

ACK

HENI DRUGS PVT. LTD.

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.,
Sarigam, (Gujarat), Pin code - 396155
Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Emails : heni@henichem.net * www.henichem.net
CIN NO.: U24139MH1993PTC070791



Date: July 22, 2016

To,
The Member Secretary
State Level Expert Appraisal Committee,
Gujarat Pollution Control Board,
Paryavarn Bhavan, Sector-10A,
Gandhinagar - 382010.



Kind Attn.: Shri. Hardik Shah

Subject: Submission of Additional Information sought after consideration of proposal in 292nd SEAC meeting held on 25/05/2016 for obtaining Environmental Clearance for M/s. Heni Drugs Pvt. Ltd. located at Plot No. 1901 & 1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155.

Ref: F. No. EIA-10-2015-7132-E.7236. dated: 7th November, 2015.
Proposal No.- SIA/GJ/IND2/11329/2015

Respected Sir,

Our proposal was considered for appraisal in the 292th meeting of SEAC, Gujarat on 25th May, 2016. The committee discussed our proposal for the grant of Environmental Clearance and as per the minutes of the 292nd SEAC meeting uploaded in the state portal, SEAC sought for Additional information for further consideration of the proposal.

With reference to the above, we have revised our EIA/EMP report with the following changes incorporated:

1. TOR Nos.- 2, 3, 7, 8, 14, 18, 30 & 44 are properly addressed in the revised EIA/EMP report as follows:

Reg. add.: "Vikram" 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai - 400 082



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1. TOR Nos. 2, 3, 7, 8, 14, 18, 30 & 44 are properly addressed in the revised EIA/EMP report as follows:



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 Tel.: 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
 Emails: heni@henidrug.com * www.henidrug.com
 CIN NO.: U24139MH1993PTC070721

TOR No.	TOR Condition	Corresponding section in revised EIA Report
2	Explore the possibility of substitute products and processes containing or using mercury With non-mercury (Mercury free) alternatives.	Instead of immediate phasing out we would like to continue our mercury based products in our product profile with implantation of safety and hazard prevention measures for mercury. Further, we would like to inform you that the production of mercury product will be on campaign basis to minimize the use of mercury and production of mercury product. It is also noteworthy that gradually we are switching to non-mercury product in our product profile and by doing so we will be able to make our product profile mercury free with development of mercury free product profile. Please refer Annexure-XIV for justification regarding this TOR condition.
3	Ensure that the various regulations for use, storage and transportation of Mercury metal/Compounds will be complied in letter and spirit. Give legal undertaking in this regard.	Please refer Annexure-XIII for document related to the actions to comply with various regulations for use, storage and transportation of Mercury metal/ Compounds. Legal undertaking is enclosed as Annexure-XI.
7	Technical details of all the plants along with details of manufacturing process/operations Of each product. Details on strategy for the implementation of cleaner production activities.	<ul style="list-style-type: none"> • Technical details of all plants including machinery and equipments have been given in EIA Report under Chap.-2, Section- 2.2.4, Page- 2-10. • The details of manufacturing process / operations of each product have been given in EIA Report under Chap.-2, Section- 2.3.2, Page- 2-14 to 2-22.
8	Chemical name of each product and raw materials along with chemical reactions of unit Processes. Detailed manufacturing process of each product along with chemical reactions and mass balance (including reuse-recycle, if any).	<ul style="list-style-type: none"> • Chemical name of each product has been given in Chap.-2, Section - 2.1.1, Table- 2.2, Page- 2-3 and Chemical name of Raw materials has been given EIA report under Chap.-2, Section - 2.3.1, Page- 2-12. • Detailed manufacturing process of each product along with chemical reactions and mass balance has been given in EIA report under Chap.-2, Section - 2.3.2, Page- 2-14 to 2-22.
2/1	Detailed effluent treatment scheme and	The Detailed effluent treatment scheme and



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 Emails : heni@heni-hem.net * www.heni-hem.net
 CIN NO.: U24139GJ11992PTC070791

TOR No.	TOR Condition	Corresponding section in revised EIA Report
	disposal method. Technical details of the proposed ETP, including size of each unit, retention time etc. including modifications / upgradation to be done in existing ETP to take care of increased effluent quantity along with its adequacy report.	disposal method. Technical details of the proposed ETP, including size of each unit, retention time etc. including modifications / up gradation to be done in existing ETP to take care of increased effluent quantity along with its adequacy report have been given in Adequacy and treatability report as Annexure-VIII of EIA report.
18	Explore the possibility of reuse/recycle and other cleaner production options for reduction of wastes. Details of methods to be adopted for the water conservation.	The Detail of reuse/recycle for reduction of wastes has been described in EIA report under chap-10, section 10.4.1.3., page 10-30.
20	Membership of Common Environmental Infrastructure including the TSDF / Common Hazardous Waste Incineration facility along with an assessment to accommodate the additional quantity of wastes to be generated. Explore the possibilities for co-processing of the Hazardous waste prior to disposal into TSDF/CHWIF.	The unit has got the provisional membership of CETP, Sarigam and TSDF (Saurashtra Enviro Projects Pvt. Ltd., Kutch for Integrated Common Hazardous Waste Management Facility). The copy of membership letter is enclosed as Annexure-XII.
44	Records of any legal breach of Environmental laws i.e. details of show-cause notices, closure notices etc. served by the GPCB to the existing unit in last five years and actions taken then after for prevention of pollution.	Closure notice along with reply regarding violation of water Act under 1974 and Revocation letter is enclosed as Annexure-X

2. The generation of Mercury bearing waste for last 5 years is ~15 Kgs till date as below.

Year	Mercury Purchased (Kgs)	Mercury Consumed in Products (Kgs)	Waste Generated* (Kgs)
2012-13	Site not in operation	Site not in operation	Site not in operation
2013-14	Site not in operation	Site not in operation	Site not in operation
2014-15	353.500	284.000	~ 2.000
2015-16	1414.500	1389.000	~ 12.000
2016-17	379.500	197.500	~ 1.000
TOTAL	2147.500	1870.500	~ 15.000

Note: * the waste is generated only from Treatment of Effluent containing Mercury. No mercury bearing waste is generated from Process.



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The quantity is lower than the quantity desired by TSDF site: "Sarigam Waste And Effluent Management Company Ltd. (Solid Waste Depository Scheme)" for lifting and disposal through secured land fill. Hence, this waste is not disposed yet and is securely stored after desensitization and stabilization in the designated hazardous waste storage area as per regulatory provision.

3. Revised list of products with capacity as per Form-1 has been given in the revised EIA/EMP Report under Chapter-2, Section - 2.1.1, Table- 2.2, Page- 2-3. The water balance and waste generation as per the revised product capacity is given in Chapter-2, Section - 2.4.2, Figure- 2.4, Page- 2-23 and Chapter-2, Section - 2.4.3, Table- 2.14, Page- 2-24 respectively.

Now, we are submitting the same (Revised EIA/EMP Report) along with its soft copy in CD for further consideration of our proposal.

In view of our detailed justification as enclosed, we most earnestly request your kind selves to consider our application for grant of Environment Clearance at your earliest.

Thanking you.

Yours faithfully,
For Heni Drugs Pvt. Ltd.

Director
Kapil Girotra



List of Enclosures:

1. Revised EIA/EMP Report as per awarded TORs.
2. CD containing soft copy of Revised EIA/EMP Report.

Summary & Conclusion

Of

Environmental Impact Assessment Report

FOR

**The proposed expansion project for manufacturing of “Esters, organic intermediates,
Aromatic metal compounds, Extracts and Oils @ 415 MT/Year”.**

“Synthetic organic chemicals industry”

Activity: 5(f) category- B



OF

M/s. HENI DRUGS PVT. LTD

Located at:

**Plot No. 1901/1901A,
Phansa Char Rasta, GIDC, Sarigam,
Tal.- Umargam, Dist.-Valsad, Gujarat-396155**

EIA CONSULTANT ORGANIZATION

UNISTAR ENVIRONMENT AND RESEARCH LABS PVT. LTD.VAPI – GUJARAT

(NABET Accredited Consultant Organization, Sr. No. 122 in the List of ACO/ Rev. 43rd July 11, 2016)

Executive SUMMARY

1. PROJECT DESCRIPTION

M/s. Heni Drugs Pvt. Ltd. is an existing Company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal.- Umargam, Dist.-Valsad, Gujarat-396155 performing Continuous distillation of crude Ethyl Oleate and production of inorganic Metal salts @ 1200 MT/Year". M/s. Heni Drugs Pvt. Ltd. has obtained NOC and CC&A (CC&A no. AWH-65133 dated 22-09-2014 valid up to 10-06-2019) of existing manufacturing unit.

Now M/s. Heni Drugs Pvt. Ltd. proposes the expansion of their production by addition of new products of "**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year**". For the proposed expansion project, the company intends to procure the available latest technology for manufacturing the proposed products.

As per the EIA notification- 2006 as amended the proposed products are covered under any activity- 5(f) category B1 requiring Prior Environmental Clearance.

Since the unit is situated within the notified industrial estate (GIDC Sarigam) developed before 2006 and falling in B category, Public Hearing is exempted for this project.

The proposed products & byproducts along with production capacity are presented below in tabulated form.

Table 1: List of Products & Byproducts with Capacity

Sr. No.	Products Name	Existing (MT/Year)	Proposed (MT/Year)	Total (MT/Year)
1	Continuous distillation	300.00	00.00	300.00
2	Metal salt	900.00	00.00	900.00
3	Esters	00.00	250.00	250.00
4	Organics Intermediates	00.00	45.00	45.00
5	Aromatic Metal Compounds	00.00	100.00	100.00
6	Extracts and Oils	00.00	20.00	20.00
Total		1200.00	415.00	1615.00

The capital of proposed project has been estimated & budgeted with costs of Rs. 400.00 Lakhs. The company has made provision of Rs. 25.00 Lakhs for the environment management system.

