	5,125 sq. km
No of Blocks/ Talukas	8
Population (2001 Census)	13,70,104
Average Annual Rainfall	1000 mm
Range of Average Temperature	21-35 °C
Major Drainage System	Narmada
Major/ Medium Irrigation Scheme	Ukai Right Bank, Karjan
Major Geological Formation	Soft Rock: Alluvium, Tertiary Hard Rock: Deccan Trap
Utilizable Ground Water Resources	238 MCM/Yr
Net Ground Water Draft	190 MCM/Yr
Stage of Ground Water Development	80 %
Blocks Showing Intensive Ground Water Development	Amod, Ankleswar, Jambusar

Geology: Geologically the major part of the state is covered by hard rock comprising of gneisses, schists, phyllites, sand stone and basalt. Remaining area in the north and central is occupied by the soft rock including coastal alluvium. District Bharuch is mainly occupied by the soft rocks like alluvium, tertiary in the north but as we move to the south the district is covered with hard rocks and few hilly areas.

Hydrology: Hydrologically the areas have soft rock aquifers with dug wells at the depth of 10 to 25m, and tube wells at the depth of 50 to 100m. The level of ground water productivity of this type of rocks are mapped by violet colour, the difference in the discharge is shown through the difference in the intensity of the colour (light colour discharge-ipm) 200 to 300 in dug wells and 400 to 60 ipm in the tube well, and dark shade shows the discharge to 200 to 300 ipm in dug wells and 600 to 1200 ipm in tube wells.

The hard rock aquifers dug well are found at the depth of 10 to 25m and bore well at the depth of 100 to 200m. The areas with extensive hard rock aquifers where pores space of rocks have secondary permeability are called 'fractured permeability'. The intensity can be measured through the darkness in the colour, that is green which is used to map the hard rock aquifers, the discharge varies from 60 to 150 ipm in dug wells areas, 100 to 300 ipm in bore wells.

Groundwater Utilization (Critical Blocks)

Based on state of groundwater development, the various blocks/talukas in a district are categorised as over-exploited, critical, semi critical & safe categories. In case, where annual groundwater withdrawals are more than 100% of the annual recharge availability, it is categorised as over-exploited, meaning that all the annually replenishable groundwater is already being used up. In cases of talukas, where the annual withdrawals are in the ranges of 90% to 100%, in relative to the annual available groundwater recharge, they are categorised as critical blocks. The talukas/blocks, in which the range is 70 % to 90%, are categorised as semi critical. The safe category of talukas/blocks has stage of groundwater development below 70% in relative to annual recharge availability.

Accordingly the various talukas in the district, coming under the project area are categorised as follows:

District	Semi- critical	Critical	Over- exploited
Bharuch	Amod	-	-
	Jhagadia	-	-

Groundwater Resource Availability, Utilization in Bharuch:

1 Annual Rainfall: There are two main types

For Monsoon season

a	recharge from rainfall	20380 mm
b	recharge from other resource	1994 mm

For non-monsoon season

a	recharge from rainfall	0
b	recharge from other resource	5504 mm

2 Total recharge: in Bharuch district the total recharge is 27878 mm

3 Net Annual Ground water Availability: 26484 mm

4 Annual ground water Draft: there are two types

a	Irrigation	13349 mm
b	domestic and industrial uses	1835 mm
c	total annual ground water draft	15184 mm

5 Projected demand for Domestic and industrial uses up to 2025: 2729 mm

6 Stage of Ground water development in percentage: 57%

Decadal Water Level Data of Bharuch District of Gujarat:

District	Location	Decadal Mean Water Level (1993-2002)	DTW Nov-03	Decadal Fluctuation
Bharuch	Amayar	3.234	2.71	0.524
	Arethi	6.126	4.18	1.946
	Bhadkdra	6.128	6.25	-0.122
	Bharuch	6.664	6.87	-0.206
	Bhensli	4.985	3.35	1.635
	Chikada	2.734	3.17	-0.432
	Dahegam	9.709	6.88	2.829
	Dediapada	5.888	4.6	1.288
	Garudeshwar	11.478	7.1	4.378
	Hirapura	4.86	8.1	-3.24
	Llav	3.836	2.26	1.576
	Jambusar	5.289	8.64	-3.351
	Jambusar	8.048	2.35	5.698
	Jesajpur	7.992	6.03	1.962

	Jetpur	3.04	3.6	-0.56
	Juna Borbhata	6.325	5.55	0.775
	Kanbi Pitha	2.121	1.04	1.081
	Kaswa	7.237	3.97	3.267
	Kavachiya	4.253	3.36	0.893
	Kavi	11.505	11.57	-0.065
	Khota Amba	1.042	2.12	-1.078
	Luhara	6.192	4.66	1.532
	Mahegam	8.791	6.75	2.041
	Modoliya	5.894	3.93	1.964
	Mokhdi	5.889	6.2	-0.311
	Motwan	2.074	2.47	-0.396
	Nani Singlot	7.271	7.75	-0.479
	Navetha	8.96	7.75	1.21
	Nirnavi	7.454	8.5	-1.046
	Panoli	3.087	1.85	1.237
	Rasela	11.548	10.4	1.148
	Raymal	3.843	1.45	2.393
	Ringani	3.026	2.42	0.606
	Roja Tankaria	10.439	12.05	-1.611
	Sajod	3.536	1.2	2.336
	Sarod	15.561	16.3	-0.739
	Selemba	6.507	7.27	-0.763
	Simodra	5.599	3.88	1.719
	Tankari	2.852	2.18	0.672
	Utraj	3.054	4.27	-1.216

3.11 DRAINAGE PATTERN

METHOD OF DATA PREPARATION

The drainage pattern has been captured from the satellite images and updated with the help of various secondary data sources available. The study area of 10 km radius around the Project Site is in the West and East of the Dahej Reserve Forest as well as that of Luvara Reserve Forest which is in the South-West direction, within Taluka Vagra of District Bharuch in Gujarat. The area is well drained by River Narmada, flowing in south direction of the study area.

3.12 DIGITAL TERRAIN MODEL

Digital Terrain Model is defined as three dimensional model of earth's surface, provided in a digital form. This gives a quantitative model of landform. Often the terms of DTM are used for model for containing discrete data on elevation. It is a computer simulation model to show relief, based on three dimensional data. The DTM for the study area, within a 10 km buffer around the project site, is extracted using Survey of India topographical sheet of 1:50,000 scale by capturing contours and spot heights.

FIGURE – 3.13

GROUND WATER HYDROLOGY

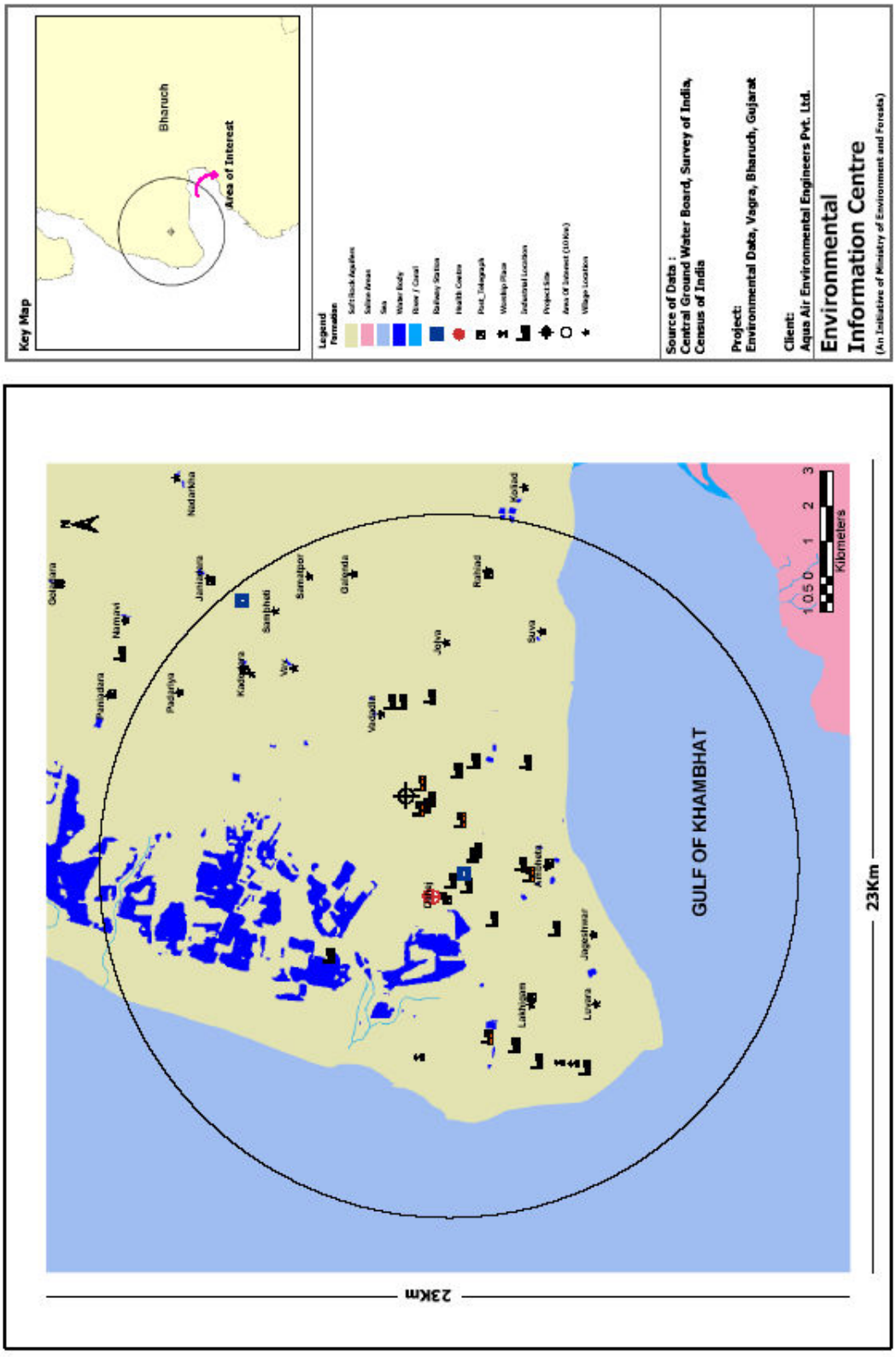
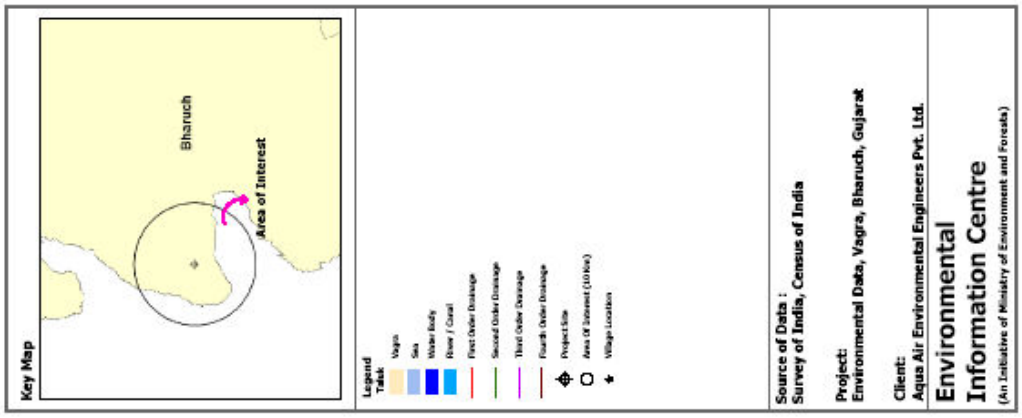


FIGURE-3.13 GROUND WATER HYDROLOGY

FIGURE – 3.14

DRAINAGE PATTERN



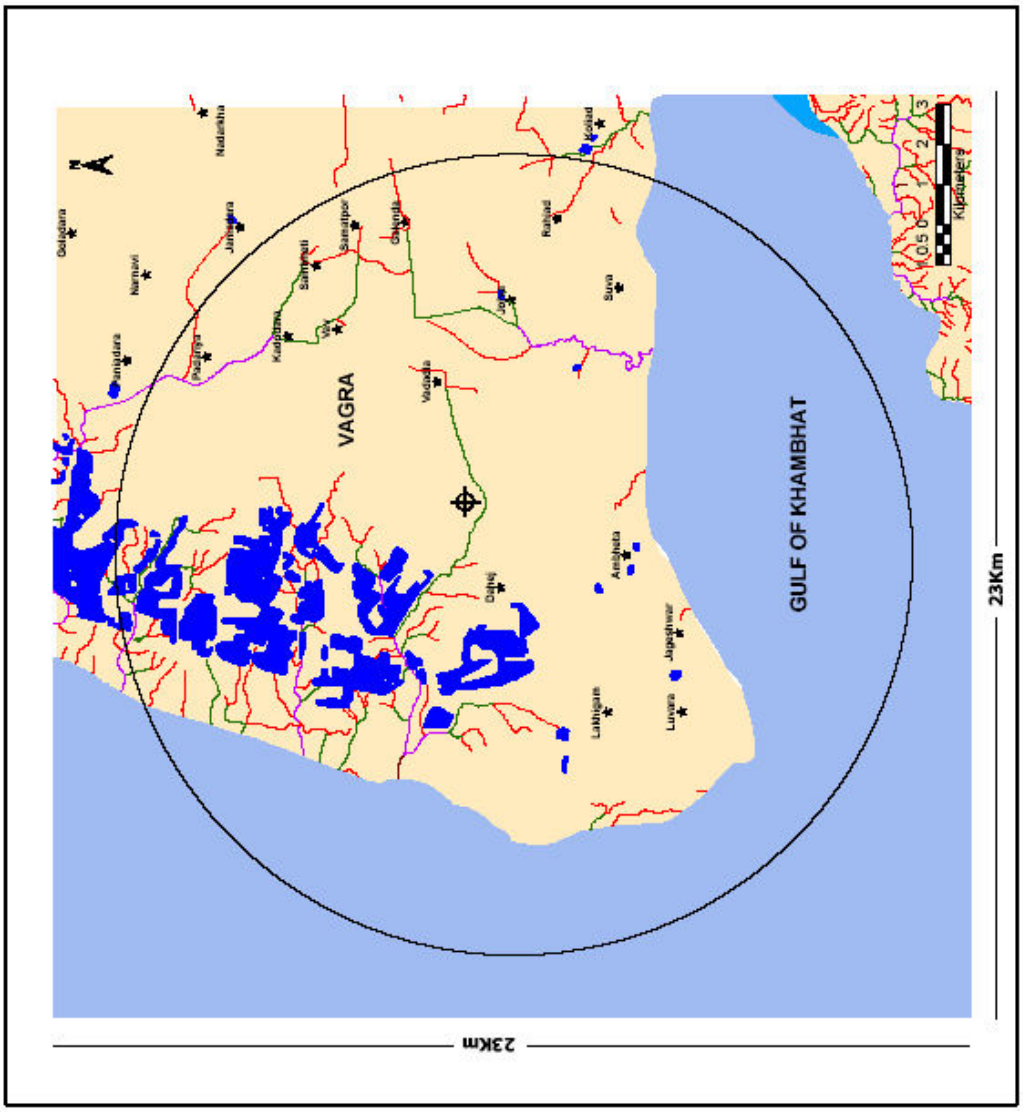
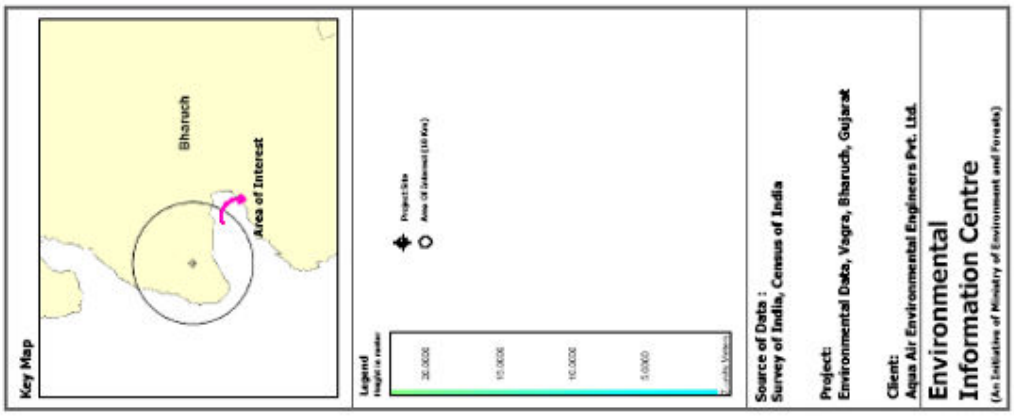


FIGURE-3.14 DRAINAGE PATTERN MAP

FIGURE – 3.15

DIGITAL TERRAIN MODEL



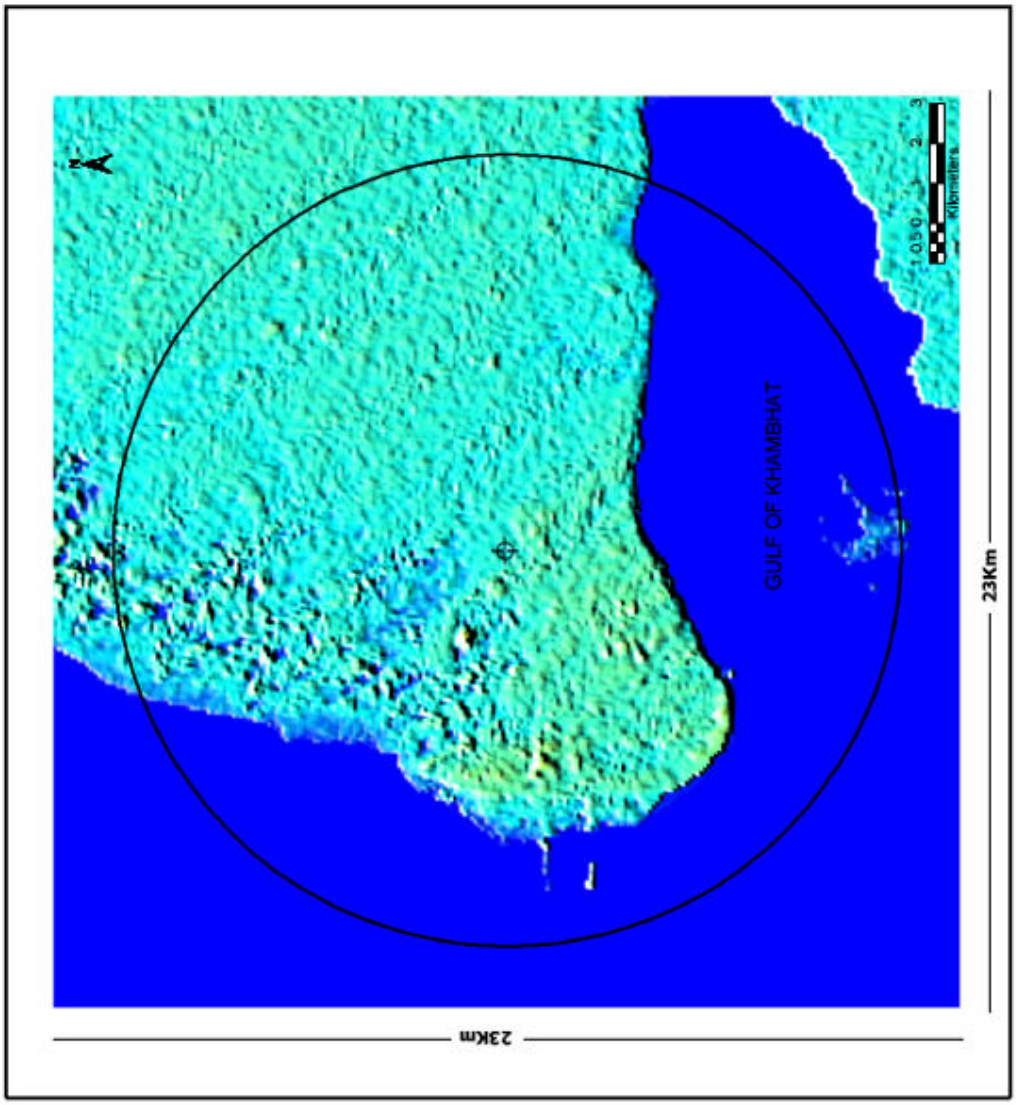


FIGURE-3.15 DIGITAL TERRAIN MODEL (DTM)

CHAPTER - 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 IDENTIFICATION OF IMPACTS

Various sources of pollution with respect to wastewater, the flue gas / process emission, hazardous waste and noise generation along with their qualitative and quantitative analysis as well as measures taken to control them are discussed herein with details. The network method was adopted to identify potential impact, which involves understanding of cause-condition-effect relationship between an activity and environmental parameters. This method involves the "road map" type of approach to the identification of second and third order effect. The basic idea is to account for the project activity and identify the type of impact that could initially occur followed by the identification of secondary and tertiary impacts.

Identified potential impacts for the various components of the environment, i.e. air, noise, water, land and socio-economic, are presented in Figure 4.1. It should be noted that in these illustrations the lines are to be read as "might have an effect on".

FIGURE – 4.1

IMPACT NETWORK ON AIR ENVIRONMENT

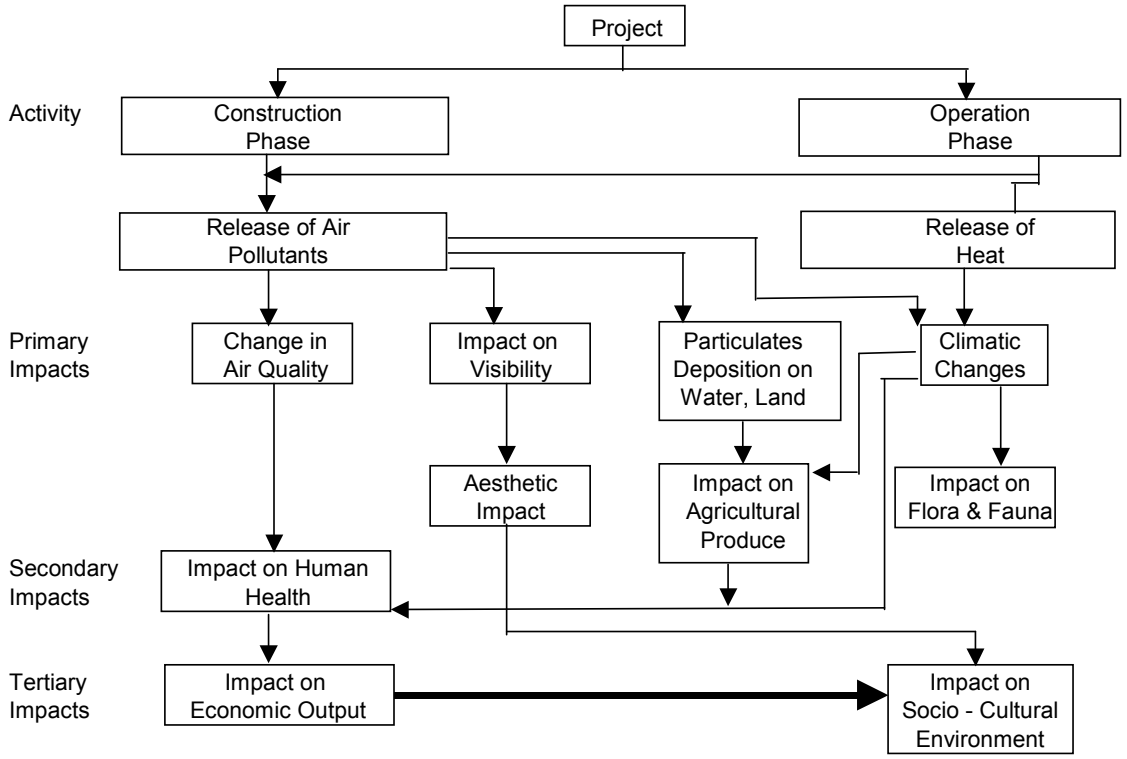


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON NOISE ENVIRONMENT

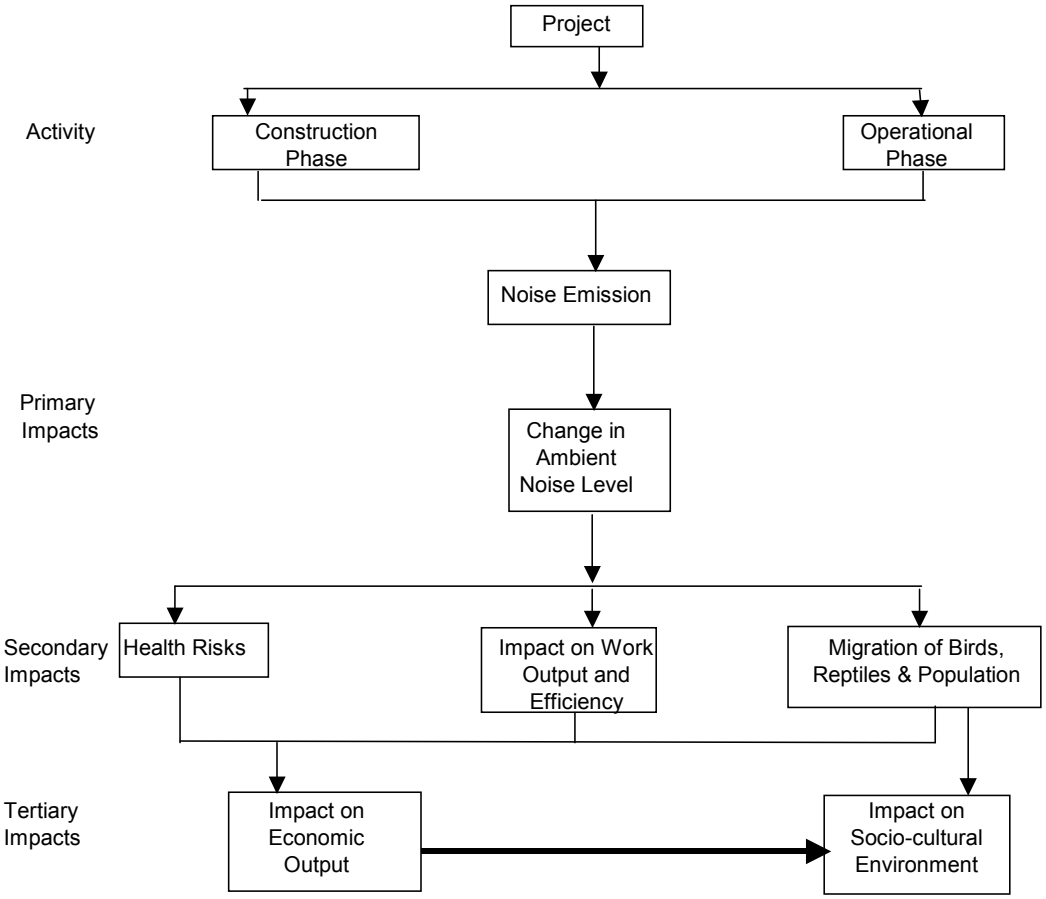


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON WATER ENVIRONMENT

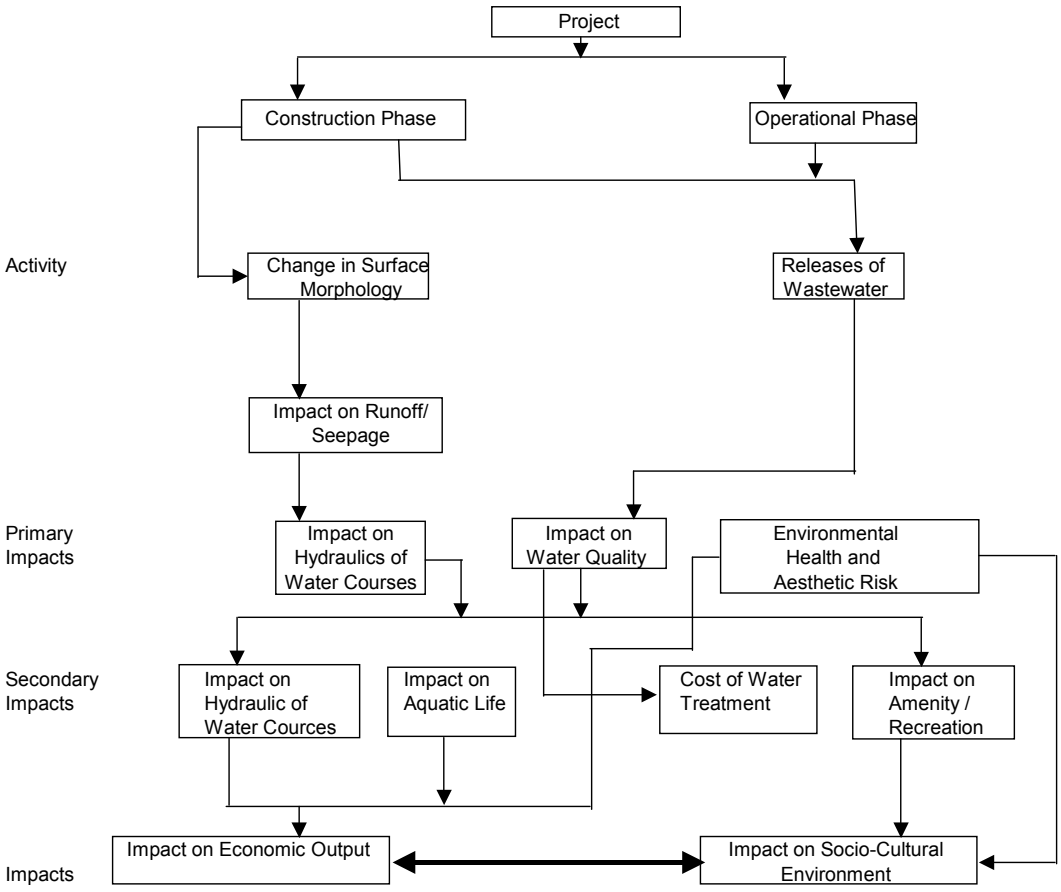


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON GROUND WATER ENVIRONMENT

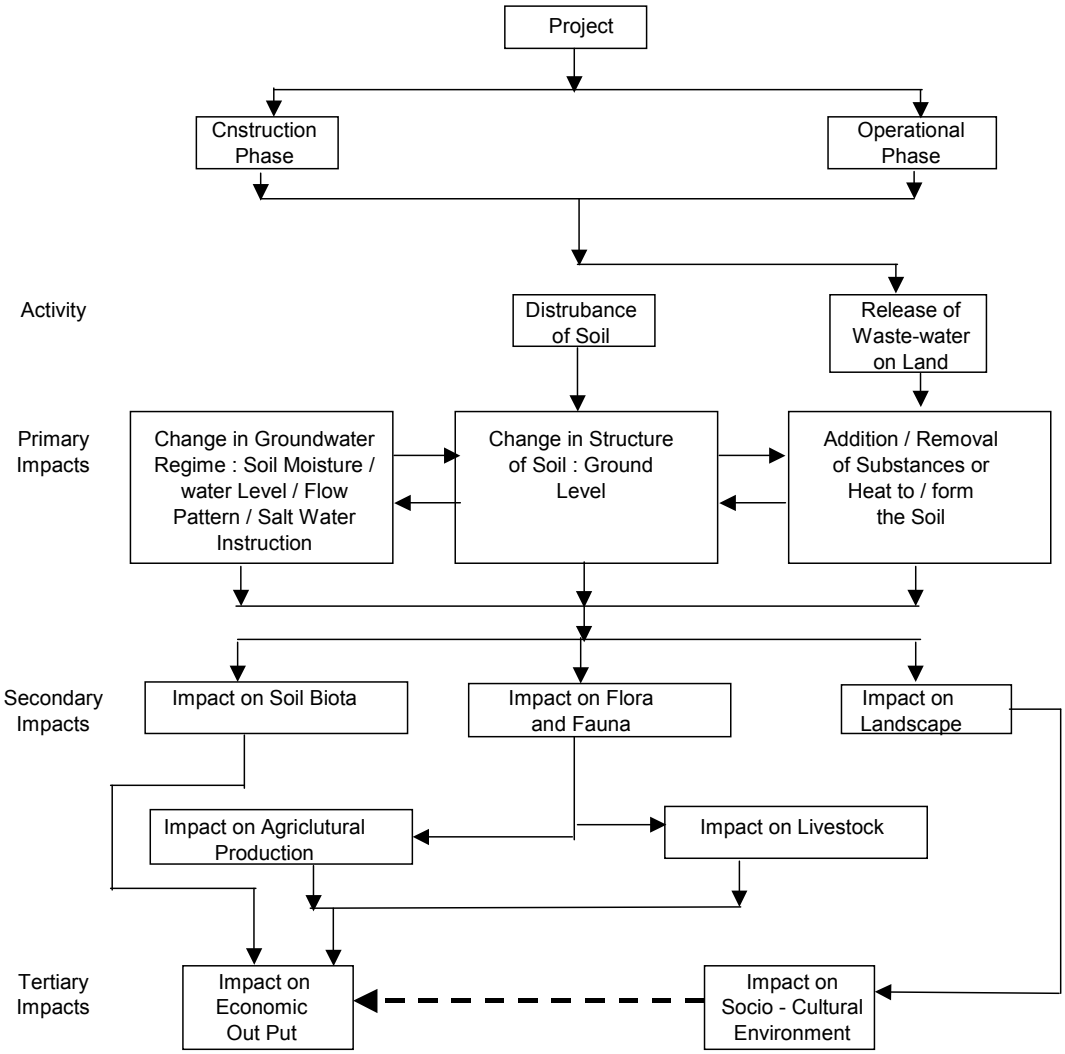


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON LAND ENVIRONMENT

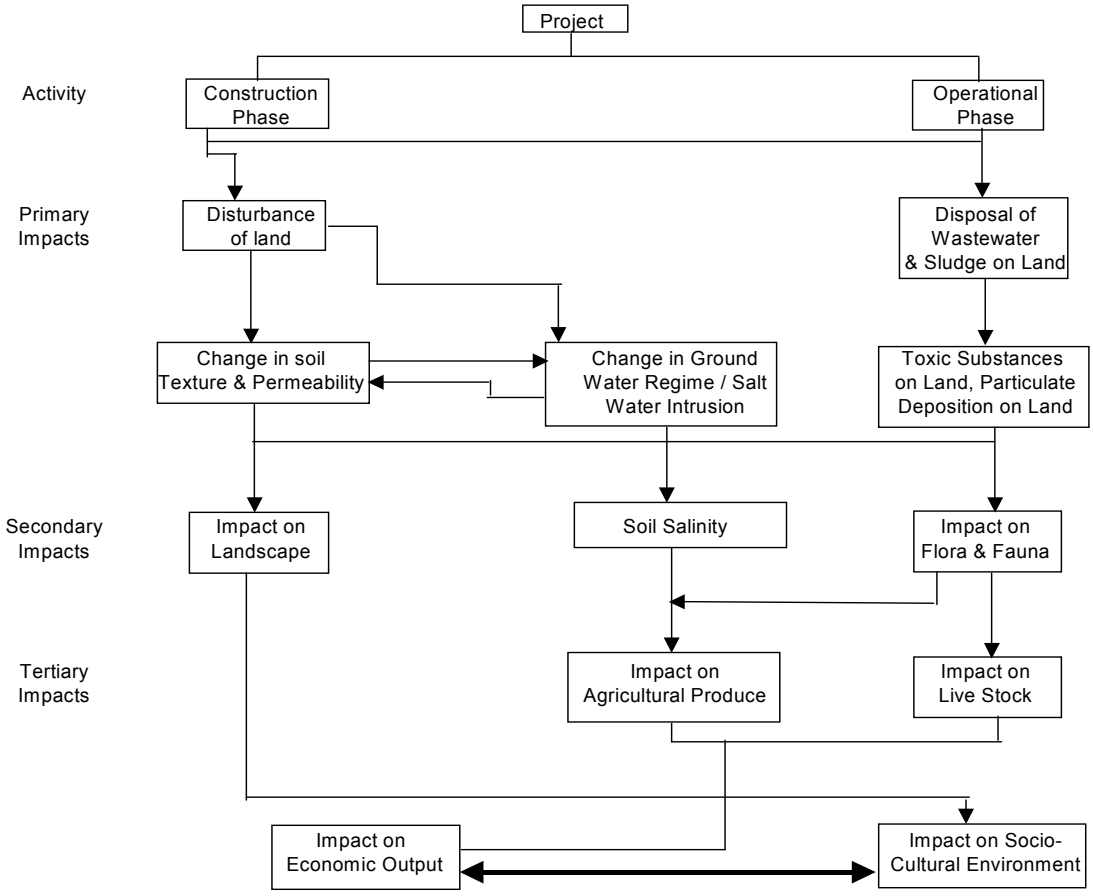
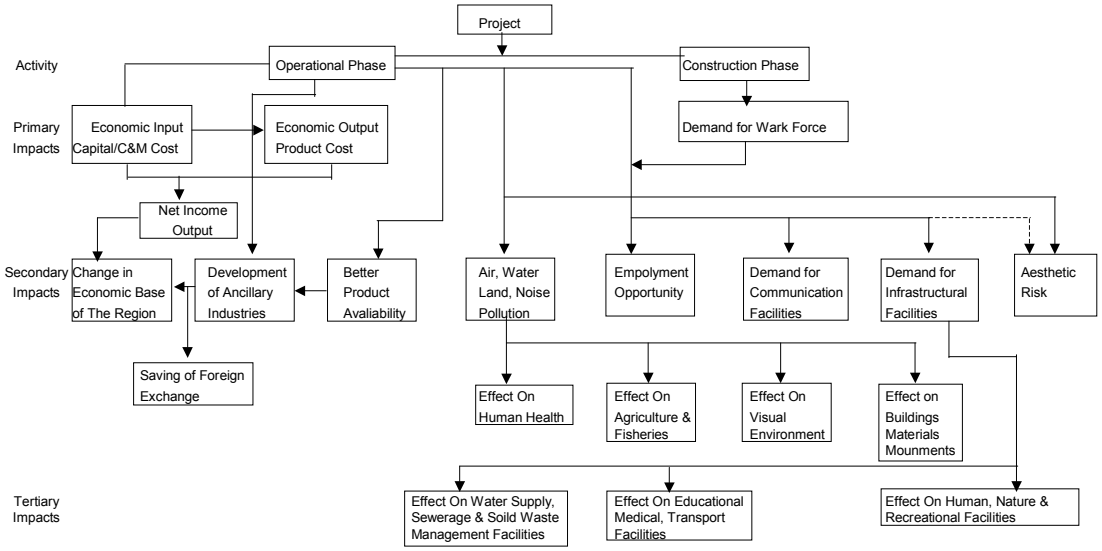


FIGURE – 4.1 CONTD.

IMPACT NETWORK ON SOCIO-ECONOMIC & CULTURAL ENVIRONMENT



4.2 EVALUATION AND PREDICTIONS OF IMPACTS

An impact can be defined as any change in physical, chemical, biological, cultural and/or socioeconomic environment that can be attributed to activities related to alternatives under study for meeting the project needs. Impact methodology provides an organized approach for prediction and assessing these impacts.

Scientific techniques and methodologies based on mathematical modeling are available for studying impacts of various project activities on environmental parameters.

The nature of the impacts due to said project activities are discussed here in detail. Each parameters identified in the proceeding chapter, is singularly considered for the anticipated impact due to various activities listed. The impact is quantified using numerical scores 0, 1, 2, 3, 4 and 5 in increasing order of activity. In order to assess the impact accurately, each parameter is discussed in detail covering the following:

1) Project activities likely to generate impact
2) Quantification and prediction of impact

4.2.1 WATER ENVIRONMENT

Water Consumption & Waste Water Generation is given in Table 2.2. Details of ETP are discussed in Para no. 2.4.3.1 of Chapter 2. Hence, overall there won't be any significant adverse impact due to proposed activity on the water environment. With the above, it can be said that there will be no significant adverse impact on surface and ground water or soil quality.

4.2.2 AIR ENVIRONMENT

The dispersion of pollutants in the atmosphere is a function of several meteorological parameters viz. temperature, wind speed and direction, mixing depths, inversion level, etc. A number of models have been developed for the prediction of pollutant concentration at any point from an emitting source. The Industrial Source Complex – Short Term (ISCST3) dispersion model is a steady-state Gaussian plume model. It is most widely accepted for its interpretability. It gives reasonably correct values because this obeys the equation of continuity and it also takes care of diffusion, which is a random process. For the present study, this model is used for the prediction of maximum ground level concentration (GLC).

The proposed air emissions at M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) are PM, SO_2, NOx, HCl & HBr. The site specific and monitored details considered for input data for the software "ISC-AERMOD View" by Lakes Environmental, Canada for prediction of impact on air environment are given in Table 4.1. The site-specific hourly meteorological data measured at site is given in Table 3.5. In order to conduct a refined air dispersion modeling using ISCST3 and ISC-PRIME short-term air quality dispersion models, the site specific hourly meteorological data measured at site is pre-processed using the U.S. EPA PCRAMMET and U.S. EPA AERMET programs. Before starting air dispersion modeling with ISC-AERMOD View, a building downwash analysis using BPIP View was done. BPIP View is a graphical user interface designed to speed up the work involved in setting up input data for the U.S. EPA Building Profile Input Program (BPIP) and Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME).

The air pollution caused by the gaseous emissions from a single or small group of stacks is a local phenomenon. Its impacts will occur at a distance ranging from within the immediate vicinity of the stack to several kilometers away from the stack. Maximum ground level concentration will occur within this range. All plumes at more downwind distances from the source by stack emission become so diluted by diffusion in the ambient atmosphere, that concentrations of pollutants become negligible. The maximum ground level concentration for different parameters is given in Table 4.2. Isopleths for PM, SO_2, NOx, HCl & HBr are given in Figure 4.2. Adequate measures shall be taken to minimize air pollution by providing

air pollution control equipment. Flue gases are discharged from stacks at adequate height (as per GPCB norms).

TABLE – 4.1

DETAILS OF EMISSION FROM STACK & VENTS

SR. NO.	OPERATING PARAMETER	UNIT	SOURCE OF EMISSION (FLUE GAS STACK ATTACHED TO)		
			Boiler	DG Set	Incinerator
1.	Stack height	Meter	50	11	30
2.	Diameter	Meter	1.0	0.2	1.0
3.	Flue Gas Temperature	^0K	428	-	-
4.	Air Pollution Control Equipment	-	ESP	-	Venture & Packed Scrubber
5.	Flue Gas Velocity	m/s	5.0	-	6.0
6.	Emission concentration PM SO_2 NOx	 mg/Nm^3 mg/Nm^3 mg/Nm^3	 150* 262* 94*	 150* 262* 94*	 50* 200* 94*

(* Permissible Limits)

Note: 1 Nos. of 1000 KVA DG Set, kept for emergency power back up.