The proposed expansion project will be within the plot of the existing unit with Plot No. 1901/1901A admeasuring 6700.00 Sq. m. located at Phansa char Rasta, GIDC Sarigam. The other resources required for the proposed project is as follows:

- Land - 6700 Sq. m.
- Water- 33.00 KLD will be fulfilled by GIDC water supply.
- Power- (Existing- 99 KVA and Proposed- 160 KVA) 259 KVA which will be met by supply from GEB.

- Utility- In existing unit, the heat requirement met from Thermopack of capacity 1 Lac Kcal/Hr. And in the proposed unit steam requirement will be meet from two Steam boilers of capacity 1Ton/hr each. One DG set of 160 KVA capacity.
- Fuel- Piped Natural Gas (Primary Fuel) 30 Nm³/hr, HSD: 30 Ltrs./Hr.
- Human Resource- Proposed 45 Nos.

The probable pollution load/sources of impacts are identified during the present EIA study. The details of the major pollution potential/identified sources of impacts are presented below.

- **Wastewater:** Industrial Effluent – 7.20 KLD, Domestic- 3.50 KLD.

The industrial effluent will be treated in full-fledged proposed in-house ETP (of capacity 10 KLD Max.) equipped with all required Primary, Secondary & Tertiary Treatment units. And the domestic waste water (Sewage) will be disposed off through septic tanks & soak pit

- **Emissions:** PM <150 mg/Nm³, SO_x <100 ppm & NO_x <50 ppm

Proposed Sack as utility emission control measures:

- Stack-I: TFH (Ht.-30 m., Dia-300 mm)
- Stack-II: Steam boilers (2 Nos.) (Ht.-30 m., Dia-300 mm)
- Stack-III: DG Set (Ht.-9 m., Dia-100 mm)

- **Solid/Hazardous wastes:**

- Used Oil: 112.50 Lit. /Month. (Sold to registered recycler /Reused)
- ETP Waste: 6.25 MT/Month (sent to TSDF Side)
- Discarded Containers: 28200 Nos/Yr (Sell to GPCB authorized scrape dealers as a scrap)
- Saturated Carbon: 5.5 MT/Month (To common Incinerator/ co-processing)
- Process Waste : 12.13 MT/Month (To common Incinerator/ co-processing)
- Solid Baggase: 0.10 Mt/Month (Composting)

- **Hazardous Material:**

The major hazards are noticed to be associated with only 6 chemicals of the project (Ethanol, 2-Ethyl hexane ,Isopropanol, Monoethylene glycol ,Bromine and Acetic acid) out of about 24 raw materials are hazardous in nature as per MSIHC rules (as amended), 2000. These hazardous materials will be received in drums by road truck and stored in designated areas of drum storage. All safety measures will be provided at design level with all required safety system for the specific chemicals to prevent the associated hazards & risks.

2 DESCRIPTION OF THE ENVIRONMENT & BASELINE ENVIRONMENT STATUS PROJECT AREA

The proposed expansion unit - M/s. Heni Drugs Pvt. Ltd. will be setup at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155. The GIDC Industrial estate has all required infrastructure like electricity, roads, transportation etc.

The project area is situated in the southern part of Gujarat State and shares some area of UT of Daman and UT of Dadra & Nagar Haveli. The area has global identity for its industrial development since many decades especially in Vapi GIDC, adjoining UTs and Sarigam GIDC. The area has contributed significantly in the development of our Nation's economy through the excellent industrial growth. The area has considerably developed in last few decades by sharing vital input through industrial development and implementation of government actions/plan of development. The area has been selected as the production hub by many large banner industries of chemicals, pharmaceutical, pesticides, textile & plastic sectors. The Damanganga river flows west into the Arabian Sea. The river flows through Maharashtra and Gujarat states, as well as the Union territories of Daman and Diu and Dadra and Nagar Haveli. The industrial towns of Vapi, Dadra and Silvassa lie on the north bank of the river, and the town of Daman occupies both banks of the river's estuary.

BASELINE STATUS

The baseline environmental studies have been done for three months of winter season of 2015-16 (November 2015 to January 2016) for the EIA of expansion project of M/s. Heni Drugs Pvt. Ltd. The study has been conducted initially considering the draft TORs proposed for approval and then continued & finalized according to the conditions of awarded TORs. The study has been conducted by following the guidelines & the EIA Manual issued by MoEF. The study has been conducted & finalized by conducting studies during the season of winter (post-monsoon) 2015 covering study area of 5 km radius from project site area for environmental sampling & monitoring and 10 km radial area for mappings to comply with the TOR awarded by the State level Expert Environmental Appraisal Committee (SEAC), Gandhinagar, Gujarat.

The frequency of various environmental sampling & analysis was determined following the guidelines provided by MoEF in online EIA Manual. The details of frequency of environmental sampling considered for the study are illustrated in the following table.

Table 2: Details of Environmental sampling frequency.

Attributes	Sampling Monitoring Frequency
A. Air Environment	
Meteorological Data	Hourly continuous during Study Period
Ambient Air Quality	24 hourly twice a week during study period
B. Noise	
	Hourly for one day during Study Period
C. Water	
Ground Water	Once in Study Period
Surface Water	Once in Study Period
D. Soil Quality	
	Once in Study Period
E. Land Use -Land Cover & Topography	
	Once in Study Period

Attributes	Sampling Monitoring Frequency
F. Ecological Data	Once in Study Period
G. Socio-economic Data	Once in Study Period
H. Other Maps	Once in Study Period

One seasonal ambient air monitoring data was collected during the study period of November 2015 to January 2016.

The data of wind pattern collected during the study period indicates that the wind was blowing dominantly from 44 Degree (NE) and the average wind speed was noticed to be around 2.70 m/sec. Maximum wind speed has been noticed to be 6.05 m/s.

Ambient Air Quality assessments for the selected locations are carried out as per the above schedule and it has been noticed that the ambient air quality status is well below the limits prescribed in NAAQS, 2009 for all studied parameter. No indication of ambient air pollution is observed.

Similar to ambient air quality no issue of critical pollution of soil and water is observed during the study. However, some natural issues like higher TDS and Hardness due to geological condition are observed in some cases.

Noise levels were also found well below the prescribed limits for residential as well as industrial area.

Further, critical issues related with ecological layout as well as socioeconomic factors have not been noticed in the studied area during the study period.

3. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

As studied during the present EIA study, no major significant impacts from proposed plant are anticipated except the cases of failure of APCD and catastrophic disaster in material storage area.

Proponent has planned to install well designed ETP, which will be efficient for adequate wastewater treatment to meet the norms for disposal through underground drainage of GIDC going to CETP, Sarigam. The ETP process adopted by the proponent is adequate to remove the pollutants from the waste water. Thus issue of water or land/soil pollution due to disposal of treated wastewater is also not envisaged. Besides, the water consumption will be met through the drawl of water from pipeline of GIDC water supply department. Groundwater will not be abstracted for water requirement of proposed project. Hence the impacts due to the water consumption are not envisaged. Risk assessment study has been conducted for the proposed project and the suggestions made in the report shall be implemented strictly to prevent any chances of environmental contamination and employee health & safety. By the efficient implementation of Hazard/Risk control/Prevention measures the negative impacts would be avoided.

Further, the fuel for TFH will be Natural Gas which is eco-friendly fuel and does not emit any considerable load pollutant. Hence, there would not be any considerable emission. Besides, the

hazardous waste generation includes almost all recyclable waste except ETP sludge and all these hazardous waste will be managed as per MoEF/CPCB/GPCB Guidelines. Hence issues of environmental contamination due to hazardous waste are not envisaged.

The proponent will plant varieties of trees & shrubs in the premises. The Greenbelt will be maintained in excellent condition giving visual of dense vegetation. The proponent will manage the greenbelt with all possible care & attention to improve environmental condition. Thus the beneficial impacts due to the dense greenbelt are envisaged. The greenbelt will be created in open land to develop greenbelt in around 2000.00 m² (around 30% area of total land) area of total land of project. The plantation for proposed greenbelt will be started in the Monsoon.

Other than these aspects, it is also found that the high noise generation sources will not be the part of proposed project. At any point of process plant the noise level at work place will remain below 75 dB (A) which will be further mitigated by provision of PPEs and shift management. The noise level out of the premises is envisaged to be below 60 dB(A) in day and below 50 dB(A) in night as maximum. Hence impacts of noise are not envisaged.

Company shall organize CSR activities in the surrounding area as well as other areas of state & country with necessary budgetary provision around 2% of capital cost in line with the time bound schedule for at least 5 years. Necessary timely revision of budgetary provision shall be done as required. All aspects of safety are adequately being managed and required safety material, equipments and facilities will be provided to all employees, contractor & visitors.

4. ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program has been prepared in five different sections covering all necessary guidelines & plan for effective & efficient monitoring of the environmental conditions to ensure that EMP is implemented efficiently to prevent/minimize the anticipated impacts. The details are of the programs are presented below in tabular form:

Table 3: Details of Environment Monitoring Program

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
1.	Ambient Air : At minimum 2 location within the plant premises having 1 location in downwind direction preferably at between 500 m. & 1 km distance from plant boundary.	Monthly - In-house lab. or External MoEF&CC recognized lab	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , VOCs*
	In case of accidental leak & spill of volatile hazardous chemical: At maximum spots likely to be affected.	When accidental spillage/leakage occurs - In-house lab. or External MoEF&CC recognized lab	VOCs*
2.	Stationary Emission: All Stacks including stacks of Thermopack, Steam boilers,	Monthly - In-house lab. or External MoEF&CC	PM, SO ₂ , NO _x , VOCs*

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
	DG Set and process area stacks	recognized lab	
3.	Workplace areas: RM Storage and Production areas	Monthly - In-house lab. or External recognized lab MoEF&CC	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , Bromine, VOCs*, Temperature, Humidity, Light and Noise
4.	Ambient Noise: At all sources (DG set, Stem boiler, Thermopack, Production Utilities/machineries, Pumps, Compressors etc.) and at deferent areas (Production area, Storage area, transportation area, Administrative area, security area, utility house, ETP etc) within premises	Weekly – In House lab.	Equivalent Noise Level - dB (A) (At least 1 hr. continuous)
5.	Untreated waste water from high concentrated stream	External recognized lab MoEF&CC	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Untreated waste water before inlet to ETP	Daily- In-house lab. External recognized lab MoEF&CC	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Treated waste water for disposal to CETP	Daily- In-house lab. External recognized lab MoEF&CC	Parameters in CETP discharge norms.
	In case of accidental spillage/leak, water samples from the area likely to be affected.	When accidental spillage/leakage occurs.- External recognized lab MoEF&CC	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphates, Phosphate, Ammonia, Chromium, Manganese, Mercury.
6.	Surface Soil: At Two locations from storage & greenbelt area in case of	Quarterly or after accidental spillage/ leakage - External MoEF&CC	pH, EC, Moisture, Organic matter, Hg, N, P, K, SO ₄ -2, Cl-, Ca+2, Mg+2 & Na+

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
	accidental spillage/leak, soil of the affected area from various spots & depth.	recognized lab	
7.	Greenbelt/Vegetation Cover: Greenbelt Area at Boundary & Garden	Throughout Year at regular interval: In House by EHS Executive & other EMC members	Number of plantation (Units), Number of Survived Plants/Trees, Number of Poor Plant/Trees
8.	Annual Environmental Audit:	Yearly (In-house by MD, Environment Manager & other EMC members; External only If required by statutory provision through Approved Lab)	As per Direction of Honorary High Court, Gujarat (if applicable)
9.	Employee Medical/Health Checkup:	Yearly- Through Approved Medical Officer & Doctor as per OHS Plan	As per statutory provision & requirement
10.	Social Aspects:	Throughout year- by PRO or HR Manager or Designated person.	Employee social status and issues, Disbursement of fund for CSR, Socio-economic requirement of the area as informed by local people.

Note: *VOCs are to be monitored in terms of Chemicals of Proposed project.

5. ADDITIONAL STUDY

In case of the present EIA study for proposed project Risk Assessment as additional studies has been given as condition in awarded TOR, which needed to be included in the EIA study & report. The Risk Assessment Study for the upcoming project has been conducted by functional area expert of EIA Team. The risk assessment has been carried out with consideration of some probable worst case scenarios like Fire, explosion and flammable cloud & toxic dispersion. The major hazards are noticed to be associated with four chemicals of the project (Ethanol, 2-Ethyl Hexanol, Isopropanol, Mono ethylene glycol, Bromine and Acetic acid) which can have worst case scenarios of fire & explosion as well as dispersion of toxic vapour & flammable cloud. As, the proposed project is of manufacturing of synthetic organic products using some organic chemicals, impacts are likely to occur due to some other chemical hazards also. Thus with such probabilities & considerations of hazards & risk, "Risk Assessment Study" has been carried out by proponent as pre-project conceptual RA study. The Disaster & Onsite Emergency Management plan has also been prepared as a part of RA study assignment. The whole Risk Assessment Report is incorporated in the chapter-7 of the EIA report, and the onsite emergency plan has been enclosed as annexure of the EIA report.

6. PROJECT BENEFITS

The project does not require any land outside of a notified industrial estate of GIDC - Sarigam and the estate is years old with all required infrastructures. Hence no major benefits in terms of development of new infrastructures & direct improvement in infrastructure due to proposed project are anticipated.

The project benefits will be significant in terms of benefit to the local socio-economic status as well as economic conditions of state & country.

7. ENVIRONMENTAL MANAGEMENT PLAN

The proposed project will have some potential of impact in form of pollution sources mainly as the emission from utilities. Such sources of impacts and the significance of the impacts are already described in above sections with necessary mitigations. In line with the above description some important mitigation measures are cited as necessary requirement to prevent &/or control / minimize the probable impacts of proposed project on environment. The details of such mitigations are described below under respective heading with necessary details.

Air Pollution Control

- Sprinkling of water will be providing for suppression of dust generated from material handling & storage.
- By providing wet Curtain/ tarpaulin barrier around the construction site from prevention of particulate emission.
- To establish proper design method to reduce airborne particles from transportation, storage & handling of materials.
- Allowing only PUC certified vehicles who will be engaged in construction work.
- Maintenance of construction equipments, machineries & utilities to reduce emissions.
- Stack Monitoring shall be done during the commissioning phase on regular basis to prevent high emission from utility.
- Provision of necessary PPEs for employees engaged in activities of storage, transportation & handling of materials as well as construction & commissioning operations
- Adequate Stack height & internal diameter are provided for proper dispersion of emission from proposed Steam Boilers & D.G. Set.
- Proper sampling port & monitoring point shall be provided to all stacks.
- To reduce the loss of resources by ensuring proper operation of production & storage to get high production efficiency and to reduce PM & VOC emission
- Provision of FD/ ID fan with utilities/ stack if/as required to maintain desired velocity of exit gas
- Hazardous material storage tanks shall be designed adequate and manufactured by suitable material for reduction of Hazards.
- The storage area shall be adequately design with efficient air change ratio. The raw material, products & fuel handling and transport facilities shall be provided.
- Provision of Safety valve on reactors and to prevent accidental emissions shall be provided Safety arrangements, facilities.

- Internal roads shall be constructed from concrete/ asphalt for prevention of dust during vehicular movement
- Adequate greenbelt coverage, in & around the plant shall be developed as per the guideline.
- Low emission vehicles shall only be used for transportation
- Transportation, handling & storage of the hazardous materials shall be done as per statutory requirements, HAZMAT and guidelines issued by concerned authorities.
- The trucks/vehicles used for the transportation of hazardous materials shall be approved by concerned authority and the driver shall be well trained to overcome the safety issues occur during the transportation.
- NG Fired steam boiler shall be installed for the proposed project.
- HSD/Diesel fired DG sets shall be run only in emergency power requirement / power supply failure from electricity department.
- Stacks of adequate height & internal diameter at top should be provided for all utilities to control and manage the emission ensuring lowest possible pollutant levels in emission. All applicable standards of emission quality as timely issued/amended/corrected shall be strictly complied.
- Hazardous material storage area shall be provided with fire detection system (if possible) & firefighting facilities like hydrant & fire extinguishers.
- Proper & adequate handling facilities & procedures shall be provided to prevent fugitive emission from handling of all materials & wastes of the project.
- The hazardous materials storage tanks shall be provided with dyke wall to prevent spreading of materials during incident of leak, spill and other hazards.
- Regular monitoring of ambient air and emission of utility shall be conducted as per environment monitoring plan.
- To ensure that DMP & RA is prepared efficiently covering all necessary action plan to prevent all major probable threats associated with the hazardous materials of the project.

Water & Wastewater Management

- Connections for drawl of water from GIDC water supply line and raw water storage facilities
- Proper sanitation facilities with septic tank & soak pit for disposal of sewage
- Adequate structural facilities for prevention of any kind of contaminated runoff from construction area causing impacts outside premises
- Proper drinking water supply facilities construction personal
- Temporary short phase, hence no other major structural measures
- Ground water shall not be used to meet water requirement of the project. All water requirements shall be met only from GIDC water supply pipeline.
- Water consumption shall be optimized by reduction of wastage, unnecessary drawl and by preventive leakage from Taps/ Valves/ Pipeline.
- Runoff from construction site would be controlled by providing bund/barrier around construction area.
- The construction equipment will be washed properly only at designated washing area.
- Domestic effluent will be disposed of through adequate soak pit and septic tank.
- All construction materials having potential of being cause of soil contamination and hence water contamination shall be stored in closed storage area with concrete floor.

- Intake facilities from Source: GIDC Water Supply
- In-house fresh water storage facilities.
- Adequately ETP will be designed for treatment of High concentrated effluent containing inorganic mercury.
- Provision of effluent collection line in storage and production area for contaminated waste steam generated due to spill/ leak of hazardous chemicals mainly mercury as well as container/ vessel washing.
- Provision of Emergency storage tank/ Guard pond for temporary storage of effluent.
- Proper arrangement for effluent disposal line connected to GIDC Underground drainage to CETP-Sarigam.
- Efficiency of ETP for treatment of industrial effluent is mentioned in the EIA report as annexure and guard pond is suggested.
- Proper sanitation facilities with septic tank/ soak pit system for domestic wastewater discharge.
- Provision of properly lined storage area for hazardous materials (especially mercury) & wastes to prevent contamination of water.
- Provision of adequate storm water drainage lines.
- Ground water and surface water from nearby canal shall not be utilized for proposed project and the whole water requirement shall be met only from GIDC water supply pipeline.
- Reduce wastage in domestic activities by preventing leak/spill from pipes, taps/valves etc.
- Regular recording of water consumption using flow meter.
- Regular inspection ground water nearby /around the project site to check the quality of Ground water regarding presence of mercury.
- Reduction of wastewater generation rate by minimal use of water for various industrial activities and by prevention of leakage from tap/valve and pipeline.
- Continuous attempts to reduce pollutant load in effluent.
- Domestic effluent shall be disposed of only through adequate septic tank and soak pit.
- Effluent treatment plant having adequate capacity for efficient treatment of waste water generated from industrial operation shall be provided.
- The ETP for proposed project shall be provided as per the proposal made in Treatability report .
- Other Treated effluent shall be disposed off only through the common effluent disposal pipeline going to CETP of Sarigam GIDC.
- Emergency storage tank/ Guard pond shall be provided for temporary storage of wastewater to overcome issues related with treatment arising during failure of ETP and emergency/major disaster of chemical spill /leak.
- Contaminated waste stream generated due to spill/ leak of hazardous chemicals as well as container/ vessel washing shall be temporarily stored in guard pond and efficient treatment in ETP prior to discharge shall be ensured.
- In condition of inefficient operation/failure of ETP and emergency waste water generated from industrial activity shall be temporarily stored in guard pond.
- In any condition, poorly or untreated effluent shall not be disposed off.