TABLE – 4.1 (CONTD.)

DETAILS OF EMISSION FROM STACK & VENTS

Sr.No.	Stack attached to	Stack Height	Air Pollution Control System	Parameter	Permissible Limit
1	Herbicide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HBr HC	20 mg/Nm^3 40 mg/Nm^3 05 mg/Nm^3 15 mg/Nm^3
2	Fungicide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HBr HC	20 mg/Nm^3 40 mg/Nm^3 05 mg/Nm^3 15 mg/Nm^3
3	Insecticide	12 m	Two Stage Water Alkali Scrubber	HCl SO2 HBr HC	20 mg/Nm^3 40 mg/Nm^3 05 mg/Nm^3 15 mg/Nm^3

(* Permissible Limits)

FIGURE - 4.2

ISOPLETHS FOR PM

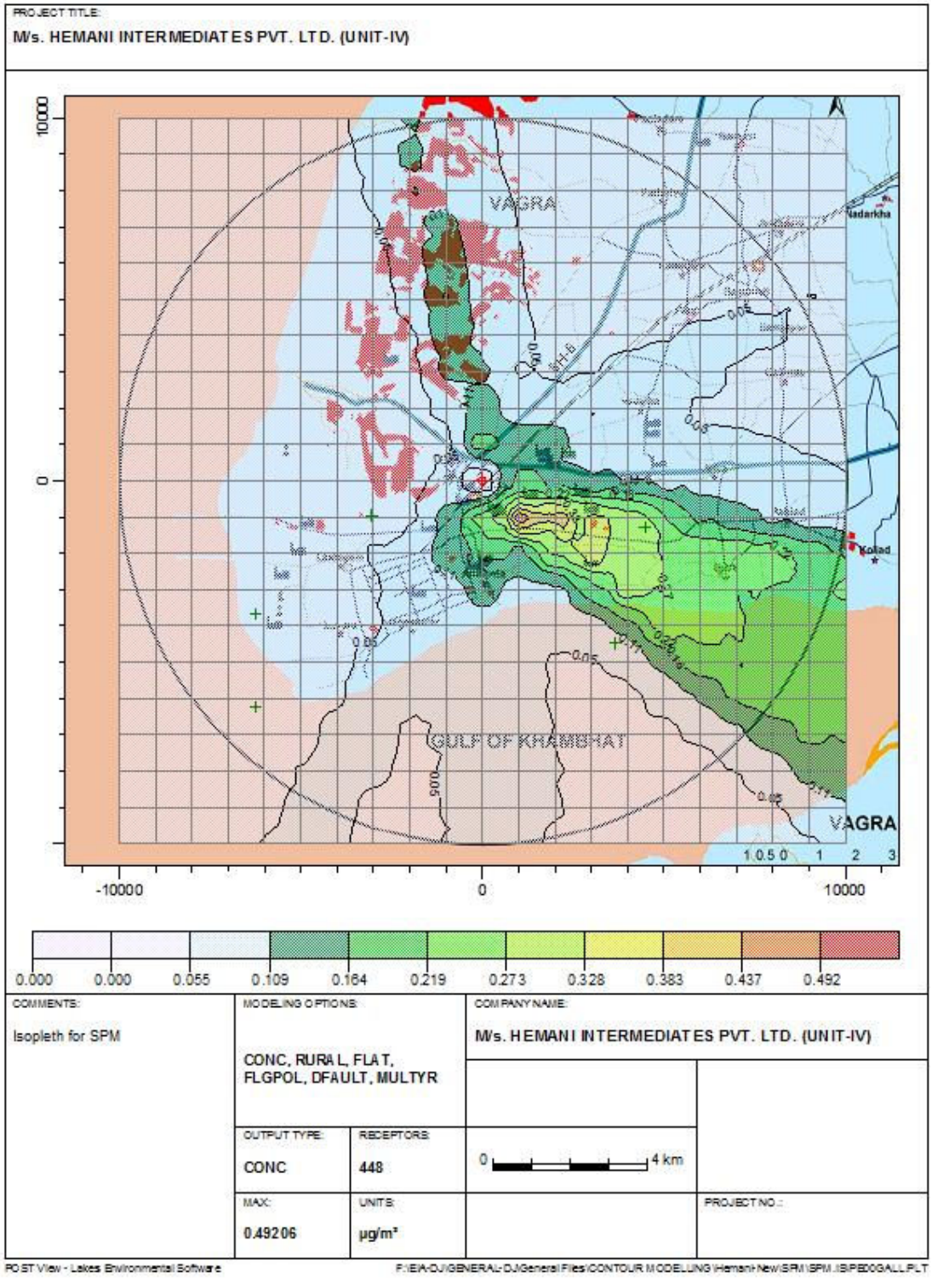


FIGURE - 4.2 (CONTD.)

ISOPLETHS FOR SO_2

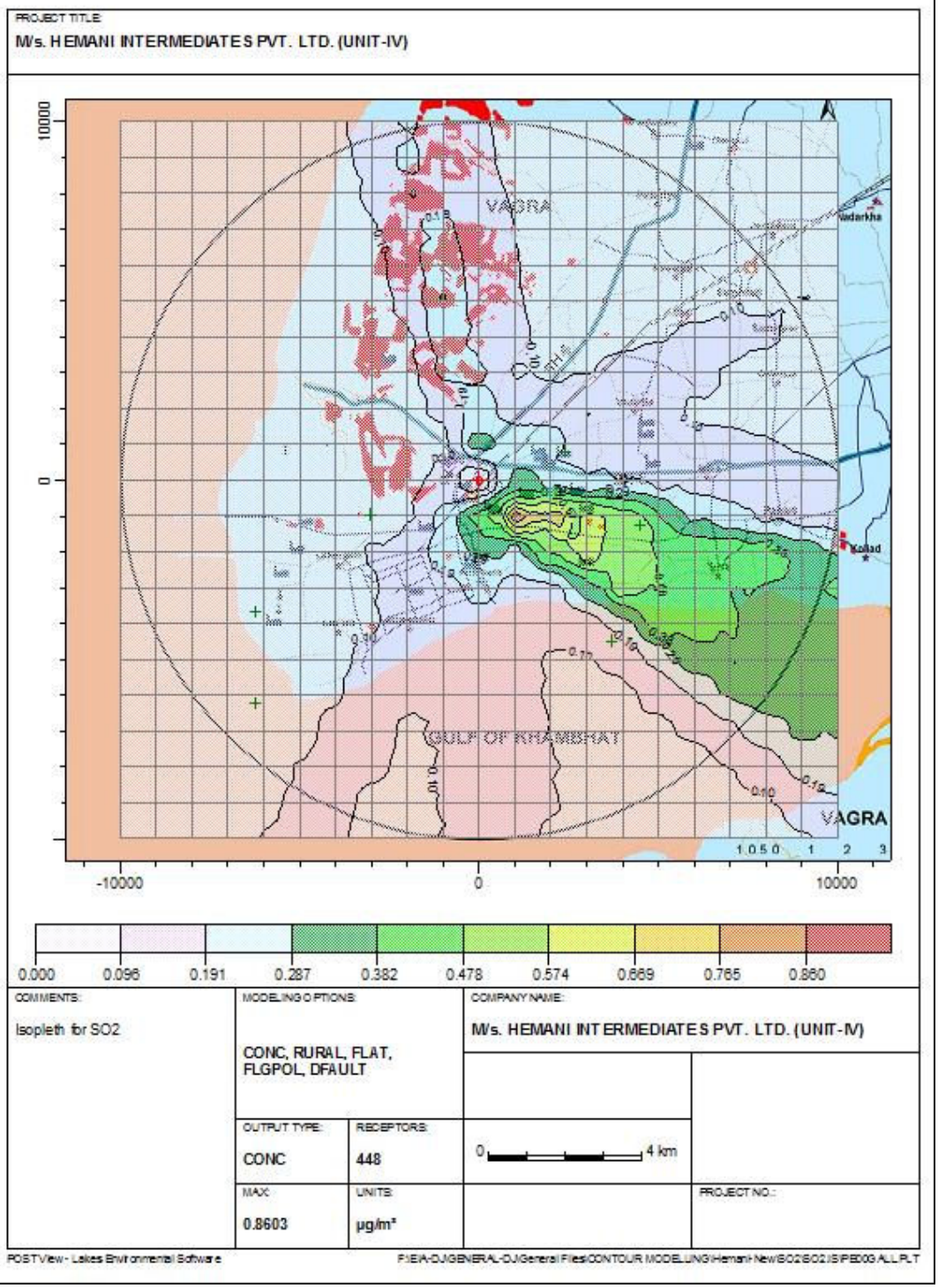


FIGURE - 4.2 (CONTD.)

ISOPLETHS FOR NOx

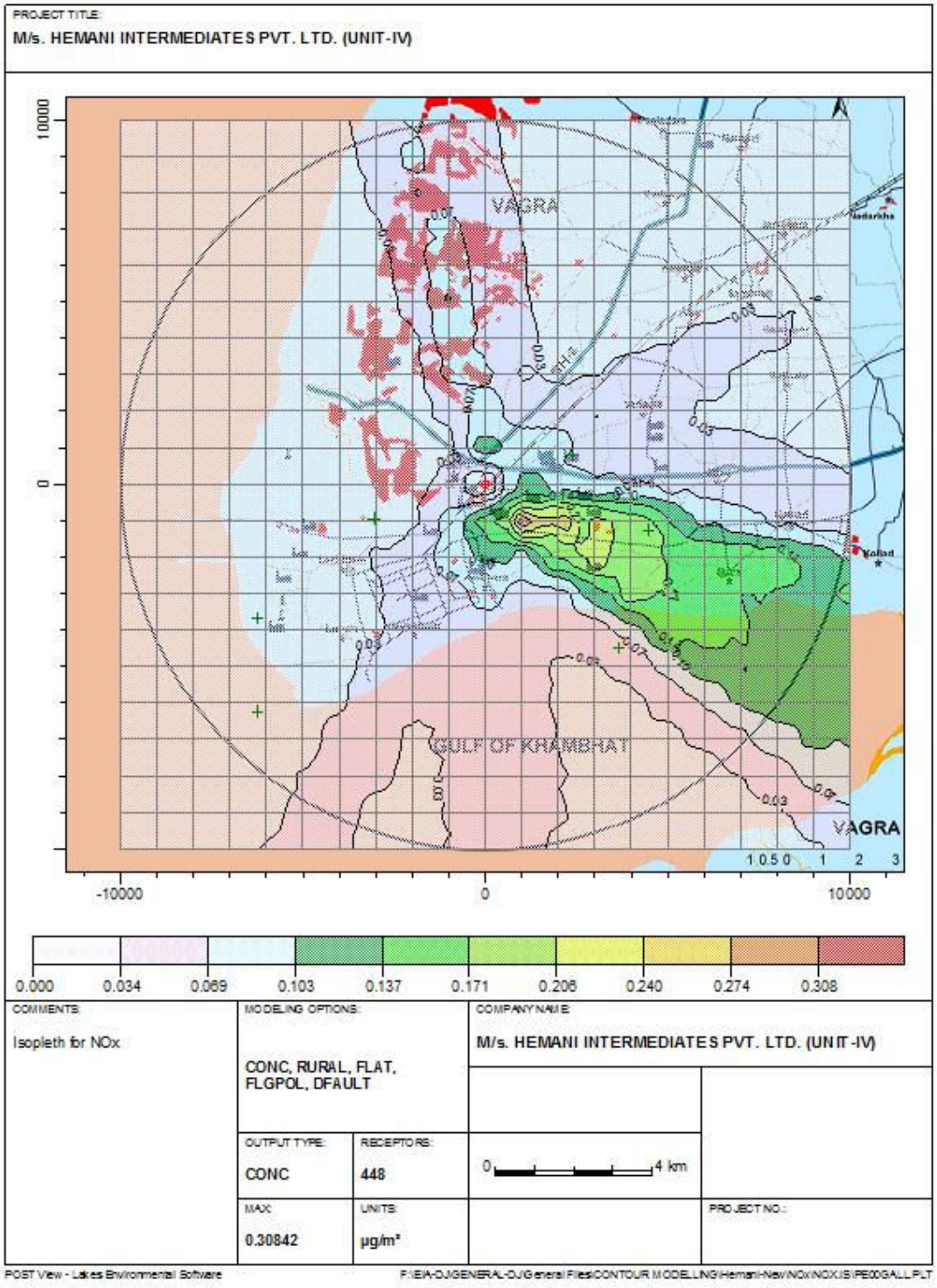


FIGURE - 4.2 (CONTD.)

ISOPLETHS FOR HCl

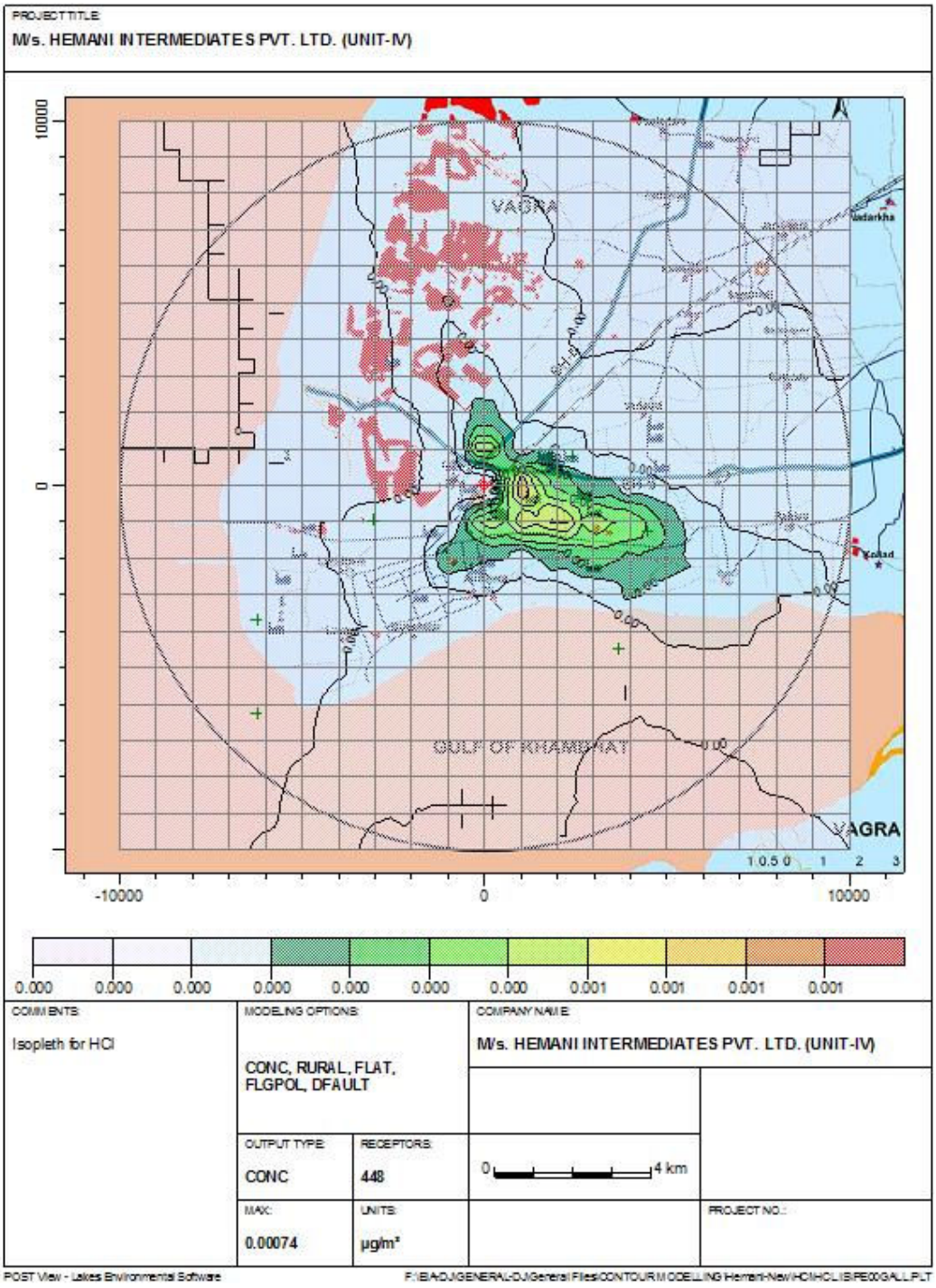


FIGURE - 4.2 (CONTD.)

ISOPLETHS FOR HBr

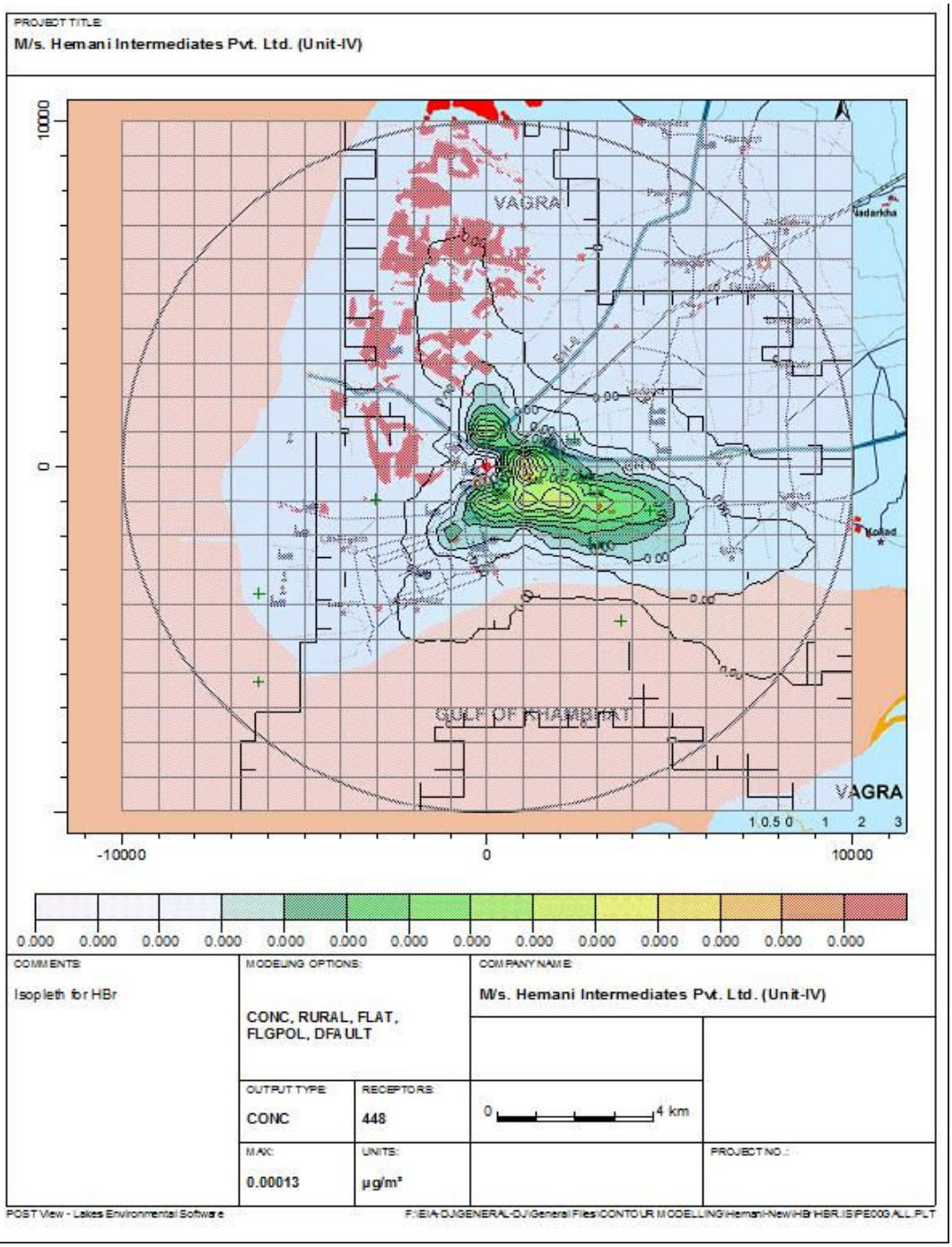


TABLE - 4.2

SUMMARY OF ISCST3 MODEL OUTPUT FOR PM, SO_2, NOx, HCl & HBr

SR. NO	LOCATIONS	CO-ORDINATES (X, Y)	CONCENTRATION (µg/m^3)				
			PM	NOx	SO_2	HCl	HBr
1.	Project-site (A1)	(0,0)	0.00	0.00	0.00	0.00	0.00
2.	Kadodara (A2)	(3680, -4480)	0.08	0.05	0.14	0.00	0.00
3.	Jolva (A3)	(4480, -1280)	0.32	0.20	0.56	0.00	0.00
4.	Dahej (A4)	(-3040, -960)	0.04	0.02	0.06	0.00	0.00
5.	Vadadla (A5)	(2400, 800)	0.09	0.05	0.15	0.00	0.00
6.	Lakhigam (A6)	(-6240, -3680)	0.02	0.02	0.04	0.00	0.00
7.	Luvara (A7)	(-6240, -6240)	0.03	0.02	0.04	0.00	0.00

SR. NO.	X, Y CO-ORDINATES	MAXIMUM CONCENTRATION (µg/m^3)				
		PM	NOx	SO_2	HCl	HBr
1.	(1000, -1000)	0.49206	-	-	-	-
2.	(1000, -1000)	-	0.30842	-	-	-
3.	(1000, -1000)	-	-	0.8603	-	-
4.	(1000, 0)	-	-	-	0.00074	-
5.	(1000, 0)	-	-	-	-	0.00013

As manufacturing activities have not yet started, the predictions were made using CPCB permissible limit as these concentrations will in no case be exceeded. Ground level concentrations calculated for proposed activities are superimposed on existing ambient air quality monitoring results and combined values (Table 4.3) are found within permissible National Ambient Air Quality Standards.

TABLE 4.3

PREDICTED AMBIENT AIR QUALITY FOR PM, SO_2, NOx, HCl, HBr Unit: $\mu g/m^3$

SR. NO.	SAMPLING LOCATION	SPM	SO_2	NOx	HCl	HBR
		AVERAGE				
1.	Project-site (A1)	164.00	13.00	16.00	BDL	BDL
2.	Kadodara (A2)	116.08	23.14	29.05	BDL	BDL
3.	Jolva (A3)	109.32	25.56	33.20	BDL	BDL
4.	Dahej (A4)	93.04	29.06	38.02	BDL	BDL
5.	Vadadla (A5)	80.09	19.15	22.05	BDL	BDL
6.	Lakhigam (A6)	116.02	26.04	31.02	BDL	BDL
7.	Luvara (A7)	107.03	24.04	32.02	BDL	BDL

BDL = Below Detectable Limit

4.2.3 NOISE ENVIRONMENT

Noise level around the plant site was measured. These values (Table-3.8B & 3.9) represent status of Noise levels. Adequate noise control measures such as mufflers, silencers at the air inlet/outlet, anti vibration pad for equipment with high vibration, earmuff and earplugs to the operators, etc. are provided. Housing / casing is provided for all noise generating machines. The noise level within plant will be less than 75 dB(A).

4.2.4 HAZARDOUS WASTE DETAILS

Hazardous wastes generation is given in Table 2.3.

4.2.5 INFRASTRUCTURE AND SERVICES

The plant is located in a well-developed industrial area, which has all essential facilities such as water, power, fuel, post, telecommunication, bank, etc. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall get water from GIDC water supply.

The power requirement will be 1000 KVA. Company shall purchase power from DGVCL. Also 1 Nos. of 1000 KVA DG Sets will be kept for emergency power back up. The transportation

of raw materials and finished products shall be by road. As stated earlier, the site is near to National Highway no. 8. As a result of proposed project there will be a marginal increase in transportation activity as compared to present total traffic upto plant premises. As a result of development of industrial estate, the neighboring areas have developed for commercial use. The infrastructure services e.g. roads, state transport, post and telegraph, communication, education and medical facilities, housing, etc. have improved in the surrounding areas in recent years.

4.2.6 ENVIRONMENTAL HAZARD

Raw material such as different chemicals etc. shall be transported by road and shall be stored in the plant premises. On site emergency plan shall be prepared for storage and handling of hazardous chemicals and shall also be submitted to relevant authorities. This report will be prepared with the consideration of hazards associated with the chemicals and care should be taken for all aspects of environmental hazards. The project proponent shall consider all the safety aspects in planning, designing and operation of the plant as per standard practices. Hence, no adverse impact on this account is anticipated.

4.2.7 HOUSING

Enough number of dwellings is available in nearby towns and villages for accommodating extra workforce. On neighboring towns or villages, the impact on this account is minimal.

4.2.8 ECOLOGY

The impact due to operation of the project and its activities on the ecological parameters like natural vegetation, cropping pattern, fisheries and aquatic life, forests and species diversity could be summarized as below.

4.2.8.1 NATURAL VEGETATION

The industry will develop a green belt on the surrounding periphery. Since the effluents and emissions generated from the project activities shall be treated and disposed as per the EMP provisions, adverse impact over any of the ecological components of the environment is reduced to minimum.

4.2.8.2 CROPS

Since, the project shall be on a non-agricultural land, it shall not alter the crop production of the area. Further, the necessary environmental protection measures have been planned under EMP e.g. air pollution control systems shall be designed to take care of even emergency releases of the gaseous pollutants like PM, SO_2, NOx, HCl, HBr and regular environmental surveillance shall be done, so as not to have any short-term or cumulative effect on the crops and the natural vegetation of the area.

4.2.8.3 FISHERIES AND AQUATIC LIFE

Since the effluents and emissions generated from the project activities shall be treated and disposed as per the EMP provisions, proposed project shall not envisaged any adverse effect on fisheries and aquatic life.

4.2.8.4 AESTHETIC ENVIRONMENT

The proposed activities and further plantation will enhance the aesthetic environment.

4.2.8.5 DEMOGRAPHY, ECONOMICS, SOCIOLOGY AND HUMAN SETTLEMENT

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will give employment to about 50 employees (Including Contract workers). In addition to direct employment, indirect employment shall generate ancillary business to some extent for the local population. There is a positive effect due to improved communication and health services, which have lead to economic prosperity, better educational opportunities and access to better health and family welfare facilities. There has been a beneficial effect on human settlement due to employment opportunities from various industries in region in addition to employment generated by M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) after proposed project more direct and indirect employment shall be generated.

Local quality of life has improved. This factor combined with all other mitigation measures, like proper treatment and disposal of hazardous waste; liquid effluent and gaseous emission, has minimized the adverse impact on ecology and has a beneficial impact on human settlement and employment opportunities. There has been a beneficial impact on

the local socio-economic environment. There shall be no displacement of any population in plant area. Any major activity that may lead to resettlement of the people is considered as permanent impact. Hence, there is no permanent impact on this account. The increasing industrial activity will boost the commercial and economical status of the locality up to some extent.

Socio-Economic Environment

Environmental Impact Assessment is a study or an estimate of the probable positive or negative impact a proposed project or expansion activity of an existing project could have on the environment, consisting of natural, social and economic aspects. An assessment of socio-economic environment forms an integral part of an EIA study. Therefore, base-line information for the same was collected during the study period. The base-line S.E. data collected for the study region has been identified in four major indicators namely- Demography, civic amenities, Economy and social culture.

Employment:

During construction phase of the company, skilled and un-skilled manpower will be required and their requirement will be met with from the local community. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will give employment to 50 people (Including Contract workers). With the employment opportunities, local people's income will increase and thereby, their economic status will boost up. Further, secondary jobs shall also increase in the local area to provide day-to-day needs/services to the working men. Demand for essential daily utilities in the market will also temporarily increase to some extent.

Public Health:

During construction period the workers will be provided wills safe water supply, low-cost sanitation facilities, first Aid Treatment, necessary personal protective equipment etc, to prevent an increase in diseases related to personal hygiene. With some other industrial units coming up in the surrounding area, Govt. dispensary, medical check-up, medicines, services of nurses & doctors etc. are likely to be increased with a view to taking care of general health of the local community.

Education:

Presently, every village has a primary school upto VII std. and for higher standard education, the students, both boys and girls, have to go to Dahej or Bharuch. With increase in population due to industrial growth, the surrounding villages may start higher standards upto X and XII. Not only male students but female students can also take advantage of the some and thereby, percentage of literate population in the local area may increase.

Transport:

With increased employment opportunities and higher economic status of the local community and with an increase in market conditions, transport facilities by way of buses, two-wheeler & four-wheeler vehicles will develop in future. Thus, overall development of the local community and their health is likely to become a matter of fact with the co-operation and support of industrial organizations of the local area. To sum up, it could be said that there will be a positive effect due to improved communication and health services, which would lead to economic prosperity, better educational opportunities and access to better health and family welfare facilities. There will be a beneficial effect on human settlement due to employment opportunities from various industrial establishments in local area in addition to employment generated by M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV). There is likely to be a beneficial impact on the local Socio-Economic environment. There shall be no displacement of any population in the plant area. The increasing industrial activity will boost up the commercial and economical status of the locality to some extent.

1. This project is on non-agricultural land and therefore, it is not likely to alter the crop production.
2. The manufacturing unit will adopt comprehensive environmental plan covering several environment protection measures, to reduce the environmental pollution resulting from the project.

To control the emission from process and utility stacks, the company would regularly examine, inspect and test its emission to make sure that the emission is below the

permissible limit. With this, the status of sanitation and community health of the area would not change.

4.2.8.6 FOREST, NATIONAL PARKS / SANCTUARIES

There is no reserved forest & no national park or sanctuary within 5 km radius of the plant. There shall be no impact on the same.

4.2.8.7 PLACES OF ARCHAEOLOGICAL/HISTORICAL/RELIGIOUS/TOURIST INTEREST

There is no place of archaeological, historical, religious or tourist interest within the study area i.e. 5 km radius of plant site. Hence, there shall be no impact on places of interest.

4.3 MATRIX REPRESENTATION

The parameters discussed are presented in the form of a matrix in Table 4.4. There is no requirement of construction phase and the industry is in operation for existing products. The impact matrix relating the parameters to the activities during operation phase and construction phase is presented in Table 4.5. The quantification of impact is done using numerical scores 0 to 5 as per the following criteria.

Score	Severity criteria
0	No impact
1	No damage
2	Slight/ Short-term effect
3	Occasional reversible effect
4	Irreversible/ Long-term effect
5	Permanent damage

The scores for various parameters and activities are presented in Table 4.6.

4.3.1 CUMULATIVE IMPACT CHART

The total negative impact of various activities on any one parameter is represented as a cumulative score and the cumulative scores of various parameters are given in the form of a cumulative impact chart presented in Table 4.7. Any particular parameter having an individual score greater than 5 or cumulative score of 20 implies serious effects due to the

project and calls for suitable mitigation measures. It is evident from the matrices that the resultant impact is beneficial to the local population and due to export (and import substitution) the resultant impact is beneficial to our country.

TABLE - 4.4

IMPACT IDENTIFICATION MATRIX (CONSTRUCTION PHASE)

ACTIVITIES DURING CONSTRUCTION PHASE	Air Quality	Noise & Odour	Water Quality	Land Quality	Infrastructure	Services	Env. Hazards	Terrestrial Ecology Land use	Socio-Economic Status	Aquatic Ecology
Water Requirement			×	x	x	×			×	×
Material Storage/ Transport	×	×	×	×	×	×	×	×	x	×
Material Handling	×	×	×	×	×	×		×		
Utilities	×	×	×			×				
Effluent Discharge			×	x		×	×	×		x
Gaseous Emissions	×	×		x			×	x	x	x
Fugitive Emissions	×	×		x			×	x	x	x
Solid Waste Disposal	×	×	×	×	x	×	×			
Spills & Leaks	×	×	×	×		×	×			
Shutdown/ Startup						×				
Equipment Failures						×	X			
Transport of Workers	×	×				×			×	
Movement of Vehicles	×	×			x	×			×	
Medical & Other Needs						×			×	

TABLE – 4.4 (CONTD.)

IMPACT IDENTIFICATION MATRIX (OPERATION PHASE)

ACTIVITIES DURING OPERATION PHASE	Air Quality	Noise & Odour	Water Quality	Land Quality	Infrastructure	Services	Env. Hazards	Terrestrial Ecology Land use	Socio-Economic Status	Aquatic Ecology
Water Requirement			x			X				X
Raw material Storage/ Transport	X	X		X		X	X			
Raw Material Handling	X			X		X	X			
Utilities	X	X	X			X				
Effluent Discharge		X	X		X	X	X			X
Gaseous Emissions	X	X					X			
Fugitive Emissions	X	X					X	X		
Solid Waste Disposal	X	X		X		X	X	X		
Product Storage/ Handling	X			X			X			
Spills & Leaks	X	X	X	X	X		X	X		X
Shutdown/ Startup	X	X	X			X				
Equipment Failures		X				X	X			
Plant Operations	X	X	X			X	X	X	X	X
Transport of Workers	X	X				X				
Movement of Vehicles	X	X				X				
Medical & Other Needs						X		X	X	

TABLE - 4.5

CONSTRUCTION & OPERATION STAGE POTENTIAL IMPACTS & MITIGATIVE MEASURES

ENVIRONMENTAL COMPONENTS	POTENTIAL IMPACTS	SOURCES OF IMPACT	MITIGATIVE MEASURE	REMARKS
Water Quality	Deterioration of water quality	Construction activity & abstraction of water for construction requirement and sanitation in housing for workers. Discharge of process effluents, sewage and utility wastewater	Proper management of surface water run off shall be made Effluent treatment plant (ETP)	Discharge of treated effluent to GIDC drain. MEE Condensate will be reused in plant premises. Discharge standards specified by authorities are being met Minor adverse impact
Air Quality	Increase in SO_2, NO_X, SPM, HCl & HBr concentrations in ambient air	Process emissions, Fugitive emissions & Utility stack emissions	Control equipment for fugitive emissions Adequate stack heights & APCE	No remarkable increase in GLCs. NAAQ Standards are met Minor adverse impacts on ambient air quality
Socio-Economic	Overall growth & development of area, increased employment, improvement in infrastructure and growth of downstream industries	Project activities	General area planning in advance by GIDC and classified as notified industrial estate by GIDC	Beneficial change
Terrestrial Ecology	Minor loss of habitat-flora & fauna, loss of agricultural land	Project activities	Green belt Proper management of solid waste	No impact
Noise	Increased noise level	Project operation	Noise abatement at generation point & green belt before receptor	Marginal impact
Infrastructure & Services	Improved communication, transport, housing, educational & medical facilities	Project	Development has been gradual	Beneficial impact
Environmental Hazards	Risk to environment & neighboring population	Handling and storage of chemicals, solvents & fuels	On site & off site Disaster management plan & Safe practices	Insignificant adverse impact

TABLE - 4.6

ENVIRONMENTAL IMPACT MATRIX

Activities	Environmental Parameter										
	Air Quality	Noise & Odour	Water Quality	Land Environment	Infrastructure	Services	Environmental Hazard	Housing	Terrestrial Ecology/ Land use	Socioeconomic Status	Aquatic Ecology
Water Requirement	0	0	1	0	1	1	0	0	0	1	1
Effluent Discharge	0	0	1	1	1	1	1	0	1	0	0
Gaseous Emissions	2	0	0	0	0	0	1	0	1	0	0
Fugitive Emissions	1	1	0	0	0	0	1	0	1	0	0
Solid Waste Disposal	1	0	1	1	1	1	1	0	0	0	0
Raw Material Storage/ Transport	1	1	0	2	2	1	1	0	1	1	0
Raw Material Handling	1	1	0	1	0	0	1	0	1	0	0
Product Storage	1	0	0	1	0	0	1	0	0	0	0
Spills & Leaks	1	1	1	1	1	1	1	0	1	0	0
Shut down/ Start up	1	1	1	0	1	1	0	0	1	1	0
Equipment Failure	1	1	1	0	0	1	1	0	1	0	0
Plant Operations	1	1	1	0	1	1	1	1	1	1	0
Transport of workers	1	1	0	0	1	1	0	0	1	1	0
Movement of Vehicles	1	1	0	0	1	1	0	0	1	1	0
Housing Needs	0	1	0	1	1	1	0	1	0	1	0
Utilities	1	1	0	0	0	1	0	0	0	0	0
Cumulative score	**14**	**11**	**7**	**8**	**11**	**12**	**10**	**2**	**11**	**7**	**1**

TABLE - 4.7

CUMULATIVE IMPACT CHART

ENVIRONMENTAL PARAMETER	TOTAL CUMULATIVE SCORE
Air Quality	14
Noise and Odour	11
Water Quality	7
Land Requirement	8
Infrastructure	11
Service	12
Environmental Hazards	10
Housing	2
Terrestrial Ecology/ Land use	11
Socio Economic Status	7
Aquatic Ecology	1

4.4 CONCLUSION

It can be concluded from the matrices that the resultant impact is beneficial in the interest of common man, the society, the state and as the country as a whole. The benefits can be summarized as below:

- The proposed project will provide quality product at lower cost to the users.
- There should be positive impact on the socio-economic condition of the area in terms of direct and indirect employment due to the proposed project.
- Numbers of local trained persons are likely to find jobs.
- Country will save valuable foreign exchange as import of these products will be reduced by corresponding amount.
- These products also have export potential. Hence, possibility of earning foreign exchange.

CHAPTER - 5

ENVIRONMENTAL MONITORING PLAN

5.1 PROJECT ENVIRONMENT MONITORING PLAN

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall adopt comprehensive environmental monitoring plan which is essential to take into account the changes in the environment. The objective of monitoring is:

- To verify the result of the impact assessment study in particular with regards to new developments.
- To follow the trend of parameters which have been identified as critical
- To check or assess the efficiency of controlling measures
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new project.

To monitor effectiveness of Control Measures:

- Monitor daily, Assess effectiveness of the Control Measures being implemented, Explore the need to modify or add new Control Measures particularly if a violation is observed & Report weekly.
- Regular monitoring of environmental parameters will be made to find out any deterioration in environmental quality.
- Monitoring of the proposed project area will be regularly conducted. The attributes, which merit regular monitoring, are specified underneath

Environment monitoring plan for proposed plant has described in Table:-5.1 along with Environment Components, parameter, standards to be followed, location and frequency.

TABLE:-5.1

PROJECT ENVIRONMENT MONITORING PLAN

Environmental Component	Parameters	Standards	Frequency
Air Environment			
AAQM at plant site	As prescribed by GPCB including $PM_{2.5}$, PM_{10}, SO_2, NOx, HCl, Cl_2, HC, HBr & VOCs	Prescribed by CPCB	Once in a month in upwind and downwind direction.
Stack emission monitoring of emissions sources	Parameters prescribed by GPCB In stack	Prescribed by GPCB	Once In a Month
Fugitive emissions/ work place monitoring within the plant side	VOC	Prescribed by GPCB	Regular
Water Environment			
Analysis of treated effluent	Parameters prescribed by GPCB	Prescribed by GPCB	Once a day by Company, Once a month by NABL Lab.
Ground water quality	Colour, pH, TDS, TSS, Sulphates, Chlorides, BOD_3, COD, oil and grease, etc.	Water quality Standards	Once a Season
Noise Environment			
Ambient Noise at plant site	Noise level in dB(A)	As per National Noise Standards	Once In a Month
Soil Environment			
At plant site	Analysis of pH, conductivity, Sulphates,	--	Pre and post monsoon season by Company

	calcium, magnesium, Cl^-		

5.1.1 LABORATORY FACILITIES

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall develop its own laboratory equipped with different equipment i.e. analytical balance, pH meter, COD heating apparatus, oven, incubator and necessary glass-wares. In addition to that M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will also develop quality control laboratory which is equipped with sophisticated equipments. Equipment of quality control laboratory is also available for analysis of environment parameters. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall make plan of the regular monitoring to ensure that pollution will be limited to below prescribed limits and to take corrective action. In case the monitored results of environment pollution shall be found to exceed the prescribed limits, remedial actions shall be taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipments of each department shall under respective department heads.

5.1.2 DOCUMETATION & RECORDS

The environmental department in respect of operation of pollution control facility will maintain following records.

- Instruction manual for operation and maintenance of pollution control equipments.
- Log sheet for self-monitoring of pollution control equipments.
- Manual for monitoring of Air, water for Ambient conditions
- Instruction manual for monitoring of water, solid and gaseous parameter discharged from the factory and also for various parameters of pollution control facilities.
- Stationary records as per the Environmental Acts.
- Monthly and annual progress reports.

CHAPTER - 7

ENVIRONMENTAL MANAGEMENT PLAN

7.1 BACKGROUND

The industry shall adopt a comprehensive Environmental Management Plan (EMP) which will cover several environmental protection measures, not only for abatement of environmental pollution resulting from the project, but also for the improvement in the ambient environment. The various components of the EMP are outlined in subsequent sections. An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

7.2 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The Environment Management area will be handled by a Qualified Manager with adequate training and experience in operation of ETP and management of other pollution control measures. He will be assisted by a Qualified Executive and one operator (in each shift) to run ETP and other pollution control system.

All the necessary controls w.r.t. management of Liquid / Hazardous / Gaseous pollutants will be exercised.

For all liquid effluents, full fledged effluent treatment plant consisting of primary, secondary and tertiary treatment will be installed to ensure adequate treatment prior to discharge.

Process stacks will be equipped at safe height with scrubbers where required to ensure emissions within prescribed limits.

DG sets will be provided with acoustic enclosure and stack.

To handle hazardous waste as per Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 of Environment Protection Act, 1986.

Hazardous waste will be disposed off at the common Incinerator / secured land fill facility available in the nearby vicinity.

- Fixed gas detection system will be installed in the workplace area.
- Work place monitoring will be carried out regularly through continuous monitoring systems and periodic checking.
- Ambient air quality will be monitored regularly.

- Good green belt will be maintained inside and outside the premises by planting trees, developing lawns.
- To work in R&D for continuous improvement in process to reduce Pollution Load & moving towards adopting cleaner production technology.

7.3 ORGANOGRAM OF ENVIRONMENT MANAGEMENT PLAN

Apart from having an environmental management plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring effective implementation. In this effect, M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will assign responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures.

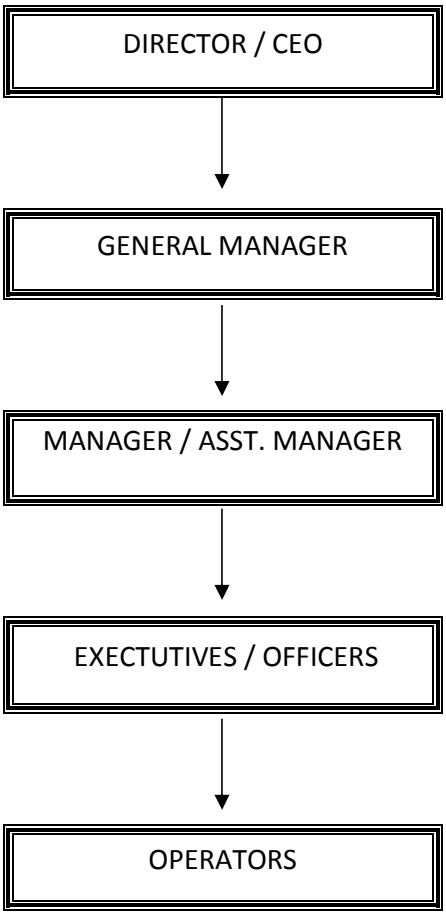
An organogram of Environment management plan is shown in Figure 7.1. This department shall undertake the monitoring of environment pollution level by measuring stack emissions, Ambient air quality, water and effluent quality, Noise level, etc. either departmentally or by appointing external agency whenever necessary. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall have its own laboratory equipped with different equipment for environmental monitoring.

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall carry out the regular monitoring in future as well as ensure that pollution is limited below prescribed limits and shall take corrective action by providing new pollution control equipment if required. In case the monitored results of environment pollution are found to exceed the prescribed limits, remedial actions are taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipment of each department is under respective department heads.

The environmental department shall also look after preparation and submission of Water Cess Return, Environmental statement and Consolidated Consent & Authorization application/ renewal under water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Ambient Air Quality as per NAAQS Standards, 2009 and Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016 under Environment Protection Act, 1986.

FIGURE - 7.1

ORGANOGRAM OF ENVIRONMENT MANAGEMENT PLAN



HEMANI INTERMEDIATES PVT. LIMITED (UNIT-IV)
PLOT No.E-362,GIDC,DAHEJ,DIST:- BHARUCH

Environment, Health and Safety Policy

We, at Hemani Intermediates Pvt. Limited (UNIT-IV), Dahej (Guj), India, perceive economical and responsible Environmental, Health and Safety (EHS) Management as an integral part of achieving our goal to grow the value of our businesses for our stakeholders.

We are committed to protecting the health and safety of all employees and ensuring that our activities are not harmful to the environment and the greater community.

OUR PRINCIPLES

- **All accidents can be prevented;**
- **No task is so important that risk of injury to people or damage to the environment is justified.**

OUR OBJECTIVES

- **Zero harm to people and the environment;**
- **To show leadership in the field of EHS Management; and**
- **To work in a responsible and sustainable manner.**

OUR METHODS

We will meet these objectives by:

- **Complying with all legal and regulatory requirements;**
- **Eliminating hazards, practices and behaviors that could cause accidents, injuries or illness;**
- **Implementing controls to eliminate pollution and environmental harm;**
- **Promoting a positive culture based on improving our HSE performance;**
- **Integrating HSE management into all aspects of the organization;**
- **Providing training and resources for staff to maintain safe systems of work;**
- **Employing contractors who aspire to the same EHS standards; and**
- **Communicating with our employees, customers and other interested parties by regularly reporting on our EHS performance and maintaining an open dialogue.**

DATE 01.10.2014 **General Manager**

(Satish Patel)

7.3.2 CORPORATE ENVIRONMENT RESPONSIBILITY

- To develop & to promote the technology having minimum pollution of Air, Water & Land.
- Educating & promoting staff & workers for creating safe working atmosphere.
- More & more tree plantation in the surrounding open area within site.

7.3.3 MANAGEMENT RESPONSIBILITY

- CEO is overall responsible for effective implementation of Occupational Health, Safety & Environment Management System (HSEMS)
- Core Committee conducts management review every Six months to assess the effectiveness of HSE Management System. If necessary the committee allocates resources for taking Corrective and Preventive action on Non-Conformance.
- The Core Committee advises and monitors the establishment and implementation of HSEMS
- HODs, Dept. in-charges, Supervisors, are responsible for implementing HSE Management Programs. Safety Officer to lead the programme. All the employees are responsible for implementing and maintaining HSE Management System.
- HODs are responsible to define and monitor the key characteristics for measure of performance in HSE. HODs are responsible for control of all the documents and data as per the requirement of ISO-14001 and OHSAS 18001
- Verification activities, including internal HSE Audits, are carried out at the direction of Core committee and team of Internal Auditors.

The organization structure of new unit (Unit-IV) of M/s. Hemani Intermediates Pvt. Ltd. at Plot No. E-362, GIDC Estate, Dahej-I, Ta: Vagra, Dist: Bharuch – 392 130, Gujarat, will be as per Organization Chart. The Roles, responsibilities, accountabilities and authorities of key personnel have been defined in the following paragraphs:

ROLE – 1: GENERAL MANAGER (OPERATION HEAD)

RESPONSIBILITIES:

- He is responsible for entire activities of Unit-IV.
- He is responsible to define HSE policy and ensure that this policy is understood, implemented and maintained at all levels in the organization.
- He is also responsible to provide adequate resources for achieving improved Occupational Health Safety and environmental performance
- He is responsible for setting organizational HSE objectives and targets.
- He is also responsible to review HSE management system at appropriate intervals, to ensure its continuing and effectiveness. Monitoring of effectiveness of the system shall be done through Management Reviews
- He is also responsible to appoint Management Representative and extend support and resources in implementing HSE management system.
- He is responsible for procurement of raw material (Indigenous & Imported) and engineering goods as per the specifications
- He is overall responsible to ensure that legal requirements are met as per the legal register.
- Review the implementation of HSE Management System and its effectiveness, at appropriate intervals, to ensure continual improvement of the organization's overall performance

In absence of General Manager, other unit's Operations Head oversees his functions. CEO also may look into the delegation of authority, during his absence.

ACCOUNTABILITY

He is accountable for all operations being carried out in the organization. His scope of accountability in terms of HSE is as follows

1. Establishment, operation and maintenance of ISO 14001 and OHSAS 18001 systems in all spheres of manufacturing site.
2. Review of performance and progress of the management systems by periodic review through Management review.
3. To ensure availability of resources essential to establish, implement, maintain and improve the HSE management system.

MRM INCLUDES

1. The AMR shall obtain the findings of statutory inspection and testing reports from concerned departments and present in the management review meeting for discussion and action
2. The minutes of the Management Review Meeting are recorded and circulated to all members of the HSE Apex Committee.

Assistant MR shall prepare minutes of meeting within two days after the meeting. He shall ensure that the review outputs are recorded in the “Action decided” column of format of Minutes of Management review meeting.

7.4 ENVIRONMENT MANAGEMENT PLAN

The Environment Management plan is meant for mitigation/ management of the adverse impacts and the strengthening positive impacts during proposed project. Environment Management Plan is tabulated in Table:-7.1

7.4.1 CONSTRUCTION PHASE

During Construction Phase sanitation facilities are required. Temporary facilities shall be made available to construction personnel. Necessary PPE's shall also be provided.

- **Sanitation**

The site should be provided with adequate and suitable sanitary facilities to maintain proper standard of hygiene for construction workers. These facilities should include water supply, sanitary toilets, rest room, etc.

- **Noise Environment**

Noise effect on the nearly habitation during construction activities will be negligible as the nearest habitat is more than 3 km from the plant. However, construction labor would be provided with noise protection devises like ear muffs and occupational safety ware, as per requirement. And noise generating equipment shall be stopped during night hours.

- **Construction Equipment & Waste**

The waste oil generated by construction equipment, if any, would be disposed through authorized recyclers and unauthorized dumping of waste oil shall be avoided. Other wastes shall be disposed-off by adopting environmentally compatible methodology.

- **Storage of Hazardous Materials**

The hazardous material such as lubricating oils, compressed gases (for welding), paints, varnishes, etc. are required to be stored at the site during construction phase. Since, these materials are hazardous in nature; they shall be stored as per the prescribed / accepted safety norms.

- **Solid / Hazardous Waste Disposal**

The hazardous materials used during the construction may include petrol, diesel, welding gas and paints. These materials would be stored and handled according to the guidelines specified under Hazardous Waste (Management, Handling & Trans-boundary Movement) Third Amendment Rules, 2010. Some of the precautions of storage and handling of the hazardous materials and waste includes the following:

- ✓ Dyke enclosures would be provided where-ever necessary for storage of hazardous materials.
- ✓ Diesel and other fuels would be stored in separate dyke enclosures.
- ✓ Separate storage for waste paints and thinners, contaminated rags and brushes to facilitate recycling and reuse. Rags could be laundered for reuse.
- ✓ Vehicle maintenance area to be selected properly, to prevent contamination of soil and ground water by accidental spillage of oil, and other wastes

TABLE:-7.1

ENVIRONMENT MANAGEMENT PLAN

ENVIRONMENT ISSUE/COMPONENT	REMEDIAL MEASURES
Hazardous waste generation & disposal	Proper collection, Safe Handling, Storage within premises and disposal of waste at approved TSDF, incineration facility, re-cyclers, re-processors.
Effluent generation and treatment	New Effluent treatment plant will be provided for treatment of wastewater generated from new project.
Emission from stack	Adequate pollution control system will be provided for control of gaseous emission. • Adequate stack height for better dispersion of pollutants • ESP & Scrubbers at Stack & Process Vents
Noise	Acoustic enclosure on DG sets, engineering control at high noise level areas like compressors etc, wherever feasible, proper oiling, lubrication and maintenance of equipment, development of greenbelt around plant boundary and inside plant
Greenbelt	25% of the plant area will be developed as greenbelt.
Rainwater harvesting	Not recommended.
Information and awareness about hazardous chemicals plant	Awareness and information will be provided within 5 km of the study area about the hazardous situations.
Preparedness to handle onsite & offsite emergency	Onsite & Offsite Emergency Management Plan will be prepared
Monitoring of Environmental parameters	Regular monitoring of various environmental parameters will be carried out to check the effectiveness of the control system.

7.4.2 WATER ENVIRONMENT

Water requirement shall be met through GIDC Water supply. However, record of water consumption for different usages should be maintained.

Water Pollution and Its Mitigation Plan

Daily water consumption shall be 366 m^3/ day and daily wastewater generation shall be 139 m^3/ day (119 m^3/day: Industrial & 20 m^3/day: Domestic). Water requirement for the proposed project shall be met through GIDC water supply. GIDC water supply authority is ready to supply the required water to M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV). Wastewater from Industrial Operations will be treated in effluent treatment plant. The final treated effluent (69 m^3/day) will be discharged through GIDC pipeline line to deep sea. And MEE Condensate (50 m^3/day) will be resued in plant premises.

Construction Phase

- The drinking water and sanitation facilities at the project site will be available to the construction work force. This is necessary to reduce pollution of any receiving water body and also to prevent hazards due to water borne vectors.

Operation Phase

- The wastewater will be treated in effluent treatment plant and discharged through GIDC pipeline to deep sea**.**
- Annual environmental audit will be carried out every year from recognized Schedule-I environmental auditor.
- Records of analysis results of treated and untreated wastewater along with MLVSS in aeration tanks should also be maintained.
- Adequate spares for effluent collection, handling, treatment and disposal system should be maintained.
- Proper housekeeping should be adopted to prevent spillages and contaminated surface runoff going to storm water drains.
- The additional water will also be utilized for various activities like horticulture, fire water make-up, etc. The following measures would be taken to minimize the water usage in the operational phase:

- ✓ Endeavor to reduce the actual process water consumption by way of improvement in operation of processing units.
- ✓ Water saving by shower head flow controls, spray taps and faucet aerators and photo-sensitive taps.
- ✓ Exploring other options of reusing the treated effluent besides fire water make up or for horticulture development.

7.4.3 AIR ENVIRONMENT

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) proposes pesticide manufacturing plant at Plot No. E-362, GIDC Estate, Dahej-I, Ta: Vagra, Dist: Bharuch – 392 130, Gujarat. There are 6 types of source of air pollution in Proposed Scenario at M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) i.e. stack attached to Boiler, DG Set, incinerator & Process Vents (3 Nos.). ESP, Ventury & Packed Scrubber, Alkali Scrubbers & Two Stage Water Alkali Scrubbers will be installed to prevent air pollution. The baseline ambient air quality monitoring is carried out during study period (March, 2014 to May, 2014) around Project site (within the study area), clearly reveals that the concentrations of PM_{10}, $PM_{2.5,}$ SO_2, $NO_{X,}$ HCl, Cl_2, O_3, Pb, CO, NH_3, C_6H_6, Benzo (a) Pyrene (BaP), Arsenic (As), Nickel (Ni) & VOCs are well within the prescribed limits as per the National Ambient Air Quality Standards for residential & Industrial.

- The major sources of air emission from the proposed project are:

1. Non point sources emissions
2. Point source emissions
3. Fugitive emissions

7.4.3.1 ACTION PLAN TO CONTROL AMBIENT AIR QUALITY AS PER NAAQES STANDARDS:

Control Measures:

The design stage endeavors to mitigate the problems related to environment and health at the process technology/ source level itself. Besides standards, emphasis would be given to comply with all design standards/ regulatory norms as specified by CPCB/MoEF/GPCB etc. Following measures would be taken right from the design stage to ensure compliance with applicable regulatory standards:

• Use of low sulfur fuels in D.G.Set.

• Under normal circumstances, there will be no continuous release of volatile hydrocarbon streams. However, if during start-up/ shut down or an emergency situation any hydrocarbon stream is released, the same will be directed to an elevated flare for complete combustion. This will eliminate the possibility of forming an explosive mixture due to sudden release of un-burnt hydrocarbons to the atmosphere.

Construction Phase (Non point sources emissions)

Generation of suspended particulate matter is a common phenomenon due to transportation of constructions materials. This would be mitigated by allowing the vehicles entering the premises under cover. Emission of fugitive dust due to movement of heavy vehicles etc. shall be controlled by spraying water in the affected zone. Hosing down the wheels of the vehicles with water and providing washing troughs for them would further mitigate the amount of dust generated. In addition, emission of other pollutants from construction machinery using diesel driven prime movers, will be controlled by proper maintenance.

Operation Phase (Point sources emissions)

In-plant Control Measures: Some of the mitigation measures, which can reduce the impact on air environment, are as follows:

- Ensuring the operations of various process units as per specified operating guidelines/ operating manuals.
- Strict adherence to maintenance schedule including lubrication for various machinery/ equipment.

- Emission at M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will be in the form of the gas emission from Boiler, DG Set and Process vents (6 Nos.). Moreover, regular monitoring of stacks shall be carried out to check the emissions. Record should be maintained for changing of scrubbing media on printed logbook In case emissions exceed, the corrective measures should immediately be taken and records of the same should be maintained.
- Regular ambient air quality monitoring shall be carried out within premises and should also be carried out in the nearby area for PM_{10}, $PM_{2.5}$, SO_2, NOx & VOCs.
- A greenbelt around the factory will be developed for reducing the air pollution and attenuation of noise.
- Adoption of good house-keeping.

7.4.3.2 INFORMATION FOR CONTROL OF FUGITIVE EMISSIONS

The emissions are normally defined as emissions to the atmosphere resulting from leaking piping sources and equipments such as valves, flanges, pump seals, connections, and compressor seals open end lines and pressure relief valves. The emissions are not visually observed but can be measured in relatively low concentration at each area of source.

Fugitive emissions are expected to be generated during construction and operation stages of the proposed project. During construction stage, main source of fugitive emission is dust which is expected mainly due to movement of vehicles carrying construction material and vehicles used for construction. During operation stage, leakage through valves, pumps, emission from open drum containing chemicals, open feeding; storage tanks, etc. are the major sources of fugitive emissions of organic chemicals and VOCs. Excess use of solvent may also results fugitive emission from the process vessels.

The above will be controlled by having proper scrubbing system with a provision of primary and secondary scrubbers, boiler stacks will be provided with ESP to take care of particulate matter, Condenser to trap VOC, solid raw material charging will be done through closed system. Proper maintenance schedule will be adhered to avoid emissions through flange joints, pump seals, etc. Proper gland packing is always maintained for pumps and valves and to the extent possible pumps will be with mechanical seal.

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall have fully closed system. Adequate dust collector will be installed for control of fugitive emission during loading of raw material and product. Condenser will be provided to trap VOC. All the Flange joints of the pipe lines which carry solvents will be covered with flange guards. All the rotating equipments like pumps will be installed with Mechanical Seals to arrest any sort of emissions. VOC detectors will be installed at various places to identify any fugitive emissions. A regular preventive maintenance schedule will be in place to replace or rectify all gaskets and joints etc. as a part of ISO systems to ensure no fugitive emissions shall take place.

Following measures will be adopted to prevent and control fugitive emissions:

1. Airborne dust at all transfers operations/ points will be controlled either by spraying water or providing enclosures.
2. Care will be taken to store construction material properly to prevent fugitive emissions, if any.
3. Adequate ventilation will be provided.
4. Regular maintenance of valves, pumps, flanges, joints and other equipment will be done to prevent leakages and thus minimizing the fugitive emissions of VOCs.
5. Entire process will be carried out in the closed reactors with proper maintenance of pressure and temperature.
6. Periodic monitoring of work area will be carried out to check the fugitive emission.
7. Breather valves will be provided on solvent tanks.
8. Solvent tank vents will be connected to vent chillers.
9. To eliminate chances of leakages from glands of pumps, mechanical seal will be provided at all solvent pumps.
10. Stand by pumps will be provided on all scrubbers. Besides, scrubbers will be equipped with on-line pH meter with hooter system for better operational control.
11. Close feeding system will be provided for centrifuges. Centrifuge and filtrate tank vents will be connected to vent chillers.
12. Minimum number of flanges, joints and valves in pipelines.
13. Regular inspection of floating roof seals and proper preventive maintenance of roofs and seals for tanks

14. Fugitive emission over reactors, formulation areas, centrifuges, chemical loading, transfer area, are collected through hoods and ducts by induced draft and controlled by scrubber/ dust collector.
15. Dedicated scrubbers are provided are used for fugitive emissions to control
16. For dust emissions, cyclones / bag filter provided.
17. Emphasis has been given to solvent management / solvent loss prevention as shown in the solvent management plan.
18. Enclosures to chemical storage area, collection of emission from loading of raw materials in particular solvents through hoods and ducts by induced draft, and control by scrubber / dust collector to be ensured.
19. Nitrogen blanketing, provided, besides special care needs to be taken for control in respect of odorous chemicals.

7.4.4 NOISE ENVIRONMENT

The sound pressure level generated by a noise source decreases with increasing distance from the source due to wave divergence. The propagation and attenuation of noise pressure wave is dependent on many parameters amongst which, the medium of travel and the ambient conditions are the most significant parameters. In order to minimize adverse impact on the noise environment, due attention shall be given for implementing noise control measures. Comprehensive measures shall be taken at design stage for noise from proposed unit. The measures are as under:

- The noise level at the plant boundary shall be restricted to 75 dB(A) during day time and 70 dB(A) during night time.
- Noise level shall be specified for various rotating equipment as per Occupational Safety and Health Association (OSHA) standards.
- Equipment lay-out shall be done considering segregation of high noise generating sources.
- Erection of suitable enclosure, if required, to minimize the impact of high noise generating sources.
- There may be small addition to the ambient noise level, due to the increased transportation activities. This creates a slight adverse impact on the sound environment.

- Regular oiling, lubrication and maintenance of the equipment shall be carried out to minimize noise generation.

During Construction Phase

Following measures shall be taken for abatement of noise during construction phase:

- Noise emissions from construction equipment will be kept to a minimum by regular maintenance.
- Heavy and noisy construction jobs shall be avoided during night hours.

Following measures shall be adopted for abatement of noise during operation phase:

- Acoustic laggings, enclosures and silencers shall be provided wherever necessary for high noise generating equipment.
- Sound proof glass paneling shall be provided for all operating stations / control rooms as well as for shift rooms at critical places.
- Strict implementation/ compliance of all statutory norms w.r.t. noise generation, occupational exposure shall be done.
- Use of personal protective devices such as ear-muffs and ear-plugs shall be strictly enforced.
- Acoustic barriers / shelter shall be developed in noisy workplaces.
- Noise generating sources in the plant areas shall be monitored regularly. Monitoring of ambient noise levels should also be carried out regularly both inside the premises as well as outside the greenbelt.

During Operation Phase

However, due to the attenuation of noise level within the factory and due to the fact that the project site is situated in a well developed industrial estate and not in the immediate vicinity of human settlement, significant impact is not expected in the nearest present human settlement. The volume of transport vehicles to be handled is very low. The company shall develop a green belt around the periphery of the premises, which shall act as a barrier to the propagation of noise from the factory premises. This shall further reduce the noise levels appreciably.

- It is recommended to measure and maintain records of noise level at various places within and outside factory premises.

- Manufacturers/ suppliers of major noise generating equipment/ machines like compressors, turbines, generators should be asked to take required measures for minimizing the noise levels generated by machines by using noise absorbing material for various enclosures or using appropriate design/ technology for fabricating/ assembling the machines.
- Audiometric tests should be conducted periodically for the employees working close to the high noise sources.

7.4.5 LAND ENVIRONMENT

7.4.5.1 HAZARDOUS WASTE MANAGEMENT

Forteen categories of hazardous wastes will be generated from the Proposed Project. Treatment, Storage & Disposal mode for the same will be followed as per Hazardous & Other Wastes (Management & Trans-boundary Movement) Rules, 2016.

Record of hazardous waste generation and disposal shall be maintained on printed logbook. All necessary precautions shall be taken during handling, loading and unloading of hazardous wastes.

Storage of Hazardous Waste:

- Hazardous waste shall not be stored for a period more than 90 days. And shall maintain records and make them available for inspection.
- Store at a designated Onsite-secured area with impervious floor that affords protection from sun & rain fall, spreading of leachate, mixing of wastes etc.

Transportation of Hazardous Waste:

- Properly packed & labeled waste transport through dedicated vehicle to a captive facility/ authorized TSDF facility.

Disposal of Hazardous Waste:

Proposed

- ETP Sludge → Collection, Storage, Transportation and Disposed at common TSDF of M/s. BEIL, Dahej.

- Incinerable Liquid Waste → Collection, Storage, Transportation and Disposed at common Incineration of M/s. BEIL, Dahej or within premises.
- Incineration Ash → Collection, Storage, Transportation and Disposed at common TSDF of M/s. BEIL, Dahej.
- Used Oil → Collection, Storage, Transportation & disposed by selling to Registered Reprocessors.
- Empty Drums/Containers & Empty Bags → Collection, Storage, Decontamination & Sold to GPCB authorized vendors.
- HCl (32%) → will be sold to end user.
- Fly Ash → Collection & sold to Brick Manufacturers.
- Sodium Sulphate Solution (30% to 35%), Potassium Chloride Solution, H_2SO_4 (70%) & Sodium Sulfite /$AlCl_3$ → Collection, Storage, Transportation & sold to end users.

7.4.5.2 IDENTIFICATION OF RECYCLE/REUSE, CLEANER PRODUCTION AND CO-PROCESSING OPTION OF HAZARDOUS WASTE

- It is recommended to analyze each hazardous waste periodically and maintain records.
- Check the calorific value of the ETP Sludge and then explore possibilities of Co-Processing in Cement Industry as Primary fuel. Waste materials used for co-processing are referred to as alternative fuels and raw materials (AFR).
    1. On-site recovery of solvent in distillation column. Recovered solvent will be recycled back for re-used and distillation residue will be sent for co-processing in cement industries or incineration.
    2. All the non-biodegradable effluents generated from plant will be converted into biodegradable effluents followed by conventional treatment in wastewater treatment plant. Treated effluent will discharge to deep sea as per GPCB norm.
    3. Second wash of plant/ equipment will be re-used as first wash in the same equipment/ reactor to reduce fresh water consumption.

7.5 GREEN BELT DEVELOPMENT

Tree plantation is known for improving the aesthetic and climatological environment of an area and properly designed green belt can help in ameliorating air pollution to a very significant degree. It should be borne in mind that the green belt will be most effective as a sink for particulate matter and gaseous emissions from ground level sources, such as, fugitive emissions. Effectiveness of green belt for the elevated sources is rather limited but its action as a green lung greatly helps in improving the air quality of the area.

BREAK UP OF DIFFERENT LAND USE OF FACTORY

Total Plot Area is of 9,705 m^2 out of which 2,400 m^2 (approx.) i.e. 25% of land shall be utilized for the green belt area.

Good greenery shall be maintained in and around the site by planting various types of tress and maintaining lawns. 2,400 m^2 area (approx.) shall be utilized for tree plantation / development of lawns. A green belt with width of min. 1 meter shall be developed within the site boundary and across the premises inside roads. Trees like Asopalav, Neem, Gulmohar, Champa, Gauva, Babul, Palm Trees, Nariyal, Ghaneri, Shevga, Jangli badam, Sag, Jamun, Mango, Rain tree etc. shall be planted in and around the site.

Green Belt to Trap and Absorb Pollutants

A green belt traps and absorbs pollutants without altering the biogeochemical cycle of water and nutrients. Absorption and trapping capacity of trees depend on height of plant, canopy structure, physiognomy and morphological character of leaf. Once fully developed, such tree plantations can serve as buffer and shock absorber against transient and accidental release of pollutants caused by power, equipment and human failures. Green belt is usually designed in such a way that the first few rows in a green belt have a shorter height and dense canopy. Plants native to an area are generally used to suit the prevailing ecosystem and biogeochemical cycle. Native plants are more tolerant to disease, grow at a faster rate and result in better attenuation of pollutants.

Plantation Design

In view of the different functional requirements of the plant in an industrial area, the pattern of plantation within plant is discussed as below:

A. Curtain Plantation

To help in restrict the movement of pollutants from inside to outside and from outside to inside, a thick green belt shall be developed at the peripheral limits of the plant along the boundary walls whenever feasible. The curtain will be an effective buffer against gases, dust and noise.

B. Avenue Plantation

Linear plantations along road-sides help reduce air and noise pollution from automobiles as well as general emissions from the industrial units. To combine bio-aesthetic and pollution abatement needs, parallel rows of trees (inner and outer rows) shall be planted on the roads and boundary.

C. Field Plantation

Plantation on the open stretches of land helps improve the general ecological conditions of the habitat by adding greenery to the landscape and by providing a vast canopy of foliage for sink of pollutants generated in the area. The open land spaces, not used for industrial purposes, shall be filled with plant species.

D. Ornamental Plantation

The immediate area of each building shall be arranged into a lawn, fringed by flower beds. In some strategic corners flowering climbers been used to highlight the visual effect.

Plantation Details

Actual Status of Plantation/Green Belt

Trees species to be planted at plant are in line with trees species recommended in CPCB's guidelines for developing Greenbelts. For plantation at the plant in future, it is suggested that these guidelines should also be followed for selecting pollutants tolerant and absorbent species.

(a.) Species of tree planted

Green Belt	Avenue Trees	Shrubs	
		Above 3m height	**Below 3m height**
Jamun	Alstonia	Bamboo	Pentas var.
Gulmohar	Pinkcaassia	Bahunia	Galphemia
Peltophorum	Spethodia	Large stomia	Miniature bamboo
Kasid	Paras, papal	Cordia	Jestropha
Gultora	Pendula	Karen	Hibiscus var.
Karen	Gulmohar	Gulltora	Braya
Kapop	Jackranda	Tecoma var.	Palmbago capensis
Neem	Bignonia	Tagari	Acalypha var.
Arjun	Largestomia		Russolia
Sisoo	Cadamba		Duranta var.
Australian babul			Lantana var.
Nilgiri			Cassia biflora
Babul			Ixora var.
Pangara			Vinca
Cassia fistula			Croton
			Cana

(b.) Co-relation of Trees with pollution control

Trees	Air pollution		Dust	Noise	Salt
Trees	Nilgiri	Karen	Pendula	Neem	Neem
	Pangara	Pendulla	Bahunia	Peltophorum	Gulmohar
	Babool	Neem	Paras pipal	Jamun	
	Cadamba	Bogunvelia	Cassia fistula	Pendula	
	Vinca	Croton			
	Tecoma var.	Spethodia			
	Alstonia	Gulmohar			
	Jackranda				
Places:	Green-Belt	Plant Area	Plant Area	Plant Area And green belt	Plant Area

GREEN BELT DEVELOPMENT PROGRAMME

YEAR	NO. OF TREES/PLANTS TO BE PLANTED IN PLANT AREA
2015-2016	300
2016-2017	200
2017-2018	200
2018-2019	100

7.6 OCCUPTIONAL HEALTH AND SAFETY

Health hazards associated with the occupation are called occupational hazards. In chemical industry due to handling of toxic and hazardous chemicals there are possibilities of developing occupational diseases. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall carry out the following checks to curb the problem:

i) Pre - employment medical check up at the time of employment.

ii) Annual medical check up shall be done for all employees.

iii) First aid training shall be given to the employees.

iv) Monitoring of occupational hazards like noise, ventilation, chemical exposure shall be carried out at frequent intervals, the records of which shall be documented.

OHC Room will be provided at Security building. Professional doctor will be called every week at factory. And routine checkup of all employees will be carried out annually for all standard tests needed as per Factory Inspector Office. Employees will be trained frequently through special master faculties on various points related to occupational health to create more awareness on the subject. All precautions shall be taken to avoid foreseeable accidents like spillage, fire and explosion hazards and to minimize the effect of any such accident and to combat any emergency at site level. Some of the preventive safety measures shall be taken to minimize the risk of accident with respect to Technical Safety, Organizational Safety and Personal Safety are listed below:

- Company shall take all reasonably practicable measures to minimize the risk of such accident in compliance with the legal obligation under the relevant safety.
- All building plans and installations shall be as per relevant acts and duly approved by competent government authorities.
- Process and Equipment shall be designed by qualified and experienced professionals and fabricated to applicable national / international codes with stage wise inspection.
- Pressure Relief Valves and rupture disks shall be installed on the reactor and jackets wherever required.

- Hazardous processes shall be operated by trained workers and shall be looked after by qualified & experienced supervisors.
- Safety features such as fire extinguishers, fire hydrant system and suitable Personal Protective Equipment (PPE) shall be provided. Regular operations and testing of fire hydrant system and fire extinguishers shall be carried out.
- Suitable provisions for control of critical process / storage parameters within specified safe limits (use of pressure relief valves, rupture discs, safety valves, trip circuits, wherever necessary) shall be done.
- Use of flameproof electrical equipment, flame arresters and breather valves shall be done.
- Provision of Earthing and lighting arrestor to prevent electrical fires and explosions in flammable / explosive chemicals storage / processing areas shall be done.
- Tanks storing hazardous liquid chemicals shall be provided with dyke wall to confine any spillage and facilitate easy collection. Necessary separation distance shall be maintained.

Personal Protective Equipment (PPE) like goggles, safety shoes, helmet, apron, earplugs, facemask & clothing shall be provided to employees as per the job requirements. The company shall prepare a comprehensive on-site emergency plan with well-defined responsibilities to face any eventuality caused under adverse circumstances and unforeseen reason.

7.7 INFORMATION FOR RAIN WATER HARVESTING

It is not recommended to provide rain water harvesting facility for M/s. Hemani Intermediates P. Ltd. (Unit-IV) as it is pesticide industry.

7.8 MEASURES FOR CONSERVATION OF ENERGY

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) shall adopt various measures for energy conservation:

- Energy efficient machineries will be used during operation phase.
- Installation of economizer & high efficiency burner on steam boilers
- Company shall try to utilize renewable sources of energy for conservation of non-renewable sources of energy.

- Enough care will be taken to prevent/minimize energy losses at each stage.
- Energy audit will be used as a tool for monitoring purpose.
- External lights will be controlled through timers for auto on/off function based on timings.
- The cable size will be selected so as to minimize the power losses.
- The power factor improvement capacitors will be provided individually for AC loads.
- Using water cooled chillers, variable frequency drives for secondary pumps and public area and building management system for HVAC equipments with non-CFC and non-HCFC based refrigerants.
- Use of VFDs for various utilities in variable load application to optimize pump and air handling unit performance, wherever required.
- Automated day light control.
- Efficient lamps and ballasts.
- Automated control for external lighting (Astronomical/Sensor)
- Occupancy Sensors.
- Phase-wise implementation of Advance Process Control (APC) in the process plants
- Replacement of conventional lighting fixture by more energy efficient fittings.
- Installation of improved insulation over the High Pressure (HP) steam line to reduce the heat loss.
- Use of FRP blade on Cooling Tower

Company shall explore possibility of use of solar energy for various infrastructure operations. Also use of Energy Efficient Lighting, Transformers, HVAC system, Use of Energy Efficient Motors, electrical appliances to minimize the energy consumption in addition to Process Planning.

7.9 NATURAL RESOURCES CONSERVATION

The substances that are found in nature and are used by the man for his welfare directly or indirectly are called as natural resources. Sun, wind, soil, fossil fuels, wood, forest, flora and fauna are some of the examples of natural resources. The judicious or wise use of natural resources in such a way that the present generations make use of natural resources without

compromising the needs of the natural resources for the future generation is called as **conservation of natural resources**.

Conservation of Natural Resources

As natural resources are beneficial to human beings, maintain ecological balance and at the same time are in a threat of getting depleted due to its indiscriminate over exploitation, there is an urgent **need for conservation of natural resources.** This can be accomplished by the following ways:

- Alternative forms of energy such as solar energy etc. shall use more in comparison to fossil fuels. Alternative forms of energy are eco-friendly, do not cause pollution and are renewable.
- Avoid using plastics, synthetic materials etc as these materials cause damage to the soil.
- Water is precious natural resources and hence avoids wasting water. Taps shall be closed when not in use.
- Adopt **3 R's** for conservation viz, **Re-use, Reduce and Re-cycle**.
- Trees shall be planted along roadsides, railway tracks and waste lands and deforestation should be avoided.
- Don't waste electricity. Fans and lights shall be switched off when not in use.

7.10 SKILLED AND TRAINED MANPOWER

Employment would be as per prevailing norms of state government for skilled and trained people for the proposed project. The company has sufficient skilled manpower for the existing unit and their technical, administration and other staff are sufficient to take care of the proposed plant. M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) will give employment to about 50 employees (Including Contract Workers).

7.11 SOCIO-ECONOMIC DEVELOPMENTAL ACTIVITIES

Apart from business, Hemani Intermediates Pvt. Ltd. (Unit-IV) shall be devoted to social commitments and will continue to do the same as per the needs of nearby village people. For Corporate Social Responsibility, Various Programs/ Projects related to Social & Economic development of surrounded area has been planned, which are as follows, Planned for providing Water purifier for Village people, conducting medical camps for Cataract

operation, pregnant women check up & Senior Citizen Check-up, deputing teacher for literacy development to Senior Citizens. Other such activities as stated as below:

A) Natural Resource Management – The main focus of this program will be to maximize the yield returns of the farmers through efficient management of existing resources & extension of new agricultural practices.

1) Integrated Agricultural Growth Project – For improvement and use of the modern techniques and thereby would certainly contribute to prosperity in the agriculture sector and reduce the rural poverty by programs like Farmers Training, Nursery Growing Trainings, Modern agriculture equipment distribution programs etc.
2) Animal Husbandry Projects – Various programs like health checkups & treatment, vaccination program, Anti sterility camps, breed improvement etc. will be carried out.

B) Income Generation Program -

1) Establishment of Self help groups
2) Rural Entrepreneurship Development Program
3) Handcrafts Development Program
4) Vocational Training
5) Business process outsourcing

C) Health, Education & Infrastructure

1) Aids Awareness Program
2) General Health Camps
3) Innovative Teaching Methods
4) Adult Education
5) Sanitation
6) Infrastructure Development Projects

Socio-Economic Developmental Activities

Financial Years >>>>>> CSR Programme with Activities Description	**2016-2017**	**2017-2018**	**2018 -19**	**2019-2020**	**2020-2021**	**Total**
	Amount to be spent (INR Lakhs)					
Skill Development • **Scholarship for higher study.** • **Scholarship for Professional course (ITI).**	**1.0**	**1.0**	**1.0**	**2.0**	**2.0**	**7.0**

• Counseling to 10th & 12th Student to prevent them getting nervous break-down (exam-phobia) • Conducting Mahila Gruh Udyog Training.						
Infrastructure • Drinking Water alongwith R. O. System. • Contribution for water Tank • Furniture & Light Fittings to School. • Donations to Schools for other activities. • Drinking Water Hub (Hawadas) for kettles • Toilets.	1.0	1.0	2.0	2.0	2.0	8.0
Health & Hygienic • Health, Eye & Dental Check-up camp. • AIDS & HIV awareness Camp • Kettle Health Check-up Camp & Medicines distribution. • Items distribution for mother & students health improvement.	2.0	2.0	3.0	3.0	3.0	13.0
Socio-Economic • Donation to Vrudhdhashram for special event like tour, festival celebration etc… • Financial support to skill development programme for disable & mentally retarded person. • AIDS & HIV awareness Camp. • Financial support to needy Senior Citizens. • Financial support for needy farmers for purchasing seeds, fertilizers & chemicals.	1.50	2.0	2.50	2.50	2.50	11.0

Social Functions, Sports & Recreation & Awareness • **Donations for local festivals celebration like Holi, Navratri, Ganesh Pooja, Dussera, New Year etc.** • **Sponsorship for Cricket Tournament.** • **Financial support to Khel Mahakumbh.** • **Financial Support for Sports Day celebrations in Schools.** • **Financial support for Beti Bachao Abhiyan (Save Girl Child) & Kanya Shikshan Abhiyan.**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**10.0**
Year-wise Total >>>>>	**7.50**	**8.0**	**10.50**	**11.50**	**11.50**	**49.0**

7.12 SOLVENT RECOVERY PLAN

Name of Solvent	Total Solvent Input Kg	Qty of Solvent Recycled Kg	Qty of Losses Kg	% Recovery	% Loss
EDC	8450	8200	250	97.04	2.96
THF	1200	1150	50	95.83	4.17
DMF	5400	5215	185	96.57	3.43
Toluene	4000	3875	125	96.88	3.12
Methanol	1800	1715	85	95.28	4.72
Hexane	5600	5360	240	95.71	4.29

SOLVENT MANAGEMENT PLAN

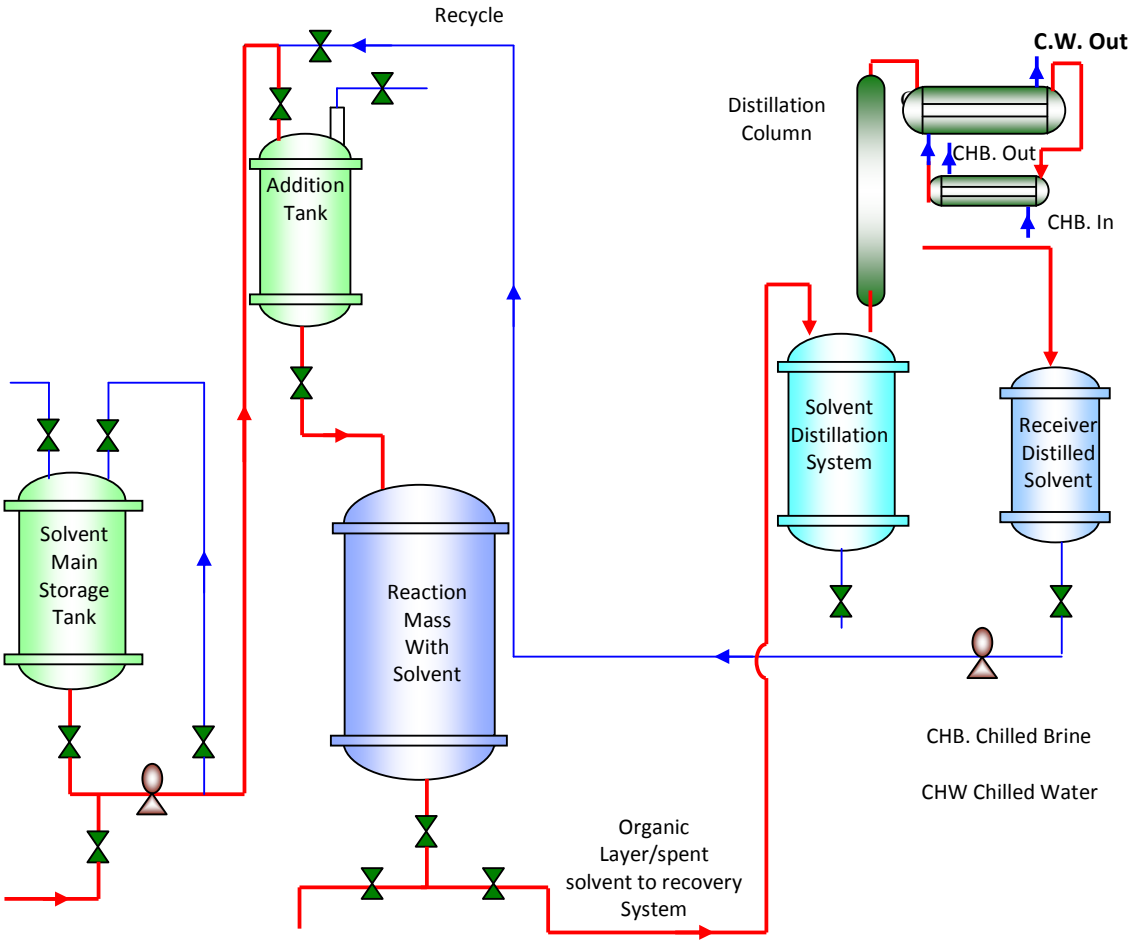
- All the solvents shall be directly distilled from product mixes and; if required shall be purified in packed column with the help of reflux and therefore there is no generation of any distillation residue from the solvent distillation.
- The solvent distillation system shall be designed so as to achieve minimum 99.0 % recovery of solvent.
- Pure solvent, crude solvent and distilled (recovered) solvent shall be stored only in storage tanks and company shall not use drums at any stage in the Solvent Management System.
- Wherever required, the solvents shall be directly pumped into day tanks from the storage tanks and shall be charged into the reactors without involving any manual handling.
- All the pumps shall be mechanical seal type to avoid any leakage of solvent.
- All necessary fire fighting systems shall be provided with alarm system. Flame proof wiring and flame proof electrical accessories shall be provided to avoid any mishap.
- All the storage tank and day tank shall be connected to a vent system through cooling water and chilled brine condensers to prevent loss of solvents in the atmosphere.
- All the distillation column vents are also connected to cooling water/ chilled brine condensers for maximum possible recovery of the solvents.
- All the vents will be connected to a common carbon Adsorber for removing traces of solvent from vent gases.