- Hazardous waste storage area and disposal as per the regulatory guideline/ provisions shall be ensured prior to inception of industrial operations of proposed project.
- Impervious lining of floor of chemical storage and production area shall be provided to prevent /eliminate the issues of land and hence subsoil water contamination.
- No disposal of poorly or untreated effluent generated from clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Provision shall be made for alternative treatment option for effluent generated clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Adequate operation & maintenance of ETP for efficient treatment of effluent.
- Regular quality assessment of treated effluent from ETP before disposal.
- Maintaining records of water consumption, effluent generation, effluent discharge, water characteristics, treated and untreated effluent characteristics.
- Maintenance of good housekeeping to avoid contamination of storm water.

Land Environment Management

- Proper handling & storage facilities shall be provided for the construction materials.
- Adequate management for transportation to ensure that materials in transport vehicles are covered to prevent spill & leak on ground as well as transportation is done in minimum frequency.
- Greenbelt development in about 30% Area of the plot as per Greenbelt Development Plan.
- All transportation of raw materials especially mercury and products shall be done in closed truck/tanker approved as per statutory requirement to prevent volatile and particulate emissions as well as leak/spill during transportation.
- Fire & explosion prevention /control measures shall be provided as per the suggestions made in RA report.
- Firefighting system shall be provided as per the suggestions made in RA report.
- Mitigation measures for prevention and control of particular emission shall be provided as suggested in RA report as well as in section of air pollution control.
- Adequate ETP for treatment of effluent & arrangement of disposal through underground drainage of GIDC going to CETP, Sarigam and for high concentrated effluent will send to MEE.
- Statutory guidelines & requirements for Hazardous waste management shall be followed in any condition/ situation.
- Effluent and solid /hazardous waste shall never be disposed off on land.
- Greenbelt development & management to ensure healthy & dens greenbelt/pasture throughout the life of the project.

Ecological Environment Management

- Proper & efficient implementation of mitigation measures & EMP suggested for control of Air pollution, Water & wastewater management, reduction of Noise and construction waste management.
- RA has to be conducted and all necessary control & prevention measures for all hazards associated with the project shall be implemented prior to inception of the project activities.

- Disaster/Emergency Management Plan shall be prepared & implemented
- Greenbelt development & maintenance within premises & around periphery as per greenbelt development plan.

Noise & Vibration Generation & Management

- Noise generating & vibrating equipment like motors, pumps etc. shall be mounted on sturdy concrete foundations with rubber padding to reduce vibrations.
- DG set shall be complying noise standard prescribed by CPCB and silencer as well as acoustic enclosure shall be provided.
- Barrier in form of Dens Greenbelt in and around premises and concrete wall wherever required & suitable.
- Further to cope up with the issue of occupational noise exposure, PPEs like earmuff & earplug will be provided to all concerned employees.
- The impacts of noise on occupational health would be mitigated by proper shift timing & regular annual checkup of concern employees.
- Periodic monitoring of noise levels as per post-project monitoring plan shall be done on regular basis.

Occupation Health & Safety

- All necessary implementation & actions for ensuring safe work condition
- All statutory guidelines related with occupational health & safety is/will be followed
- Implementation of all hazards & risk control & prevention measures
- Provision of all necessary PPEs, safety equipment/ materials
- Regular inspection for the safety procedures and use of PPEs & Safety equipment/material
- The medical histories of all employees shall be maintained in the prescribed format. Thereafter, the employees shall be subjected to medical examination on annual basis..
- Training programs & safety audit on regular basis to prevent impacts of the operational activities on occupational health as well as to improve workplace condition & safe work system.

Greenbelt Development

The greenbelt will be created in open land to develop greenbelt in around 2000.00 m² (about 30 % area of total land) area of total land of project. The plantation for proposed greenbelt will be started in the Monsoon season. The greenbelt will be maintained in healthy & dense condition throughout its operation period after the proposed project. Company shall plant trees with density of about 1200 trees per hectare in the greenbelt area. Only indigenous species with fast growth will be selected or form the base of selection as Green Belt can come in view as fast as possible. Company shall plant local species of trees & shrub for greenbelt development. All necessary actions like fertilization, irrigation, pest control, pruning & trimming as well as re-plantation as required shall be taken timely to ensure dense healthy greenbelt all the time.

Socioeconomic welfare & CSR Activities

- Socio economy development activities will be a part of CSR activities to be carried by the unit. We proposed following activities as a part of socio-economic development to considering local social need.
- A budget of Rs. 8 Lacs (2 % of the total cost) have been provided for the next 5 years to carry out various CSR activities in nearby area of Sarigam GIDC Area as detailed in EIA report. Attached as Annexure of EIA Report.
- M/s. Heni Drugs Pvt. Ltd. will be counted various CSR Activities education development, health care, women empowerment and sustainable livelihood, infrastructure development and various social issues through its CSR programme in the region. Various CSR activities will carry out by Propjet proponent.
- Maximum employment preferably 80% employment shall be done from local area by giving priority to local people/contractors under direct or indirect employment programs/plan.

8. CONCLUSION

The study for the proposed project of M/s. Heni Drugs Pvt. Ltd. at Sarigam GIDC has revealed that the upcoming activities of synthetic organic chemical manufacturing will have some considerable impacts which would mainly occur only upon accidental spill/leak of chemicals/materials and catastrophic disasters. All other impacts of the project will remain far below acceptable limits after necessary mitigation as described & suggested in EIA report. The major impacts of catastrophic disaster will also be brought under acceptable limits by implementing the required hazard prevention & control measures as suggested in RA report. Thus it has been concluded that there would not be any major impacts on environment due to the proposed project except the impacts of emissions and major accident scenarios which may extend out of the plant area.

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED EXPANSION PROJECT BY ADDITION NEW PRODUCTS
FOR MANUFACTURING
Synthetic Organic Chemicals

M/s. Heni Drugs Pvt. Ltd.

Located at:

Plot No. 1901/1901 A, Phansa Char Rasta, GIDC, Sarigam,
Tal. Umargam, Dist.-Valsad, Gujarat-396155



EIA CONSULTANT ORGANIZATION

UNISTAR ENVIRONMENT AND RESEARCH LABS PVT. LTD., VAPI – GUJARAT

(NABET Accredited Consultant Organization, Sr. No. 122 in the List of ACO/ Rev. 43rd July 11, 2016)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

THE PROPOSED EXPANSION PROJECT

(BY ADDITION OF NEW PRODUCTS)

FOR MANUFACTURING OF

“ESTERS, ORGANIC INTERMEDIATES,

AROMATIC METAL COMPOUNDS, EXTRACTS AND OILS@415 MT/YEAR

Activity: 5(f) Category-B



M/s. Heni Drugs Pvt. Ltd.

Located at:

Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam,
Tal. Umargam, Dist.-Valsad, Gujarat-396155

EIA CONSULTANT ORGANIZATION

UNISTAR ENVIRONMENT AND RESEARCH LABS PVT. LTD., VAPI – GUJARAT
(NABET Accredited Consultant Organization, Sr. No. 122 in the List of ACO/ Rev. 43rd July 11, 2016)

Revision no.: 00

Issue date : 25/04/2015

Revision no.:01

Issue date : 22/07/2016

UNDERTAKING

(As per MoEF Office Memorandum No. 11013/41/2006-IA.II (I) dtd. 04-08-2009)

I, the undersigned Mr. Haresh P. Joshi as Managing Director of M/s. UniStar Environment and Research Labs Pvt. Ltd. located at White House, Near GIDC Office, Char Rasta, Vapi-396 195, Tal: Pardi, Dist.: Valsad, (Gujarat). Do hereby solemnly affirm and declare,

That M/s. Heni Drugs Pvt. Ltd unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155 obtained TORs to obtain Environmental Clearance under the EIA notification 2006 as amended timely for proposed expansion project for manufacturing Synthetic Organic Chemicals vide SEAC Vide letter Ref. No. EIA-10-2015-7132-E.7236 dated: 7th November, 2015.

As an EIA Consultant organization, we have carried out EIA Study in compliance with all the points in the awarded TORs prescribed for the proposed unit and the data submitted in the EIA report are factually correct.


Name of all the experts involved in the preparation of EIA study report and laboratory through which the sample have been got analyzed are stated in the EIA report.

Our laboratory through which the sample have been got analyzed is approved under the Environment (Protection) Act 1986.

We declare that the above information is true to the best of our knowledge and belief.

Date: 03-05-2016
Place: Vapi

For UniStar Environment and
Research Labs Pvt. Ltd.


Mr. Haresh P. Joshi
(Managing Director)



HENI DRUGS PVT. LTD.