- Residue generated from the distillation will be incinerated in-house or sent to BEIL incinerator site.

- Coolant to be used

Primary Condensers	Cooling Water
Secondary Condensers	Chilled Brine up to -15^{0}C
Vent Condensers	Chilled Brine up to -15^{0}C

FLOW DIAGRAM OF SPENT SOLVENT MANAGEMENT SYSTEM



For Hemani Intermediates Pvt. Ltd.

7.13 CAPITAL COST FOR ENVIRONMENTAL MANGEMENT

Total Project Cost for proposed project activity is Rs. 15 Crores. Capital cost of air & water pollution control system and environmental monitoring equipments will be Rs. 2.5 Crores. Recurring cost of air & water pollution control system and environmental monitoring equipments will be Rs. 20 Lakhs per annum.

CHAPTER - 8

EXECUTIVE SUMMARY

8.1 INTRODUCTION

M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV) proposes Pesticide Manufacturing Plant at Plot No E-362, GIDC Estate, Dahej-I, Ta: Vagra, Dist: Bharuch – 392 130, Gujarat. The total area of the premises is 9,705 m^2. Total cost of the Project will be Rs. 15 Crores.

COMPANY PROFILE

The Hemani Group is highly advanced, adaptable and attuned to the evolving needs of today's basic chemicals for Organic Pigment and Dyestuff industry with big capacities like world class players, catering to the whole world. The group is a dynamic enterprise targeting its specialized expertise to the development and production of high quality products for Pigments and Dyestuffs Industry. Hemani group is well known in the International as well as Domestic market for manufacturing and marketing in specialized product range as under:

- Dyes and Dyes Intermediates
- Organic Pigment Intermediates
- Pesticides and Pesticides Intermediates
- Other Specialty Chemicals

Hemani Group is a multi-company, multi-product set up at different locations in the Gujarat state of India. Hemani Group has consistently expanded its facilities and product mix investing in increasingly advanced installations and at the same time in the ongoing development and upgradation of products and processes that comply with the international standards and demands. The Hemani Group started its manufacturing activities in 1977 with Dyes Intermediates. With time, 3 Private Limited Companies were started and new products came into being which are in great demand in International as well as Domestic markets. Today with over 80% of the USD 20 Million turnover coming

from exports, they are all set to achieve the 40% export growth that they have been achieving over the past 3 years inspite of a sluggish world economy. Mr. Premji Hemani and Mr. Mohan Hemani are the main promoters and think tank of the Group. In the year 1983, Hemani Group commenced its commercial production of 3, 3 Dichloro Benzidine Di Hydrochloride [3, 3 DCB]. Today, Hemani Group is one of the largest manufacturers and exporters of 3, 3 DCB.

Group Companies

Ideal Dye Chem Industries

Ideal Dye Chem was started in March, 1977 to manufacture dyes and dye intermediates in a very small capacity. They expanded their capacity in 1982 for the same product range.

In the year 1984, Ideal Dye Chem Industries started the production of 3, 3 DCB in a very small capacity. As demand grew the capacity was expanded to 10 TPM (tons per month) in 1988 and was further expanded to 16 TPM in 1990. The major milestones thereon include commencement of manufacturing of 4 B acids in 1991, 2 B acids in 1993. In 1994 4 B acid capacity was expanded to 15 TPM and later again expanded to 40 TPM in 2000. Ideal Dye Chem Industries started exports in 1993 for the first time of dye intermediates to Japan and has not looked back since then. Also due to the success of Ideal Dye Chem Industries, the promoters acquired land and machinery to setup Hemani Intermediates Private Limited in December, 1993.

Hemani Organics & Chemicals Pvt. Ltd.

The plant was started in the year 1992 with a small capacity to cater to the diverse needs of the market. This initiative yielded immediate success and the capacity was increased to 16 TPM (tons per month) in 1996. Today the plant hires more than a 110 people with an installed capacity of 100 TPM. The main products being manufactured and marketed include Meta Phenoxy Benzaldehyde.

Hemani Intermediates Pvt. Ltd.

After the success of Hemani Organics and Chemicals Private Limited, Hemani Group acquired land and machinery in December, 1993 to setup a world-class plant and setup under the aegis of Hemani Intermediates Private Limited. Today housing state-of-the-art machinery, Hemani Intermediates Pvt. Ltd. is a Govt. recognized export house catering to the demanding needs of the industry in terms of quality and capacity. With a team of more than 90 people, the plant is looking for ISO certification in the near future. They have already won accolades from clients with regard to their systems and quality processes.

Premonit International Eximp & Hemani International

Due to the growing demand in the international market for their products, a separate firm: Premonit International Eximp was setup in 1994 to manage the exports of products manufactured by the Hemani Group. Having met with success in the same, Hemani International was setup in 2000 for trading and development of new businesses such as pharmaceuticals and textiles. Today a dedicated team of 25+ people manages the export demand for products of the Hemani Group and looks into emerging markets to trade in newer products.

FUTURE PLANS

An ISO 9001 certification is on the anvil soon since everything is in place for the certification. Their international clientele is a proof of their quality systems and standards already. Almost 5% of the turnover is invested back in research and development every year. It is their endeavor to develop new specialty products, benzene based derivatives, pesticides, specialty pigment intermediates with the current manufacturing facility itself.

They keep themselves abreast of the latest machinery across the world and on the basis of the same upgrade themselves from time to time to provide their valued customers

with the very best of quality. Hemani Group will continue to expand its capacity and capability through innovations, strategic alliances and acquisitions.

a. Research & development

Their research and development facility is well equipped with advanced equipment for chemical analysis, process design and quality control. Quality research is the foundation on which their production capitalizes. Every aspect of purchase, manufacturing and marketing revolves around the performance of the product and they follow the "Zero Defect policy". Their R & D focuses on new product and the process development and enhancing quality of the existing products. They are planning to introduce new products evolved by them in the near future. They have the most modern plant at Vapi and Ankleshwar with state-of-the-art technology. The laboratory is well equipped with latest equipments viz. GC, HPLC, TLC and also an intensive R & D Lab with Pilot plant facility wherein they develop new specialty products as per requirements and demand.

b. Environment

Their respect for the environment is reflected in their efforts at ensuring best practices followed at all levels. They not only adhere to the statutory norms but have a holistic approach towards environmental protection. The major environmental issues addressed are:

- Ongoing manufacturing processes are studied in detail with a view to minimize generation of liquid/gaseous waste streams as a part of continuous improvement.
- A specially constituted Pollution Control Cell at their R&D centre is actively engaged in developing technologies for environment protection at their manufacturing plants. Their Pollution Cell in fact also helps out smaller industrial units that do not have capabilities and infrastructure for such jobs. The efforts of their team are not aimed at just pollution minimization but also to conserve energy, improve process yields and product quality.

At their manufacturing sites they ensure a clean environment by:

- Continuously operating Effluent Treatment Plants
- Burning of waste gases
- Controlling NOx emission
- Monitoring of ambient air quality
- Monitoring of effluents and emission quality
- Safely disposing solid waste
- A regular review of the Safety measures and HAZOP study is undertaken to ensure that the plants and those working there are protected.

The above practices help in achieving strict compliance with statutory standards laid down by Gujarat Pollution Control Board for plant effluent and emission quality.

PROMOTERS AND THEIR BACK GROUND

The main promoters and the think tank of Hemani Group are:

Mr. Premjibhai Hemani - Technical Director

Mr. Mohanbhai Dama - Commercial Director

Mr. Ramesh Bapat - Executive Director

Mr. D.N. Rai - Technical Director

Mr. Jayesh Dama - Administrative Head

8.2 Product and Capacity

LIST OF PRODUCTS ALONG WITH THEIR PRODUCTION CAPACITY

Sr. No.	Name of the Products	Quantity in MT/Month
		Proposed
1. Fungicides		
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propioconzole (T)	
d)	Mancozeb (T)	
2. Herbicides		
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Metsulfuron Methyl (T)	
d)	Pendimethalin (T)	
3. Insecticides		
a)	Transfluthrin (T)	300
b)	Cyfluthrin & Beta Isomers (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomers (T)	
e)	Chloropyriphos (T)	
f)	Imidacloprid (T)	
Total		**900**

LIST OF BY PRODUCTS

Sr. No.	Name of the Products	Quantity in MT/Month Proposed
1.	HCl (32%)	250
2.	Sodium Sulphate Solution (30% to9 35%)	2000
3.	Aluminum Chloride 25%	1000
4.	Potassium Chloride Solution	860
5.	H_2SO_4 (70%)	100
6.	Sodium Sulfite Solution (20%)	600

8.3 Water Consumption, Waste Water Generation and Treatment:

Daily water consumption shall be 366 m^3/ day and daily wastewater generation shall be 139 m^3/ day (119 m^3/day: Industrial & 20 m^3/day: Domestic). Water requirement for the proposed project shall be met through GIDC water supply. GIDC water supply authority is ready to supply the required water to M/s. Hemani Intermediates Pvt. Ltd. (Unit-IV). Wastewater from Industrial Operations will be treated in effluent treatment plant. The final treated effluent (69 m^3/day) will be discharged through GIDC pipeline line to deep sea. And MEE Condensate (50 m^3/day) will be resued in plant premises.

8.4 Air Pollution Source and Control Measure:

The source of air pollution due to the project will be Flue gas & Process Emissions. The source of Flue Gas & Process Vent emission will be from the stack attach to Boiler, DG Set, Incinerator & Process Vent (3 Nos. i.e. Herbicide, Fungicide & Insecticide Plant). ESP, Ventury & Packed Scrubber, Alkali Scrubbers & Two Stage Water Alkali Scrubbers shall be installed to prevent air pollution. D.G. Set will be provided for emergency power backup.

8.5 Hazardous Wastes:

Forteen Categories of Hazardous/Solid Wastes shall be generated from this Unit and their mode of disposal are as given below:

DETAILS OF HAZARDOUS WASTE AND ITS MODE OF DISPOSAL

SR. NO.	TYPE OF HAZARDOUS WASTE	HAZARDOUS WASTE CATEGORY	QUANTITY (MT/MONTH)	STORAGE, COLLECTION & DISPOSAL
1.	ETP Sludge	37.3	120	Collection, Storage, Transportation & Disposal to nearest TSDF at Dahej
2.	Used Oil/Spent Oil	5.1	200 Lit/Month	Collection, Storage, Transportation & Sell to GPCB Authorized Reprocessor
3.	Empty Drums/Container	34.1	500 Nos./Month	Collection, Storage, Transportation & Sell to GPCB Authorized Vendor
4.	Empty Bags	34.1	1000 Nos./Month	Collection, Storage, Transportation & Sell to GPCB Authorized Vendors
5.	Distillation Residue	29.1	50	Collection, Storage, Transportation & Disposal at nearest Incinerator Site, Dahej or incineration within premises or co-processing in cement industries
6.	HCl (32%)	29.6	250	HCl (32%) will be sold to end user.
7.	Off specification of batch	29.3	3.0	Collection, Storage, Transportation & Disposal at nearest Incinerator Site, Dahej or incineration within premises or co-processing in cement industries.
8.	Incineration Ash	37.2	10	Collection, Storage, Transportation & Disposal to nearest TSDF at Dahej.
9.	Fly Ash	B2050	300	Collection, storage & sell to brick manufactures
10.	Sodium Sulphate Solution (30% to 35%)	B2120	2000	Collection, Storage, Transportation & Sell to end user

11.	Aluminum Chloride (25%)	B2120	1000	Collection, Storage, Transportation & Sell to end user
12.	Potassium Chloride Solution	B2120	860	Collection, Storage, Transportation & Sell to end user
13.	H_2SO_4 (70%)	29.6	100	Collection, Storage, Transportation & Sell to end user
14.	Sodium Sulfite Solution (20%)	29.6	300	Collection, Storage, Transportation & Sell to end user

8.6 Green Belt:

Total Plot Area: 9,705 m^2.

Total 9,705 sq. meter land area is available at site; out of this area about 2,400 sq. meter (25 %) area is covered as greenbelt and other forms of greenery.

8.7 Power Requirements:

Power requirement will be 1000 KVA. Total power requirement will be fulfilled by DGVCL. 1 Nos. of 1000 KVA DG Set will be kept for emergency power back up.

8.8 Fuel requirement

SR. NO.	FUEL	QUANTITY
1	Coal	35 MT/Day
2	LDO	10 KL/Day
3	HSD	50 lit/Hour

8.9 Storage details of Hazardous Chemicals

NAME OF HAZARDOUS SUBSTANCE	MAX. STORAGE CAP. [Qty.]	ACTUAL STORAGE CAP.	PLACE OF IT'S STORAGE	OPERATING PRESSURE AND TEMP.	TYPE OF HAZARD	CONTROL MEASURE PROVIDED
Hydrochloric Acid	20 KL	10 KL x 2 Nos Tank	MS A/G Tank	ATP	Corrosive	➢ Safety Showers provided ➢ Caution note provided ➢ Dyke wall provided ➢ Level gauge provided. ➢ Double drain valve provided ➢ Scrubber provided ➢ Required PPEs provided to all employees
Sulfuric Acid	50 KL	25 KL x 2 Nos Tank	MS A/G Tank	ATP	Corrosive	➢ Safety Showers provided ➢ Caution note provided ➢ Dyke wall provided ➢ Level gauge provided. ➢ Double drain valve provided ➢ Scrubber provided ➢ Required PPEs provided to all employees
Nitric Acid	50 KL	25 KL x 2 Nos Tank	MS A/G Tank	ATP	Corrosive	➢ Safety Showers provided ➢ Caution note provided ➢ Dyke wall provided ➢ Level gauge provided. ➢ Double drain valve provided ➢ Scrubber provided ➢ Required PPEs provided to all employees

Bromine	5 KL	5 KL x 1 Nos Tank	Isolated Tank	ATP	Toxic	➢ Bromine will be stored in Iso-container in separate storage area and transported in Iso-container.
EDC	10 KL	10 KL x 1 Nos Tank	U/G Tank MS	ATP	Flammable	➢ Flame proof plant, pumping transfer, close process, etc. ➢ Double Static earthing ➢ Dyke wall ➢ Tanker unloading procedure. ➢ SCBA sets available. ➢ Flame proof plant, pumping transfer, close process, etc. ➢ Jumper clips on flanges ➢ Fire extinguishers ➢ Fencing and No Smoking and prohibited area. ➢ Tanker unloading procedure. ➢ Flame arrestor provided on vent line of the tank ➢ Hydrant system
Toluene	20 KL	10 KL x 2 Nos Tank	U/G Tank MS	ATP	Flammable	
N-Hexane	10 KL	10 KL x 1 No Tank	U/G Tank MS	ATP	Flammable	
Methanol	20 KL	10 KL x 2 Nos Tank	U/G Tank MS	ATP	Flammable	
Dimethyl Formamide	20 KL	10 KL x 2 Nos Tank	U/G Tank MS	ATP	Flammable	
Hydrogen	2 MT	Cylinder	Cylinder	ATP	Explosive	

8.10 Capital and recurring cost earmarked for environmental protection measures:

Total Project Cost for proposed project activity is Rs. 15 Crores. Capital cost of air & water pollution control system and environmental monitoring equipments will be Rs. 2.5 Crores. Recurring cost of air & water pollution control system and environmental monitoring equipments will be Rs. 20 Lakh per annum.

8.11 Conclusion

It can be concluded that the proposed project is beneficial in the interest of common man, the society, the state and as the country as a whole. The benefits can be summarized as below:

- The proposed project will provide quality product at lower cost to the users.
- There should be positive impact on the socio-economic condition of the area in terms of direct and indirect employment due to the proposed project.
- Numbers of local trained persons are likely to get jobs.
- Country will save valuable foreign exchange as import of these products will be reduced by corresponding amount.
- These products also have export potential. Hence, possibility of earning foreign exchange.

CHAPTER - 9

DISCLOSURE OF CONSULTANTS ENGAGED

Aqua-Air Environmental Engineers Pvt. Ltd.

Environmental Engineering Consultants & Engineers

NABL ACCREDITED TESTING LABORATORY

ISO 9001:2008 Certified Company

COMPANY PROFILE

Aqua-Air Environmental Engineers Pvt. Ltd. is a Surat based company; one of the leading and multidiscipline Environmental Engineering Consulting & Engineering firms of Gujarat.

Aqua-Air Environmental Engineers Pvt. Ltd. was founded by Mr. Jayeshkumar S. Patel & Mrs. Archana J. Patel on May 7, 2008 and Aqua-Air Environmental Engineers Pvt. Ltd. was registered under the companies Act on May 7, 2008.

Office having 3756 Sq. Ft. of area covering EC/EIA Department, R & D Centre (Environmental Laboratory), Consent (NOC/CC&A) Department, ETP/Civil Department and Account Department, Library, Conference room and Administration Department, etc. with experienced and qualified staff to render services in the field of Environmental Management of various types of industries.

Aqua-Air Environmental Engineers Pvt. Ltd. has a well-established track record in monitoring legislation and developing and implementing strategies for organizations that enable them to manage the impact of environmental issues on their business.

The company has built a reputation for delivering innovative and practical solutions to environment related business issues. These solutions help our clients to achieve successful business outcomes and make sustainable environment serving improvements within their business operations.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO/IEC 17025:2005 Accreditation by NABL, New Delhi for the Competence Testing & Calibration Laboratories on June 24, 2008 and submitted the application (Version No. 10) to NABL, New Delhi for ISO/IEC 17025:2005 registration on October 7, 2008. After final assessment and Non-Conformances resolved and corrective actions taken against the Non-Conformances, Laboratory Department - Aqua-Air Environmental Engineers Pvt. Ltd. was accredited with the certification of ISO/IEC 17025:2005 on October 19, 2010. Present certification of ISO/IEC 17025:2005 is valid up to January 5, 2018.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO 9001:2008 registration for Quality Management System on December 1, 2009 and submitted the application for ISO 9001:2008 registration on March 4, 2010. After final assessment, Aqua-Air Environmental Engineers Pvt. Ltd. was certified from ANAB by M/s. Intertek System Certification on May 4, 2010. Present certificate of ISO 9001:2008 is valid up to Sept. 14, 2018.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for "EIA Consultant Organization" accreditation under National Accreditation Board for Education And Training (NABET)/Quality Council of India (QCI), New Delhi on January 7, 2010 and submitted the application (Rev. 06) for "EIA Consultant Organization" accreditation under NABET, New Delhi on April 8, 2010. Office assessment was done by external NABET/QCI auditors [Dr. L. Ramakrishnan & Mr. A. K. Gupta (B.Sc. Mechanical Engg.)] on Feb. 3 & 4, 2011. NABET/QCI closed the application of Aqua-Air Environmental Engineers Pvt. Ltd. on March 15, 2011. Aqua-Air Environmental Engineers Pvt. Ltd. filed SCA in Hon'ble High Court of Gujarat against MoEF, QCI & NABET, New Delhi on April 13, 2012. Hon'ble High Court of Gujarat issued stay order against operation of all OMs (related to NABET/QCI Scheme) of MoEF, New Delhi for the company on Jan. 24, 2013. MoEFCC, New Delhi published Notification regarding mandatory implementation accreditation scheme of NABET/QCI on March 3, 2016. Aqua-Air Environmental Engineers P. Ltd. along with 11 EIA Consultants of Gujarat filed SCA No. 5312 of 2016 in Hon'ble High Court of Gujarat. Hon'ble High Court of Gujarat gave Stay Order on Apr. 5, 2016 against implementation of Notification dated March 3, 2016 of MoEFCC, New Delhi till further orders.

Aqua-Air Environmental Engineers Pvt. Ltd. received the Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on January 18, 2011.

The company's work is spread all over Gujarat in India & Oman. Company have already prepared 202 Form-1, 169 EIA & EMP reports, 151 Risk Assessment & DMP reports, conducted 73 Public Hearings and obtained 186 Environmental Clearances so far that includes Water related Projects / Pesticide Industry Projects / Textile Industry Projects / Sugar Industry Projects / Chemical Industries / Specialty Chemical Industry Projects / Bulk Drug (API) Industry Projects / Chemical Fertilizer Industry Projects /

Cement Plants / Thermal Power Plants / Mining Projects / Infrastructure Projects / Construction Projects / Distilleries / Petrochemical Industry Projects/ SEZ Projects/ CRZ Projects, etc.

Company's NABL Accredited Testing Laboratory has conducted Environmental Monitoring & Analysis with Environmental Institute and Gujarat Pollution Control Board in Industrial Estates of Ankleshwar, Panoli & Jhagadia. Company is also doing Turnkey/Consulting Projects for M/s. BASF (Detail Engineering for Effluent Treatment Plant) & M/s. Reva Proteins Ltd. (Design of Effluent Treatment Plant, supply of mechanical items, Commissioning and operation of Effluent Treatment Plant).

2. ABOUT US

Aqua-Air Environmental Engineers Pvt. Ltd. has registered office in one of the top five fastest growing cities of India – Surat. We are one of the most trusted and reliable environmental and engineering consultancy service providers. With complete hold in the related domain and proficiency, we execute our work all over Gujarat region.

In addition to engineering consultancy, we also execute turnkey projects for effluent treatment plants at the client's site.

Aqua-Air Environmental Engineers Pvt. Ltd. is:

- One of the leading companies in the region providing high quality services in environmental engineering to the best of client's satisfaction.
- Posses a well - developed design office with Computer Center and Laboratory -cum- R&D Center to carry out designing and analysis in the field of environmental engineering.
- Recognized as Schedule-II Environmental Auditor under the Environment Audit Scheme proposed by the Hon'ble High Court of Gujarat.
- Listed with Gujarat Pollution Control Board as Consultants and proposing to get enlisted with GPCB as Pollution Control Equipment Suppliers.
- Going to become a member of Consulting Engineers Association of India.
- Having well-developed library to render services in the field of environmental auditing, consulting, monitoring and analysis.

3. ACHIEVEMENTS

1. Registered under the companies Act on May 7, 2008.
2. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on Dec. 24, 2008.
3. Certificate of ISO 9001:2008 received on May 4, 2010. Import Export Licence received from Government of India on May 31, 2010.
4. Solvency Certificate of Rs. 1,40,00,000/- received from Bank of India, Gopipura branch, Surat on Sept. 3, 2010.
5. Certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) received on Oct. 15, 2010.
6. Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on Jan. 18, 2011.
7. Certificate of Authorization as dealer in India received from Spectrum Technologies, Inc., USA on May 1, 2011.
8. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on May 04, 2011.
9. Certificate of ISO 9001:2008 received on April 01, 2013. (Reassessment). And Certificate is valid upto May 04, 2016.
10. Certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) received on June 05, 2013. (Reassessment). And Certificate of NABL is valid upto June 04,2015
11. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on January 4, 2014. (Reassessment). And Certificate of Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor is valid upto January 17, 2017.

4. SERVICE PROVIDE

M/s. AQUA-AIR ENVIRONMENTAL ENGINEERS PVT. LTD. offers following specialized services in Environmental Engineering, Water Supply Engineering and Civil Engineering.

4.1 TURN KEY/BOOT/BOO PROJECTS

4.1.1 ENVIRONMENTAL ENGINEERING

- Detailed design
- Water Treatment Plants (WTPs)

- Construction
- Fabrication
- Piping
- Electrification
- Supply
- Erection
- Testing and Commissioning of Effluent Treatment Plants (ETPs)
- Sewage Treatment Plants (STPs)
- Common Effluent Treatment Plants (CETPs)
- Recycling Plants (RPs)
- Zero Discharge Plants (ZDPs)
- Incineration System Plants (ISPs)
- Hazardous waste Storage areas (HWSAs)
- Secured/ Sanitary Landfill Facilities
- Bio–Medical Waste (BMW) Treatment Facilities on a turnkey or BOOT/BOO basis.

4.1.2 CIVIL ENGINEERING

Construction of

- Water Treatment Plan
- Sewage Treatment plant
- Industrial Wastewater Treatment plant
- Elevated Service Reservoirs (ESRs)
- Underground Reservoirs (UGRs)
- Sewage Pumping Stations, etc.

4.2 CONSULTING

4.2.1 ENVIRONMENTAL ENGINEERING

1. Complete study of the Pollution Problem in industries from wastes generation to disposal and providing necessary technical knowledge like–

- How including design
- Basic engineering, detailed engineering
- Water Treatment Plants (WTPs)
- Tender preparation for Effluent Treatment Plants (ETPs) for industrial wastewater
- Sewage Treatment Plants (STPs) for residential wastewater
- Common Effluent Treatment Plants (CETPs) for more than two industries
- Zero Discharge Plants (ZDPs)
- Recycling plants (RPs) for reuse of water upto maximum extent
- Incineration System Plants (ISPs) for various non-biodegradable or toxic industrial wastes on Consulting basis
- Design of Hazardous waste Storage area and Consultancy Services for Secured/ Sanitary Landfill Facilities
- Design and Consultancy Services for Bio – Medical Waste Treatment Facilities.

2. Water Supply Distribution System

- Analysis
- Design
- Tender preparation

3. Laboratory Analysis of

- Air
- Water
- Sewage
- Waste Water
- Industrial Effluent
- Industrial Sludge

4. Process Study

- Reduce the pollution at source
- Reuse / Recycle effluent

5. Pollution Control Facility

▪ Performance study of existing	▪ Suggesting scheme for the optimization of the facility

6. Environment Management

▪ Environmental Clearance from • MoEF • New Delhi or DoEF • Gandhinagar	▪ Environmental Impact Assessment Studies (EIAs) • Short term (Rapid) • Long term (Comprehensive)
▪ Environmental statements	▪ Environmental Auditing

7. Statutory Requirements under Factory Act

▪ Safety Audit	▪ HAZOP study
▪ On-site / Off-site Emergency Plan	

8. For Various Energy Conservation Schemes

▪ Energy Audit	▪ Design

9. Environmental Management System

▪ Preparing Adequacy Report	▪ Preparing Efficacy Report

10. Operation and Maintenance (O & M)

▪ Effluent Treatment Plants (ETPs)	▪ Water Treatment Plants (WTPs)
▪ Sewage Treatment Plants (STPs)	

11. Air Monitoring

▪ Ambient Air	▪ Stack
▪ Vent	

12. Design of Pollution Control Equipment

▪ Cyclone	▪ Flash mixers
▪ Scrubbers	▪ Reaction Vessels
▪ Bag Filters, fume extraction systems	▪ Clariflocculators
▪ Blowers	▪ Scrapper Mechanisms
▪ Aerators	▪ Incinerators
▪ Agitators	▪ Scrubbers, etc.

13. Pollution Control

▪ Effluent Survey	▪ Feasibility Studies
▪ Environmental review of Pollution control equipment and systems	▪ Laboratory bench scale Treatability studies ▪ Pilot Plant studies etc.

14. Consulting Service

▪ NOC	▪ Air Consent
▪ Water Consent	▪ Hazardous Waste Authorization Application, etc.

15. As per requirements under Factory Act-1948 and Gujarat Factory Rules

▪ Monitoring	▪ filling up Form-37

- Analysis of Work Area Environment

16. Technical Consultation & assistance to ensure and assure compete Environ-Legal compliance

- Liaison with statutory bodies in order to get the required permits
- Clearance
- Consents

4.3 EQUIPMENT MFG. /TRADING

4.3.1 ENVIRONMENTAL ENGINEERING

1. Manufacture and supply of Pollution Control Equipment such as

- Incinerators With scrubbers
- Autoclaves
- Hydro-claves
- Fixed Aerators
- Floating Aerators
- Submersible Aerators (EOLO2)
- Submersible Mixers (RIO or BRIO)
- Cascade Aerators
- Clarifier mechanisms
- Agitators
- Clariflocculator
- Clariflocculator mechanism
- Flash mixes
- Oil skimmers
- Dissolved Air Flotation (DAF) units
- Cyclone
- Scrubbers
- Bag Filters
- Oil Skimmers
- Deoiler Pipes
- API separators
- Vacuum Drum filters
- Solid bowl centrifuges
- Filter presses
- Belt filters
- Reaction vessels
- Reverse Osmosis, etc.

LIST OF ANNEXURES

ANNEXURE NO.	TITLE	PAGE NO.
1	National ambient air quality standards	A-2
2	Damage risk criteria for hearing loss occupational safety & health administration (OSHA)	A-4
3	CPCB recommendations for community noise exposure	A-5
4	CPCB standards classification of inland surface water	A-6
5	Indian standards specifications for drinking water	A-7
6	Copy of Agreement For Land Acquisition From GIDC	A-10
7	Meteorological Data	A-21
8	Compliance to the recommendations mentioned in the CREP guidelines	A-64
9	The questionnaire for industry sector	A-66
10	TOR Letter	A-79
11	Copy of Stay Order against QCI/NABET scheme of MoEF	A-86
12	Material safety data sheet for all the chemicals	A-91
13	Toxic Management Plan	A-118
14	Consent to establish from GPCB	A-122
15	Notification of GIDC Dahej -1	A-131

ANNEXURE - 1

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) (2009)

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual* 24 Hours**	50 80	20 80	• Improved West and Geake • Ultraviolet fluorescence
2	Nitrogen Dioxide (NOx), $\mu g/m^3$	Annual* 24 Hours**	40 80	30 80	• Modified Jacob & Hochheiser (Na-Aresenite) • Chemiluminescence
3	Particular Matter (size less than 10 µm) or PM_{10} $\mu g/m^3$	Annual* 24 Hours**	60 100	60 100	• Gravimetric • TOEM • Beta attenuation
4	Particular Matter (size less than 2.5 µm) or $PM_{2.5}$ $\mu g/m^3$	Annual* 24 Hours**	40 60	40 60	• Gravimetric • TOEM • Beta attenuation
5	Ozone (O_2) $\mu g/m^3$	8 Hours** 1 Hour**	100 180	100 180	• UV photometric • Chemiluminescence • Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual* 24 Hours**	0.50 1.0	0.50 1.0	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper • ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 Hours** 1 Hour**	02 04	02 04	• Non Dispersive Infra Red (NDIR) Spectrology
8	Ammonia (NH_3) $\mu g/m^3$	Annual* 24 Hours**	100 400	100 400	• Chemiluminescence • Indophenol blue method

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	• Gas chromatography based continuous analyzer • Absorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (BaP) particulate phase only, mg/m^3	Annual*	01	01	• Solvent extraction followed by HPCL/GC analysis
11	Arsenic (AS), mg/m^3	Annual*	06	06	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), mg/m^3	Annual*	20	20	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

***** Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hours at uniform intervals

****** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed he limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

ANNEXURE - 2

DAMAGE RISK CRITERIA FOR HEARING LOSS
OCCUPATIONAL SAFETY& HEALTH ADMINISTRATION (OSHA)

MAXIMUM ALLOWABLE DURATION PER DAY (HOURS)	NOISE LEVEL (SLOW RESPONSE) dB(A)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or Less	115

ANNEXURE - 3

CPCB RECOMMENDATIONS FOR COMMUNITY NOISE EXPOSURE (1989)

CATEGORY OF AREA	**Leq (dBA) (DAYTIME) (06:00 TO 21:00 HRS)**	**Ldn (dBA) (NIGHT TIME) (21:00 TO 06:00 HRS)**
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

Note:

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.

2. Night time shall mean from 10.00 p.m. to 6.00 a.m.

3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by competent authority.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

*dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is energy mean of the noise level, over a specified period.

ANNEXURE - 4

CLASSIFICATION OF INLAND SURFACE WATER (CPCB STANDARDS)

SR NO.	CHARACTERISTICS	A[@]	B[@]	C[@]	D[@]	E[@]
1	Dissolved Oxygen (mg/L), Min	6	5	4	4	-
2	Biochemical Oxygen Demand (mg/L), Min	2	3	3	-	-
3	Total Coliform Organisms, MPN/100 ml, Max.	50	500	5000	-	-
4	Total Dissolved Solids (mg/L), Max	500	-	1500	-	2100
5	Chlorides (as Cl^-), mg/L, Max.	250	-	600	-	600
6	Colour, Hazen units, Max	10	300	300	-	-
7	Sodium absorption ratio, Max	-	-	-	-	26
8	Boron (as B), mg/L, Max	-	-	-	-	2
9	Sulphates (as SO_4^{-2}), mg/L, Max.	400	-	400	-	1000
10	Nitrates (as NO_3^-), mg/L, Max	20	-	50	-	-
11	Free Ammonia (as N), mg/L, Max	-	-	-	1.2	-
12	Conductivity at 25°C, micromhos/cm, Max	-	-	-	1.0	2.25
13	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.0
14.	Arsenic (as As), mg/L, Max	0.05	0.2	0.2	-	-
15	Iron (as Fe), mg/L, Max	0.3	-	50	-	-
16	Fluorides (as F), mg/L, Max	1.5	1.5	1.5	-	-
17	Lead (as Pb), mg/L, Max	0.1	-	0.1	-	-
18	Copper (as Cu), mg/L, Max	1.5	-	1.5	-	-
19	Zinc (as Zn), mg/L, Max	15	-	15	-	-

*: If the Coliform count is found to be more than the prescribed tolerance limits, the criteria for coliforms shall be satisfied if not more than 20 percent of samples show more than the tolerance limits specified, and not more than 5 percent of samples show values more than 4 times the tolerance limit. Further, the feacal coliform should not be more than 20 percent of the coliform.

ANNEXURE - 5

INDIAN STANDARDS/SPECIFICATIONS FOR DRIINKING WATER IS: 10500-1991

SR NO.	SUBSTANCES OR CHARCTER-ISTICS MAX	REQUIREME-NT (DESIRABLE LIMIT)	UNDESIRABLE EFFECTS OUT-SIDE THE DESIRABLE LIMIT	PERMISSIBLE LIMIT IN ABSENCE OF ALTERNATE SOURCE	METHOD OF TEST CI REF OF IS: 3025	REMARKS
ESSENTIAL CHARACTERISTICS						
1	Colour, Hazen unit	5	Above this, consumer acceptance decreases	25	4 of 3025, 1983	Extended upto 25 only if toxic substances are not suspected in absence of alternate Source.
2	Odour		Unobjectionable	-	5 of 3025,1983	a. Test cold and when heated b. Test at several dilutions
3	Taste		Agreeable	-	-	Test to be conducted only after safety has been established
4	Turbidity, NTU	5	Above this, consumer acceptance decreases	10	8	Test to be conducted only after safety has been established
5	pH Value	6.5-8.5	Beyond this range the water will affect the mucous membrane and/or water supply system	No relaxation	8	-
6	Total Hardness mg/L (as $CaCO_3$)	300	Encrustation on water supply structure and adverse effects on domestic use	600	-	-
7	Iron (as Fe), mg/L	0.3	Beyond this limit,, taste/appearance are affected has adverse effect on domestic uses and water supply structures & promotes iron bacteria	1.0	32 of 3025, 1964	-
8	Chlorides (as Cl^-) mg/L	250	Beyond this limit taste, corrosion and palatability are affected	1000	32 of 3025	-
9	Residual free chlorine, mg/L	0.2	-	-	26 of 3025, 1986	To be applicable only when water is chlorinated tested at consumer end, when protection against viral infection is required it should be min 0.5 mg/L

ANNEXURE – 5 (Contd.)

DESIRABLE CHARACTERISTICS						
10	Dissolved Solids, mg/L	500	Beyond this palatability decrease and may cause gastrointestinal irritation	2000	16 of 3025	
11	Calcium (as Ca) mg/L	75	-	200	40 of 3025, 1984	
12	Copper (as Cu), mg/L	0.05	Astringent, taste discoloration of pipes, fittings and utensils will be caused beyond this	1.5	36 of 3025, 1964	
13	Manganese (as Mn), mg/L	0.1	Astringent, taste discoloration of pipes, fittings and utensils will be caused beyond this	0.3	35 of 3025,1964	
14	Sulphate (as SO_4^{-2}), mg/L	200	Beyond this causes gastrointestinal irritation when magnesium or sodium are present	400	24 of 3025, 1986	May be extended upto 400 provided (as Mg) does not exceed 30 mg/l
15	Nitrate (as NO_3^-), mg/L	45	Beyond this methaemoglo-binemia	100	-	-
16	Fluoride (as F^-), mg/L	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1. 5	23 of 3025, 1964	-
17	Phenolic substances mg/L (as C_6H_5OH)	0.001	Beyond this, it may cause objectionable taste and odour	0.002	54 of 3025	
18	Mercury (as Hg), mg/L	0.01	Beyond this, the water becomes toxic	No relaxation	See note mercury ion analyzer	To be tested when pollution is suspected
19	Cadmium (as Cd), mg/L	0.01	Beyond this the water becomes toxic	No relaxation	See note mercury ion analyser	To be tested when pollution is suspected
20	Selenium (as Se) mg/L	0.01	Beyond this the water becomes toxic	No relaxation	28 of 3025, 1964	To be tested when pollution is suspected
21	Arsenic (As), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	37 of 3025, 1988	To be tested when pollution is suspected
22	Cyanide (CN^-), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	27 of 3025, 1986	To be tested when pollution is suspected
23	Lead (Pb), mg/L	0.05	Beyond this the water becomes toxic	No relaxation	See note 86	To be tested when pollution plumb solvency is suspected

ANNEXURE – 5 (Contd.)

24	Zinc (as Zn), mg/L	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	39 of 3025,1964	To be tested when pollution is suspected
25	Anionic detergents mg/L (as MBAS)	0.2	Beyond this limit undesirable taste and odour after Chlorination takes place	1.0	Methylene blue extraction method	To be tested when pollution is suspected
26	Chromium (as Cr^{+6}), mg/L	0.01	May be carcinogenic above this limit	0.05	28 0f 3025	To be tested when pollution is suspected
27	Polynuclear aromatic hydrocarbons, mg/L	-	May be carcinogenic	-	28 of 3025,1964	To be tested when pollution is suspected
28	Mineral Oil, mg/L	0.01	Beyond this limit undesirable taste and odour after Chlorination takes place	0.03	Gas chromatographic method	To be tested when pollution is suspected
29	Pesticides mg/L	Absent	Toxic	0.001	58 of 3025, 1964	-
30	Radioactive materials a. Alpha emitters Bq/L b. Beta emitters pci/L	- -	- -	0.1 1.0	- -	- -
31	Alkalinity (as $CaCO_3$), mg/L	200	Beyond this limit taste becomes unpleasant	600	13 of 3025,1964	-
32	Aluminum (as Al), mg/L	0.03	Cumulative effect is reported to cause dementia	0.2	31 0f 3025,1964	-
33	Boron (as B), mg/L	1	-	5	29 of 3025,1964	-

Note: Atomic absorption spectrophotometric method may be used.

ANNEXURE – 6
COPY OF AGREEMENT FOR LAND ACQUISITION FROM GIDC

GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION
(A GOVT. OF GUJARAT UNDERTAKING)
Administrative Office Building,
Plot No.624/B, GIDC, Ankleshwar, Dist. Bharuch
Phone: 02646-221351,221451,221403

No. GIDC/RM/ANK/ 2112 RPAD Date: 25/09/2013

To,
M/s. Hemani Intermediates P Ltd
Plot No. 3207/3208,
GIDC Industrial Estate,
Ankleshwar – 393 002.

Sub: Handing over possession of Plot No. **E-362** at Dahej-I Industrial Estate
Dear Sir,

We thank you for having returned to u 4 (Four) copies of agreement duly executed. We return herewith one copy duly executed for your record. We are also pleased to inform you that is now possible for us to hand over the possession of Plot No. **E-362** area admeasuring **9705.67** sq. mtrs. (Tentative) In our **Dahej** Industrial Estate. For this purpose, you are requested to contact **DEE, Dahej-1, GIDC Constuction Division** on any working day.

We had already sent you a sketch map of your Plot along with relevant section of the detailed development plan/drawing of the shed design. Kindly bring the same with you when you come for taking over the possession within the period of 20 days from the date of this letter. If there are any deficiencies or missing fixture in the plot, please incorporate the same in possession receipt while taking the possession from our estate officer. Any complaint not incorporated in the possession receipt will not be entertained in future.

Further you may note that in care where there are no genuine reasons no extension will be given under any circumstances. The Plot is allotted on **"As is where is basis"**

Thanking You

Yours faithfully

Divisional Manager(CG)
GIDC, Ankleshwar

Copy to:

1. The Executive Engineer, GIDC, Bharuch.....For information please
2. The DY CAO, GIDC, Ankleshwar with a copy of agreement duly executed.
3. The Deputy Executive Engineer, Dahej-1 GIDC, Construction Division (The party has executed the requisite agreement on dtd: /09/2013 and therefore, it has been decided to handover the possession to them. A copy of the possession receipt should be sent to Executive Engineer & Accounts Officer.

FORM OF AGREEMENT

(FOR PLOT)

(As per regulation 8 of the Land Regulation Dahej Industrial Area)

AN AGREEMENT made at Ankle this 13th day of Augast of the year Two thousand Thirteen, between the GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION, (A Corporation constituted under the Gujarat Industrial Development Act, 1962) and having its Head office at Udbyog Bhavan, Block No.4, Gandhinagar. (hereinafter called " the Licensor" which expression shall unless the context does not so admit reffered to as it includes its successors and assigns) of the one part and Shri .....
M/s. Hemani Intermediates P. Ltd
residing at Plot no. 3207 - 3208
GIDC Industrial Estate Ankleshwar
a firm/company/society registered at Ankleshwar
and having its registered office at -As Above-
.....
(hereinafter called 'the Licensee' which expression shall unless the context does not so admit, includes his heirs, executors, administrators and assigns/ its successors in Lusiness and assigns) of the other part. WHEREAS the Licensor is seized and prossessed of the land described in the schedule hereunder written (hereinafter referred to as the said land) AND WHEREAS the Licensee has applied to the Licensor to allot the said land to the Licensee for* Engineering activities AND WHEREAS THE Licensor has agreed to grant to the Licensee for the aforesaid purpose a License in the first instance in respect of the said land on the terms and conditions hereinafter appearing. AND WHEREAS the parties hereto are desirous of recording the terms of License in writting.

State the purpose

For HEMANI INDUSTRIES LTD.

Authorised Signatory

[1]

Now it is hereby agreed and declared between the parties follow :

1. On the Licensee paying amount of Rs. 2,92,14,067 ..... such amount being on amount equi. to 100% perecent of the price of the said land which is calulated at Rs 3010 per sq metre and the licensor will permit the Licensee to enter upon the said land for the purpose and on the terms and conditions hereinafter appearing.

2. In addition to the amount of Rs. 2,92,14,067 PLP mentioned above, the Licensee agrees to pay the Licensor the balance amount of Rs. ..... with interest at the rate of ..... within a period of .....years commencing from ..... in the following manner. 100% 2,92,14,067.

(a) A sum of Rs. ..... equal to..... of the price will be paid before allotment. Which is paid by you.

(b) Balalance amount of Rs. ..... equal to ..... % will be rapid within a period of 2/4/8 years from the date of allotment in 8/16/32 Quarterly Instalments. Each Quarterly Instalment of Capital will be of Rs. ..... and the interest Instalment of Rs. ..... to be paid quarterly on reducing balance Rs. ..... to be paid quarterly on reducing balance.

(i) The First quartely Instalment will be paid on or belure the 10th date of the month .....

(ii) The Second quartely Instalment will be paid on or before the 10th date of the month .....

(iii) The Third quartely Instalment will be paid on or before the 10th date of the month .....

(iv) The Forth quartely Instalment will be paid on or before the 10th date of the month .....

(C) Panel Interst @ 3% over the normal rate of interest would be charged on the amount in default. The interest rate would be subject to the revision from time to time at the discretion of the Corporation and interest would be payable at such revised rate from such date as may be specified by the Corporation from time to time. The interest liablity will start from the date of agreement or after one month of the date of allotment whichever is ealrier of allotment.

(d) The Licence further agrees that he/she will pay the service charges. Nonagricultural assessment and lease rent regularly, as may be detarmined by the licensor, on failing to pay the above dues to the corporation, the Licencee will pay interest on outstanding dues of SC, NAA & LR at the rate as may be specified by the coporation from time to time.

You/The Licensee/The Lessee shall not start production activity in the allotted plot/shed unless and untill it has effectively and completely complied with the pollution control measurer required to be undertaken by you/The Licensee / The Leassee / The Leassee under any permission which may have been granted by the G.P.C.B. and if you/the Licensee/ The Leassee without complying with the pollution measure start or continue with their industrial activity you/ the Licensor/ The Leaser shall be duty bound to disconnect electricty supply and water supply of the Licensee unit even without prior notice.

For HEMANI INDUSTRIES LTD.

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[2]

*strike off where not applicable

3. Grant of License State the purpose

4.

5.

Submission of plans for approval

fancing during construction

*strike off where not applicable

(* The Licensee further agrees that he will pay to the Licensor such additional sum as may be determined by the Licensor. The additional sum shall be paid in lump-sum or in such instalment with interest at ..... percent per annum as may be allowed by the Licensor) The Licensee further agree that if any payment is delayed he shall pay penal interest at 3% above the normal rate of interest on the amount of penal interest default. Provided that if the payment as so delayed is not made within a period of two months from the date of which it was required to be made the Licensee shall be liable to be evicted under Gujarat Public Premises (eviction of unauthorised occupants) Act, 1972. During the currency of this agreement it shall be open to the Licensee to pay at any time to the Licensor in lump sum the amount of the price than due from him together with the amount of interest if any due thereon. Until the entire amount payable under this clause is paid by the Licensee to the Licensor. The licensee will in each year within two months from the expiry of his accounting year supply to the Licensor a copy of his profit and loss account pertaining to the accounting year and of the business run by him in the land.

Grant of License State the purpose

3. The Licensee shall have licence and authority only to enterupon the said land described in the schedule hereunder written for the purpose of building and executing work thereon for* As per Plan and for no other purpose whatsoever, acts otherwise than the Licensor will be entitled to terminate this Licensee and evict the Licensee without prejudice to the other rights which the Licensee may have.

4. Nothing in these present contained shall be construed as a demise in law of the said land so as to give to the Licensee any legal interest therein but the Licensee shall only have License to enterupon the said land for the purpose of performing this Agreement.

5. The Licensee hereby agrees to observe and perform the following stipulations that is to say.

Submission of plans for approval

(a) That he will within three months of the date hereof submit to the Executive Engineer of the Licensor (hereinafter called the Executive Engineer) which expression shall include any other officer to whom the duties and fuctions of the said Executive Engineer may be assigned for his approval. The specifications, plans, elevations sections and details of the factory building hereby agreed by the Licensee shall to be erected on the said land and the Licensee shall at his own cost and as offten as he may be called upon to do so ammend all or any such plans and elevation and if so required will produce the same before the Executive Engineer of the Licensor and will supply him such details as may be called for of the specifications shall be finally approved by the Executive Engineer and signed by him, the Licensee shall sign and leave with him three copies thereof and also three signed copies of any further conditions or stipulation which may be agreed upon between the Licensee and the Executive Engineer provided that the Exective Engineer shall within two months from the date of the receipt to the plans, specifications elevations and sections as aforesaid communicate to the Licensee his approval or any objection thereof.

fancing during construction

(b) The said land shall be fenced during construction by the Licensee at his expense in avery respect or the boundary of said land shall be demarcated by the Licensee at his expense.

For HEMANI INDUSTRIES LTD.

[3]

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No work to commence till plans are approved

(c) No work shall be commence which infringes of the building condition and also other regulations so far as the same may be applicable to the said land until the said plans and elevations shall have been so approved as aforesaid and thereafter the Licensee shall not make any alteration or addition thereto unless such alterations, additions shall have been previously in like manner approved.

Time limit for commence-ment and completion of construction

(d) The Licensee shall, within a period of six months from the date hereof commence and within a period of two years from the said date at his own expense and in a substential and workman liks manner and with all rules, bye-laws and regulations applicable thereof and in strict accordance with the plans, elevations, details and specifications to the satisfaction of the Executive Engineer and in accordance with the building condition; of Licensor build and completely finish fit for occupation a building to be used as industrial factory with all requisite drains and other convenience thereto as may be necessary under the Factories Act.

According to the policy of the Corporation, you shall put the plot to use within a period of 3 years from the date of offer cum allotment falling which corporation is entitled to obtain the possession back of the plot.

In case of Plot you are required to get the building plans approved from Executive Engineer GIDC Vadodara within 3 months from the date of Physical Possession and inform this office with copy of approved plan. In case of delay/ late approval fee at Rs.0.50/m2/month shall be levied till the plans are approved.

Similarly, you are required to start housing construction within 12 months from the date of physical Possession and inform this office. Delay will be levied with late construction penalty at Rs.0.50/m2/month till the construction starts

Strike off area of Plots is less than 20,000 Sq.mtrs

* The area of the plot allotted to the Leassee being 9705.68 sq.mtres. It shall be premissible to him to utilise it within the period and in the manner aforesaid a part of the area for the contruction of the building to be used as an Industrial factory and to retain the remainining area of the plot for future expansion of his project to the following conditions :

(i) The remaining area of the plot shall be fully utilised for the expansion of this Project within a period of ten year from the date of this agreement.

(ii) It shall be opened to the Licensor to review the progress of the utilisation at the internal of every three years and to resume the possession of utilised portion of the plot.

(iii) while utilising a part of the plot for the construction of a builiding as aforesaid and retaining the remaining part of the plot for future expansion, the part to be utilised for the construction of the building shall be so demarcated as to make a subdivision of the remaining part feasible in the event of the Licensor deciding to resume the possession of the untilised portion of the plot.

Licensee to pay rates, taxes etc.

(e) The Licensee will have pay taxes and cesses payable in respect of the said land and any building erected thereon and will also pay the charges of water description including charges for the supply of water and his share of expense of maintance of roads and other common facilities and the claims and outgoings chargeble against owner or occupier in respect of the said land and building erected thereon.

Provided that if the Licensor demands in writing that any of such payments should be made to the Licensor for remittance shall make such payments to the Licensor within the period specified by the Licensor thereof. As regards supply of water, the Licensee shall be abide by the conditions laid down in that behalf from time to time.

For [illegible] INDUSTRIES LTD.

Authorised Signatory

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*The licensee shall consume water for his unit at following rates from year to year.

Year	*Consumption per day (in Litres)
I	
II	450 m³/day.
III	

strike off if not applicable

Onwards.....

Even if he fails to consume water to the extent mentioned above, he shall pay the water charges for the quantity equal to 70% of the above mentioned quantity irrespective of consumption. If demand is more than 50,000 ltrs. per day, the payment for minimum charge for 70% of the above agreed quantity shall commence from the date of commencement of actual consumption of water or from the date on which the utilisation period / from the date of allotment, namely two years for plot and one year for shed is over, whichever is earlier. The water charges shall be payable at the prevailing water rate of the estate for the financial year as fixed by the Corporation from time to time and on failure to pay the minimum charges, the Licensee shall be liable to the action including termination of agreement & other steps.

Indeminity

(f) The Licensee will keep the Licensor indeminified against any and all claims for damage which may be caused to any adjoining buiding or other premises by such building of in consequance of the execution of the aforesaid works and also against all payments whatsoever which during the progress of the work may become payable or be demanded by the local authority in respect of the said work or of anything come under the authority herein contained.

Sanitation

(g) The Licencee shall observe and confirm to all rules, regulations and bye - laws of the Corporation and of the local authority concerned of any other statutory regulation in any way relating to public health, effluent treament and disposal and sanitation in force for the time being and shall provide sufficient latrine accommodation and other sanitary arrangement for the laboures and workmen employed during the construction of the building on the said land in order to keep the said land and its surroundings, clean and in good condition to the entire satisfaction of the Executive Engineer, and shall not without the consent in writing of the Executive Engineer permit any labourers or workmen to reside upon the land and in event of such consent being shall comply strickly with he terms thereof. Failure on the part of the Licensee to comply with the provision of any law regarding disposal of industrial effluent shall entitle the corporation to disconnect water supply to the Licensee and to resume the possession of land. The Licensee shall have to take drainage connection, when intimated by the Corporation, and shall have to pay all the necessary amounts towards capital amount recovery and shall have to pay regular drainage cess as fixed by the Corporation, from time to time. While taking drainage connection, the Licensee shall have to comply with all regulations contained in the "Drainage Regulations, 1990 of GIDC".

(gg) The Licensee shall comply with all laws, including Acts, Rules, Regulation or oreders passed, made or issued by the Govt. of Gujarat or by the Goverment of India from time to time, relating to the business of industry carried on by the Licensee or having a bearing on the same. (The Licensee shall in particular comply with, observe and act, according to laws, on the subject of ecology and Enviornment like the water (Preveption & Control of pollution Act. 1974) the Air Prevention & Control Pollution Act, 1981, the Water Prevention & Control of Pollution) Cess Act, 1977 and the Enviornment Protection Act, 1986. The fact of the Licensor assisting the Licensee in [illegible] providing

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amenities, facilities like water supply, sewage, electicity etc. shall not mean that the Licensee is thereby absolved from the responsibility or liability in respect of the same. Similarly in respect of any or scheme, project or work undertaken by the Licensor on behalf of for the benefit of the Licensee or of the other industries of persons jointly, the Licensee shall not thereby the deemed to have been absolved from the liability under the relevent or concerned law. Nor shall it make the Licensor or any if its servants or agents liable for any non compliance, non-observance or breach of any such law.

(ggg) The Licensee shall be free to obtain any service, amenity or facility like water, drainage, electricity etc. directly from the concerned agency like the local body, electricity Board, etc. In case the Linensor makes arrangements for procuring or supplying such services, etc. for the benefit of and on behalf of the Licensee, separately or jointly with others, and the Licensee avails of the same, it shall not amount to a commitment on behalf of the licensor to provided the same, nor shall it be constructed as hiring of or contract for supply of such service by the Licensor to the Licensee, The Licensee shall not be held the Licensor liable in case of any delay, deficiency, insufficiency of failure in supply of such amenity, facility of service nor shall the Licensee be deemed to be a consumer in respect of the same within the meaning of the provision of consumer protection Act, 1986.

Excavation

(h) The Licensee will not make any excavation upon any part of the said land or remove any stone, earth or material there form except so far as may, in the opinion of the officer authorised by the Licensor be necessary for the purpose of foundation of the buildings and compound walls and executing the works authorised by this Agreenent.

Insurance

(i) The Licencess will keep the building to be erected on the said land, excluding foundation and plinth, insured in the name of the Licensee against lose or demages by fire in a sum equivelant to the cost of the building (Exculding foundation and plinth) in some well established insurance company.

Nuisance

(j) The Licensee shall not at any time do, cause or permit any nuisance in or upon the said land and in particular shall not cause or permit the said land to be used for any industry specified by the Licensor as obnoxious. The licensee shall not interfere or cause damage to the properties belonging to the Licensee whether located outside or inside the premises such as water supply lines drainage lines, water meters, street lights and such other properties. In case he is found interfering or causing damage to the properties of the Licensor it would amount to breach of the conditions of the aggrement and he would be liable to be evicted from the premises occupied by him under the provisions of the Gujarat Public Premises (Eviction of Unauthorised Occupants) Act, 1972; or any other law of the time being in force and the Licensor shall be entitled to recover the cost of making good such damages with penalty as it may determine and such amount would be recoverable as an arrears of land revenue.

Access roads power to terminate agreement

(k) The Licensee shall at his own cost construct and manitain an access road leading from the Estate road to the said land in strict accordance with the specifications and detailed prescribed by the Executive Engineer of the Licensor.

(6) Should the Executive Engineer of the Licensor not approve the plans, elevations, datails and specfications whether originally submitted or subsequently required of if the same shall not be submitted within the time hirein before stipulated, the Licensor may notice in writing to the Licensee to terminate this Agreement and its possession as a Licensee has been given by the Licensor, may re-enter upon the sold land and there upon the said land shall stand resumed to the Licensor. The Licensee will be allowed to remove the building materials and machinery it any of the

[6]

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(7) Power of Licensor — Until the factory building and work have been completed and certified as completed in accordance with clause 9 thereof and the price is paid full or the Lease Deed is executed in accordance with clause 9 hereof, the Licensor shall have the following rights and powers namely :

To enter and inspection — [a] The right for the Licensor and his officers and servants at all resonable time to enter upon the said land to review the state and progress of the work and for all other reasonable purposes.

[b] POWER :

(i) Inspite of the Licensor having approved the plans, if the Licensee failed to complete the said factory building within the time aforesaid and in accordance with the stipulations herein before contained (time in this respect being the essence of the contract) or shall commit default in payment of installment with interest as agreed to be paid by the Licensee to the Licensor as provided in clause 2 hereof or shall not proceed with the works with due diligence and shall fail to observe any of the stipulations on his part hereincontained, the Licensor shall without prejudice to the hereincontained, the remedy available under this agreement against non payment of dues payable to the Licensor have a right to forfeit the amount already paid by the Licensee and to terminate this Agreement by giving 24 hours notice and thereupon to re-enter and resume possession of the land and accepting thereon and thereupon this Agreement shall cease and the Licensee shall be allowed to remove materials and things after the expenses and dues of the Licensor are paid.

(ii) To continute the said land in the occupation of the Licensee on payment of such fine as may be decided by the Licensor.

(iii) To direct removal or altration of any building or structure erected of used contrary to the conditions of the grant within the time prescribed in that behalf and on such removal or alterations not being carried out within the time prescribed, cause the same to be carried out and recover the cost of carrying out the same from the Licensee as an arrears of land revenue.

(8) Not with standing any such default as aforesaid, the Licensor may in his discretion give notice to the Licensee of his intention to enforce the Licensee's agreement herein contained or may with reference to clause 5(d) fix any extended period for the completion of the factory, building & the works, if he is satisfied that the building & the works could not be completed within the prescribed time for the reasons beyond the control of the Licensee & thereupon the obligations hereunder of the Licensee, to complete the factory, building shall be taken to refer to such extended period.

(9) For Power Supply — [a] For obtaining power supply, the concerned allotee Licensee shall have to apply to the concerned the power supply authorities in prescribed application form. He is also responsible for follow-up for timely receipt of estimate & power. Corporation will not be responsible for timely receipt of the estimates of power.

[b] The Licensee allotee shall have to complete the formalities of signing agreement, payment of security deposit & complete wiring of electrical installation, as per Industrial Estate rules and submit the Test Report for the electrical wiring from the Licenced Electrical Contractor before release of connection.

[c] High tention consumer having power demand in excess of 500 KVA and of specific requirements shall have to make separate feeder at his cost.

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[7]

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[d] Full cost of high tension or low tension line, both and the cost of feeder and sending equipments, as the case may be, is to be borne by the consumer. No reimbursement or cost sharing is admissible to high tension or low tension consumer. For extension of load at the future date, full cost is to be borne by the consumer.

[e] The supply voltage and source of power shall be decided by the Power Supply Authority for the consumer having power demand in excess of 2400 KVA.

[f] Licensee is liable to pay for the cost of land occupied for corridor for laying electric circuit for power supply, as per the site conditions and pervalent policy of the corporation.

[g] The Licensee has to pay for the cost of augmentation of sub-station on his prorata demand basis at the rate and policy prevalent in the corporation.

[h] Licensee/Purchaser cannot seek relief of defferement of payment towards the installment for delay/inavailability of power.

(10) Employment

The party of the second part/ the Leasee shall have to fillup atleast 85% post by local persons in their industrial unit and for managerial & supervisory cadres atleast 60 % posts are to be filled up by local persons. The expression Local Person shall mean a person domiciled in the Gujarat State for minimum 15 years shall be considred as local person,

(11) Terms of allotment

Gujarat Industrial Development corporation allotts plots/properties, on "as is where is" basis, and no compenasation for levelling/filling or the land shall be entertained, nor any request for reduction in premium price as fixed by the corporation shall be entertained on account of levelling/ filling of the land.

(12) The Corporation may or may not provide Fire Fighter Service in some of the Estates as an amenity. In case of non provision or any delay or non-availability of fire fighter,at the time of fire, the Purchaser / Licensee/ Lessee will not claim any losses/ damages due to this.

(13) Grant of Lease

If the Executive Engineer of the Licensor has certifed that the factory building and works have been erected in accordance with the terms thertof and if the Licesee shall have observed all the stipulations and conditions here in before contained, the Licensor will be granted and the Licensee will accept a lease (which shall be executed by the parties in duplicate) of the said land for a term of 99 years from the date of possession being given to the Licensee or the date of execution of the Agreement whichever is earlier, at the yearly rent as may be fixed by the Licensor from time to time.

(14) Form of Lease

The Deed of Lease shall be prepared in duplicate in accordance with the form prescribed by the Licensor and all cost, charges and expenses of and incidental to the execuation of the Agreement and its duplicate and also the execution of the Lease Deed and its duplicate shall be borne and paid by the Licensee alone. 'The Deed of Lease shall be registered at a place within the State of Gujarat, where such registration is permissible under the provisions of the Indian Ragistration Act."

(15) Notices

All notices, consents and approvals given under this Agreement shall be in writing and shall unless otherwise provided herein signed by the Chief Executive Officer or any other officer authorised by him and any notice to be given to the Licnesee shall be considered as duly served if the same shall have been delivered/to left for post or addressed to the Licensee at the usual or last known place residence or business or the said land or if the same shall have been affixed to any building or erection temporary or otherwise upon the said land.

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[8]

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(16) The Licensor may at any time and from time to time alter the layout, building conditions, General Estate Regulations and other conditions relating to the other parts of the Estate of the Licensor of which the said land forms part and the Licensee shall have no right to require the enforcement thereof or any of them at any time against the Licensor or any person claiming under the Licensee.

Licensor may alter estate rules

(17) In the event of any breach of any condition or convenant of these presents by the Licensee, the Licensor shall be entitled to terminate this Agreement by giving 24 houres notice.

Breach of conditions

(18) The marginal notes do not from part of this Agreement and they shall not be refered to for consturuction and interpretion thereof.

Marginal Notes

(19) The rights, powers, etc. of the Licensor and of the Executive Engineer of the Licensor, under these presents may be exercised by any officer or servant or agent of the Licensor duly authorised by him.

Excercise of rights etc. by officers, servants of Licensor

(20) Should there be any conflict between the terms contained in this Agreement and the terms contained in the Building conditions and General Estate Regulations, the former shall prevail, the Licensor had issued in repect of the said land and allotment letter NO GIDC/PM/CCO/AMG-1484 dated 10-4-2013 & Carrigendum order No. 2104 dtd. 5/6/13

Conflict between agreement and regulations.

The terms of the said allotment letter will form part of this Agreement.

(21) The Licencee/Lessee further agree that he/she will pay the service charges, non agricultural assessment and lease rent regularly, as may be determined by the Licensor/Lessor on failing to pay the above dues to the corporation, the Licencee/Lessee will pay interest on outstanding dues of Service charges, Non Agricultural Assessment and Lease Rent, at the rate as may be specified by the Corporation from time to time.

(22) The Plot no. E-362 is offered / allotted to you is reallotted cases and GEB Dues/ municipal tax for the use of this property are payable and you shall have to clear the dues of both the GEB/Municipal Corporation. You have to plant one tree per 100 Sq.mts. of the plot area before approval of the plan for the allotted plot.

(23) The Corporation has established the Gujarat Cleaner Production Centre, the Center imparts technical advice for minimizing the waste at production stage resulting economic saving with reduction of pollution load in the industry.

The Licencee/Lessee should get maximum advantage from this Centre of the Corporation / The details may be obtained from Member Secretary, Gujrat Clearner Production center, GIDC, Udyog Bhavan, Gandhinagar.

For HEMANI INDUSTRIES LTD.

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SCHEDULE

(Description of land)

ALL THAT Piece of land known as plot No. Adjoining Plot E-362 in the Dahej Industrial Area/Estate consisting of revenue Survery Nos 900/P 901/P 903/P & 904/P within the village limits of Dahej Taluka Vagra Dist Bharuch containing by admeasuremet 9705.68 Cts sq. mtrs of there about a bounded as follows that is to say.

On or towards the North by Dahej - Vagra Railway line & 10-mt SWD

On or towards the South by 30-00 mt wide Road & Plot No CH-5

On or towards the East by Plot No CH-5

On or towards the West by Plot No E-206-207

IN WITNESS WHERE OF the Licensor has caused Shri D.S. Parmar Divisional manager an officer authorised by it, to set his hand and affix the common seal hereto and the Licensee has hereinto set his hand and seal on the day year first above written.

SIGNED, SEALED AND DELIVERED

By Shri D.S. Parmar D.M
Officer of the GUJARAT INDUSTRIAL DEVELOPEMENT CORPORATION.

Signature Divisional Manager (CG) G.I.D.C., Ankleshwar
(Full name in block letters)

In the presence of :

1. Signature.
(full name in block letter) (CJ V Patel)

2. Signature.
(full name in block letter) ( )

For HEMANI INDUSTRIES LTD.
Nitin K Dama
Authorised Signatory

SIGNED SEAL AND DELIVERED BY the above named Licencee in the presence of :

(NITIN K. DAMA)
Signature
(Full name in block letters)

1. Signature
(Full name in block letter) (SATISH B. PATEL)

2. Signature
(Full name in block letter) (V. P. MISHRA)

[10]

ANNEXURE – 7

METEOROLOGICAL DATA

March-2014

Year	Month	Date	Hour	Cloud Cover	Temp (deg C)	R Humidity (%)	Wind Direction(Deg)	Wind Spd(Km/hr)	Hourly Precipitation
2014	3	1	1	0	20	55	237	2	0
2014	3	1	2	0	18	66	232	1	0
2014	3	1	3	0	18	74	248	1	0
2014	3	1	4	0	17	78	284	1	0
2014	3	1	5	0	16	82	306	1	0
2014	3	1	6	0	16	80	99	0	0
2014	3	1	7	0	15	89	70	0	0
2014	3	1	8	0	16	89	46	1	0
2014	3	1	9	0	20	60	23	3	0
2014	3	1	10	0	23	42	307	3	0
2014	3	1	11	0	27	34	271	3	0
2014	3	1	12	0	17	73	226	3	0
2014	3	1	13	0	19	74	232	3	0
2014	3	1	14	0	21	60	228	2	0
2014	3	1	15	0	24	48	263	3	0
2014	3	1	16	0	24	57	296	6	0
2014	3	1	17	0	25	51	283	4	0
2014	3	1	18	0	26	47	279	4	0
2014	3	1	19	0	27	43	286	5	0
2014	3	1	20	0	28	37	259	4	0
2014	3	1	21	0	29	38	252	2	0
2014	3	1	22	0	26	49	165	8	0
2014	3	1	23	0	24	59	169	9	0
2014	3	1	24	0	21	58	171	8	0
2014	3	2	1	0	21	73	176	6	0
2014	3	2	2	0	21	85	179	6	0
2014	3	2	3	0	20	91	168	6	0
2014	3	2	4	0	19	94	164	5	0
2014	3	2	5	0	19	94	167	4	0
2014	3	2	6	0	19	93	170	5	0
2014	3	2	7	0	19	96	162	2	0
2014	3	2	8	0	17	94	26	3	0
2014	3	2	9	0	18	95	5	1	0
2014	3	2	10	0	17	84	309	5	0
2014	3	2	11	0	17	80	307	3	0
2014	3	2	12	0	16	80	308	6	0
2014	3	2	13	0	18	79	312	3	0
2014	3	2	14	0	20	69	307	5	0
2014	3	2	15	0	22	57	1	5	0
2014	3	2	16	0	25	47	5	3	0
2014	3	2	17	0	26	47	270	4	0
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2014	3	18	23	0	30	22	228	3	0
2014	3	18	24	0	27	35	285	1	0
2014	3	19	1	0	26	38	327	2	0
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2014	3	19	7	0	20	61	286	3	0
2014	3	19	8	0	21	59	307	4	0
2014	3	19	9	0	19	55	293	2	0
2014	3	19	10	0	19	55	293	2	0
2014	3	19	11	0	18	52	308	1	0
2014	3	19	12	0	20	56	288	2	0
2014	3	19	13	0	24	37	302	5	0
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2014	3	19	15	0	29	35	298	4	0
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2014	3	19	21	0	35	12	305	9	0
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2014	3	20	9	0	52	12	29	4	0
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2014	3	20	11	0	53	18	18	3	0
2014	3	20	12	0	42	21	21	2	0
2014	3	20	13	0	30	19	29	2	0
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2014	3	20	24	0	19	19	19	1	0
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2014	3	21	2	0	26	23	14	2	0
2014	3	21	3	0	25	28	242	3	0
2014	3	21	4	0	24	40	240	7	0
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2014	3	21	6	0	23	48	285	3	0
2014	3	21	7	0	22	49	279	3	0
2014	3	21	8	0	21	55	297	3	0
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2014	3	21	11	0	20	65	299	3	0
2014	3	21	12	0	21	63	310	5	0
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2014	3	21	14	0	26	40	311	3	0
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2014	3	21	24	0	28	24	247	0	0
2014	3	22	1	0	26	28	270	0	0
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2014	3	22	6	0	24	54	237	3	0
2014	3	22	7	0	23	57	239	4	0

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2014	3	22	9	0	21	70	250	2	0
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2014	3	22	11	0	22	62	314	5	0
2014	3	22	12	0	22	57	304	4	0
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2014	3	22	17	0	31	43	269	3	0
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2014	3	22	19	0	33	32	286	4	0
2014	3	22	20	0	35	21	241	4	0
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2014	3	23	7	0	24	56	276	2	0
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2014	3	23	9	0	23	60	252	2	0
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2014	3	23	11	0	22	69	356	4	0
2014	3	23	12	0	23	55	26	4	0
2014	3	23	13	0	25	45	18	5	0
2014	3	23	14	0	28	37	321	3	0
2014	3	23	15	0	30	31	309	6	0
2014	3	23	16	0	32	33	286	4	0
2014	3	23	17	0	31	23	36	3	0
2014	3	23	18	0	32	19	50	5	0
2014	3	23	19	0	34	17	18	2	0
2014	3	23	20	0	34	17	287	2	0
2014	3	23	21	0	33	17	360	1	0
2014	3	23	22	0	31	22	305	8	0
2014	3	23	23	0	29	36	303	7	0
2014	3	23	24	0	27	53	309	9	0
2014	3	24	1	0	26	52	301	6	0
2014	3	24	2	0	26	66	294	3	0
2014	3	24	3	0	26	66	292	3	0
2014	3	24	4	0	25	57	337	10	0
2014	3	24	5	0	25	52	38	4	0
2014	3	24	6	0	25	51	37	4	0
2014	3	24	7	0	24	48	24	4	0
2014	3	24	8	0	23	53	33	3	0
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2014	3	24	10	0	23	55	50	7	0
2014	3	24	11	0	23	56	50	7	0
2014	3	24	12	0	22	60	47	5	0
2014	3	24	13	0	22	61	48	4	0

2014	3	24	14	0	23	61	53	7	0
2014	3	24	15	0	24	62	51	6	0
2014	3	24	16	0	26	57	55	6	0
2014	3	24	17	0	30	41	3	5	0
2014	3	24	18	0	31	36	351	6	0
2014	3	24	19	0	28	49	303	6	0
2014	3	24	20	0	29	48	297	5	0
2014	3	24	21	0	28	53	290	4	0
2014	3	24	22	0	27	54	306	8	0
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2014	3	25	2	0	25	71	311	9	0
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2014	3	25	14	0	28	48	324	1	0
2014	3	25	15	0	29	48	278	1	0
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2014	3	25	18	0	31	42	299	4	0
2014	3	25	19	0	31	42	292	4	0
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2014	3	25	23	0	25	69	318	19	0
2014	3	25	24	0	25	72	320	22	0
2014	3	26	1	0	28	39	28	1	1
2014	3	26	2	0	29	38	29	1	1
2014	3	26	3	0	31	39	31	1	1
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2014	3	26	5	0	33	39	33	1	4
2014	3	26	6	0	36	37	36	1	2
2014	3	26	7	0	31	39	31	1	0
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2014	3	26	9	0	36	39	36	1	1
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2014	3	26	11	0	31	42	31	1	17
2014	3	26	12	0	36	49	36	1	25
2014	3	26	13	0	38	38	45	1	20
2014	3	26	14	0	31	36	46	1	11
2014	3	26	15	0	39	39	39	1	11
2014	3	26	16	0	30	37	30	1	11
2014	3	26	17	0	30	39	30	1	10
2014	3	26	18	0	29	39	29	1	6
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2014	3	26	21	0	28	39	28	4	2
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2014	3	26	23	0	25	37	25	2	2
2014	3	26	24	0	25	38	25	2	1
2014	3	27	1	0	25	60	323	9	0
2014	3	27	2	0	24	60	328	9	0
2014	3	27	3	0	25	55	354	7	0
2014	3	27	4	0	18	56	17	4	0
2014	3	27	5	0	17	59	25	10	0
2014	3	27	6	0	17	60	25	6	0
2014	3	27	7	0	16	62	24	9	0
2014	3	27	8	0	15	66	21	6	0
2014	3	27	9	0	15	67	23	8	0
2014	3	27	10	0	15	68	4	4	0
2014	3	27	11	0	14	72	301	4	0
2014	3	27	12	0	15	68	350	3	0
2014	3	27	13	0	17	62	318	2	0
2014	3	27	14	0	20	51	7	3	0
2014	3	27	15	0	24	42	351	2	0
2014	3	27	16	0	26	38	293	3	0
2014	3	27	17	0	27	37	300	6	0
2014	3	27	18	0	27	41	297	6	0
2014	3	27	19	0	28	42	281	4	0
2014	3	27	20	0	27	38	277	4	0
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2014	3	27	22	0	25	49	287	3	0
2014	3	27	23	0	22	59	305	4	0
2014	3	27	24	0	22	55	315	5	0
2014	3	28	1	0	21	61	305	3	0
2014	3	28	2	0	20	62	307	3	0
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2014	3	28	4	0	14	58	289	2	0
2014	3	28	5	0	13	64	306	4	0
2014	3	28	6	0	13	66	311	5	0
2014	3	28	7	0	12	62	311	7	0
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2014	3	28	17	0	23	39	1	6	0
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2014	3	28	19	0	23	31	27	9	0
2014	3	28	20	0	24	32	26	15	0
2014	3	28	21	0	23	33	27	14	0
2014	3	28	22	0	22	38	24	4	0
2014	3	28	23	0	18	52	298	3	0
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2014	3	29	3	0	21	61	305	3	0
2014	3	29	4	0	20	62	307	3	0
2014	3	29	5	0	19	58	355	2	0
2014	3	29	6	0	14	58	289	2	0
2014	3	29	7	0	13	64	306	4	0
2014	3	29	8	0	13	66	311	5	0
2014	3	29	9	0	12	62	311	7	0
2014	3	29	10	0	12	60	309	6	0
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2014	3	29	13	0	11	62	301	3	0
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2014	3	29	18	0	20	43	338	3	0
2014	3	29	19	0	23	39	1	6	0
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2014	3	30	7	0	24	82	317	13	0
2014	3	30	8	0	24	79	327	7	0
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2014	3	30	10	0	24	57	353	4	0
2014	3	30	11	0	22	52	0	4	0
2014	3	30	12	0	22	54	360	3	0
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2014	3	30	15	0	27	41	38	1	0
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2014	3	30	18	0	30	35	305	2	0
2014	3	30	19	0	30	37	359	9	0
2014	3	30	20	0	29	31	340	10	0
2014	3	30	21	0	30	33	294	3	0
2014	3	30	22	0	29	39	301	7	0
2014	3	30	23	0	28	41	309	9	0
2014	3	30	24	0	27	46	312	11	0
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2014	3	31	2	0	25	63	318	13	0
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2014	3	31	4	0	25	57	337	10	0
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2014	3	31	8	0	23	53	33	3	0
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2014	3	31	10	0	23	55	50	7	0
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2014	3	31	12	0	22	60	47	5	0
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2014	3	31	17	0	30	41	3	5	0
2014	3	31	18	0	31	36	351	6	0
2014	3	31	19	0	28	49	303	6	0
2014	3	31	20	0	29	48	297	5	0
2014	3	31	21	0	28	53	290	4	0
2014	3	31	22	0	27	54	306	8	0
2014	3	31	23	0	26	64	313	16	0
2014	3	31	24	0	25	73	315	19	0

April -2014

Year	Month	Date	Hour	Cloud Cover	Temp (deg C)	R Humidity(%)	Wind Direction(Deg)	Wind Spd(Km/hr)	Hourly Precipitation
2014	4	1	1	0	36	15	167	6	0
2014	4	1	2	0	35	21	60	11	0
2014	4	1	3	0	33	27	49	9	0
2014	4	1	4	0	32	30	53	10	0
2014	4	1	5	0	30	34	50	8	0
2014	4	1	6	0	29	41	32	5	0
2014	4	1	7	0	28	41	359	8	0
2014	4	1	8	0	27	37	63	2	0
2014	4	1	9	0	27	34	88	2	0
2014	4	1	10	0	27	33	78	2	0
2014	4	1	11	0	26	34	88	1	0
2014	4	1	12	0	26	34	106	1	0
2014	4	1	13	0	26	41	44	4	0
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2014	4	1	15	0	23	59	28	1	0
2014	4	1	16	0	23	62	32	1	0
2014	4	1	17	0	22	58	31	2	0
2014	4	1	18	0	22	51	360	4	0
2014	4	1	19	0	26	34	9	3	0
2014	4	1	20	0	29	26	147	4	0
2014	4	1	21	0	32	23	83	3	0
2014	4	1	22	0	34	24	263	3	0
2014	4	1	23	0	35	27	230	6	0
2014	4	1	24	0	35	27	56	1	0
2014	4	2	1	0	35	21	241	6	0
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2014	4	2	3	0	34	21	224	3	0
2014	4	2	4	0	33	21	353	4	0
2014	4	2	5	0	32	21	251	4	0
2014	4	2	6	0	29	21	173	1	0
2014	4	2	7	0	29	24	138	1	0
2014	4	2	8	0	31	21	46	2	0
2014	4	2	9	0	32	23	69	3	0
2014	4	2	10	0	32	22	313	6	0
2014	4	2	11	0	33	21	287	3	0
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2014	4	2	13	0	35	20	290	2	0
2014	4	2	14	0	35	21	277	1	0
2014	4	2	15	0	35	21	360	0	0
2014	4	2	16	0	34	22	291	2	0
2014	4	2	17	0	23	21	298	4	0
2014	4	2	18	0	24	22	311	6	0
2014	4	2	19	0	25	21	311	4	0
2014	4	2	20	0	26	22	314	6	0
2014	4	2	21	0	28	21	308	8	0
2014	4	2	22	0	28	23	285	3	0
2014	4	2	23	0	29	22	288	3	0
2014	4	2	24	0	29	21	298	5	0
2014	4	3	1	0	29	55	305	7	0
2014	4	3	2	0	29	61	294	5	0
2014	4	3	3	0	28	71	298	7	0

2014	4	3	4	0	27	77	299	8	0
2014	4	3	5	0	26	83	310	10	0
2014	4	3	6	0	24	88	308	10	0
2014	4	3	7	0	25	89	303	6	0
2014	4	3	8	0	24	91	303	6	0
2014	4	3	9	0	24	91	309	7	0
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2014	4	3	12	0	23	93	318	4	0
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2014	4	3	16	0	23	95	295	3	0
2014	4	3	17	0	22	94	283	4	0
2014	4	3	18	0	22	93	288	4	0
2014	4	3	19	0	24	86	286	2	0
2014	4	3	20	0	26	77	291	2	0
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2014	4	20	3	0	25	80	186	4	0
2014	4	20	4	0	25	75	207	1	0
2014	4	20	5	0	25	71	118	1	0
2014	4	20	6	0	25	74	196	3	0
2014	4	20	7	0	24	75	201	4	0
2014	4	20	8	0	24	78	210	3	0
2014	4	20	9	0	25	78	164	2	0
2014	4	20	10	0	24	77	184	4	0
2014	4	20	11	0	26	73	181	5	0
2014	4	20	12	0	27	67	198	4	0
2014	4	20	13	0	28	61	230	4	0
2014	4	20	14	0	29	54	213	5	0
2014	4	20	15	0	29	56	155	14	0
2014	4	20	16	0	28	63	159	13	0
2014	4	20	17	0	29	63	163	12	0
2014	4	20	18	0	29	63	164	14	0
2014	4	20	19	0	29	65	168	17	0
2014	4	20	20	0	28	67	169	17	0
2014	4	20	21	0	27	69	168	14	0
2014	4	20	22	0	26	75	169	13	0
2014	4	20	23	0	26	80	168	11	0
2014	4	20	24	0	25	82	169	10	0
2014	4	21	1	0	25	84	172	10	0
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2014	4	21	8	0	25	77	237	8	0
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2014	4	21	10	0	24	78	238	5	0
2014	4	21	11	0	26	70	251	5	0
2014	4	21	12	0	27	65	276	4	0
2014	4	21	13	0	29	60	269	4	0
2014	4	21	14	0	30	54	253	5	0
2014	4	21	15	0	31	47	252	5	0
2014	4	21	16	0	32	46	243	5	0
2014	4	21	17	0	32	50	164	8	0
2014	4	21	18	0	30	57	162	9	0
2014	4	21	19	0	30	58	168	10	0
2014	4	21	20	0	29	63	171	11	0
2014	4	21	21	0	28	72	174	14	0
2014	4	21	22	0	27	77	171	14	0
2014	4	21	23	0	26	82	170	14	0
2014	4	21	24	0	25	84	169	15	0
2014	4	22	1	0	25	85	166	13	0
2014	4	22	2	0	25	86	166	12	0
2014	4	22	3	0	25	88	168	12	0
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2014	4	22	5	0	26	91	160	11	0
2014	4	22	6	0	26	92	164	9	0
2014	4	22	7	0	25	84	179	5	0
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2014	4	22	9	0	25	79	239	6	0
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2014	4	22	12	0	28	64	273	4	0
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2014	4	22	14	0	31	55	281	5	0
2014	4	22	15	0	31	50	277	4	0
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2014	4	22	17	0	34	38	173	7	0
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2014	4	22	19	0	32	48	161	7	0
2014	4	22	20	0	31	47	168	8	0
2014	4	22	21	0	31	56	171	9	0
2014	4	22	22	0	28	72	173	11	0
2014	4	22	23	0	26	80	173	12	0
2014	4	22	24	0	26	81	170	13	0
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2014	4	23	4	0	36	36	0	0	0
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2014	4	23	12	0	29	39	0	0	0
2014	4	23	13	0	30	30	0	0	0
2014	4	23	14	0	32	32	0	0	0
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2014	4	23	18	0	36	36	0	0	0
2014	4	23	19	0	34	34	0	0	0
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2014	4	24	2	0	26	91	175	5	0
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2014	4	24	14	0	32	54	210	7	0
2014	4	24	15	0	32	46	190	7	0
2014	4	24	16	0	34	52	162	11	0
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2014	4	24	18	0	34	59	168	13	0
2014	4	24	19	0	36	67	167	14	0
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2014	4	24	22	0	32	76	171	14	0
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2014	4	25	2	0	27	88	186	7	0
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2014	4	25	6	0	26	74	241	8	0
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2014	4	25	11	0	27	70	238	7	0
2014	4	25	12	0	30	65	253	6	0
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2014	4	25	14	0	32	53	287	5	0
2014	4	25	15	0	33	46	243	8	0

2014	4	25	16	0	34	40	244	8	0
2014	4	25	17	0	35	37	241	6	0
2014	4	25	18	0	36	43	164	8	0
2014	4	25	19	0	36	48	167	10	0
2014	4	25	20	0	35	56	176	12	0
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2014	4	25	23	0	33	79	181	9	0
2014	4	25	24	0	31	79	171	9	0
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2014	4	26	6	0	27	67	233	8	0
2014	4	26	7	0	26	71	237	6	0
2014	4	26	8	0	26	71	232	5	0
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2014	4	26	22	0	33	64	171	11	0
2014	4	26	23	0	32	70	170	11	0
2014	4	26	24	0	31	71	169	10	0
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2014	4	27	2	0	28	88	172	9	0
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2014	4	27	7	0	26	74	279	5	0
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2014	4	27	16	0	35	54	170	6	0
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2014	4	27	18	0	34	57	165	8	0
2014	4	27	19	0	34	59	169	9	0
2014	4	27	20	0	35	66	171	12	0
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2014	4	27	23	0	32	71	170	9	0
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2014	4	28	5	0	28	66	240	11	0
2014	4	28	6	0	27	69	238	8	0
2014	4	28	7	0	27	70	236	6	0
2014	4	28	8	0	26	73	237	5	0
2014	4	28	9	0	25	76	236	7	0
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2014	4	28	12	0	27	64	238	7	0
2014	4	28	13	0	29	60	238	5	0
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2014	4	28	15	0	32	49	154	9	0
2014	4	28	16	0	35	48	163	10	0
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2014	4	28	18	0	37	62	166	12	0
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2014	4	28	22	0	30	78	169	16	0
2014	4	28	23	0	28	81	166	14	0
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2014	4	29	7	0	26	49	241	9	0
2014	4	29	8	0	26	55	242	7	0
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2014	4	29	22	0	30	59	174	9	0
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2014	4	29	24	0	28	67	137	2	0
2014	4	30	1	0	38	38	8	2	0
2014	4	30	2	0	37	37	5	2	0
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2014	4	30	18	0	34	34	6	4	0
2014	4	30	19	0	35	35	7	14	0
2014	4	30	20	0	32	32	4	13	0
2014	4	30	21	0	36	36	5	18	0
2014	4	30	22	0	38	38	6	14	0
2014	4	30	23	0	37	37	4	14	0
2014	4	30	24	0	36	36	7	15	0