SITE : PLOT NO.1901/1901A,Phansa Char Rasta,GIDC,Sarigam, (Gujarat), 396 155, INDIA.
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UNDERTAKING

(As per MoEF Office Memorandum No. 11013/41/2006-IA.II (I) dtd. 05-10-2011)

I, The undersigned Mr. Kapil Girotra, adult Indian resident of 1302 ,A wing, Maple leaf building, Raheja Vihar, Chandi velly, Pavai- Mumbai-400 072, am the Director of the company M/s. Heni Drugs Pvt. Ltd., located at 1901/1901A, Phansa Char Rasta, GIDC Sarigam,Tal.: Umergaon, Dist.: Valsad, (Gujarat). Do hereby solemnly affirm and declare,

That M/s. Heni Drugs Pvt. Ltd., unit located at 1901/1901A, Phansa Char Rasta, GIDC Sarigam,Tal.: Umergaon, Dist.: Valsad, (Gujarat) obtained TORs to obtain Environmental Clearance under the EIA notification 2006 as amended timely for proposed expansion project for manufacturing synthetic organic chemicals vide SEAC letter Ref. No. EIA-10-2015-7132-E.7236 dated: 7th November, 2015.

As a project proponent, I undertake that the present EIA Study Report of the proposed project for M/s. Heni Drugs Pvt. Ltd., unit located at 1901/1901A, Phansa Char Rasta, GIDC Sarigam,Tal.: Umergaon, Dist.: Valsad, (Gujarat) is entirely in compliance with the prescribed TORs.

And further, I endorse all the contents (data and information) of the EIA Report, as presented by EIA consultant (M/s. UniStar Environment and Research Labs Pvt. Ltd.), to be accurate, true and correct and I own the responsibility for the same.

Date: 21/04/2016
Place: Sarigam

For Heni Drugs Pvt. Ltd.


Mr. Kapil Girotra
(Director)

Declaration by Experts contributing to the EIA of M/s. Heni Drugs Pvt. Ltd., GIDC, Sarigam, Dist.-Valsad (Gujarat)

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator:

Name: Mr. Haresh P. Joshi

Signature & Date: 25/04/2016

Period of involvement: June -2015 to till obtaining clearance.

Contact information: M/s. Unistar Environment And Research Labs Pvt. Ltd.,

White House, Near GIDC Office, Char Rasta, Vapi (Gujarat)-396195.

Tel. No. : 0260-2433966, E-mail: haresh.joshi@uerl.in

Functional Area Experts:

Sr. No.	Functional Areas	Name of the expert/s	Involvement (Period & Task**)	Signature & Date
1	AP*	Mr. Haresh .P. Joshi	Nov.-2015 to Jan.-2016	H. Joshi
2	WP*	Mrs. Neelam J. Rohit Mrs. Kamini Prajapati*	Nov.-2015 to Jan.-2016	N.Rohit K.P. Prajapati
3	SHW*	Mr. Haresh .P. Joshi Mr. Manish Patel*	Nov.-2015 to Jan.-2016	H. Joshi M.L. Patel
4	SE*	Dr. Shital Tamakuwala Mr. Arik Vasava*	Nov.-2015 to Jan.-2016	A. Vasava S. Tamakuwala
5	EB*	Mr. Ranjan Maharaj	Nov.-2015 to Jan.-2016	R. Maharaj
6	HG*	Mrs. Neelam J. Rohit	Nov.-2015 to Jan.-2016	N.Rohit
7	GEO*	Mr. Mukesh Surolia	Nov.-2015 to Jan.-2016	M. Surolia
8	SC*	Mr. Ranjan Maharaj	Nov.-2015 to Jan.-2016	R. Maharaj
9	AQ*	Mr. Haresh .P. Joshi Mr. Manish Patel*	Nov.-2015 to Jan.-2016	H. Joshi M.L. Patel
10	NV*	Mr. Vipul Thanki	Nov.-2015 to Jan.-2016	V. Thanki
11	LU*	Mrs. Neelam J. Rohit	Nov.-2015 to Jan.-2016	N.Rohit
12	RH*	Mrs. Sejal Patel	Nov.-2015 to Jan.-2016	S. Patel

*One TM against each FAE may be shown,

** Please attach additional sheet (if required)

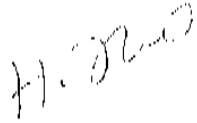
+ Functional area associate (FAA)

Contributed as “Team Member” in the project:

Sr. No.	Functional Areas	Name of the Team Member	Involvement (Period & Task**)
1.	AP	Mr. Manish Patel	Nov.-2015 to Jan.-2016
2.	WP	Mr. Bhavin Patel	Nov.-2015 to Jan.-2016
3.	SHW	Mr. Kamlesh Joshi	Nov.-2015 to Jan.-2016
4.	SE	Mrs. Manisha A. Vasava	Nov.-2015 to Jan.-2016
6.	V (of NV)	Mr. Vipul Thanki	Nov.-2015 to Jan.-2016
7.	RH	Mr. Manish Patel	Nov.-2015 to Jan.-2016

Declaration by the Head of the Accredited Consultant Organization:

I, Haresh P. Joshi, hereby, confirm that the above mentioned experts prepared the EIA of M/s. Heni Drugs Pvt. Ltd., GIDC Sarigam, Dist.-Valsad (Gujarat), I also confirm that the consultant organisation shall be fully accountable for any mis-leading information mentioned in this statement.



Signature:

Name: **Mr. Haresh P. Joshi**

Designation: **Managing Director**

Name of the EIA Consultant Organization: **Unistar Environment and Research Labs Pvt. Ltd.**

NABET Certificate No.: **NABET/EIA/RA021/092** & Issue Date: **14-10-2014**.

Involvement and task of the Functional Area Experts

S. No.	Functional Areas	Name of the experts / associates / team member	Task
1	AP	Mr. Haresh .P. Joshi Mr. Manish Patel*	<ul style="list-style-type: none"> Air pollution monitoring (Site visit & finalization of monitoring location). Meteorological parameter measurement. Qualitative analysis of air quality data. Identification & assessment of quantum of emission and its Mitigation measures. Preparing EMP for Air pollution control measures, cost estimation for control systems.
2	WP	Mrs. Neelam J. Rohit Mr. Bhavin Patel*	<ul style="list-style-type: none"> Water Quality monitoring network designing. Sampling of water samples (surface and ground water). Monitoring of water quality. Finalization of Qualitative analysis of wastewater generation. Finalization of Water Balance, budgeting and water conservation. Identification & assessment of quantum of water pollution and its Mitigation measures. Contribution to EIA documentation
		Mrs. Kamini Prajapati@	<ul style="list-style-type: none"> Quantification water and waste water generation, preparing water balance. Preparing Adequacy cum treatability report ETP Suggestion.
3	SHW	Mr. Haresh .P. Joshi Mr. Kamlesh Joshi*	<ul style="list-style-type: none"> Finalization of Identified hazardous and non-hazardous wastes Reuse and recycling of solid wastes. Handling and disposal of Non- Hazardous solid waste & Hazardous waste. Reviewing the mitigation measures for management of hazardous waste
		Mr. Manish Patel @	<ul style="list-style-type: none"> Identification of hazardous and non-hazardous wastes. Studying adequacy of mitigation measures for management of hazardous waste
4	SE	Dr. Shital Tamakuwala Mrs. Manisha A. Vasava*	<ul style="list-style-type: none"> Review the data of baseline socio economic survey(Interviews, Questionnaires, focused group discussion) Evaluation of Socio economic development status of the area.
		Mr. Arik Vasava@	<ul style="list-style-type: none"> Baseline socio economic survey(Interviews, Questionnaires, focused group discussion) Enterprise social commitment provisions. CSR Activity planning. Contribution to EIA documentation
5	EB	Mr. Ranjan Maharaj	<ul style="list-style-type: none"> Conducted Ecological survey & preparation of status report. Application of taxonomy in resource inventory (Flora & Fauna)

			<ul style="list-style-type: none"> List of species animals and plants report. Identification & assessment of ecological impact due to proposed project and its Mitigation measures.
6	HG	Mrs. Neelam J. Rohit	<ul style="list-style-type: none"> Hydrological studies & analysis preparation of drainage patterns of the study area. Analysis and description of aquifer characteristics. Preparation of water budget details. Rain water harvesting proposal to recharge bore-wells.
7	GEO	Mr. Mukesh Surolia	<ul style="list-style-type: none"> Geology & Geomorphologic analysis and preparation of maps.
8	SC	Mr. Ranjan Maharaj	<ul style="list-style-type: none"> Sampling analysis & characterization of soil quality. Soil pollution & contaminated soil probability and its mitigation measures.
9	AQ	Mr. Haresh .P. Joshi	<ul style="list-style-type: none"> Ambient Air Quality monitoring network designing. Reviewing the data of micrometeorological before using in model. Review the Air quality modelling results for proposed prediction of impact due to proposed installation of D.G. Sets.
		Mr. Manish Patel @	<ul style="list-style-type: none"> Processing of micrometeorological data for using in model. Air quality modelling through ISC- Aermol for proposed prediction of impact due to proposed installation of D.G. Sets. Contribution to EIA documentation
10	N	Mr. Vipul Thanki	<ul style="list-style-type: none"> Monitoring of noise levels of the project site and surrounding area. Assessment of noise level and vibration potential due to proposed project and its mitigation measures.
11	LU	Mrs. Neelam J. Rohit	<ul style="list-style-type: none"> Secondary data collection from Organisation (Govt & Private). Preparation of topographical maps (SRTM Data). Analysis of Data related to Land use pattern and Preparation of Land use map using GIS tools and its classifications. Verification of present status by visiting the site and surrounding area. Contribution to EIA documentation
12	RH	Mrs. Sejal Patel Mr. Manish Patel*	<ul style="list-style-type: none"> Identification of hazards due to proposed project. Identification of hazardous substances in the proposed project. Preparation of risk assessment report and onsite emergency plan.