May-2014

Year	Month	Date	Hour	Cloud Cover	Temp (deg C)	R Humidity(%)	Wind Direction(Deg)	Wind Spd(Km/hr)	Hourly Precipitation
2014	5	1	1	0	35	25	125	12	0
2014	5	1	2	0	35	19	127	12	0
2014	5	1	3	0	36	18	108	3	0
2014	5	1	4	0	38	18	79	2	0
2014	5	1	5	0	36	24	356	3	0
2014	5	1	6	0	32	43	135	4	0
2014	5	1	7	0	29	56	94	4	0
2014	5	1	8	0	28	61	111	4	0
2014	5	1	9	0	27	55	125	4	0
2014	5	1	10	0	26	66	118	3	0
2014	5	1	11	0	26	71	2	4	0
2014	5	1	12	0	26	81	290	5	0
2014	5	1	13	0	25	82	294	4	0
2014	5	1	14	0	25	82	284	3	0
2014	5	1	15	0	25	82	277	4	0
2014	5	1	16	0	26	82	273	2	0
2014	5	1	17	0	26	79	301	4	0
2014	5	1	18	0	27	75	244	3	0
2014	5	1	19	0	28	72	267	5	0
2014	5	1	20	0	29	69	284	9	0
2014	5	1	21	0	29	69	284	13	0
2014	5	1	22	0	29	67	285	13	0
2014	5	1	23	0	30	66	289	12	0
2014	5	1	24	0	28	69	287	11	0
2014	5	2	1	0	28	72	288	19	0
2014	5	2	2	0	29	73	289	18	0
2014	5	2	3	0	28	72	287	17	0
2014	5	2	4	0	27	76	289	17	0
2014	5	2	5	0	26	79	288	17	0
2014	5	2	6	0	27	80	292	13	0
2014	5	2	7	0	27	79	296	8	0
2014	5	2	8	0	26	80	292	11	0
2014	5	2	9	0	25	81	309	7	0
2014	5	2	10	0	25	82	309	4	0
2014	5	2	11	0	25	81	254	3	0
2014	5	2	12	0	26	81	321	5	0
2014	5	2	13	0	26	82	293	3	0
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2014	5	2	15	0	28	76	265	2	0
2014	5	2	16	0	29	68	334	3	0
2014	5	2	17	0	30	63	319	3	0
2014	5	2	18	0	30	62	282	12	0
2014	5	2	19	0	29	66	288	15	0
2014	5	2	20	0	29	68	289	16	0
2014	5	2	21	0	29	71	288	18	0
2014	5	2	22	0	28	73	291	16	0
2014	5	2	23	0	27	76	294	11	0
2014	5	2	24	0	26	78	292	12	0
2014	5	3	1	0	26	79	293	14	0
2014	5	3	2	0	27	80	296	12	0
2014	5	3	3	0	27	80	290	9	0

2014	5	3	4	0	27	65	349	11	0
2014	5	3	5	0	26	68	353	7	0
2014	5	3	6	0	25	70	341	7	0
2014	5	3	7	0	25	73	346	6	0
2014	5	3	8	0	24	75	337	7	0
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2014	5	3	12	0	27	66	3	4	0
2014	5	3	13	0	28	62	347	4	0
2014	5	3	14	0	28	61	297	2	0
2014	5	3	15	0	29	59	287	3	0
2014	5	3	16	0	29	61	286	5	0
2014	5	3	17	0	28	64	290	8	0
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2014	5	4	4	0	25	77	327	12	0
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2014	5	4	11	0	26	58	324	5	0
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2014	5	4	14	0	29	51	297	7	0
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2014	5	4	16	0	28	62	292	9	0
2014	5	4	17	0	28	65	294	14	0
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2014	5	4	24	0	25	87	297	11	0
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2014	5	5	2	0	25	82	318	16	0
2014	5	5	3	0	25	80	324	12	0
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2014	5	5	6	0	25	75	335	12	0
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2014	5	5	9	0	26	72	338	8	0

2014	5	5	10	0	26	66	345	9	0
2014	5	5	11	0	28	63	338	8	0
2014	5	5	12	0	29	57	311	3	0
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2014	5	5	22	0	26	81	305	10	0
2014	5	5	23	0	26	83	296	7	0
2014	5	5	24	0	26	80	289	5	0
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2014	5	22	6	0	29	67	334	10	0
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2014	5	22	8	0	30	64	287	3	0
2014	5	22	9	0	30	66	293	7	0
2014	5	22	10	0	31	65	286	5	0
2014	5	22	11	0	30	64	283	5	0
2014	5	22	12	0	30	64	286	6	0
2014	5	22	13	0	29	67	286	7	0
2014	5	22	14	0	28	72	287	10	0
2014	5	22	15	0	28	76	290	10	0
2014	5	22	16	0	27	80	284	7	0
2014	5	22	17	0	27	81	286	7	0
2014	5	22	18	0	27	82	292	11	0
2014	5	22	19	0	26	83	295	12	0
2014	5	22	20	0	26	85	306	21	0
2014	5	22	21	0	26	85	312	15	0
2014	5	22	22	0	26	81	330	13	0
2014	5	22	23	0	27	80	328	12	0
2014	5	22	24	0	26	77	347	9	0
2014	5	23	1	0	26	74	336	12	0
2014	5	23	2	0	26	76	331	11	0
2014	5	23	3	0	26	77	315	10	0
2014	5	23	4	0	27	72	336	13	0
2014	5	23	5	0	28	67	327	13	0
2014	5	23	6	0	30	61	352	7	0
2014	5	23	7	0	30	59	348	7	0
2014	5	23	8	0	31	56	340	3	0
2014	5	23	9	0	31	55	289	3	0

2014	5	23	10	0	31	56	290	4	0
2014	5	23	11	0	30	61	293	7	0
2014	5	23	12	0	30	65	297	10	0
2014	5	23	13	0	29	67	296	11	0
2014	5	23	14	0	28	70	296	11	0
2014	5	23	15	0	28	75	360	3	0
2014	5	23	16	0	27	80	286	8	0
2014	5	23	17	0	27	82	293	10	0
2014	5	23	18	0	27	84	291	9	0
2014	5	23	19	0	27	84	294	9	0
2014	5	23	20	0	27	82	302	13	0
2014	5	23	21	0	28	76	310	18	0
2014	5	23	22	0	27	73	321	15	0
2014	5	23	23	0	28	71	331	14	0
2014	5	23	24	0	26	73	341	8	0
2014	5	24	1	0	26	72	9	2	0
2014	5	24	2	0	26	72	360	5	0
2014	5	24	3	0	26	73	354	8	0
2014	5	24	4	0	27	67	350	7	0
2014	5	24	5	0	28	64	343	10	0
2014	5	24	6	0	29	60	17	6	0
2014	5	24	7	0	30	57	35	6	0
2014	5	24	8	0	31	53	12	3	0
2014	5	24	9	0	31	54	288	3	0
2014	5	24	10	0	32	45	290	3	0
2014	5	24	11	0	32	47	290	4	0
2014	5	24	12	0	32	49	289	6	0
2014	5	24	13	0	29	61	296	11	0
2014	5	24	14	0	29	68	297	12	0
2014	5	24	15	0	28	72	291	9	0
2014	5	24	16	0	27	76	297	11	0
2014	5	24	17	0	27	74	300	15	0
2014	5	24	18	0	27	80	308	21	0
2014	5	24	19	0	26	81	313	23	0
2014	5	24	20	0	27	77	322	19	0
2014	5	24	21	0	27	73	331	19	0
2014	5	24	22	0	28	70	344	12	0
2014	5	24	23	0	28	67	353	7	0
2014	5	24	24	0	27	69	353	7	0
2014	5	25	1	0	26	71	21	4	0
2014	5	25	2	0	27	71	42	8	0
2014	5	25	3	0	26	72	52	16	0
2014	5	25	4	0	27	69	58	19	0
2014	5	25	5	0	28	64	60	10	0
2014	5	25	6	0	29	58	60	6	0
2014	5	25	7	0	30	55	49	7	0
2014	5	25	8	0	31	52	45	6	0
2014	5	25	9	0	33	46	33	6	0
2014	5	25	10	0	34	37	10	6	0
2014	5	25	11	0	35	42	341	3	0
2014	5	25	12	0	32	53	293	5	0
2014	5	25	13	0	30	62	300	12	0
2014	5	25	14	0	28	71	303	21	0
2014	5	25	15	0	28	73	306	24	0

2014	5	25	16	0	27	74	305	20	0
2014	5	25	17	0	28	75	295	7	0
2014	5	25	18	0	27	73	287	5	0
2014	5	25	19	0	27	79	291	6	0
2014	5	25	20	0	27	79	308	8	0
2014	5	25	21	0	27	70	333	11	0
2014	5	25	22	0	28	67	21	4	0
2014	5	25	23	0	27	68	45	10	0
2014	5	25	24	0	27	69	45	8	0
2014	5	26	1	0	26	70	53	14	0
2014	5	26	2	0	26	73	57	15	0
2014	5	26	3	0	26	73	55	16	0
2014	5	26	4	0	26	70	53	14	0
2014	5	26	5	0	27	68	55	19	0
2014	5	26	6	0	28	65	55	17	0
2014	5	26	7	0	29	62	54	13	0
2014	5	26	8	0	30	57	50	10	0
2014	5	26	9	0	31	49	45	9	0
2014	5	26	10	0	34	41	49	6	0
2014	5	26	11	0	34	35	51	10	0
2014	5	26	12	0	33	46	311	6	0
2014	5	26	13	0	29	64	304	21	0
2014	5	26	14	0	29	72	303	23	0
2014	5	26	15	0	28	75	305	23	0
2014	5	26	16	0	27	80	303	16	0
2014	5	26	17	0	28	79	300	13	0
2014	5	26	18	0	28	79	301	11	0
2014	5	26	19	0	27	82	296	8	0
2014	5	26	20	0	28	79	308	12	0
2014	5	26	21	0	27	74	330	1	0
2014	5	26	22	0	28	67	55	10	0
2014	5	26	23	0	28	67	45	7	0
2014	5	26	24	0	28	65	42	7	0
2014	5	27	1	0	27	67	42	8	0
2014	5	27	2	0	27	67	33	5	0
2014	5	27	3	0	26	69	360	2	0
2014	5	27	4	0	28	63	25	4	0
2014	5	27	5	0	28	60	50	11	0
2014	5	27	6	0	29	60	54	10	0
2014	5	27	7	0	30	56	50	8	0
2014	5	27	8	0	31	54	46	9	0
2014	5	27	9	0	33	48	52	10	0
2014	5	27	10	0	34	46	354	3	0
2014	5	27	11	0	31	56	289	5	0
2014	5	27	12	0	30	61	299	11	0
2014	5	27	13	0	29	68	302	17	0
2014	5	27	14	0	28	74	303	22	0
2014	5	27	15	0	28	77	304	23	0
2014	5	27	16	0	28	79	306	24	0
2014	5	27	17	0	27	76	305	21	0
2014	5	27	18	0	27	78	302	14	0
2014	5	27	19	0	27	83	294	8	0
2014	5	27	20	0	27	86	299	7	0
2014	5	27	21	0	28	82	321	5	0

2014	5	27	22	0	28	72	22	4	0
2014	5	27	23	0	28	71	33	4	0
2014	5	27	24	0	27	71	23	2	0
2014	5	28	1	0	37	60	352	7	0
2014	5	28	2	0	36	52	353	6	0
2014	5	28	3	0	36	52	353	8	0
2014	5	28	4	0	37	57	5	6	0
2014	5	28	5	0	38	53	1	5	0
2014	5	28	6	0	39	40	10	7	0
2014	5	28	7	0	31	50	19	8	0
2014	5	28	8	0	32	41	5	8	0
2014	5	28	9	0	32	43	333	5	0
2014	5	28	10	0	31	49	285	5	0
2014	5	28	11	0	30	46	290	9	0
2014	5	28	12	0	39	48	287	10	0
2014	5	28	13	0	39	41	289	10	0
2014	5	28	14	0	38	45	287	10	0
2014	5	28	15	0	38	47	283	7	0
2014	5	28	16	0	27	49	285	7	0
2014	5	28	17	0	27	60	184	6	0
2014	5	28	18	0	28	83	184	6	0
2014	5	28	19	0	27	84	183	17	0
2014	5	28	20	0	27	81	275	9	0
2014	5	28	21	0	29	73	344	8	0
2014	5	28	22	0	28	67	349	14	0
2014	5	28	23	0	27	67	346	12	0
2014	5	28	24	0	27	71	339	16	0
2014	5	29	1	0	26	76	332	14	0
2014	5	29	2	0	26	77	334	13	0
2014	5	29	3	0	26	77	333	11	0
2014	5	29	4	0	28	72	335	12	0
2014	5	29	5	0	28	69	334	10	0
2014	5	29	6	0	28	67	319	7	0
2014	5	29	7	0	29	68	305	6	0
2014	5	29	8	0	30	64	287	3	0
2014	5	29	9	0	30	64	288	6	0
2014	5	29	10	0	29	68	289	10	0
2014	5	29	11	0	29	68	288	9	0
2014	5	29	12	0	33	46	311	6	0
2014	5	29	13	0	29	64	304	21	0
2014	5	29	14	0	29	72	303	23	0
2014	5	29	15	0	28	75	305	23	0
2014	5	29	16	0	27	80	303	16	0
2014	5	29	17	0	28	79	300	13	0
2014	5	29	18	0	28	79	301	11	0
2014	5	29	19	0	27	82	296	8	0
2014	5	29	20	0	27	79	308	8	0
2014	5	29	21	0	27	70	333	11	0
2014	5	29	22	0	28	67	21	4	0
2014	5	29	23	0	27	68	45	10	0
2014	5	29	24	0	27	69	45	8	0
2014	5	30	1	0	25	90	285	5	0
2014	5	30	2	0	25	89	298	7	0
2014	5	30	3	0	26	87	307	10	0

2014	5	30	4	0	26	77	336	7	0
2014	5	30	5	0	25	71	349	8	0
2014	5	30	6	0	25	71	344	6	0
2014	5	30	7	0	25	69	346	7	0
2014	5	30	8	0	26	65	333	11	0
2014	5	30	9	0	28	63	337	11	0
2014	5	30	10	0	28	56	335	9	0
2014	5	30	11	0	30	53	321	7	0
2014	5	30	12	0	29	57	289	5	0
2014	5	30	13	0	29	59	286	5	0
2014	5	30	14	0	29	64	281	4	0
2014	5	30	15	0	29	68	287	8	0
2014	5	30	16	0	28	70	289	10	0
2014	5	30	17	0	28	73	288	10	0
2014	5	30	18	0	28	76	287	9	0
2014	5	30	19	0	27	79	279	6	0
2014	5	30	20	0	26	84	285	6	0
2014	5	30	21	0	26	86	285	7	0
2014	5	30	22	0	26	88	286	7	0
2014	5	30	23	0	26	90	281	5	0
2014	5	30	24	0	26	92	282	4	0
2014	5	31	1	0	26	87	304	3	0
2014	5	31	2	0	26	78	347	2	0
2014	5	31	3	0	26	59	17	2	0
2014	5	31	4	0	25	60	50	7	0
2014	5	31	5	0	25	65	57	8	0
2014	5	31	6	0	25	67	34	3	0
2014	5	31	7	0	24	70	51	2	0
2014	5	31	8	0	27	61	358	4	0
2014	5	31	9	0	28	56	11	4	0
2014	5	31	10	0	29	55	342	8	0
2014	5	31	11	0	30	49	331	7	0
2014	5	31	12	0	30	56	287	4	0
2014	5	31	13	0	30	55	289	4	0
2014	5	31	14	0	29	63	283	5	0
2014	5	31	15	0	29	67	279	6	0
2014	5	31	16	0	29	69	284	8	0
2014	5	31	17	0	28	73	283	8	0
2014	5	31	18	0	28	76	283	7	0
2014	5	31	19	0	27	78	284	6	0
2014	5	31	20	0	27	82	287	7	0
2014	5	31	21	0	26	84	283	6	0
2014	5	31	22	0	26	87	282	5	0
2014	5	31	23	0	26	89	278	3	0
2014	5	31	24	0	26	91	283	3	0

ANNEXURE – 8

COMPLIANCE WITH CREP GUIDELINES

SR. NO.	ACTION POINTS	COMPLIANCE
1.	**SEGREGATION OF WASTE STREAMS:** Waste streams should be segregated into high COD waste, toxic waste, low COD waste, inorganic waste, etc. for the purpose of providing appropriate treatment.	Waste streams will be segregated for appropriate treatment.
2.	**DETOXIFICAITON AND TREATMENT OF HIGH COD:** High COD stream should be detoxified and treated in ETP or thermally destroyed in Incinerator.	High COD streams shall be identified & solvent will be recovered from it in solvent recovery plant. Residue generated will be sent to common incineration facility for disposal.
3.	**MANAGEMENT OF SOLID WASTE:** Proper facilities should be provided for handling and storage of hazardous waste. For final disposal of hazardous waste, recycling and reuse should be given priority, either within the premises or outside with proper manifest system. In case of Incinerable waste, property designed common incineration facility. The non-Incinerable hazardous waste should be disposed off in properly designed common secure landfill facility.	Hemani Intermediates Pvt. Ltd. will develop system/ facility for segregation, collection, storage of wastes and disposal as per Hazardous Waste Rules 2009. Separate storage area will be developed for Incinerable organic wastes and landfill wastes for sending to common TSDF sites. On-site/ off-site recovery of solvent, reuse and/ or selling to the end user.
4.	**MINIMUM SCALE OF PRODUCTION TO AFFORD COST OF POLLUTION CONTORL:** For new industries which are not connected with CETP and TSDF and which do not have the economics to install treatment facilities may not be considered for granting consent to establish. Industry association shall submit proposal to SPCB/ CPCB.	Necessary pollution control equipment will be provided.
5.	**LONG TERM STRATEGIES FOR REDUCTION IN WASTE :** Consent for establishment and consent for operation under the Water Act will be based on pollution load and concentration of pollutants. Each industry will submit pollution load, concentration of final discharge along with water balance to SPCB/CPCB for formulation of strategy.	Will be complied.

6.	**CONTROL OF AIR POLLUTION:** Industry will take up on priority, the control of hazardous air pollutants (such as benzene, carbon tetrachloride, 1-4 dioxane, methanol, toluene, methyl chloride, etc.) and odorous compounds (mercaptan and hydrogen sulphide).	We will provide double condenser system for the vessels (primary condenser with cooling water and secondary condenser with chilled brine) where solvent recovery operations are carried out. On solvent tanks breather valve will be provided. Tank vents will be connected to the vent chillers. All solvent condensers will be connected to vent chillers. Close feeding of the centrifuges will be carried out. Centrifuge vents and filtrate tank vents will be connected to vent chillers. Dryer vents will be connected to finned tube vent chillers. Provision of line meters will be done to eliminate day pot thus reduces inventory and losses by avoiding repeated transferring.
7.	**SELF REGULATION BY INDUSTRY THROUGH REGULAR MONITORING AND ENVIRONMENTAL AUDITING :** Industries on their own will carry out monitoring of environmental parameters, audit it at regular intervals & submit the same to SPCB. Comment of BDMA – There shall be a policy for accreditation the auditors and the policy guidelines may be issued by MoEF.	Yearly audit will be carried out and report will be submitted.
8.	**ORGANIZATIONAL RESTRUCTURING AND ACCREDITATION OF ENVIRONMENTAL MANAGER OF INDUSTRY :** (a) Environment management cell will be created for each industry reporting to CEO directly. (b) There should be a certification system for the environmental managers at individual level and common facility level. BDMA may evolve the programme along with SPCB/CPCB.	The plant will have environment management cell reporting to Plant Head.
9.	**OPTIMISING THE INVENTORY OF HAZARDOUS CHEMICALS :** The information shall be submitted to SPCB regularly along with rational action plan	Noted and will be complied.

ANNEXURE – 9

The questionnaire for industry sector

QUESTIONNAIRE FOR ENVIRONMENTAL APPRAISAL

(INDUSTRY SECTOR PROJECTS)

of

M/s. Hemani Intermediates P. Ltd. (Unit-IV)

Plot No. E-362, GIDC Estate-Dahej,

Tal: Vagra, Dist: Bharuch, GUJARAT

for

ENVIRONMENTAL CLEARANCE (INDUSTRIAL SECTOR) FOR PROPOSED SPECIALTY CHEMICALS AND PESTICIDE UNIT

QUESTIONNAIRE FOR ENVIRONMENTAL APPRAISAL
(INDUSTRY SECTOR PROJECTS)

I GENERAL INFORMATION

a)	**Name of the Project**	M/s. Hemani Intermediates P. Ltd. (Unit-IV)
b)	**Plant Capacity (TPA)**	Proposed Capacity: 12900 MT/Month
c)	**Location**	Plot No. E-362, GIDC Estate-Dahej, Tal: Vagra, Dist: Bharuch, GUJARAT

Village	**Tehsil**	**District**	**State**
Dahej	Vagra	Bharuch	Gujarat

d)	Geographical Information	
1	Latitude	21° 43’ 13.8” N
2	Longitude	72° 36’45.60” E
3	Elevation above Mean Sea Level (meters)	-
4	Total area envisage for the project (in ha.)	9705 Sq. Mt.
5	Nature of terrain (hilly, valley, plains, coastal plains, etc.)	Plain
6	Nature of soils (sandy, clayey, sandy loam, etc.)	alluvial type of fine, loamy, calcareous soil
7	Permeability (cm / sec)	4.4×10^{-3}
e)	Alternate sites considered	No, as the site is available with all the necessary infrastructure facilities
f)	Reasons for selecting the proposed site based on comparative evaluation of environmental considerations	----------do----------

2 ENVIRONMENTAL SETTING

a)	Current land usage of the proposed site area (in hectares)	Land will be utilized for industrial purposes only.
	Notified Industrial Area/Estate	- do -
	Agricultural	-
1.	Irrigated	
2.	Unirrigated	
3.	Homestead	-
4.	Forest	-
5.	Grazing	-
6.	Fallow	-
7.	Marshy	-
8.	Mangroves	-
9.	Others (Pl. Specify)	-
	Total	-
b)	Please indicate area earmarked for each of the following (hectares)	A detailed layout map of the plant is given as Figure 1.2, Section 1.4, Chapter-1 in EIA Report (Page No.1-10).
		Total Proposed (Sq. Mt.)
1	Plant facilities	5900
2	Ash disposal	
3	Storage (Fuel)	
4	Storage (Water)	
5	Storage (Hazardous Waste)	
6	Storage (Hazardous Chemicals)	
7	Storage (Others)	
8	Approach Road(s)	
9	Township	-
10	Green Belt	2400
11	Others (Please specify)	**1405**
	Total	9705
c)	Is the proposed site located in a low – lying area? If yes,	No

1	Level before filling (above MSL in meters)	Not Applicable
2	Level after filling (above MSL in meters)	Not Applicable
Quantity of Fill Material required (in cum.)		Source
Not Applicable		Not Applicable
d)	Proximity to sea / water bodies	
	Sea	Other Water Bodies like river / creek / lake, etc. (Narmada river)
Distance in site boundary * (in meters)	--	3.5 Km
Distance of plant facilities (in meters)	--	3.5 Km

*** From highest flood line / high tide line**

e)	Whether any of the following exist within 7 km of the periphery of the project site. If so, please specify the aerial distance and the name of the ecosystem as given under the Table			
Sr. No.	**Eco System**	**Name**	**Area falling within 7 km periphery of the project (ha)**	**Aerial Distance (in km)**
1	National Park / Wild life Sanctuary	None	Not Applicable	Not Applicable
2	Tiger Reserve / Elephant Reserve / Turtle Nesting Ground	None	Not Applicable	Not Applicable
3	Core zone of Biosphere Reserve	None	Not Applicable	Not Applicable
4	Habitat for migratory birds	None	Not Applicable	Not Applicable
5	Lakes / Reservoirs / Dams	None	Not Applicable	Not Applicable
6	Stream / Rivers	Narmada river	650	5 Km
7	Estuary / Sea	Gulf of Kambay	5500	8 Km
8	Mangroves	None	Not Applicable	Not Applicable
9	Mountain / Hills	None	Not Applicable	Not Applicable
10	Notified Archeological sites	None	Not Applicable	Not Applicable
11	Any other Archeological sites	None	Not Applicable	Not Applicable
12	Industries / Thermal Power Plants	--		
13	Defense Installation	None	Not Applicable	Not Applicable
14	Air Ports	None	Not Applicable	Not Applicable
15	Railway lines *	Railway line is 0.3 km from the site.		
16	National Highways/State Highways	National Highway No. 8 (43.7 km), State Highway SH (0.44 km)		

*** 0.5 km from Railway lines / National / State Highway should be maintained**

f)	Description of flora / vegetation within 7 km radius under following headings	
1	Agricultural Crops	Oil seeds, Vegetables, Food grains and Fruits.

2	Commercial Crops	--------- do ----------
3	Plantation	--
4	Natural vegetation / Forest type	--------- do ----------
5	Grass Lands	None
6	Endangered species	None
7	Endemic species	--
8	Others (Please specify)	None
g)	Description of fauna (non – domesticated) within 7 km under following headings	
1	Total listing of faunal elements	--
2	Endemic fauna species	--------- do ----------
3	Endangered species	None
4	Migratory species	None
5	Route of migratory species of birds and mammals	Not applicable
6	Details of aquatic fauna (in applicable)	Not applicable

3 METEOROLOGICAL PARAMETERS

a)	Seasonal Monitoring Data (continuous monitoring for one full season exclude monsoon should be carried out)	Please refer Table 3.7, Chapter -3 in EIA Report (Page No. 3-14).	
1	Temperature		
a) Maximum:		b) Minimum:	c) Mean:
2	Rainfall (in mm):		
3	Mean value of humidity (in %)		
4	Inversion occurrence	Not available	
a) In percentage: b) Height in meters:			
5	Seasonal wind rose pattern (16 points on compass scale)	Please refer Annexure-7 in list of Annexure	
6	Hourly Mean Meteorological data (based on one full season data collected at site required as input for air quality modeling)	Please refer Annexure-7 in list of Annexure	

4 AMBIENT AIR QUALITY DATA

Frequency of Monitoring should be as per guidelines of CPCB and monitoring should cover one full season (excluding monsoon)		
a)	Season and period for which monitoring has been carried out	1st March, 2014 to 31st May, 2014
b)	Frequency of sampling	Twice a week in each location
c)	Number of samples collected at each site	Twenty four (24)
d)	Specific air pollution issues in the project area	None

5 MANUFACTURING PROCESS DETAILS

a)	Raw materials (including process chemicals, catalysts & additives)	Please refer Table no. 2.1, Section no. 2.3, Chapter no. 2 of EIA report (Page No. 2-25 to 2-28).
b)	Brief description of the process	Manufacturing process details along with the chemicals reaction & process flow chart is referred as Section 2.2, Chapter-2 in EIA Report (Page No. 2-1 to 2-24).
c)	Details of process technology know-how / collaboration	-
d)	Production profile (T / Year)	List of products and their capacity is referred as Table No.1.3, Section 1.1, Chapter-1 in EIA Report (Page No.1-13).
e)	Means of transportation of raw material and final products	Raw materials and final products are mainly transported by road.

6 WATER

a)	**Water requirement per day**				
Purpose	**Existing Demand**	**Proposed Demand**	**Source**	**Type (Treated / Untreated / Fresh / Recycled)**	**Remarks**
1) Project			GIDC Water Supply	The treated effluents (Low COD) will be disposed in deep sea through by GIDC drain. High COD stream will be treated in MEE and MEE Condensate will be reused.	
i) Process + Washing		116			
ii) Cooling Water		90			
iii) DM Water / Boiler		120			
iv) Dust Suppression					
v) Domestic		25			
vi) Green Belt		15			
vii) Fire Service					
viii) Others					
2) Township		Not applicable	NA	Not applicable	
i) Green Belt					

ii) Drinking					
iii) Others (Pl. specify)					
Total		**366**			

b)	Source of water supply		
Sr. No.	**Source**	Cu. m. / hr	Cu. m. / day
1	Sea	None	None
2	River	None	None
3	**Ground water**	**None**	None
4	Other surface water bodies (Please specify)	--.	
c)	Lean season flow in case of surface water source (cusecs / cumecs)	Not Applicable	
d)	Ground water (a) Recharge Rate / Withdrawal Rate	--	
1	Ground water level (meters)	Not Applicable	
	i) Pre monsoon		
	ii) Post monsoon		
	(to be obtained from State Ground Water Authorities)		
e)	Competing users of the Water Source	GIDC water supply	

Sr. No.	**Usage**	**Present Consumption (cu.m. / hr)**		**Addition proposed as per local plan**		**Total**	
		Surface	**Ground**	**Surface**	**Ground**	**Surface**	**Ground**
1	Irrigation	Not Applicable					
2	Industry						
3	Drinking						
4	Others (Please specify)						
TOTAL							

f)	Physico chemical analysis of Raw Water at intake point	Please refer Table 3.11, Section 3.4, Chapter-3 in EIA Report (Page No.3-23 to 3-26)
g)	Physico chemical analysis of Treated Water to be used in project / township	
h)	Wastewater management	Please refer Section 2.4.3, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).
1	Description of wastewater treatment plant with flow chart	Please refer Section 2.4.3, Chapter-2 in EIA Report (Page No. 2-32 to 2-37).
2	Characteristics of discharge stream(s) before and after treatment	--
3	Daily discharge (m^3 / day) from different sources	Daily wastewater generation will be 139 m^3/day.
4	Quantity of water recycled	-
5	Details of recycling mechanism	-
6	Mode of final discharge / disposal of treated effluent	Low COD treated effluents will be disposed in deep sea through by GIDC drain. High COD stream will be sent to treated in MEE and MEE Condensate will be reused.

Mode	Length (in m.)	Quantity (in m^3/d)

1) Closed Channel - RCC		Not applicable
2) Pipeline		Not applicable
3) Others (Please specify)		
7	Point of final discharge	Low COD treated effluents will be disposed in deep sea through by GIDC drain. High COD stream will be sent to treated in MEE and MEE Condensate will be reused.
8	Lean season flow rate in case of discharge in a river / stream	Not Available
9	Downstream users of water (in case of river, reservoir, lake)	None
10	Analysis of river water 100 meters upstream of discharge point and 100 meters downstream of discharge point (except in rainy / monsoon season) along with details of aquatic life	Not Available
11	What is the predicted impact on water quality of the receiving body due to discharge? (Briefly state the prediction tool adopted)	No significant adverse impact.

7 HAZARDOUS WASTE MANAGEMENT

a)	**Details**			
Sr. No.	Source	**Qty.**	**Form (Sludge, Dry Sludge, etc.)**	**Composition**
1	Raw water treatment plant			
2	ETP			
3	Process			
4	Spent Catalyst			
5	Oily sludge – used oil			
6	Others			
b)	If waste(s) contain any hazardous / toxic substance / radioactive material or heavy metals, provide data and proposed precautionary measures		--	
c)	What are the possibilities of recovery and recycling of wastes?		None	
d)	Possible users of Solid Waste (s)		--	
e)	Method of disposal of solid waste (s)		Please refer Section 2.4.6, Chapter-2 in EIA Report (Page No.2-39 to 2-40).	
f)	In case of landfill		M/s. Hemani Intermediates Pvt. ltd.(Unit-IV) will become the member of TSDF and Common Incinerator.	
g)	In case of incineration			
1	Details of incinerator		--	
	i) Type			
	ii) Size			
	iii) Capacity			
	iv) Fuel			
2	Likely composition and quantum of emissions		--	

8 NOISE POLLUTION CONTROL AND MANAGEMENT

a)	Source	--
b)	Level at Source (dB)	
c)	Level at project boundary capacity (dB)	
d)	Abatement measures (give source wise details)	

9 FUEL / ENERGY REQUIREMENTS

a)	Total Power Requirement (KW)			
	Project	Township	Others (Please specify)	Total
Present				
Total Proposed	1000 KVA	NA	NA	1000 KVA
TOTAL	**1000 KVA**			**1000 KVA**

b)	Source of Power (MW)		
	DGVCL	Captive Power Plant	DG Sets
Present			
Proposed	Company shall purchase power from DGVCL.	-	1 - D.G. Set

c)	Details of fuel used		
Fuel	**Existing Consumption**	**Proposed Consumption**	**Total Proposed Consumption**
Natural Gas	-	--	--
HSD	-	50 Liter	50 Liter
FO	-	10 KL/Day	10 KL/Day
Coal/Agro Waste	-	35 MT/Day	35 MT/Day
Lignite	-	-	--
Other (Briquettes)	-	-	--

Either Natural Gas / Furnace Oil / *Diesel for emergency use only

d)	Source of fuel (Distance in km) 1. Port 2. Mine 3. Refinery 4. Storage depot/Terminal	
e)	Mode of transportation of fuel to site 1. Trucks (numbers/day) 2. Pipeline (length in km.) 3. Railway Wagons (numbers/day)	

10 ATMOSPHERIC EMISSIONS

a)	Flue gas characteristics (SPM, SO_2, NO_x, CO, in $\mu g / m^3$)	Please refer Table 4.1, Sector 4.2.2, and Chapter-4 in EIA Report (Page No.4-10).
b)	Size distribution of SPM at the top of the stack	Not available
c)	Stack emission details (all the stacks attached to process units, boilers, captive power plant, DG Sets, incinerator, both for existing and proposed activity)	Please refer Table 4.1, Sector 4.2.2, and Chapter-4 in EIA Report (Page No.4-10).
d)	Details of fugitive emissions (indicate the points of fugitive emissions and quantities estimated)	Not estimated
e)	Predicted impact on air quality (as per CPCB guidelines for conducting the air quality monitoring)	Please refer Table No. 4.3 (Chapter - 4) of EIA report. (Page No.4-19).

11 POLLUTION LOAD STATEMENT

APPLICABLE TO EXPANSION AND MODERNISATION PROJECT:

Parameter	After total Proposed Expansion/ Modernization	Total	Remarks
1. Land area (Sq. M)	9705	9705	
2. Raw water (m^3/day)	858	858	Source – GIDC Water
3. Power (KVA/day)	1000 KVA	1000 KVA	**Source –DGVCL**
4. Waste water (effluent generation) (m^3/day)	437	437	
5. Air emissions (Kg/d)			
a. SPM	150	150	
b. CO	-	-	
c. SO_2	262	262	
d. NOx	94	94	
e. Others HCl	20	20	
6. Hazardous Chemical Storage (give item-wise)	Please refer Table 6.1 of EIA Report		Enough safety precautions to be taken in storage of

7. Solid waste (TPD) a. Non-Hazardous b. Hazardous	Please refer Section 2.4.6, Chapter-2 in EIA Report (Page No.2-39 to 2-40).		hazardous chemicals to prevent an accident.

12 OCCUPATIONAL HEALTH AND INDUSTRIAL HYGIENE

12	**STORAGE OF CHEMICALS (INFLAMMABLE / EXPLOSIVE / HAZARDOUS / TOXIC SUBSTANCES)**	**Please refer Table 6.1, Chapter-6 of EIA Report**
a)	What are the major occupational health and safety hazards anticipated? (Explain briefly)	There is no major occupational health hazard anticipated due to the proposed project.
b)	What provisions have been made / propose to be made to conform to health & safety requirements. (Explain briefly).	Separate occupational health center with necessary facility will develop. Part time Medical Officer (MBBS) will be appointed. Medical check-up will be carried out before recruitment and 6 months thereafter for all employees.
c)	Details of personal protective equipment provided / to be provided to the workers	Following PPEs will be Provided Goggles, Gloves, Safety Shoes, Helmet, Ear Plugs, Facemasks, and PVC Suit etc.
d)	Details of proposed measures for control of fugitive emission / odour nuisance from different sources.	Local exhaust and ventilation will be provided. The gases that will be emitted from the vent will be as per GPCB norms. Utmost care will be taken to minimize odour problem.
e)	Details of fire protection and safety measures envisaged to take care of fire and explosion hazards	As Per requirement

13 POLLUTION CONTROL ASPECTS

a)	Details of pollution control systems		
Sr. No.		**Existing**	**Proposed to be installed**
1	Air		ESP & Scrubber

2	Water		--
3	**Noise**		In high noise areas, ear protective equipments are provided to all personnel.
4	Solid waste		Hazardous waste storage facility
b)	Efficiency of each pollution control equipment / system installed		Efficiency of pollution control equipment is 98-99%

14 GREEN BELT DEVELOPMENT

a)	Total area of project / township (in ha.)	9705 Sq.M
b)	Area already afforested (for existing projects) in ha.	-
c)	Area proposed to be afforested (in ha.)	9705 Sq.M
d)	Plant species proposed	Type of the trees to be planted are Saru, Gulmohar, Asopalav, Neem, etc.
e)	Width of green belt (min. in m.)	
1	Along plant boundary	5 m
2	Roads and avenues within the plant	6 m
3	Ash dike	Not Applicable
4	Township	Not Applicable
5	Other ornamental, garden species	Rose, Bottleplam, acalifa golden, etc.
6	Commercial plantations, etc.	None
f)	Trees planted and proposed	
1	Planted	-
2	Survival rate	-
3	List of species planted	-
4	Proposed (Nos.)	100 Nos. (For 1st Two Years)
5	List of species	-
15	**CONSTRUCTION PHASE MANAGEMENT ASPECTS**	
a)	Estimated duration of construction in months	12 Months
b)	Number of persons to be employed for construction	
1	Peak	--
2	Average	--

c)	What provisions has been made for the sewage treatment for the construction workers	Septic tank facility will be made available.		
d)	How the fuel (kerosene, wood, etc.) requirement of labor force will be met to avoid cutting of trees from adjoining areas	All fuels will be available in nearby area.		
e)	Proposed health care measures with emphasis on protection from endemic diseases	Safe water supply, first aid and personal protective equipment.		
f)	Educational and other social welfare measures provided	-		
16	**HUMAN SETTLEMENT**	Not Applicable		
		Aerial distance from the periphery of the site		
		Upto 500m from periphery	500m to 3000 m from the periphery	3000m to 7000m from the periphery
Population				
Number of Houses				
Present Occupational Pattern				
17	**REHABILITATION & RESETTLEMENT PLAN (WHEREVER APPLICABLE)**	**Not Applicable**		
a)	Village(s) affected by the project			
b)	Population to be displaced			
c)	Salient features of Rehabilitation plan			
i	Site where the people are proposed to be resettled			
ii	Facilities proposed at the site			
iii	Compensation package			
iv	Agency / Authority responsible for their settlement			

ANNEXURE – 10

TOR Letter

Term of Reference

F. No. J-11011/378/2013-IA II (I)
Government of India
Ministry of Environment and Forests

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003
E-mail: tchand2003@yahoo.co.uk
Telefax: 011- 2436 0108

Dated: 23rd April 2014

To,

Shri Satish Patel,
General Manager,
M/s. Hemani Industries Ltd.,
Plot. No. CH/5, Dahej-1, Dahej Ind. Area,
Tal: Vagra, Dist.: Bharuch – 392130,
GUJARAT.

Sub: **Specialty Chemicals & Pesticide Manufacturing Plant (Unit-IV) of M/s. Hemani Intermediates Pvt. Ltd. at GIDC Dahej-1, Taluka:Vagra, District: Bharuch, Gujarat (TOR)**

Sir,

This is with reference to your letter No. III dated 17.10.2013 along with project documents including Form-I, Pre-Feasibility Report seeking Terms of Reference' (TOR) as per the EIA Notification, 2006. Based on the documents furnished, it is noted that M/s. Hemani Intermediates Pvt. Ltd. has proposed for setting up of Specialty Chemicals & Pesticide manufacturing Plant (Unit-IV) at GIDC Dahej-1, Tal: Vagra, Dist.: Bharuch, Gujarat. The GIDC Dahej-1 was established in 1994. Total 9 units of the total 60-70 units of Dahej1 are pesticide units. Dahej-II and III were established after 2006. Total plot area is 9705 m^2 of which green belt area will be developed in 2400 m^2. No national park, wildlife sanctuaries, biosphere reserve, heritage sites, parks, reserve forests etc. are located within 10 km distance. Total cost of project is Rs. 10 crores.

2. All units producing technical grade pesticides are listed at S.N. 5(b) under category 'A' and approved at Central Level

3. The following products will be manufactured:

S.N.	Products	Quantity (in MTPM)
1	Chlorination Derivatives (e.g. MCB, DCB, ODCB, PDCB, MDCB & TCB)	3500
2	Nitration of Chlorobenzene (ONCB, PNCB & MNCB)	4000
3	Calcium Chloride	1500
4	Di-Calcium Phosphate	1500
5	2,4 DNCB	1500
6	Fungicide	
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propiconzole (T)	
d)	Mancozeb (T)	
7	Herbicide	
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Metsulfuron Methyl (T)	
d)	Pendimethslin	
8	Insecticide	

1

a)	Transfluthrin (T)	500
b)	Cyfluthrin & Beta, Isomer (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomer (T)	
e)	Chlorpyriphos (T)	
f)	Imidacloprid (T)	
	Total	**12900**

4. ESP along with stack height (50 m) will be provided to coal fired boiler (20 TPH). Venturi & Packed scrubber will be provided to incinerator. Scrubber will be provided to control process emissions viz. HCl, Cl2 and SO2. Fresh water requirement from GIDC water supply will be 858 m^3/day. Quantity of effluent generation will be 437 m^3/day and treated in ETP consisting of primary, secondary and tertiary treatment units. Treated effluent will be disposed into deep sea through GIDC pipeline. Sludge and distillation residue will be sent to TSDF. Fly ash will be sent to brick manufacturers.

5. The aforesaid proposal was considered by the Reconstituted Expert Appraisal Committee (Industry) (EAC (I)) in its 16th Meeting held on 20th -21st February 2014. The project proponents gave a detailed presentation on the salient features of the project and proposed environmental protection measures to be undertaken along with the draft Term of References for the preparation of EIA-EMP. After detailed deliberations, the Expert Appraisal Committee prescribed the following TORs regd with Generic TOR at Annexure-1 and additional TORs at Annexure-2 for preparation of EIA-EMP report.

(i) A clarification from GPCB whether addition of this unit would be absorbed by Dahej I.
(ii) Toxicity Bioassay Tests also regd. BTEX Test (VOC Test) required.
(iii) Monitoring of VOC and NMHC in addition to other AAQ parameters (PM 10, PM 2.5, SO2 and NOx).

6. The Ministry of Environment & Forests on the basis of the aforesaid recommendations hereby accords the aforesaid TORs as given in the attached Annexure for preparation of the EIA-EMP Report.

(Dr.T.Chandini)
Director

Copy to: The Chairman, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector – 10, A, Gandhinagar – 382010, Gujarat (E-mail: chairman@gpcb.gov.in; Fax No.: 079-23232156)

(Dr.T.Chandini)
Director

ANNEXURE -I

GENERIC TERMS OF REFERENCE (TOR)

1. Executive summary of the project along with justification for the project.
2. Photographs of the proposed and existing (if applicable) plant site.
3. A line diagram/flow sheet for the process and EMP.
4. In case of existing projects seeking expansion, (i) A certified copy of the Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012, on the status of compliance of the conditions stipulated in the environmental clearance and (ii) Status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB, which shall include data on AAQ, water quality, solid waste etc. shall be submitted.
5. A toposheet of the study area and site location map on Indian map of 1:10, 00,000 scale followed by 1:50,000/1:25,000 scale on an A3/A2 sheet of a circle of aradius of 10 kms and further 10 kms on A3/A2 sheets with proper longitude/latitude/heights with minimum 100/200m contours shall be included. A 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
6. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area. Present land use – agricultural land, forestland, wasteland, water bodies, settlements, etc shall be prepared based on satellite imagery.
7. Topography of the area shall be given clearly indicating whether the site requires any filling. If so, details of filling, quantity of fill material required, its source, transportation etc. shall be given. In case the site is located on a hilly terrain, a 3-dimesional view of the location vis-à-vis major landuse features and locations such as Critically Polluted Area(s) and Eco-sensitive Area(s) found within the study area, indicating shortest distance from the site shall be provided.
8. Map showing location of Eco-sensitive Areas such as National Parks/Wildlife Sanctuary/Reserve Forests within 10 km. radius (study area) shall specifically be mentioned. A map showing land use/land cover, reserved forests, wildlife sanctuaries, national parks, tiger reserve etc in 10 km of the project site and shortest (aerial) distance from critically/severely polluted area(s) and Eco-sensitive Areas.
9. Project site layout plan to scale using AutoCAD of the project site showing Plant details, raw materials, fly ash and other storage plans, ash pond and water harvesting structures, bore well or water storage, aquifers (within 1 km.), dumping, waste disposal, green belt (areas), water bodies, rivers/drainage passing through/near the project site shall be included.
10. Coordinates of the plant site with topo sheet co-ordinates shall also be included.
11. Details and classification of total land (identified and acquired) shall be included.
12. A copy of the mutual agreement for land acquisition signed with land oustees.
13. Proposal shall be submitted to the Ministry for environment clearance only after acquiring total land. Necessary documents indicating acquisition of land shall be included.
14. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department, in case the project involves forestland.
15. If the project falls within 10km of an eco-sensitive area, present status/approval from the Standing Committee on Wildlife of the NBWL shall be furnished.
16. Rehabilitation & Resettlement (R & R) shall be as per the R&R Policy of the State Govt. and a detailed action plan shall be included.
17. A list of major industries with name and type within study area (10km radius) shall be incorporated.
18. List of raw material required, analysis of all the raw materials and source along with mode of transportation shall be included. All the trucks for raw material and finished product transportation must be "Environmentally Compliant".
19. Action plan for excavation and muck disposal during construction phase.

20. Studies for fly ash, muck, slurry, sludge material disposal and solid waste generated from the plant operations and processes and environmental control measures. If the raw materials used have trace elements, an environment management plan shall also be included.
21. Manufacturing process details shall be included.
22. Mass balance for the raw material and products shall be included.
23. Energy balance data for all the components of steel plant including proposed power plant shall be incorporated.
24. One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall and AAQ data (except monsoon) shall be collected. The monitoring stations shall take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.
25. One season data for gaseous emissions other than monsoon season is necessary.
26. Ambient air quality monitoring at 8 locations within the study area of 10 km, aerial coverage from project site with one AAQMS in downwind direction shall be carried out.
27. Suspended particulate matter present in the ambient air must be analysed for source analysis – natural dust/generated from plant operations (for eg. Cement dust)/flyash/etc. The SPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM.
28. Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain/elevation, the AQIP Modelling shall be done using inputs of the specific terrain characteristics of the project for determining the potential impacts of the project on the AAQ.
29. Action plan to implement National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 shall be included.
30. Ambient air quality modelling along with cumulative impact shall be included for the day (24 hrs) for maximum GLC along with following :
    i) Emissions (g/second) with and without the air pollution control measures
    ii) Meteorological inputs (wind speed, m/s), wind direction, ambient air temperature, cloud cover, relative humidity & mixing height) on hourly basis
    iii) Model input options for terrain, plume rise, deposition etc.
    iv) Print-out of model input and output on hourly and daily average basis
    v) A graph of daily averaged concentration (MGLC scenario) with downwind distance at every 500 m interval covering the exact location of GLC.
    vi) Details of air pollution control methods used with percentage efficiency that are used for emission rate estimation with respect to each pollutant
    vii) Applicable air quality standards as per LULC covered in the study area and % contribution of the proposed plant to the applicable Air quality standard. In case of expansion project, the contribution shall be inclusive of both existing and expanded capacity.
    viii) No. I-VII are to be repeated for fugitive emissions and any other source type relevant and used for industry
    ix) Graphs of monthly average daily concentration with down-wind distance
    x) Specify when and where the ambient air quality standards are exceeded either due to the proposed plant alone or when the plant contribution is added to the background air quality.
    xi) Fugitive dust protection or dust reduction technology for workers within 30 m of the plant active areas.
31. A plan for the utilisation of waste/flue gases (if applicable) for generating power shall be presented.
32. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. The alternate method of raw material and end product transportation shall also be studied and details included.
33. An action plan to control and monitor secondary fugitive emissions from all the sources as per the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008.
34. Presence of aquifer(s) within 1 km of the project boundaries and management plan for recharging the aquifer shall be included.
35. If the site is within 1 km radius of any major river, Flood Hazard Zonation Mapping is required at 1:5000 to 1:10,000 scale indicating the peak and lean River discharge as well as flood occurrence frequency.

36. Details of water requirement, water balance chart for new unit or for existing unit as well as proposed expansion (if expansion). Measures for conservation water by recycling and reuse to minimize the fresh water requirement.
37. Source of water supply and permission of withdrawal of water from Competent Authority.
38. Water balance data including quantity of effluent generated, recycled and reused and discharged is to be provided. Methods adopted/to be adopted for the water conservation shall be included. Zero discharge effluent concepts to be adopted.
39. Source of surface/ground water level, site (GPS), cation, anion (Ion Chromatograph), metal trace element (as above) chemical analysis for water to be used. If surface water is used from river, rainfall, discharge rate, quantity, drainage and distance from project site shall also be included. Information regarding surface hydrology and water regime shall be included.
40. Ground water analysis with bore well data, litho-logs, drawdown and recovery tests to quantify the area and volume of aquifer and its management.
41. Ground water monitoring minimum at 8 locations and near solid waste dump zone, Geological features and Geo-hydrological status of the study area are essential as also. Ecological status (Terrestrial and Aquatic) is vital.
42. Ground water modelling showing the pathways of the pollutants shall be included
43. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources. Rain water harvesting and groundwater recharge structures may also be constructed outside the plant premises in consultation with local Gram Panchayat and Village Heads to augment the ground water level. Incorporation of water harvesting plan for the project is necessary, if source of water is bore well.
44. A note on the impact of drawl of water on the nearby River particularly during lean season. Permission of competent authority for withdrawl of river/groundwater.
45. Surface water quality of nearby River (60 m upstream and downstream) and other surface drains at eight locations to be provided in and around the project site.
46. A note on treatment of wastewater from different plants, recycle and reuse for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards.
47. Provision of traps and treatment plants are to be made, if water is getting mixed with oil, grease and cleaning agents.
48. If the water is mixed with solid particulates, proposal for sediment pond before further transport shall be included. The sediment pond capacity shall be 100 times the transport capacity.
49. Wastewater characteristics (heavy metals, anions and cations, trace metals, PAH) from any other source shall be included.
50. The pathways for pollution via seepages, evaporation, residual remains are to be studied for surface water (drainage, rivers, ponds, and lakes), sub-surface and ground water with a monitoring and management plans.
51. Action plan for solid/hazardous waste generation, storage, utilisation and disposal from all the sources and fly ash. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.
52. Details of evacuation of ash, details regarding ash pond impermeability and whether it would be lined, if so details of the lining etc. need to be addressed. Copies of MOU regarding utilisation of ash shall also be included.
53. End use of solid waste and its composition shall be covered. Toxic metal content in the waste material and its composition shall also be incorporated.
54. All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.
55. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated. All rooftops/terraces shall have some green cover.
56. Detailed description on flora and fauna (terrestrial and aquatic) exists in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

57. Risk Assessment and Disaster (Emergency) Preparedness and Management Plan including damage control needs to be addressed and included.

58. Occupational health:

a. Details of existing Occupational & Safety Hazards. What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,

b. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.

c. Annual report of heath status of workers with special reference to Occupational Health and Safety.

d. Action plan for the implementation of OHS standards as per OSHAS/USEPA.

e. Plan and fund allocation to ensure the occupational health & safety of all contract and sub-contract workers.

59. Corporate Environment Policy

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

60. Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

61. Impact of the project on local infrastructure of the area such as road network and whether any additional infrastructure needs to be constructed and the agency responsible for the same with time frame.

62. Environment Management Plan (EMP) to mitigate the adverse impacts due to the project along with item wise cost of its implementation. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

63. Plan for the implementation of the recommendations made for the Sector in the CREP guidelines must be prepared.

64. At least 5 % of the total cost of the project shall be earmarked for the initial 5 years towards the Enterprise Social Commitment and 2% of retain profit thereafter for life of the project towards CSR based on public hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

65. A note on identification and implementation of Carbon Credit project shall be included.

66. Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

67. A tabular chart with index for point wise compliance of above TORs.

68. The questionnaire for industry sector (available on MOEF website) shall be submitted while submitting EIA-EMP.

69. 'TORs' prescribed by the Expert Appraisal Committee (Industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. Where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the State Pollution Control Board of the concerned State for conduct of Public Hearing. The SPCB shall conduct the Public

Hearing/public consultation, district-wise, as per the provisions of EIA notification, 2006. The issues raised in the Public Hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately in EIA-EMP Report in the form of tabular chart with financial budget (capital and revenue) along with time-schedule of implementation for complying with the commitments made. The final EIA report shall be submitted to the Ministry for obtaining environmental clearance.

70. The TORs prescribed shall be valid for a period of two years for submission of the EIA-EMP reports along with Public Hearing Proceedings (wherever stipulated).

The following general points shall be noted:

i. All documents shall be properly indexed, page numbered.
ii. Period/date of data collection shall be clearly indicated.
iii. Authenticated English translation of all material in Regional languages shall be provided.
iv. The letter/application for environmental clearance shall quote the MOEF file No. and also attach a copy of the letter.
v. The copy of the letter received from the Ministry shall be also attached as an annexure to the final EIA-EMP Report.
vi. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report
vii. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry shall also be followed.
viii. The consultants involved in the preparation of EIA-EMP report after accreditation with Quality Council of India (QCI) /National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA-EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc.

******

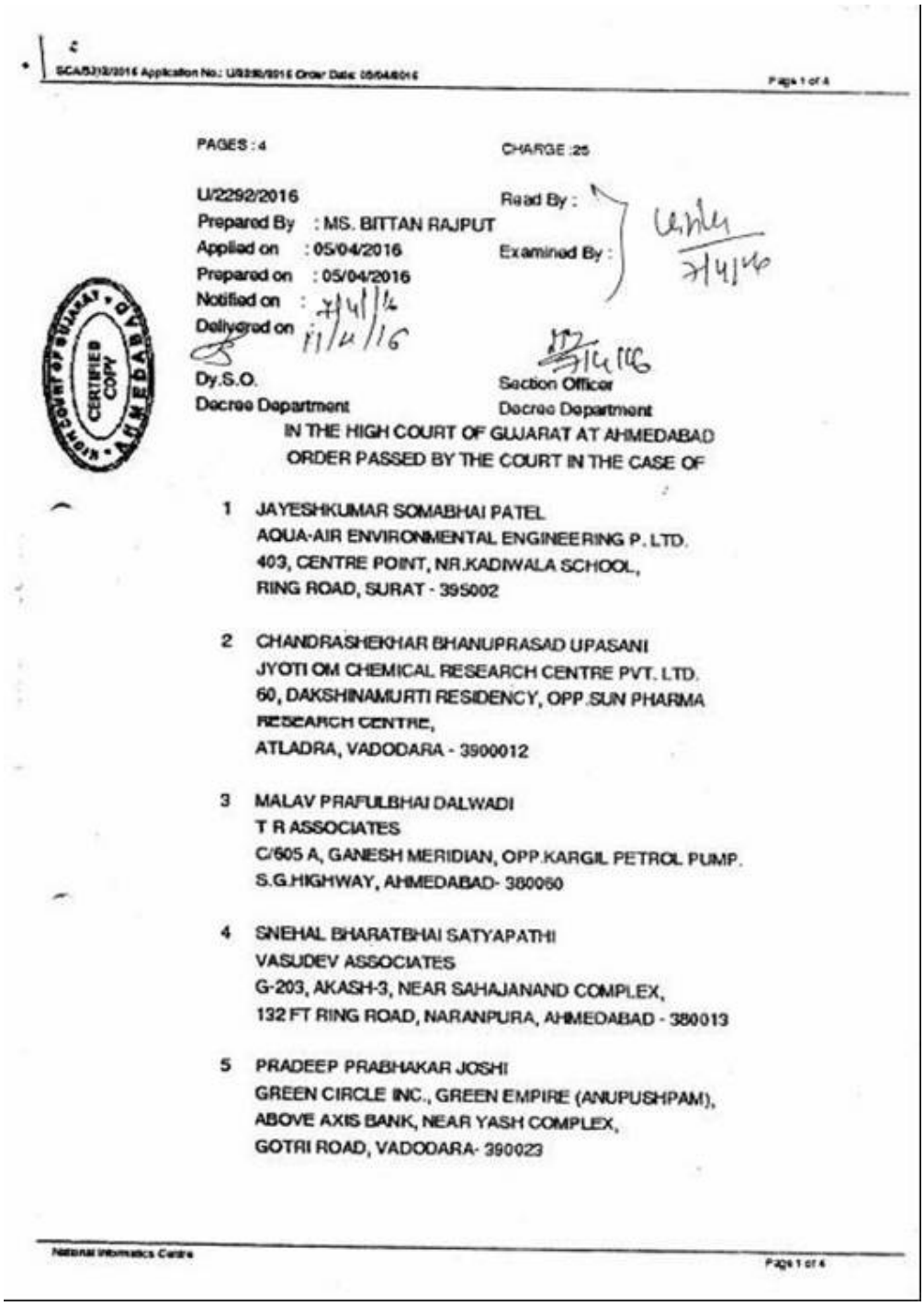
ANNEXURE-2

ADDITIONAL TORs FOR SYNTHETIC ORGANIC CHEMICALS INDUSTRY

1. Manufacturing process details along with the chemical reactions and process flow chart.
2. Name of all the solvents to be used in the process and details of solvent recovery system.
3. Design details of ETP, incinerator, if any along with boiler, scrubbers/bag filters etc.
4. The details of solid and hazardous wastes generation, storage, utilisation and disposal particularly related to the hazardous waste calorific value of hazardous waste and detailed characteristic of the hazardous waste. Action plan for the disposal of fly ash generated from boiler shall be included.
5. Precautions to be taken during storage and transportation of hazardous chemicals shall be clearly mentioned and incorporated.
6. Material Safety Data Sheet for all the Chemicals are being used/will be used. CAS No./RTECS No./DOT/UN etc to be mentioned against each chemicals.
7. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.
8. Risk assessment for storage for chemicals/solvents. Action plan for handling & safety system.
9. Details of occupational health programme.
   i) To which chemicals, workers are exposed directly or indirectly.
   ii) Whether these chemicals are within Threshold Limit Values (TLV)/ Permissible Exposure Levels as per ACGIH recommendation.
   iii) What measures company have taken to keep these chemicals within PEL/TLV.
   iv) How the workers are evaluated concerning their exposure to chemicals during pre-placement and periodical medical monitoring.
   v) Liver function tests (LFT) during pre-placement and periodical examination.
10. A Toxic management Plan shall be prepared.
11. A write up on "Safe Practice" followed for handling, storage, transportation and unloading of chemicals to be submitted.
12. What are onsite and offsite emergency plan during chemical disaster.
13. A write up on "Treatment of workers affected by accidental spillage of chemicals".

ANNEXURE – 11

STAY ORDER AGAINST THE ACCREDITATION WITH QUALITY COUNCIL OF INDIA (QCI) / NATIONAL ACCREDITATION BOARD OF EDUCATION AND TRAINING (NABET) SCHEME OF MOEF



SCA/5313/2016 Application No.: UI/2292/2016 Order Date: 05/04/2016 Page 1 of 4

PAGES : 4 CHARGE :25

U/2292/2016
Prepared By : MS. BITTAN RAJPUT
Applied on : 05/04/2016
Prepared on : 05/04/2016
Notified on : 7/4/16
Delivered on 11/4/16

Read By :
Examined By : 7/4/16

Dy.S.O.
Decree Department

7/4/16
Section Officer
Decree Department

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD
ORDER PASSED BY THE COURT IN THE CASE OF

1 JAYESHKUMAR SOMABHAI PATEL
AQUA-AIR ENVIRONMENTAL ENGINEERING P. LTD.
403, CENTRE POINT, NR.KADIWALA SCHOOL,
RING ROAD, SURAT - 395002

2 CHANDRASHEKHAR BHANUPRASAD UPASANI
JYOTI OM CHEMICAL RESEARCH CENTRE PVT. LTD.
60, DAKSHINAMURTI RESIDENCY, OPP.SUN PHARMA
RESEARCH CENTRE,
ATLADRA, VADODARA - 3900012

3 MALAV PRAFULBHAI DALWADI
T R ASSOCIATES
C/605 A, GANESH MERIDIAN, OPP.KARGIL PETROL PUMP.
S.G.HIGHWAY, AHMEDABAD- 380060

4 SNEHAL BHARATBHAI SATYAPATHI
VASUDEV ASSOCIATES
G-203, AKASH-3, NEAR SAHAJANAND COMPLEX,
132 FT RING ROAD, NARANPURA, AHMEDABAD - 380013

5 PRADEEP PRABHAKAR JOSHI
GREEN CIRCLE INC., GREEN EMPIRE (ANUPUSHPAM),
ABOVE AXIS BANK, NEAR YASH COMPLEX,
GOTRI ROAD, VADODARA- 390023

National Informatics Centre Page 1 of 4

6 GAURANG VINODBHAI PARMAR
ECO-CARE SOLUTIONS, 306-307, 3RD FLOOR, DWARKESH COMPLEX,
SUN PHARMA ROAD, ATLADRA, VADODARA - 390020

7 DARSHAN JITENDRABHAI PAREKH
AKSHAR CONSULTANTS, 704 & 813, SAKAR-5,
NEAR MITHALHALI RAILWAY CROSSING,
OFF ASHRAM ROAD, AHMEDABAD - 380009

HIGH COURT OF GUJARAT AHMEDABAD CERTIFIED COPY

8 SURESH TULSHIBHAI MORADIA
EARTHCARE ENVIRO SOLUTIONS PVT. LTD.
B-1/106, 304 & 308, PUSHPRAJ APRTMENT, NR.CNG PETROL PUMP
KHATODARA, SURAT - 395002

9 SUDHIR NARAISINGH VERMA
RAAS ENVIROCARE, 93/94, MATRI MANDIR SCOIETY,
ISKON ROAD, OFF GOTRI ROAD, VADODARA

10 SEEMA CHANDRAKANT ABHALE
PRAKRUTI ENVIRONMENTAL ENGINEERS,
1, UTKANTH SOCIETY, B/H ALKAPURI CLUB,
ALKAPURI, VADODARA - 390007

11 DILIP CHANDUBHAI THAKKAR
SUNRISE ENVIROMENTAL CONSULTANT,
TF-4, THIRD FLOOR, KRISHNA ARCADE,
NEAR BSNL OFFICE, NARODA, AHMEDABAD - 382330

12 BALU TRIBHOVAN PATEL
NATURE ENVIRO CARE, SURVEY NO.274/4,
OPP. GUJARAT HIGH COURT BUILDING, B/H SATYAMEV COMPLEX,
NEAR CAR BOX, S.G.HIGHWAY, AHMEDABAD- 380060

Petitioner(s)

VERSUS

1 UNION OF INDIA
THROUGH SECRETARY, MINISTRY OF ENVIRONMENT, FOREST
&
CLIMATE CHANGE, INDIARA PRAYAVARAN BHAVAN,
JOR BAGH ROAD, NEW DELHI - 110003

Respondent(s)

HIGH COURT OF GUJARAT AHMEDABAD CERTIFIED COPY

Being SPECIAL CIVIL APPLICATION No. 5312 of 2016

Appearance on Record:
MR NILESH P SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12
ANSHUL N SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12

COURT'S ORDER :

CORAM :
HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
Date of Decision: 05/04/2016
(COPY OF ORDER ATTACHED HEREWITH)

C/SCA/5312/2016 ORDER

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

SPECIAL CIVIL APPLICATION NO. 5312 of 2016

JAYESHKUMAR SOMABHAI PATEL & 11....Petitioner(s)
Versus
UNION OF INDIA....Respondent(s)

Appearance:
MR ANSHUL N SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12
MR NILESH P SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12

CORAM: HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
and
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

Date : 05/04/2016

ORAL ORDER
(PER : HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY)

Notice returnable on 13.06.2016. Implementation of the impugned Notification dated 03.03.2016 shall stand deferred till further orders.

(R. SUBHASH REDDY, CJ)

(VIPUL M. PANCHOLI, J.)

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TRUE COPY
07/04/2016
DEPUTY / ASSISTANT REGISTRAR
THIS 7/4/16 DAY OF
Page 1 of 1

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

SPECIAL CIVIL APPLICATION NO. 5312 of 2016

==========

JAYESHKUMAR SOMABHAI PATEL & 11....Petitioner(s)

Versus

UNION OF INDIA....Respondent(s)

==========

Appearance:
MR ANSHUL N SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12
MR NILESH P SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12

==========

CORAM: HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
and
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

Date : 05/04/2016

ORAL ORDER
(PER : HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY)

Notice returnable on 13.06.2016. Implementation of the impugned Notification dated 03.03.2016 shall stand deferred till further orders.

सत्यमेव जयते
THE HIGH COURT OF GUJARAT
WEB COPY

(R. SUBHASH REDDY, CJ)

(VIPUL M. PANCHOLI, J.)

satish

ANNEXURE – 12

MATERIAL SAFETY DATA SHEET FOR ALL THE CHEMICALS

Toluene:

ScienceLab.com
Chemicals & Laboratory Equipment

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Bromine:

Material Safety Data Sheet

Bromine MSDS

Section 1: Chemical Product and Company Identification

Product Name: Bromine

Catalog Codes: SLB4777

CAS#: 7726-95-6

RTECS: EF9100000

TSCA: TSCA 8(b) inventory: Bromine

CI#: Not available.

Synonym:

Chemical Name: Bromine

Chemical Formula: Br2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
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Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Bromine	7726-95-6	100

Toxicological Data on Ingredients: Bromine: ORAL (LD50): Acute: 3100 mg/kg [Mouse]. 4160 mg/kg [Rabbit]. 2600 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive). Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP, None. by OSHA, None. by NIOSH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to mucous membranes. The substance may be toxic to kidneys, liver, cardiovascular system, central nervous system (CNS), thyroid. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of combustible materials of reducing materials of organic materials of aluminum

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Flammable in the form of liquid or vapor by spontaneous chemical reaction with reducing materials. May cause fire in contact with wood, sawdust, cotton, straw, etc. F L A M M A B L E W I T H A N T I M O N Y , B O R O N , C E S I U M A C E T Y L E N E C A R B I D E , CHLOROTRIFLUOROETHYLENE, COPPER HYDRIDE, CUPROUS ACETYLIDE, FLUORINE, GERMANIUM, LITHIUM CARBIDE, MAGNESIUM PHOSPHIDE, PHOSPHINE, PHOSPHORUS, PHOSPHORUS OXIDE, PHOSPHORUS TRIOXIDE, RUBIDIUM ACETYLENE CARBIDE, RUBIDIUM CARBIDE, & SODIUM ACETYLENE CARBIDE, STRONTIUM PHOSPHIDE & ZIRCONIUM DICARBIDE. IT COMBINES READILYWITH POTASSIUM, PHOSPHORUS & TIN, & REACTION MAY BE ACCOMPANIED BY SPONTANEOUS IGNITION.

Special Remarks on Explosion Hazards:
REACTS EXPLOSIVELY WITH ACETYLENE, ACRYLONITRILE, AMMONIA, DIMETHYL FORMAMIDE, ETHYL PHOSPHINE, HYDROGEN, ISOBUTYROPHENONE, NICKEL CARBONYL, NITROGEN TRIIODIDE, OZONE, OXYGEN

DIFLUORIDE, PHOSPHORUS, POTASSIUM, SILVER AZIDE, SODIUM, & SODIUM CARBIDE. Lithium is stable in contact with dry bromine, but heavy impact will initiate explosion, while sodium in contact with bromine needs only moderate impact for initiation. Potassium ignites in bromine vapor and explodes violently in contact with liquid bromine and rubidium ignites in bromine vapor. During preparation of praseodymium bromide, accidental contact of liquid bromine with small particles of praseodymium led to a violent explosion.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, organic materials.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.66 STEL: 1.3 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 0.2 (ppm) from ACGIH (TLV) [United States] TWA: 0.1 from OSHA (PEL) [United States] TWA: 0.7 (mg/m3) from OSHA (PEL) [United States] TWA: 0.66 STEL: 2 (mg/m3) [United Kingdom (UK)] TWA: 1 STEL: 0.3 (ppm) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Suffocating. (Strong.)

Taste: Not available.

Molecular Weight: 159.808 g/mole

Color: Red-Brown (Dark.)

pH (1% soln/water): Not available.

Boiling Point: 58.78°C (137.8°F)

Melting Point: -7.25°C (18.9°F)

Critical Temperature: 315°C (599°F)

Specific Gravity: 3.11 (Water = 1)

Vapor Pressure: 23.3 kPa (@ 20°C)

Vapor Density: 7.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.05 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water. Freely soluble in alcohol, chloroform, carbon disulfide, carbon tetrachloride, concentrated hydrochloric acid, and aqueous solution of bromides.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Highly reactive with reducing agents, combustible materials, organic materials.

Corrosivity:
Extremely corrosive in presence of aluminum, of zinc, of stainless steel(304), of stainless steel(316). Highly corrosive in presence of copper. Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with organic compounds containing active hydrogen atoms adjacent to the carbonyl group (aldehydes, ketones, carboxylic acids). They may react violently in unmoderated contact with bromine. Also incompatible with diethyl zinc, potassium, germanium, rubidium, aluminum, mercury, titanium, liquid halogen, silane, acetylene, acrylonitrile, ammonia, dimethyl formamide, ethyl phosphine, hydrogen, isobutyrophenone, nickel carbonyl, nitrogen triiodide, ozone, oxygen difluoride, phosphorous, potassiuml, silver azide, sodium , sodium carbide, alkali hydroxides, arsenites, ferrous, mercurous salts, hypophosphites, and other oxidizable materials, saw dust, antimony, tin, boron, cesium acetylene carbide, chlorotrifluoroethylene, copper hydride, cuprous, acetylide, fluorine,lithium carbide, megnesium phosphide, phosphine, phosphorous oxide, phosphorus trioxide, rubidium acetylene carbide, rubidium carbide, sodium acetylene carbide, strontium phosphide, zirconium dicarbide, wood, cotton, straw. Bromine reacts violently in contact with natural rubber, but more slowly with some synthetic rubbers. Aluminum, mercury, or titanium react violently with dry bromine.

Special Remarks on Corrosivity:
Corrodes iron, stainless steel and copper. Severe corrosive effect on bronze.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2600 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 750 1 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP, None. by OSHA, None. by NIOSH. Causes damage to the following organs: mucous membranes. May cause damage to the following organs: kidneys, liver, cardiovascular system, central nervous system (CNS), thyroid.

Other Toxic Effects on Humans:

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Contact with liquid is corrosive and causes ulceration and skin burns. In milder cases, it might cause skin rash, pustles, measle-like erruptions, furuncles, and cold and clammy skin with cyanosis or pale color. Eyes: It is a lacrymator and causes eye irritation, eyelid inflammation at low concentration. At higher concentrations it may cause blepharospasm, photophobia, conjunctivitis, and burns. Inhalation: Inhalation of smaller amounts may cause severe irritation of the respiratory tract with coughing, chest tightness, shortness of breath, and nosebleed. Inhalation of larger amounts may cause pulmonary edema, chemical pneumonitis, bronchospasm, pneumomidiastinum, glottal spasm, glottal edema, inflammatory lesions in the mucous membranes, inflammed tongue and palate, chemical burns of the lungs, asthmatic bronchitis, and severe choking. Death may occur due to circulatory collapse, asphyxiation from edema of the glottis, aspiration pneumonia, or pulmonary edema. It may also affect behavior/central nervous system and gastrointestinal tract, cardiovascular system, thyroid, Symptoms may include dizziness, headache, fatigue, disturbances of sleep and sexual function, feeling of opression, vertigo, anxiety, depression, muscle incoordination, emotional instabililty, delirium, stupor, vomiting, diarrhea, abdominal pain, tachycardia, hypotension. Ingestion: May cause severe and permanent damage to the digestive tract. It may cause gastrointestinal tract burns, burning pain of the mouth and esphagous, corrosive gastroenteritis with vomiting, abdominal pain, diarrhea, and possible bloody feces. It may cause kidney damage (hemmorrhagic nephritis with oliguria or anuria, and liver damage, brownish discoloration of lips, tongue and mucous membranes It may also affect the cardiovascular system (tachycardia, hypotension, and cyanosis and behavior/central nervous system (symptoms similar to inhalation) Chronic Potential Health Effects: Inhalationand Ingestion: Prolonged or repeated exposure may affect respiration and endocrine system (thyroid), metabolism, behavior/central nervous system, and cardiovascular system, and cause kidney and liver damage. Effects may be delayed.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification:
Class 8: Corrosive material CLASS 6.1: Poisonous material.

Identification: : Bromine UNNA: 1744 PG: I

Special Provisions for Transport: Poison-inhalation hazard, Zone A

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Bromine Illinois toxic substances disclosure to employee act: Bromine Illinois chemical safety act: Bromine New York release reporting list: Bromine Rhode Island RTK hazardous substances: Bromine Pennsylvania RTK: Bromine Minnesota: Bromine Massachusetts RTK: Bromine Massachusetts spill list: Bromine New Jersey: Bromine New Jersey spill list: Bromine Louisiana RTK reporting list: Bromine California Director's list of Hazardous Substances: Bromine TSCA 8(b) inventory: Bromine SARA 302/304/311/312 extremely hazardous substances: Bromine SARA 313 toxic chemical notification and release reporting: Bromine

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R26- Very toxic by inhalation. R35- Causes severe burns. R50- Very toxic to aquatic organisms. S1/2- Keep locked up and out of the reach of children. S7/9- Keep container tightly closed and in a well-ventilated place. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S61- Avoid release to the environment. Refer to special instructions/ Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Ethylene Dichloride:

Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name : **Ethylene Dichloride (EDC)**

Uses : Use as chemical intermediate for the production of vinyl chloride

General Product Characteristics : Colorless Liquid.
chloroform-like. (Odour)

Hazard Classification : Toxic.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms

Ethylene Dichloride Dichloroethane

Hazardous Components

Chemical Name	CAS	EINECS	Symbol(s)	R-phrase(s)	Conc.
Ethylene Dichloride	107-06-2	203-458-1	F, T	R45; R11; R22; R36/37/38	>= 99.98 %

Additional Information : Refer to chapter 16 for full text of EC R-phrases.

3. HAZARDS IDENTIFICATION

Health Hazards
Harmful if swallowed. Harmful if swallowed. Irritating to eyes, respiratory system and skin. Irritating to eyes, respiratory system and skin. Possibility of organ or organ system damage from prolonged exposure; see Chapter 11 for details. Target organ(s): Kidney. Liver. May cause cancer. May cause cancer. Possible risk of irreversible (genetic) effects.

Signs and Symptoms
Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Other signs and symptoms of central nervous system (CNS) depression may include headache, nausea, and lack of coordination. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. Breathing of high vapor concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death. Liver damage may be indicated by loss of appetite, jaundice (yellowish skin and eye color), fatigue, bleeding or easy bruising and sometimes pain and swelling in the upper right abdomen. Kidney damage may be indicated by changes in urine output or appearance, pain upon urination or in the lower back, or general oedema (swelling from fluid retention).

Aggravated Medical Condition

Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin. Eyes. Liver. Kidney.

Safety Hazards

Highly flammable. May form flammable/explosive vapor-air mixture.

Environmental Hazards

Not classified as dangerous under EC criteria. Not classified as dangerous under EC criteria.

4. FIRST AID MEASURES

General Information

Keep victim calm. Obtain medical treatment immediately.

Inhalation

DO NOT DELAY. Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.

Skin Contact

Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye Contact

Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

Ingestion

If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Give nothing by mouth.

Advice to Physician

Simultaneous exposure to EDC and alcohol can increase the toxic hazards of EDC.

5. FIRE FIGHTING MEASURES

Extinguishing Media

Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media

Do not use water in a jet.

Protective Equipment for Firefighters

6. ACCIDENTAL RELEASE MEASURES

Observe all relevant local and international regulations. Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal.

Protective measures

Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas. Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Ventilate contaminated area thoroughly.

Clean Up Methods

For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Additional Advice

Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Vapour may form an explosive mixture with air.

7. HANDLING AND STORAGE

Handling

Avoid contact with skin, eyes, and clothing. Avoid inhaling vapour and/or mists. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Handling Temperature: Ambient.

Storage

Storage Temperature: Ambient. Must be stored in a well ventilated area, away from sunlight, ignition sources and other sources of heat. Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapor treatment system.

Product Transfer

Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge.

Recommended Materials

For lines and fittings, use stainless steel. For containers or container linings, use stainless steel. Carbon steel

Unsuitable Materials

Natural, butyl, neoprene or nitrile rubbers. PVC.

Additional Information

Ensure that all local regulations regarding handling and storage facilities are followed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Ethylene Dichloride	ACGIH	TWA	10 ppm		
	KOR OEL	TWA	10 ppm	40 mg/m3	

Additional Information

Skin notation means that significant exposure can also occur by absorption of liquid through the skin and of vapour through the eyes or mucous membranes.

Material	Source	Hazard Designation
Ethylene Dichloride	ACGIH	Not classifiable as a human carcinogen.

Exposure Controls

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated. The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Exhaust emission systems should be designed in accordance with local conditions; the air should always be moved away from the source of vapor generation and the person working at this point. Eye washes and showers for emergency use. Items that cannot be decontaminated should be destroyed (see Chapter 13).

Personal Protective Equipment

Check with respiratory protective equipment suppliers. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory Protection

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN141 (AS/NZS:1716). Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where respiratory protective equipment is required, use a full face mask. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)].

Hand Protection

Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739, AS/NZS:2161) made from the following materials may provide suitable chemical protection: Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical

resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Eye Protection : Monogoggles (EN166)

Protective Clothing

Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood and chemical resistant gloves. Otherwise use chemical resistant apron and gauntlets.

Environmental Exposure Controls
Adequate ventilation to control airborne concentrations. Exhaust emission systems should be designed in accordance with local conditions; the air should always be moved away from the source of vapour generation and the person working at this point.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Colorless Liquid.
Odour	: chloroform-like
Odour threshold	: 40 ppm
Boiling point	: 84 °C / 183 °F
Melting / freezing point	: -35 °C / -31 °F
Flash point	: 13 °C / 55 °F
Explosion / Flammability limits in air	: >= 6.2 %(V) 16 %(V)
Auto-ignition temperature	: 413 °C / 775 °F
Vapour pressure	: 81.3 hPa at 20 °C / 68 °F
Density	: 1.253 g/cm3 at 20 °C / 68 °F
Water solubility	: 8.5 g/l at 20 °C / 68 °F
n-octanol/water partition coefficient (log Pow)	: 1.45at 20 °C / 68 °F
Dynamic viscosity	: 0.84 mPa.s at 20 °C / 68 °F
Vapour density (air=1)	: 3.4 at 20 °C / 68 °F
Surface tension	: 24.15 mN/m at 20 °C / 68 °F
Molecular weight	: 98.96 g/mol

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions of use. Darkens on exposure to air or light.

Conditions to Avoid

Avoid heat, sparks, open flames and other ignition sources. Exposure to air or moisture over prolonged periods. Exposure to sunlight.

Materials to Avoid

Aluminium. Nitric acid. Oxidising agents. Bases.

Hazardous Decomposition Products
Emits toxic fumes of phosgene, hydrogen chloride, acetylene and vinylchloride when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	: Information given is based on product testing.
Acute Oral Toxicity	: Moderately toxic: LD50 >200 - 2000 mg/kg , Rat
Acute Dermal Toxicity	: Low toxicity: LD50 >2000 mg/kg , Rabbit
Acute Inhalation Toxicity	: Low toxicity: LC50 >5 mg/l / 10 hours, Rat
Skin Irritation	: Irritating to skin.
Eye Irritation	: Irritating to eyes.
Respiratory Irritation	: Inhalation of vapours or mists may cause irritation to the respiratory system.
Sensitisation	: Not expected to be a skin sensitiser.
Repeated Dose Toxicity	: Kidney: can cause kidney damage. Liver: can cause liver damage.
Mutagenicity	: Mutagenic; positive in in-vivo and in-vitro assays.
Carcinogenicity	: Causes cancer in laboratory animals.

12. ECOLOGICAL INFORMATION

Acute Toxicity

Fish : Harmful: 10 < LC/EC/IC50 <= 100 mg/l
Aquatic Invertebrates : Low toxicity: LC/EC/IC50 > 100 mg/l
Algae : Low toxicity: LC/EC/IC50 > 100 mg/l
Microorganisms : Low acute toxicity, LC/EC/IC50 > 100 mg/l

Mobility : If product enters soil, it will be mobile and may contaminate groundwater. Evaporates within a day from water or soil surfaces.

Persistence/degradability : Inherently biodegradable. Not susceptible to hydrolysis.

Bioaccumulation : Does not bioaccumulate significantly.

13. DISPOSAL CONSIDERATIONS

Material Disposal

Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses. Waste product should not be allowed to contaminate soil or water.

Container Disposal : Data not available.

Local Legislation : Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Ethyl Acetate:

Material Safety Data Sheet

Ethyl acetate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethyl acetate

Catalog Codes: SLE2452, SLE2317

CAS#: 141-78-6

RTECS: AH5425000

TSCA: TSCA 8(b) inventory: Ethyl acetate

CI#: Not available.

Synonym: Acetic Acid, Ethyl Ester Acetic Ether

Chemical Name: Ethyl Acetate

Chemical Formula: C4-H8-O2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethyl acetate	141-78-6	100

Toxicological Data on Ingredients: Ethyl acetate: ORAL (LD50): Acute: 5620 mg/kg [Rat]. 4100 mg/kg [Mouse]. 4935 mg/kg [Rabbit]. VAPOR (LC50): Acute: 45000 mg/m 3 hours [Mouse]. 16000 ppm 6 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to mucous membranes, upper respiratory tract. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 426.67°C (800°F)

Flash Points: CLOSED CUP: -4.4°C (24.1°F). (TAG) OPEN CUP: 7.2°C (45°F) (Cleveland).

Flammable Limits: LOWER: 2.2% UPPER: 9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat. Non-explosive in presence of shocks.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards:
The liquid produces a vapor that forms explosive mixtures with air at normal temperatures. Explosive reaction with lithium tetrahydroaluminate.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 400 (ppm) from OSHA (PEL) [United States] TWA: 400 from ACGIH (TLV) [United States] TWA: 1400 (mg/m3) from NIOSH [United States] TWA: 400 (ppm) from NIOSH [United States] TWA: 400 (ppm) [Canada] TWA: 1440 (mg/m3) [Canada] TWA: 1400 (mg/m3) from OSHA (PEL) [United States]3 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal. Fruity. (Slight.)

Taste: Bittersweet, wine-like burning taste

Molecular Weight: 88.11 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 77°C (170.6°F)

Melting Point: -83°C (-117.4°F)

Critical Temperature: 250°C (482°F)

Specific Gravity: 0.902 (Water = 1)

Vapor Pressure: 12.4 kPa (@ 20°C)

Vapor Density: 3.04 (Air = 1)

Volatility: Not available.

Odor Threshold: 3.9 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 0.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility: Soluble in cold water, hot water, diethyl ether, acetone, alcohol, benzene.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Also incompatible with nitrates, chlorosulfonic acid, oleum, potassium-tert-butoxide, and lithium tetrahydroaluminate. Moisture sensitive. On storage, it is slowly decomposed by water.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4100 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 45000 mg/m3 3 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. Causes damage to the following organs: mucous membranes, upper respiratory tract. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: LD50 [Rabbit] - Route: skin; Dose >20,000 ml/kg

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenic). May cause adverse reproductive effects. based on animal test data. No human data found at this time.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: Causes eye irritation. May cause irritation of the conjunctivia. Inhalation: May cause respiratory tract and mucous membrane irritation. May affect respiration and may cause acute pulmonary edema. May affect gastrointestinal tract (nausea, vomiting). May affect behavior/central nervous system (mild central nervous system depression - exhilaration, talkativeness, boastfulness, belligerancy, vertigo, diplopia, drowsiness, slurred speech, slowed reaction time, dizziness, lightheadedness, somnolence, ataxia, unconciousness, irritability, fatigue, sleep disturbances, reduced memory and concentration, stupor, coma), cardiovascular system (peripheral vascular collapse (shock) - rapid pulse, hypotension, cold pale skin, hypothermia). Other symptoms may include: flushing of face and sweating.