@ : Involved as Functional Area Associate.

* : Contributed as Team Member under able guidance and are our experts.

S. No.	Functional Area Code	Complete name of the Functional Areas
1.	AP	Air Pollution Prevention, Monitoring & Control
2.	WP	Water Pollution Prevention, Control & Prediction of Impacts
3.	SHW	Solid Waste and Hazardous Waste Management
4.	SE	Socio-Economics
5.	EB	Ecology and Biodiversity
6.	HG	Hydrology, Ground Water & Water Conservation
7.	GEO	Geology
8.	SC	Soil Conservation
9.	AQ	Meteorology, Air Quality Modelling& Prediction
10.	NV	Noise/ Vibration
11.	LU	Land Use
12.	RH	Risk Assessment & Hazard Management

PREFACE

The trend of the industrial development in the India has shown the tremendous rise in its frequency and quantum. It has become the most essential phenomenon of the development of India. Because of the increasing industrialization many problems have shouted immediate attention towards the consequence of the problems. If attention to these problems is not given on priority basis, the future of our offspring will be horrible. To ensure better living on Earth, it has become essential to look deep in to the problems arising due to the industrialization & allied development. Each and every country facing the similar problem and hence it has become a Global issue. So, what is needed is, the clarity and presence of mind to be able to strike a proper balance between these developmental process and ecology; i.e. establishment or up-gradation of one should not lead to the degradation of other. To control the negative impact at the source is better, as Environmental problems have cumulative impact so, redemption at a later stage will lead to considerably high costs and irreversible damages. After all, there is only one world or mankind which if ruined poses a great threat to man's continuing existence.

Keeping in mind, MoEF, Delhi has published a notification vide SO 1533, dated 14th Sept 2006 regarding the necessity & applicability of Environmental Clearance for many industrial or developmental activity. This notification is intended to encourage productive and enjoyable harmony between man and his environment. The act has brought about a profound impact on actions affecting the environment by requiring environmental considerations to be included in decision making, process covering number of projects and activities. Specifically, MoEF requires each agency to prepare a detailed statement of Environmental impact before proceeding with any major action that may significantly affect the quality of the human Environment. Especially the project or activity covered under Schedule of the notification SO 1533 are required to prepare an EIA report to get Prior EC before implementation of the project activity.

M/s. Heni Drugs Pvt. Ltd. proposes expansion unit manufacturing of "Synthetic Organic Chemicals" – serving India's customers, as well as to international markets. M/s. Heni Drugs Pvt. Ltd. is well positioned to colour, beautify and positioned to benefit from robust consumer spending as well as the rapidly growing industrial sectors in India. M/s. Heni Drugs Pvt. Ltd is located in GIDC area of Sarigam of Valsad District.

The present study of Environmental Impact Assessment has been conducted for the purpose of obtaining EC for proposed expansion project of M/s. Heni Drugs Pvt. Ltd. and this report is being presented to depict the details of the environment, proposed expansion project and associated issues which are revealed during the study. Any error detected in the report is due to oversight and unintentional. All efforts will be made to cover-up the shortcomings and remove the errors from the report. In process of compiling this report, we were earnestly supported & helped by individuals of M/s. Heni Drugs Pvt. Ltd. & various departments of Government. We are grateful to all of them as well as our team members who have worked hard to successfully complete this EIA study.



Haresh P. Joshi

MD & EIA Coordinator

Unistar Environment & Research Labs Pvt. Ltd., Vapi

Date: 3/05/2016

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CHAPTER: 01

INTRODUCTION

1.1. GENERAL

1.1.1. About The Company

HENI ventured in the business of manufacturing more than 45 years back with its first company Heni Chemical Industries. Heni Drugs Pvt. Ltd. was established in 1995 to manufacture some speciality fine chemicals such as inorganic salts of bismuth with applications in pharmaceuticals as APIs and other industries including paints, ceramics, batteries, and cosmetics. Over the years, the company established itself as a reliable, quality conscious manufacturer of its products, especially Phenolphthalein of the laxative grade in the world markets. Exports were well established with clients in the USA, South America and Africa recognizing HENI as a brand name for the product. More products were added to the portfolio in time. Products offered include APIs i.e., laxatives, excipients, blood stains and pH indicators and specialty dyes.

Presently at the project site, company is engaged in production of “Synthetic Organic Chemicals (i.e. continuous distillation of crude ethyl Oleate and Inorganic Metal salt) @ 1200 MT/Year”.

The company now proposes to manufacture additional new products under the category “Synthetic Organic chemicals” (Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year). Business for the product has bright future and lucrative prospects in various region of India and abroad. The company has been promoted by five promoters and the company will start its operation of the proposed expansion project after obtaining the EC and other statutory clearances/ consents/ permissions.

1.1.2. About Proponent

The company is a registered Private Limited company and is promoted by Five Directors. Details related to them are given below:

Table 1.1: List of Promoters

Sr. No.	Name of Directors	Residential Address	Background
1.	Mr. Hemendra Kalidas Thakrar	26, Vikaram, Dreamland Society, Near Shastri Nagar, Mulund (W), Mumbai: 400082	Chemical Engineer
2.	Mr. Kapil Satyabhushan Girotra	1302 ,A wing, Maple leaf building, Raheja Vihar, Chandi velly, Powai- Mumbai-400 072	Chemical Engineer
3.	Nisha Thakrar	26, Vikaram, Dreamland Society, Near Shastri Nagar, Mulund (W), Mumbai: 400082	M.Sc. (Chemistry)

4.	DevikaThakrar	1302 A Wing, Maple Leaf Building, RahejaVihar, Chandiwili, Powai, Mumbai: 400072.	M.Tech(Biotechnology)
5.	Nicole Thakrar	26, Vikaram, Dreamland Society, Near ShastriNagar,Mulund (W), Mumbai: 400082	B. Com.

1.2. PROPOSED PROJECT**1.2.1. Nature & Type of Project**

M/s. Heni Drugs Pvt. Ltd. Proposes to expand their existing manufacturing unit at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155 by addition of new products Esters, Organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year which are Synthetic Organic Chemicals.

The existing unit performs Continuous distillation of crude ethyl Oleate and manufacturing of inorganic Metal salts @ 1200 MT/Year. For the proposed expansion project, the company intends to procure the available latest technology for manufacturing the proposed products.

As per the EIA notification- 2006 as amended the proposed expansion project involves the production of "Esters, Organic intermediates, Aromatic metal compounds, Extracts and Oils", which falls under item no. "5(f) – Synthetics organic Chemicals industries as per the EIA notification- 2006, hence required Prior Environmental Clearance.

1.2.2. Products & Capacity of Project

The unit proposed for expansion by manufacturing of the additional synthetic organic chemicals - @415 MT/Year, in addition to the existing capacity of 1200 MT/Year. These chemicals groups includes following products.

Existing Products:

- Continuous distillation of crude ethyl Oleate : 300 MT/Year ,
- Metal salt : 900 MT/Year

Proposed Additional Products:

- Esters : 250 MT/Year,
- Organic Intermediates:45 MT/Year,
- Aromatic Metal Compounds: 100 MT/Year
- Extracts and Oils: 20 MT/Year

1.2.3. Project Location

The proposed expansion project of M/s. Heni Drugs Pvt. Ltd. will be within the existing unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155. The Sarigam is situated in southern most part of Gujarat. The Arabian Sea is situated in west direction, which is about 8.51 Km W away from the GIDC industrial Estate. The nearest railway station – Bhilad is about 4 kms away from project site. The project site is well

connected with state & national Highway network and the nearest National Highway (NH8) is about 5.530 kms away from project site. The nearest interstate boundary (Dadra & Nagar Haveli- about 7KM & Daman- about 8KM) is situated at distance of about 7.0 Km. Nearest wildlife sanctuary (D & NH Wild Life Sanctuary) is situated at about 14 Km.

1.2.4. Regulatory Framework

The proposed project of M/s. Heni Drugs Pvt. Ltd. is of synthetic organic manufacturing unit with proposal of utilization of some chemicals having flammable & toxic hazards; hence the regulatory framework related with the hazardous or toxic chemicals as well as regulatory provision of risk, emergency & safety management are applicable to the proposed project. The regulatory provision related with hazardous material handling, manufacturing, storage & transportation are also applicable to the proposed project. The transportation is proposed through road network and so the applicability of road transport and other related regulations are required to confirm. The unit will have potential of pollution and also attracts the provisions of EIA notifications 2006- SO 1533 (as amended timely). Thus, the proposed project may be required to comply with many regulatory provisions. The proponent shall follow the regulatory framework as listed below and additional applicable provision shall also be referred timely as cited as mandatory provision for proposed project. In any case, proponent shall comply with the regulatory provision as directed through particular regulatory provision. The major regulatory provisions applicable to the proposed project area listed below.

- 1 Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and rules there under
- 2 Water (Prevention and Control of Pollution) Act, 1974 amended 1988 & rules there under
- 3 The Environment (Protection) Act, 1986, amended 1991 and rules there under
- 4 Hazardous Waste (Management and Handling) Rules, 1989 amended 2000 and 2003
- 5 Manufacture Storage and Import of Hazardous Chemicals Rules, 1989 amended 2000
- 6 Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- 7 EIA Notification, 2006 as amended timely (2009, 2011)
- 8 Public Liability Insurance Act, 1991 amended 1992 and rules there under
- 9 Factories Act, 1948 & rules there under (Gujarat Factories Rules, 1963)
- 10 The Static and Mobile Pressure Vessels (Unfired) Rules, 1981
- 11 The Motor Vehicle Act, 1988 & rules there under

The company has its existing unit under operation having valid CC&A for manufacturing of existing products. Company always ensures that the operation is done in compliance with the CC&A granted for existing unit. The compliance report for the existing unit is attached herein the report as Annexure-I. The proposed unit is being expansion unit will obtain NOC & CC&A for its proposed project after obtaining the EC. The company will always ensure that the proposed unit complies with all statutory requirements as timely issued in form of EC, NOC, CC&A, Other order & circular from the concern authorities. The CC&A & EC compliance report of the proposed unit will be submitted regularly as required by statutory provisions.

1.3. TERMS OF REFERENCE FOR EIA STUDY

In line with the sequential proceeding for Prior EC described in EIA Notification SO 1533 (as amended), proponent had applied in Form-I along with pre-feasibility report for approval of Terms of Reference for proposed project. The TOR application was made to the SEAC, Gujarat on 29th June 2015, since the proposed project is to be developed within the notified industrial estate of GIDC Sarigam, and has more than 5 km distance from the nearest interstate boundary (Dadra & Nagar Haveli- about 7KM & Daman- about 8KM). The unit is also far away from the nearest wildlife sanctuary (D&NH Wild Life Sanctuary about 14 km). The application & proposal had been considered by the committee in 254th SEAC, Gujarat meeting held on 9th Sept. 2015. On 7th Nov. 2015, approved TOR with additional information & conditions for terms of reference for EIA study for proposed project had been issued by SEAC vide letter no. EIA-10-2015-7132-E.7236. Committee had noticed that the proposed project is falling under category 5(f) –“B” as per the EIA Notification-2006 (as timely amended) and issued the above said letter for approved/awarded TORs. Committee has noted that public hearing / consultation is not required due to project being located in the notified industrial area/estate established before 2006. The SEAC had earmarked the area covering 5 km radial area from site for monitoring & sampling as well as for preparation of some maps for proposed EIA study. With respect to the awarded /Approved TOR, the present EIA study has been conducted for the proposed EIA study in area covering & 5 km radial distance from site. All points of TORs issued by EAC has been addressed in the study and covered in the present EIA report under respective heading. The details of Terms of Reference including the copy of letter for TOR issued by SEAC and the tabular compliance report for the issued TOR are presented in Annexure-II.

1.4. NEED & SCOPE OF EIA STUDY**1.4.1. Need Of EIA Study**

The proposed project is to be established for manufacturing synthetic organic chemicals; hence it is classified as category 5(f)-B in line with the applicability of these legal provisions of SO 1533(as timely amended). As per the provision of SO 1533 (as timely amended) EIA study is required for all category A and Category B1 project. Considering these, an application for approval of TOR for EIA for prior environmental clearance had been made in Form 1 to the SEAC, Gandhinagar, Gujarat for approval of draft TORs as well as to obtained the awarded TOR for preparation of an Environmental Impact Assessment (EIA) for project appraisal to obtain environmental clearance for proposed project depending upon the nature and location specificity of the project. The SEAC has cited many requirements for environmental studies and has issued the awarded TORs, which mentions that a detailed EIA study has to be conducted as per the applicability of SO 1533 (as timely amended). Hence, the present EIA study has been conducted as it is mandatory requirement as per applicability of EIA Notification SO 1533 (as timely amended).

1.4.2. Public Hearing

As per the applicability of provision for Public Hearing of SO 1533 and other order & recent O.M. No. J-11013/36/2014-IA-I dated 10th Dec. 2014 under the SO 1533, category ‘A’ and

category 'B1' projects or activities situated in notified industrial area/estate (established before 2006) are exempted from public consultation. Considering this, public hearing is not required to be conducted for the proposed unit of M/s. Heni Drugs Pvt. Ltd., GIDC Sarigam.

1.4.3. Scope & Objective of EIA Study

M/s. Heni Drugs Pvt. Ltd., Sarigam has appointed NABET Accredited EIA Consultant- M/s. Unistar Environment & Research Labs Pvt. Ltd, Vapi as Environmental Consultants to carry out the Rapid Environment Impact Assessment for the project of upcoming expansion project for manufacturing of synthetic organic chemical unit to be situated at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155.

The major objective of the present EIA study is to determine the change in impact due to the project proposed. The present report is outcome of EIA study conducted during November 2015 to January 2015 as per awarded TORs by SEAC, Gandhinagar, Gujarat. The area of study is a radial coverage of 5 Km around the proposed site. While deciding the scope of the EIA study, the awarded TOR as presented in Annexure-I has been referred to comply with all conditions provided therein for EIA study. The scope of this study is to receive approval of SEAC, Gandhinagar for Environmental Clearance. Besides, the report will have scope of utilization for approval from other government authorities like GPCB.

The objectives of the present EIA conducted for the development of a proposed project are to examine the following with respect to the TORs awarded by SEAC, Gandhinagar, Gujarat:

- Collection & study of details regarding the activities, operations, processes, utilities, machineries, equipment, and other materials & requisites related to construction and operation phase.
- Characterization and benchmarking of existing environmental status of a study area surrounding the project site.
- Carrying out Environmental monitoring and analysis for parameters like Air, Water, Marine, Noise, Soil and Biological Environment.
- Collection of meteorological parameters like humidity, wind speed, wind direction etc.
- Identification of the probable environmental impacts due to the construction and operation of the proposed project on the existing environmental parameters.
- Preparation of an environmental monitoring & management plan to minimize the adverse impacts due to the project(s) and formulation of a post – operational monitoring scheme.
- Preparation of a Risk Assessment report as well as disaster management plan to meet the safety and emergency requirements during probable hazards & disasters.

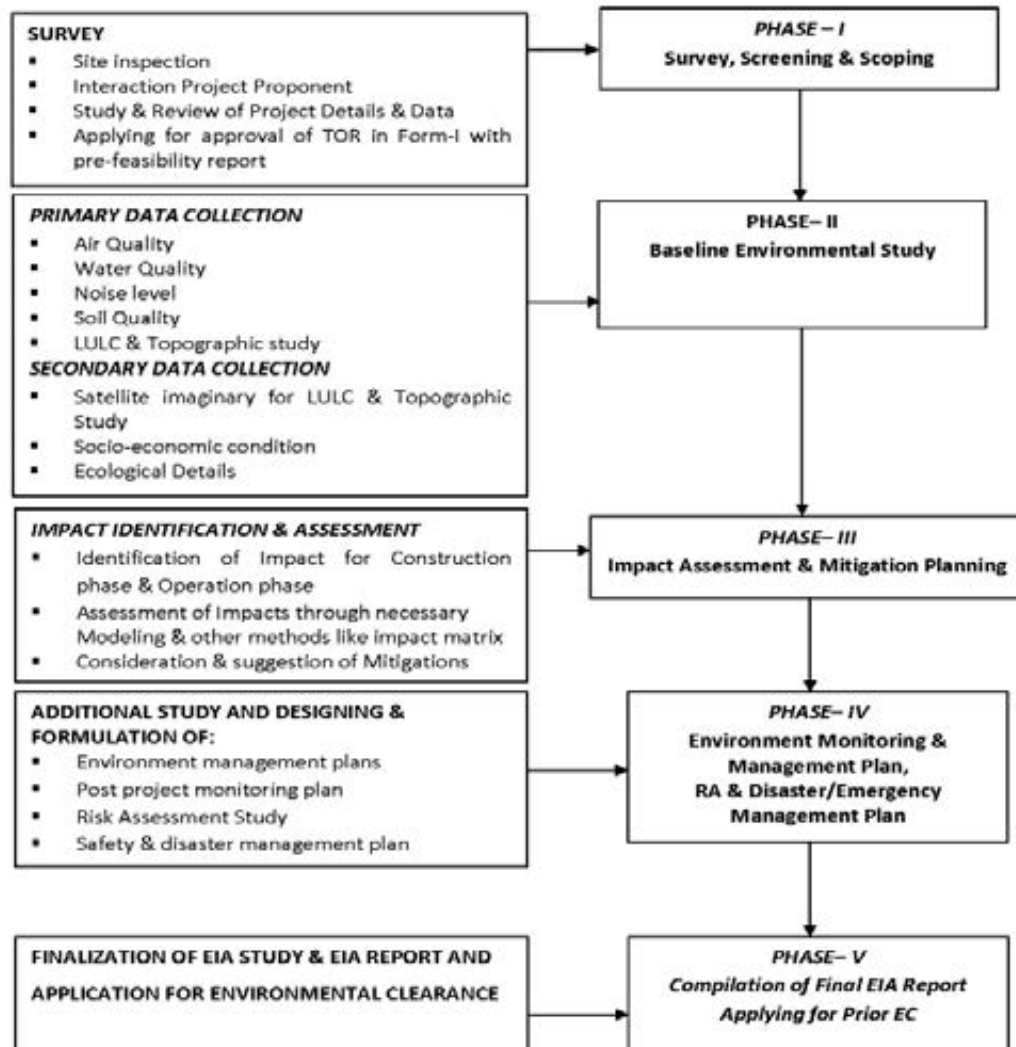
The main objectives of the present environmental impact assessment study are:

- To assess the prevailing environmental status of project area- 5 km radial area from proposed site situated in Notified Industrial Area –GIDC Estate of Sarigam, Gujarat
- To prepare necessary maps of project area- 5 km radial area from proposed site situated in Notified Industrial Area – GIDC Estate of Sarigam, Gujarat to comply with awarded TOR and to improve EIA quality.