Ingestion: May cause gastrointestinal tract irritation with nausea and vomiting. May affect blood, behavior/central nervous system (CNS depression - effects may be similar to that of inhalation). Chronic Potential Health Effects: Skin: Repeated or prolonged skin contact may cause drying and cracking of the skin. Ingestion: Prolonged or repeated ingestion may affect the liver. Inhalation: Prolonged inhalation may affect behavior/central nervous system (symptoms similar to those of acute inhalation), and cause liver, kidney, lung, and heart damage. It may also affect metabolism, and blood (anemia, leukocytosis).

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 220 mg/l 96 hours [Fish (Fathead minnow)]. 212.5 ppm 96 hours [Fish (Indian catfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethyl Acetate UNNA: 1173 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethyl acetate Illinois toxic substances disclosure to employee act: Ethyl acetate Illinois chemical safety act: Ethyl acetate New York release reporting list: Ethyl acetate Rhode Island RTK hazardous substances: Ethyl acetate Pennsylvania RTK: Ethyl acetate Florida: Ethyl acetate Minnesota: Ethyl acetate Massachusetts RTK: Ethyl acetate Massachusetts spill list: Ethyl acetate New Jersey: Ethyl acetate New Jersey spill list: Ethyl acetate Louisiana spill reporting: Ethyl acetate California Director's list of Hazardous Substances: Ethyl acetate TSCA 8(b) inventory: Ethyl acetate TSCA 4(a) final test rules: Ethyl acetate TSCA 8(a) IUR: Ethyl acetate TSCA 12(b) annual export notification: Ethyl acetate CERCLA: Hazardous substances.: Ethyl acetate: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):
R11- Highly flammable. R36- Irritating to eyes. S2- Keep out of the reach of children. S16- Keep away from sources of ignition - No smoking. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S33- Take precautionary measures against static discharges. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:18 PM

Last Updated: 05/21/2013 12:00 PM

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ANNEXURE – 13

TOXIC MANAGEMENT PLAN

1. **General Information**

   Name of Company: Hemani Intermediates Pvt. Ltd. (Unit-IV)

   Address of Company: Plot No. E-362, GIDC Estate, Dahej, Tal: Vagra, Dist: Bharuch (Guj.)

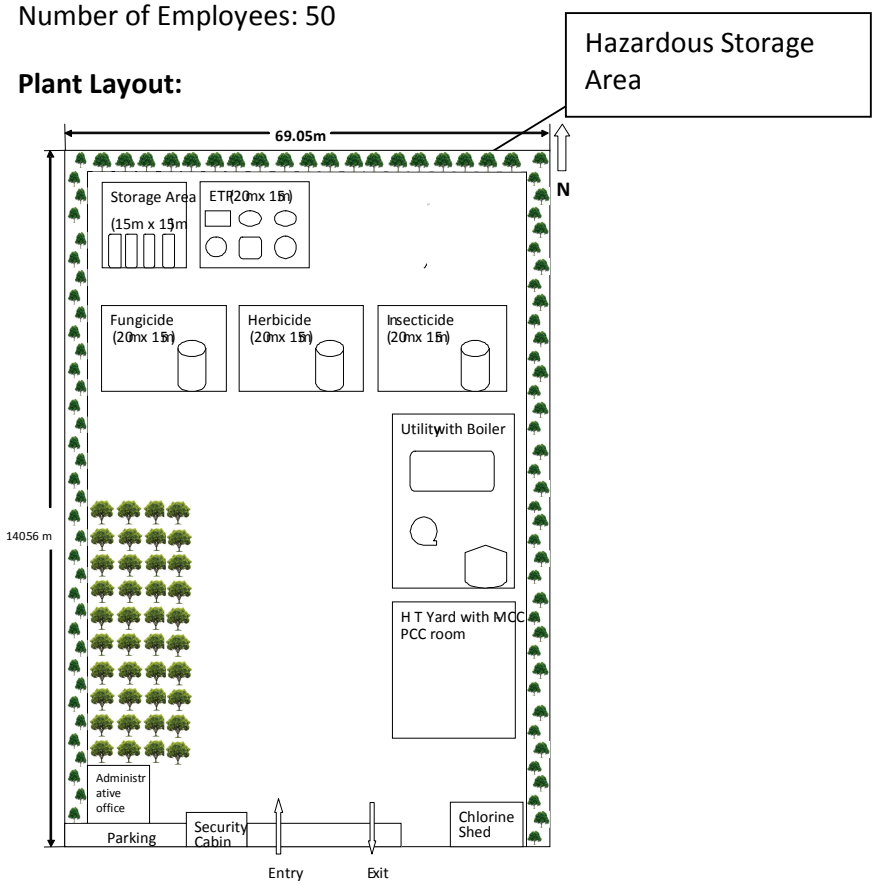
2. **Facility Description**

   Nature of Business: Specialty Chemicals & Pesticides

   Operating Hours: 20 Hours

   Number of Employees: 50

   Plant Layout:



3. Toxic Chemicals to be used

1. Bromine
2. Thionyl Chloride
3. Toluene
4. EDC
5. THF
6. IPA
7. Aluminium Chloride
8. Methanol
9. Acetone

4. Process Description

Please refer Chapter-2.

5. Identification of Toxic Organic Chemicals Entering plant waste waters:

Loss of solvent may be go to waste water and air.

6. Inventory of Toxic Organics used at the facility:

Sr. No.	Name of the Products	Quantity in MT/Month
		Proposed
1. Fungicide		
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propioconzole (T)	
2. Herbicide		
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Pendimethalin (T)	
3. Insecticide		
a)	Transfluthrin (T)	300
b)	Cyfluthrin & Beta Isomers (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomers (T)	
e)	Imidacloprid (T)	
Total		**900**

7. Method of Disposal:

All chemicals will be used in the process. Crude solvent will be generated from the process and it will be distilled out and distilled solvent will be reused in the process. Some loss of solvent will go to wastewater and it will be treated in ETP and treated effluent will be disposed into deep sea through GIDC drain. High COD stream will treated in MEE and MEE condensate will be reused in plant premises and distillation residue will be disposed to common incinerator or sold to cement industries for co-processing.

8. Toxicity of Hazardous Chemicals

Name of Chemicals	**TLV/TWA (ACGIH)** **TLV-STEL**	**PEL (OSHA)**	**NFPA Rating** **H F R S**
Methanol	200 ppm	200 ppm	1 2 0 0
EDC	10 ppm	10 ppm	2 3 0 0
Acetone	750 ppm	1000 ppm	1 3 0 0
Thionyl Chloride	1 ppm	1 ppm	4 0 2 0
Toluene	300 ppm	50 ppm	2 3 0 0
MDC	50 ppm	25 ppm	2 1 0 0
Ethyl Acetate	400 ppm	400 ppm	1 3 0 0
Bromine	0.2 ppm	0.1 ppm	3 0 0 0 3 0 0 0

SAFETY PRECAUTIONS:

MITIGATION MEASURES:

- ✓ Isolate the source if possible without risk.
- ✓ If leakage is small, dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.
- ✓ Absorb with DRY earth, sand or other non-combustible material.
- ✓ Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift.
- ✓ Use water spray to reduce vapors.
- ✓ Prevent entry into sewers, basements or confined areas.
- ✓ Neutralize the residue with a dilute solution of sodium carbonate.

PREVENTIVE MEASURES:

- ✓ A dyke will be provided to accommodate the full quantity stored in all the drums.
- ✓ Drums will be stored in designated area.
- ✓ Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective TLVs.
- ✓ Never add water to this product.
- ✓ In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label.
- ✓ Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture.
- ✓ Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.
- ✓ While handling always use face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent.
- ✓ Ensure that eyewash stations and safety showers are proximal to the work-station location.

The proposed EMP will also include measure to keep air-born concentration of toxic and hazardous chemicals below its PEL and TLV, like…

- Leak Surveys
- Separate storage for toxic chemicals
- Exhaust Ventilation
- Proper illumination
- On-line detectors toxic chemicals
- Close processes to avoid spills and exposures
- Atomization of process operations to hazards of manual handling of chemicals
- Supply of proper PPEs like Air mask, Berating canisters, SCBA sets, On-line breathing apparatus at the places where there is possibility of presence of toxic chemicals
- Decontamination procedure for empty drums and carboys.
- Regular maintenance program for pumps, equipment, instruments handling toxic and corrosive chemicals
- Display of warning boards
- Training to persons handling toxic and corrosive chemicals

Annexure-14

Consent to establish from GPCB

GPCB

GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN
Sector 10-A, Gandhinagar 382 010
Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

By R.P.A.D

Consent to Establish (CTE)
(CTE No -80457)

NO: GPCB/ BRCH-B/CTE - 256/ ID-44626 /
TO,
M/s. HEMANI INTERMEDIATES PVT LTD (UNIT-IV)
PLOT NO: E-362,
GIDC, DAHEJ-I,
TAL: VAGRA,
DIST: BHARUCH.

SUB: Consent to Establish (CTE) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981.
REF: Your CTE application vide inward Id No:-86370 dated: 16/10/2014.

Sir,

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish (CTE)** for setting up of an industrial plant/activities by **M/s. HEMANI INTERMEDIATES PVT LTD (UNIT-IV)** at **PLOT NO: E-362, GIDC, DAHEJ-I, TAL: VAGRA, DIST: BHARUCH** for the manufacturing of the following items.

The Validity period of the order will be Five years from date of issue. i.e. up to 15/10/2019.

I. **NAME OF THE PRODUCTS ALONG WITH QUANTITY:-**

Sr. no.	Name of Product	Quantity (MT/Month)
1.	**Fungicide**	
a)	Hexaconzole (T)	300
b)	Tebuconzole (T)	
c)	Propioconzole (T)	
2.	**Herbicide**	
a)	Dicamba (T)	300
b)	Metribuzine (T)	
c)	Pendimethalin (T)	
3.	**Insecticide**	
a)	Transfluthrin (T)	300
b)	Cyfluthrin & Beta Isomers (T)	
c)	Bifenthrin (T)	
d)	Cypermethrin (T) & Beta/Zeta/Theta Isomers (T)	
e)	Imidacloprid	
	TOTAL	900

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2. SUBJECT TO THE FOLLOWING SPECIFIC CONDITIONS RELATED TO ENVIRONMENT CLEARANCE (EC):-

2.1 The applicant shall not produce any products as well as not carry out any activities for products/process listed in the EIA Notification dated 14/09/2006 as amended from time to time, requiring prior Environmental Clearance from competent authority.

2.2 Applicant shall strictly comply/fulfill with all the conditions stipulated by competent authority in the order of Environmental Clearance as and when issued/issued.

2.3 Unit shall strictly comply/fulfill with Coal Handling Guideline and Fly Ash Notification.

2.4 Unit shall strictly comply/fulfill with draft guideline for the management of the spent solvent

2.5 Unit shall submit time bound Action Plan for achieving Zero Liquid Discharge and shall achieve ZLD within stipulated reasonable time being a Pesticide products manufacturing unit.. The action plan shall be submitted prior to making of CCA Application.

3. CONDITIONS UNDER WATER ACT:-

3.1 The quantity of total water consumption shall not exceed **406 KL/day.**(Break up as below)
a) Domestic - **25 KL/day**
b) Industrial - **366 KL/day**
c) Gardening/Green belt - **15 KL/day.**

3.2 The quantity of total waste water generation shall not exceed **139 KL/day.** (Break up as below)
a) Domestic - **20 KL/day**
b) Industrial - **119 KL/day**

3.3 The quantity of the industrial effluent from the manufacturing process and other ancillary industrial operations shall be **119 KL/day** and the quantity of domestic waste water (sewage) shall not exceed **20 KL/day.**

3.4 **50 KL/day** of concentrated /high TDS stream of industrial effluent from process shall be the evaporation system, condensate from MEE shall be recycled back to process/scrubber etc. The generating solids after settlers, nutsch filters and centrifuged shall be disposed off at approved TSDF site.

3.5 **69 KL/day** of biological industrial effluent shall be sent to ETP for primary, secondary and tertiary treatment. After treatment the treated effluent shall be sent for disposal into GIDC underground drainage-Dahej Vilayat Pipeline Common Disposal System up to the sea.

3.6 The Effluent treatment plant consisting of the following treatment units shall be installed.
i) Collection cum Equalization Tanks (CETs)
ii) Neutralization Tank (NT)
iii) Flash Mixer (FM)
iv) Flocculator (FL)
v) LIME Dosing Tank (LDT)
vi) Alum Dosing Tank (ADT)
vii) Polyelectrolyte Dosing Tank (PEDT)

Consent No 368882, 07/09/201

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viii) Nutrient Dosing Tank (LDT)
ix) Primary Clarifier (PCL)
x) Aeration Tank 1 (AT-1)
xi) Aeration Tank 1 (AT-2)
xii) Secondary Clarifier (SCL)
xiii) Intermediate Sump (IS)
xiv) Pressure sand Filter (PSF)
xv) Activated Carbon Filter (ACF)
xvi) Treated Effluent Sumps (TES)
xvii) Sludge Sump (SS)
xviii) Filter Press (FP)

3.7 The quality of treated effluent shall conform to the following standards prior to disposal GIDC Sewer Line - Dahej Vilayat Pipeline/Common Disposal System up to the sea.

PARAMETERS	PERMISSIBLE LIMIT
pH	5.5 to 9.0
Temperature	Shall not exceed 5 C above the receiving water temperature
Colour (pt.co.scale) in units	All efforts shall be made to remove colour and unpleasant odour as far as practicable.
Suspended Solids	100 mg/l
Oil and Grease	20 mg/l
Phenolic Compounds	5 mg/l
Cyanides	0.2 mg/l
Fluorides	15 mg/l
Sulphides	5 mg/l
Ammonical Nitrogen	50 mg/l
Arsenic	0.2 mg/l
Total Chromium	2 mg/l
Hexavelent Chromium	1 mg/l
Copper	3 mg/l
Lead	2 mg/l
Mercury	0.01 mg/l
Nickel	5 mg/l
Zinc	15 mg/l
Cadmium	2 mg/l
BOD (3 days at 27° C)	100 mg/l
COD	250 mg/l
Insecticide/Pesticides	Absent
Selenium	0.05 mg/l
Boron	2 mg/l
Manganese	2 mg/l

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Bio-assay test	90 % Survival of fish after 96 hours in 100 % effluent.

3.8 The effluent conforming to the above standards shall be discharged into GIDC Sewer Line - Dahej Vilayat Pipeline/Common Dispesal System up to the sea for final disposal at NIO designated point.

3.9 Sewage shall be treated seperately and reuse/recycle.

3.10 The unit shall affix of water meters as per Section 4 (1) of the water (Prevention and Control of Pollution) Cess Act 1977 for the purpose of measuring and recording the quantity of water consumed at such places as may be required, within 15 days and it shall be presumed that the quantity indicated by the meter has been consumed by the industry until the contrary is proved.

3.11 SUBJECT TO THE FOLLOWING SPECIFIC CONDITIONS UNDER WATER ACT:-

3.11.1 Applicant shall be a member of Dahej CETP as & when come up and sent its industrial waste water, if required.

3.11.2 The effluent shall be stripped off, of VOC's in a closed system before further treatment into ETP.

3.11.3 Unit shall provide treated effluent holding facility for at least 48 hrs, having vertical tank design preferably.

3.11.4 Applicant shall carry out Bio Assay and Toxicity test for the treated waste water and same shall be submitted to the GPCB.

3.11.5 Unit shall install continuous monitoring as well as alarm system for parameters of treated effluent, such as:-pH meter, TOC analyzer, magnetic flow meter along with totalizer and recorder at the final outlet of factory drain/pipe of ETP. Records of the same shall be maintained invariably by the unit and shall be submitted to GPCB every month.

3.11.6 Applicant shall ensured & undertake on Rs. 100 stamp paper that it has one & only one outlet in GIDC U/G drain.

3.11.7 The GIDC drainage connection from units final out let to nearest sump of GIDC Sewer Line - Dahej Vilayat Pipeline/Common Disposal System up to the sea shall be completed & commissioned before applying for CCA further unit shall submit GIDC permission letter pertaining to same.

3.11.8 Name of the unit & technical relevant details shall be prominently written /printed on mouth of pipeline opening in to GIDC U/G drain & shall be made visible to inspecting officials.

4. CONDITIONS UNDER AIR ACT:-

4.1 The following shall be used as fuel in the Boiler / D G Set /Incinerator / Thermic Fluid Heater as following rates:

Sr. No.	Name of Fuel	Quantity
1	Coal	35 MT/day
2	LDO	10 KL/day
3	HSD	50 Lit/hr

4.2 The applicant shall install & operate a comprehensive adequate air pollution control measures in order to achieve prescribed below.

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Date of Order No. 168832 Dt. 10/09/201

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4.3 The flue gas emission through stack attached to Boiler / D G Set / Incinerator/ Thermic Fluid Heater shall conform to the following standards:

Sr No.	Stack attached to	Stack height in (M)	Air Pollution Control system	Parameter	Permissible Limit
1.	Thermic Fluid Heater & Boiler (8 M Phes)	50	ESP	Particulate matter SO2 NOx	150 mg/Nm³ 100 ppm 50 ppm
2	D.G.Sets (1000 KVA)	11	-	-	-
3	Incinerator	30	Venturi Scrubber & Packed Scrubber	PM HCl SO_2 CO TOC Total dioxines and furans Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V and their Compounds	50 mg/Nm³ 50 mg/Nm³ 200 mg/Nm³ 100 mg/Nm³ 20 mg/Nm³ 0.1 ng TEQ/Nm³ 1.5 mg/Nm³

4.4 The Process emission through various stacks/ vents of reactors, process, vessel shall conform to the following standards: (Whichever is applicable)

Sr. No.	Stack attached to	Stack(H)	Air Pollution Control System	Parameter	Permissible Limit
1	Herbicide Plant	12 mtr.	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm³ 40 mg/Nm³ 15 mg/Nm³ 05 mg/Nm³
2	Fungicide Plant	12 mtr.	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm³ 40 mg/Nm³ 15 mg/Nm³ 05 mg/Nm³
3	Insecticide Plant	12 mtr.	Two Stage Water Alkali Scrubber	HCl SO2 HC HBr	20 mg/Nm³ 40 mg/Nm³ 15 mg/Nm³ 05 mg/Nm³

4.5 Stack monitoring facilities like port hole, platform/ladder etc, shall be provided with stacks/vents chimney in order to facilitate sampling of gases being emitted into the atmosphere.

4.6 Ambient air quality within and outside the premises of the unit shall conform National Ambient Air Quality standards notified by MOEF vide notification dated 16/11/2009 and mainly to the following standards:-

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air
1.	Sulphur Dioxide (SO2), µg/m3	Annual 24 Hours	50 80

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2.	Nitrogen Dioxide (NO2), µg/m3	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than 10 µm) OR PM10 µg/m3	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than 2.5 mm) OR PM 2.5 µg/m3	Annual 24 Hours	40 60
5.	Carbon Monoxide (CO) mg/m³	8 Hours 1 Hour	02 04

*Annual arithmetic mean of minimum of 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 Hourly or 08 Hourly or 01 Hourly monitored values as applicable, shall be complied with 98 % of the time in a year, 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: - Wherever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

4.7 The applicant shall operate industrial plant / air pollution control equipment very efficiently and continuously so that the gaseous emission always conforms to the given standards.

4.8 The consent to operate the industrial plant shall lapse if at any time the parameters of the gaseous emission are not within the tolerance limits specified in the conditions.

4.9 The applicant shall provide portholes, ladder, platform etc. at chimney(s) for monitoring the air emissions and the same shall be open for inspection to / and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted /displayed to facilitate identification.

4.10 All measures for the control of environmental pollution shall be provided before commencing production.

4.11 SUBJECT TO THE FOLLOWING SPECIFIC CONDITIONS UNDER AIR ACT:-

4.11.1 Total control of odour nuisance from the plant premises, shall be achieved & maintained by the applicant continuously.

4.11.2 Unit shall submit action plan for VOC control and shall be achieved & maintained.

4.11.3 The applicant shall install continuous /online monitoring system on the stacks for the parameters such as SO2, NOx & PM, HCL, HC etc.

5. CONDITIONS UNDER HAZARDOUS WASTE:-

5.1 Applicant shall have to comply with provisions of Hazardous and other wastes (Management and Transboundry Movement) Rules, 2016, for all the types/categories of the generating hazardous waste.

5.2 The applicant shall obtain membership of common TSDF site for disposal of Hazardous and other wastes as categorized in Hazardous and other wastes (Management and Transboundry Movement) Rules, 2016, as amended from time to time.

5.3 The applicant shall obtain membership of common Hazardous and other wastes incinerator for disposal of incinerable waste.

5.4 The applicant shall provide temporary storage facilities for each type of Haz. Waste as per Hazardous and other wastes (Management and Transboundry Movement) Rules, 2016, as amended from time to time.

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Consent Order No. AWH-87109/2016

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5.5 By-Products mentioned in the application falls in the Haz-waste category as per Hazardous and other wastes (Management and Transboundry Movement) Rules, 2016, and shall be managed as per the rules.

5.6 GENERAL CONDITOINS:-

6.1 Regular maintenance of the pipeline shall be carried out to avoid any spillage or leakage during conveyance of the effluent.

6.2 Unit shall keep accurate records of their water consumption and wastewater generation, discharge, quantity of each product manufactured, and consumption of electricity on day-to-day basis and shall be required to submit the compiled record for each month to GPCB on or before seventh day of the succeeding month. Separate logbooks shall be maintained for recording all the necessary data.

6.3 Magnetic flow meters shall be installed at the various stages of inlet & outlet of pipeline to measure the quantity of effluent at each stage of conveyance.

6.4 SEZ - GIDC shall constitute a monitoring committee for monitoring of the effluent discharged by its members in the pipeline.

6.5 In case of power failure, separate stand-by D.G. set having power generation capacity equivalent to the requirement of power to run the APCM system shall be installed, so that it shall always be operated round the clock even in case of power failure also. The unit shall not keep any bypass line or system for stack emission.

6.6 Unit shall have only one outlet for the discharge of its effluent and no effluent shall be discharged without requisite treatment and without meeting with the GPCB norms. Convenient easy approach shall be provided at the outlet for ease of sampling. The unit shall not keep any bypass line or system, or loose or flexible pipe for discharging effluent outside or even within the effluent treatment plant. The unit shall not keep dual disposal mades.

6.7 Unit shall submit, to the GPCB, the site plan of the unit indicating the location of the effluent treatment plants, and also a separate plan indicating the channels / pipelines through which water / effluent passes from different stages of effluent treatment process right up to the stage of its final outlet. Such plan shall also be displayed by the unit on a Board of adequate size within its compound and near its effluent treatment plant.

6.8 The company shall have to undertake and implement following measures:

- Water conservations measures to minimize the fresh water consumption. Metering system for water consumption.
- Cleaner production options.
- Reuse / recycle of trade waste, ground (ruin) water recharging, electricity conservation.
- Use of solar or wind energy for lighting / heating purpose.
- Control of odour nuisance from the plant premises.

6.9 The company shall have to keep baseline quality data of land, water and air and shall be required to submit to GPCB with CTE / CCA applications.

6.10 The company shall carry out regular monitoring of ground water quality (including for all pesticides) within the premises as well as around the impervious guard ponds. Separate logbook shall be maintained. The data shall be submitted for each month to GPCB on or before 7th day of

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succeeding month, and shall also comply with the instructions of GPCB in case of deterioration if applicable.

6.11 Handling, manufacturing, storage and transport of hazardous chemicals shall be in accordance with the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

6.12 Transportation of effluent, solid waste or any other goods pertaining to treatment activities, shall be carried out as per central Motor Vehicle Rule-1989 & hazardous waste Management, Handling & Trans Boundary –Rule 2008.

6.13 The hazardous wastes shall be handled as per the Hazardous Waste (Management and Handling) Rules of the Environment (Protection) Act, 1986.

6.14 On site and off site emergency plan as required under the Rules 13 & 14 of handling, manufacturing, storage and import of the Hazardous chemicals Rules, 1989 shall be prepared and approval from the Board shall be obtained.

6.15 Periodic medical checkup of the workers shall be done and records maintained as a measure to provide occupational health protection to the workers.

6.16 Unit shall provide state of the art composite samplers & set up testing laboratory facilities for collection, analysis of samples under the supervision of competent technical personnel.

6.17 The Environmental Management Unit / Cell shall be setup to ensure implementation and monitoring of environmental safe guards and other conditions stipulated by statutory authorities. The Environmental Management Unit / Cell shall directly report to the Chief Executive of the organization and shall works as a focal point for internalizing environmental issues. These Cells /Units shall also coordinate the exercise of the environmental audit and preparation of the environmental statements.

6.18 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitted to the GPCB latest by 30th September every year.

6.19 Storm water shall not be mixed with the industrial effluent. Disposal system for storm water shall be provided separately.

6.20 Good housekeeping shall be maintained within the premises. All pipes, valves and drains shall be leak proof. Floor washing shall be admitted in to the effluent collection system for subsequent treatment and disposal.

6.21 The entire pipeline shall be protected from external corrosion/damage.

6.22 Necessary clearances for the safety & safety measures shall be obtained from the concerned authority.

6.23 Unit shall comply with the provisions of all the laws of land including safety, disaster management and prevention of eco contamination.

6.24 The applicant shall have to submit the returns in prescribed form regarding water consumption and shall have to make payment of water cess to the Board under the Water Cess Act- 1977.

6.25 In case of change of ownership/management the name and address of the new owners/ partners/ directors/ proprietor shall immediately be intimated to the Board.

6.26 The applicant also comply with the General conditions as per Annexure - I attached herewith (No.1 to 38) (whichever applicable).

6.27 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

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6.28 Adequate plantation shall be carried out all along the periphery of the industrial premises in such a way that the density of plantation is at least 1000 trees per acre of land and a green belt of adequate width is developed. Unit shall comply with CPCB guideline for green belt development.

6.29 The applicant shall however, not without the prior consent of the Board bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the Water Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986.

6.30 The concentration of Noise in ambient air within the premises of industrial unit shall not exceed following levels:

Between 6 A.M. and 10 P.M.: 75 db(A)
Between 10 P.M. and 6 A.M.: 70 db(A)

For and on behalf of
Gujarat Pollution Control Board
D.M. Thaker 7/9
(D.M.Thaker)
Environmental Engineer

Outward No:368882/07/09/2016

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Annexure-15

Notification of GIDC Dahej -1

REGISTERED NO. G/G.[illegible]

The Gujarat Government Gazet

EXTRAORDINARY

PUBLISHED BY AUTHORITY

Vol. XXXVI] FRIDAY, JULY 21, 1995/ASADHA 30, 1917

Separate paging is given to this Part in order that it may be filed as a Separate Compilat

PART I-B

CENTRAL SECTION

Government Notifications published under Land Acquisition Act only.

REVENUE DEPARTMENT

Notification

Sachivalaya, Gandhinagar, 21st July, 1995.

[illegible] Acquisition Act, 1894 (I of 1894) :

District : Bharuch.

No. AM/95/175/M/LBR/1395/1746/GH.—Whereas it appears to the Government of Gujarat t[illegible] lands specified in the schedule hereto are likely to be needed for public purpose viz., for establis[illegible] of Industrial Estate by Gujarat Industrial Development Corporation, it is hereby notified under the provisions of Section 4 of the Land Acquisition Act, 1894 (I of 1894) that the said lands are likely to be needed for the purpose specified above.

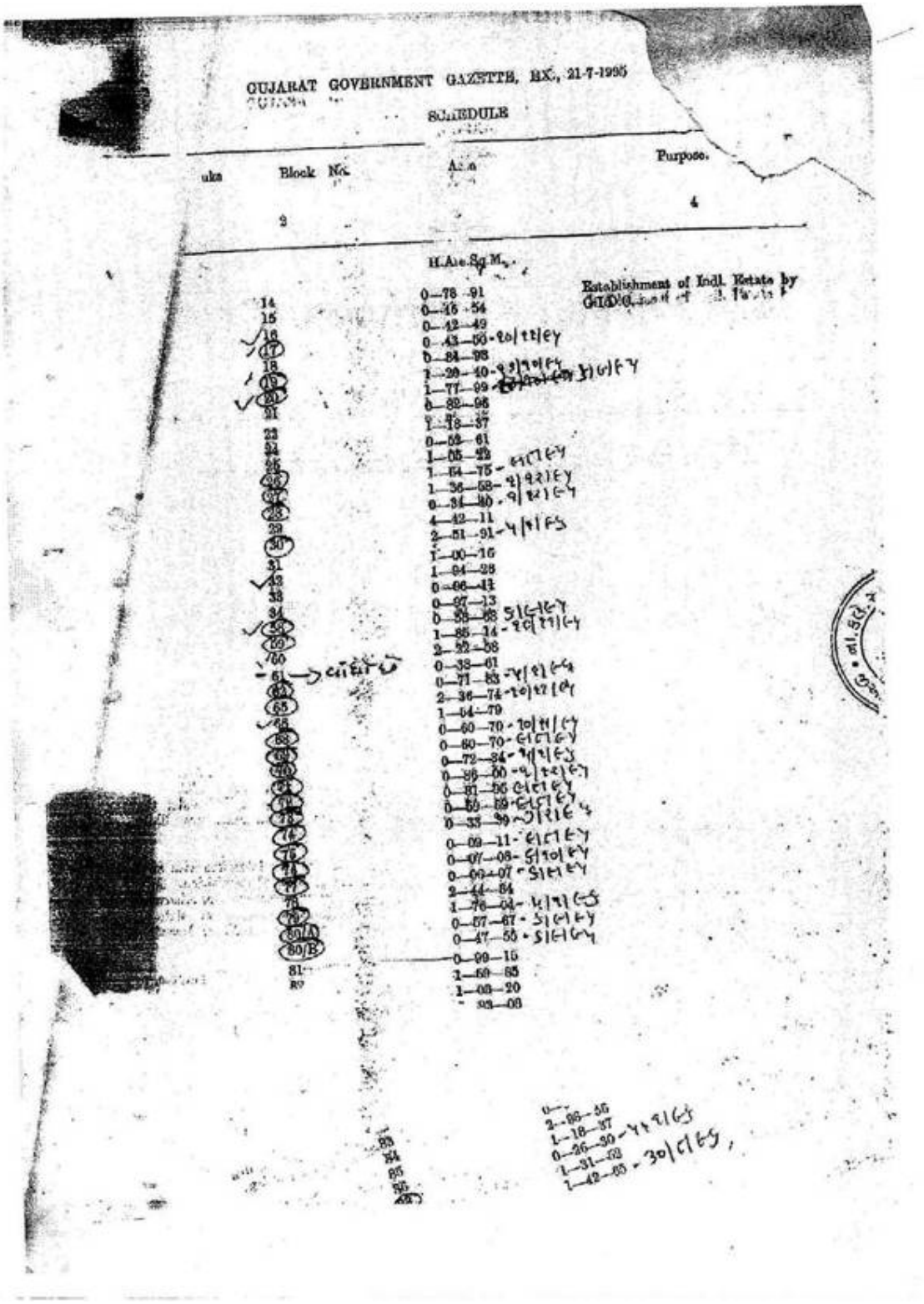
All persons interested in the said lands are hereby warned not to obstract for interefere with any surveyors or other persons employed upon the said lands for the purpose of the said acquisition. Any contract for the said disposal of the said lands by sale, lease, mortgage assignment, exchange, or otherwise or any outlay or improvements made therein, without the sanction of the Collector, after the date of this notification, will under section 24 (seventhly) of the said Act, be disregarded by the Officer Assessing compensation for such parts of the said lands as may be finally acquired.

If the Government of Gujarat is satisfied that the said lands are needed for the aforesaid purpose, a final notification to the effect under Section 6 of the said Act will be published according to law in due course. If the acquisition is abandoned wholly or in part, the fact will be duly notified according to law.

Under clause (c) of Section 3 of the Land Acquisition Act, 1894 the Government of Gujarat is pleased to appoint the Officer on Special Duty (Land Acquisition) No. 1 The Eadia Chambers, 4th Floor, Aahram Road, Navrangpura, Ahmedabad-380009 to perform the functions of a Collector under Section 6[illegible] of the said Act in respect of the said lands.

229-I

I-B-Extra-229-1



GUJARAT GOVERNMENT GAZETTE, EX., 21-7-1995

SCHEDULE

uka	Block No.	Area	Purpose.
2			4
		H.Ae.Sq.M.	
	14	0—78—91	Establishment of Indl. Estate by GIDC
	15	0—15—54	
	16	0—12—49	
	17	0—43—60	
	18	0—84—98	
	19	1—29—10	
	20	1—77—99	
	21	0—82—98	
	22	1—18—37	
	24	0—52—61	
	25	1—05—23	
	26	1—14—75	
	27	1—36—58	
	28	0—34—80	
	29	4—42—11	
	30	2—51—91	
	31	1—00—16	
	32	1—04—28	
	33	0—66—47	
	34	0—97—13	
	35	0—58—88	
	59	1—85—14	
	60	2—52—58	
	61	0—38—61	
	62	0—71—83	
	63	2—36—74	
	64	1—04—79	
	65	0—60—70	
	66	0—80—70	
	67	0—72—34	
	68	0—36—00	
	69	0—81—56	
	70	0—55—89	
	71	0—33—99	
	72	0—09—11	
	73	0—07—08	
	74	0—09—07	
	75	2—44—84	
	76	1—76—04	
	77	0—57—67	
	78	0—47—55	
	79	0—99—15	
	80/A	1—50—85	
	80/B	1—09—20	
	81	93—09	
	82		
	83	2—86—55	
	84	1—18—37	
	85	0—26—30	
	86	1—31—93	
	87	2—42—65	

1	2	3	4
	91	0—25—29	
	92	0—22—26	
	93	0—66—78	
	94	0—69—76	
	95	0—79—92	
	96	0—83—87	
	97	0—81—95	
	123	0—77—90	
	124	1—15—28	
	125	0—20—24	
	126	0—37—45	
	127	1—15—63	
	128/A	0—13—24	
	128/B	0—22—40	
	129	1—15—64	
	130	0—58—80	
	131	0—28—43	
	132	1—15—41	
	133	2—50—67	
	134	0—43—50	
	135	0—62—81	
	136	0—57—67	
	137	0—74—87	
	138	1—41—64	
	139/A	0—71—83	
	139/B	0—79—93	
	140	4—87—05	
	141	0—54—63	
	142	0—66—75	
	143	0—27—32	
	144	0—30—35	
	145	1—41—64	
	146	2—10—55	
	147	0—71—83	
	148	0—96—11	
	152	1—97—20	
	153	2—54—72	
	154	2—67—33	
	155	3—77—37	
	156	0—72—86	
	157	0—05—06	
	158	3—19—70	
	159	0—60—84	
	160	1—62—89	
	161	2—36—58	
	162	1—31—52	
	163	0—62—73	
	164	0—96—11	
	165	0—90—05	
	166	0—83—02	
	167	0—53—56	
	170	1—15—43	
	171	0—62—73	
	172	1—60—75	
	173	1—05—25	
	174	1—05—22	
	175	0—31—35	

1	2	3	4
	176	2—50—91	
	177	1—77—05	
	178	1—60—86	
	179	1—00—16	
	187	0—83—97	
	188	0—84—99	
	189	1—66—96	
	190	1—66—93	
	191	0—87—32	
	193/A	0—40—59	
	193/B	0—08—48	
	194/A/1	0—02—56	
	194/A/2	1—04—26	
	194/B	0—66—77	
	195/A	0—34—32	
	195/B	0—19—00	
	196/A	0—84—78	
	196/B	0—08—48	
	197	0—46—20	
	198	1—18—47	
	199	0—46—77	
	200	0—65—76	
	201	0—80—70	
	202/A/1	0—24—07	
	202/A/2	1—59—75	
	202/B/1	1—16—68	
	202/B/2	0—07—20	
	203	0—29—34	
	204	1—94—27	
	205	0—08—89	
	207	0—17—13	
	208/A	1—39—30	
	208/B	0—06—07	
	209	2—89—35	
	210	2—65—68	
	211	1—27—48	
	212	0—58—68	
	213	1—94—25	
	214	0—66—77	
	215	1—15—34	
	216	0—21—25	
	217	0—87—01	
	219	1—61—87	
	220	1—71—99	
	221	0—54—63	
	222	0—53—63	
	223	0—73—86	
	224	0—76—99	
	225/A	0—82—45	
	225/B/1	0—01—28	
	225/B/2	2—32—08	
	226/A	0—25—42	
	226/B	1—19—69	
	227	0—84—98	
	228	0—26—29	
	229	0—33—39	
	230	1—18—87	

1	2	3	4
	231	1-04-21	
	232	1-10-27	
	233	2-59-97	
	234/A	0-57-40	
	234/B	0-37-44	
	235	0-69-08	
	236	1-05-22	
	237	0-81-95	
	238	0-79-93	
	239	0-90-04	
	240	0-74-37	
	241	1-05-23	
	242	0-53-62	
	243	0-61-71	
	244	1-23-42	
	246	0-52-61	
	247	0-51-60	
	248	0-67-79	
	249	0-34-40	
	250	0-55-62	
	251	0-76-89	
	252	0-23-27	
	253/A	1-11-63	
	253/B	0-13-40	
	254/A	0-25-32	
	254/B	0-60-75	
	255/A	0-61-62	
	255/B	0-22-72	
	256	1-23-49	
	257	0-82-94	
	258	0-16-18	
	259/A	0-01-44	
	259/B	0-37-30	
	260	0-60-70	
	263/A	0-25-80	
	263/B	0-73-95	
	264	1-24-93	
	265/A	0-80-91	
	265/B	0-69-08	
	266	0-01-05	
	267	0-75-88	
	268	0-01-91	
	269	0-20-23	
	270	0-20-30	
	271	1-01-14	
	272	1-43-67	
	273	0-52-67	
	274	1-17-36	
	275	1-20-30	
	276	2-01-35	
	277	3-40-37	
	278	1-12-30	
	279	2-27-40	
	280	1-27-48	
	281	1-11-29	
	282	1-15-33	

1	2	3	4
	283	0-28-33	
		0-02-02 KHA	
	284	0-92-07	
	285	0-97-13 - ૯।૮।૯૫	
	287	0-19-22 - ૧૩।૧૦।૯૫	
	288	0-09-11 - ૧।૧૨।૯૫	
	289	0-88-02	
	290	0-91-05	
	291	1-47-71 - ૨૯।૬।૯૬	
	292	1-36-58	
	293	0-41-48	
	294	0-84-98 - ૯।૮।૯૫	
	295	1-57-84	
	296	1-35-56	
	297	1-03-20	
	298	0-40-47 - ૧।૧૨।૯૫	
	299	0-79-93	
	300	0-54-63	
	301	1-76-04 - ૨૯।૬।૯૬	
	302	0-71-83 - ૬।૯।૯૫	
	304	1-26-47 - ૯।૮।૯૫	
	305	0-40-47 - ૬।૯।૯૫	
	309	2-55-16	
	310	2-11-45	
	311	0-02-02	
	331	1-47-71 - ૯।૮।૯૫	
	332	1-21-40	
	355	0-88-02 - ૧।૧૨।૯૫	
	356	1-47-71 - ૫।૧।૯૬	
	365	2-13-63 - ૧૮।૧।૯૬	
	367	1-44-68	
	368	1-89-19 - ૧।૧૨।૯૫	
	369	1-73-00 - ૩૦।૮।૯૬	
	370	1-21-41	
	371	0-96-12	
	372	1-24-44 - ૩૦।૮।૯૬	
	374	1-67-95 - ૧।૧૨।૯૫	
	375/A	2-19-55 - ૧।૧।૯૬	
	375/B	0-92-07 - ૫।૧।૯૬	
	376	1-07-24 - ૫।૧।૯૬	
	377	1-04-21 - ૧૦।૧૧।૯૫	
	378	2-03-36 - ૯।૨।૯૬	
	379	1-85-74 - ૬।૯।૯૫	
	380	2-43-82 + ૧૦।૧૧।૯૫	
	381	3-65-23	
	382	1-31-53	
	383	1-00-17 - ૬।૯।૯૫	
	384	0-78-91	
	385	1-58-84	
	386	1-46-70 - ૧।૧૨।૯૫	
	387	1-74-62 - ૧।૧૨।૯૫	
	388	1-73-00 - ૨૯।૬।૯૬	
	389	1-16-35 - ૧।૧૨।૯૫	
	391	2-06-39 - ૫।૧।૯૬	
	392	2-06-39 ૬।૯।૯૫	

1	2	3	4
	393	0-73-86	
	394	3-19-70	
	395	1-17-36	
	396	0-50-59	
	397	1-56-82	
	398	3-22-58	
	399	2-52-58	
	400	1-99-31	
	401	3-10-80	
	402	1-41-64	
	403	0-13-49	
	404	2-16-51	
	405	1-07-34	
	406	3-26-79	
	407	1-64-91	
	408	0-64-54	
	409	2-01-33	
	410 ચાંદીનો	1-64-91	
	411	2-34-72	
	412	1-36-58	
	413	0-79-93	
	414	1-45-69	
	415	0-51-38	
	416	0-57-30	
	417	2-78-23	
	418	0-78-22	
	419	1-30-58	
	420	0-51-45	
	421	1-17-36	
	422	2-03-36	
	423	0-81-71	
	440	0-59-31	
	441	2-03-05	
	442	0-72-84	
	443	1-84-13	
	445	0-97-13	
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	493	0-70-83	
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	498	0-45-53	
	499	0-98-14	
	500 ચાંદીનો	0-40-47	
	501 ચાંદીનો	1-41-64	
	502	2-44-83	
	503	2-31-68	

ચાંદીના સાધનો
તા. ૧૪/૨/૧૯૫૭
ના રોજ મળેલી સભા
વ્યવસ્થાપક સમિતિ

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I-B-EX-229 (3)

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	701/B	1-87-17 }	
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