- To identify potential sources of impacts of proposed unit, which includes impacts due to emission, water consumption & wastewater disposal, hazardous & solid waste generation & disposal, noise generation, contamination of environment by chemicals, toxic effects of raw materials & products, hazards & risk of various operations and employment & other social aspects of projects.
- To predict and evaluate the major impact on environment along with pollution control measures taken especially for emission as well as various probable hazards like fire, explosion & toxic dispersion.
- To ensure that there will not be considerable impacts on wild life sanctuary, forest & other sensitive area of situated in the surrounding area through preparing adequate EMP & EM plans
- To ensure that there will not be considerable impacts on air quality, water quality & quantity, human health and flora & fauna of the surrounding area through preparing adequate EMP & EM Plans
- To ensure that all necessary action plan are prepared for implementation to avoid any critical environmental & safety issue in the surrounding area due to proposed project operation
- To prepare an EIA Study report with efficient environment management plan.
- To utilize any content or whole report of present EIA study for applicable statutory clearances for proposed project and/or any other management purpose.

1.5. APPROACH & METHODOLOGY OF EIA STUDY

The EIA study for the proposed project has been conducted with respect to the process cycle of EIA as suggested by MoEF & CC vide SO 1533 as well as provided in TGM issued by MoEF & CC. The stages of approaches & methodology of EIA study has been presented in illustrative form in the figure 1.1 and detailed in subsequent paragraphs.

Figure 1.1: Approach & Methodology of EIA Study

The summarised details of the EIA cycle followed during the study for proposed project is described below as various phases:

- Screening
- Scoping and consideration of alternatives
- Baseline data collection
- Impact prediction
- Assessment of alternatives, delineation of mitigation measures and environmental impact statement
- Environment Management Plan
- EIA Review
- Application for EC

Screening

Screening is done to see whether a project requires environmental clearance as per the statutory notifications. Screening Criteria are based upon:

- Scales of investment;
- Type of development; and,
- Location of development.

A Project requires statutory environmental clearance only if the provisions of EIA notification and/or one or more statutory notification cover the proposed Project.

Scoping

Scoping is a process of detailing the terms of reference of EIA. It has to be done by the consultant in consultation with the project proponent and with reference to the guidance of MoEF & CC as well as if needed from Impact Assessment Agency.

The Ministry of Environment and Forests has published guidelines for different sectors, which outline the significant issues to be addressed in the EIA studies. Quantifiable impacts are to be assessed on the basis of magnitude, prevalence, frequency and duration and non-quantifiable impacts significance is commonly determined through the socio-economic criteria. After the areas, where the project could have significant impact, are identified, the baseline status of these should be monitored and then the likely changes in these on account of the construction and operation of the proposed project should be predicted.

Baseline Data

Baseline data describes the existing environmental status of the identified study area. The baseline study shall be carried out in the study area falling within 5km Radial distance from project site.

The following baseline data for the present EIA study should be collected:

✓ Meteorology & Ambient Air Quality

- Collection of hourly primary meteorological data of one season for study area by installing weather station
- Primary data collection for determination of prevailing ambient air quality in study area at Six locations (one in Downwind Direction)

✓ Water Resources Study

- Hydrogeological information of study area
- Availability of water resources
- Primary data collection for Water quality of Surface water sample from Three Locations
- Primary data collection for Water quality of Groundwater sample from Six Locations

✓ Land

- Geological information of study area
- Primary data collection for Soil quality of Six locations
- Primary data collection for Preparation of LULC Map of 5 km radial area from project Site

✓ Noise Level

- Primary data collection for Ambient noise level at Six locations (Day and Night Noise level)

✓ Ecology

- Identification of significant ecological site & habitat (including manmade & natural like

forest, farm, river, pond etc.)

- Identification & collection of data for Flora and Fauna of the study region

✓ **Socio-Economic**

- Secondary data Collection from Census data for villages falling in study area
- Secondary data Collection for available Public amenities and infrastructures in study area

Impact Prediction

Impact prediction is a way of 'mapping' the environmental consequences of the significant aspects of the project and its alternatives. Environmental impact can never be predicted with absolute certainty and this is all the more reason to consider all possible factors and take all possible precautions for reducing the degree of uncertainty.

The following impacts of the project should be assessed:

✓ **Air**

- Changes in ambient levels and ground level concentrations due to total emissions from point, line and area sources
- Effects on soils, materials, vegetation, and human health

✓ **Noise**

- Changes in ambient levels due to noise generated from equipment and movement of vehicles
- Effect on fauna and human health

✓ **Water**

- Availability to competing users
- Changes in quality
- Sediment transport
- Ingress of saline water

✓ **Land**

- Changes in land use and drainage pattern
- Changes in land quality including effects of waste disposal
- Changes in shoreline/riverbank and their stability

✓ **Ecology**

- Deforestation/tree-cutting and shrinkage of animal habitat.
- Impact on fauna and flora (including aquatic species if any) due to contaminants/pollutants
- Impact on rare and endangered species, endemic species, and migratory path/route of animals.
- Impact on breeding and nesting grounds

✓ **Socio-Economic**

- Impact on the local community including demographic changes.
- Impact on economic status
- Impact on human health.
- Impact of increased traffic

Environment Monitoring and Management Plan

Efficient mitigation plan should be drawn up for the selected option and is supplemented with an Environmental Management Plan (EMP) to guide the proponent towards environmental improvements. The EMP is a crucial input to monitoring the clearance conditions and therefore details of monitoring should be included in the EMP.

- Delineation of mitigation measures including prevention and control for each environmental component.
- Delineation of monitoring scheme for compliance of conditions
- Delineation of implementation plan including scheduling and resource allocation.

An EIA report should provide clear information to the decision-maker on the different environmental scenarios without the project, with the project and with project alternatives. Uncertainties should be clearly reflected in the EIA report.

Review of Draft EIA Report, Preparation of Final EIA Report & Application for EC

The draft EIA report prepared for proposed project should be reviewed at different level (From Coordinator to Technical Experts/FAEs) and then necessary changes and modification shall be made for imperative version of EIA Report for submission/ further application. During this stage, all necessary details to address the queries or suggestion raised in reviewing process. After carefully reviewing the all details and issues cited by experts, final EIA report shall be prepared & submitted along with the application for EC for Environmental Clearance of the proposed project.

1.6. STRUCTURE OF EIA REPORT

The report has been suitably structured covering various aspects like project description, baseline conditions, environmental impacts, mitigation measures, environmental management plan. The EIA report has been prepared chapter wise in accordance with generic structure suggested by MoEF& CC in EIA notification. The report of the EIA study for the proposed projects has been prepared in the following structure.

Chapter 1 Introduction: This chapter includes details like Identification of project & project proponent, Brief description of nature, size, location of the project and its importance, Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)

Chapter 2 Project description: Description of the project (based on project feasibility study), Details are provided to give clear picture of the following:

- Type & Need of project and Size or magnitude of operation
- Maps showing Project Location, plant layout & study area.
- Technology and process description
- Description of facilities, infrastructure, resource requirement, pollution potentials & mitigation measures implemented for control of pollution

Chapter 3 Description of the Environment: This chapter includes the baseline environmental information of the project area and related details as mentioned below.

- Study area & period, components & methodology of study
- Establishment of baseline for valued environmental parameters, as identified in scope
- Base maps of necessary environmental Components/Features

Chapter 4 Anticipated Environmental Impacts & Mitigation Measures: This chapter comprises Details of Investigated Environmental impacts due to project establishment, possible accidents, project design, regular operations, final commissioning of project. The details covered in chapter are tabulated below.

- Assessment of significance of impacts (Criteria for determining significance, Assigning significance)
- Measures for minimizing and / or offsetting adverse impacts identified.

Chapter 5 Analysis of Alternative (Technology & Site): Detailed description of alternative analysis for selection of site & technology for proposed project (as required).

Chapter 6 Environmental Monitoring Program: Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)

Chapter 7 Additional Studies: Risk Assessment & Disaster Management Plan

Chapter 8 Project Benefits: Improvements in the physical & social infrastructure, Employment & Other tangible benefits.

Chapter 9 Environmental Cost Benefit Analysis: A systematic process for calculating and comparing **benefits** and **costs** of a project. Broadly, CBA has two purposes: To determine if it is a sound investment/decision (justification/feasibility), and to provide a basis for comparing projects. (If recommended at the scoping stage).

Chapter 10 Environmental Management Plan: Description of the administrative & managerial aspects of ensuring that mitigation measures are implemented and their effectiveness monitored, after approval of the EC, NOC and CC&A

Chapter 11 Summary & Conclusion: Overall justification for implementation of the project, Explanation of how, adverse effects have been mitigated

Chapter 12 Disclosure of Consultants Engaged: The introduction & description of the consultants engaged and nature of consultancy rendered.

CHAPTER: 02

DESCRIPTION OF PROJECT

2.1. HIGHLIGHT OF THE PROJECT

M/s. Heni Drugs Pvt. Ltd is an existing Company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal.- Umargam, Dist.-Valsad, Gujarat-396155 operating for Continuous distillation of crude Ethyl Oleate and production of inorganic Metal salts) @ 1200 MT/Year". M/s. Heni Drugs Pvt. Ltd. has obtained NOC and CC&A (CC&A no. AWH-65133 dated 22-09-2014 valid up to 10-06-2019) of existing manufacturing unit.

Now M/s. Heni Drugs Pvt. Ltd. proposes the expansion of their production by addition of new products of "**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year**".

For the proposed expansion project, the company intends to procure the available latest technology for manufacturing the proposed products.

As per the EIA notification- 2006, as amended, the proposed expansion project involving the production of "**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils**", falls under item no. "5(f) – Synthetics organic Chemicals industries, hence required Prior Environmental Clearance.

The details of the proposed project are summarized as highlight of the project in the following table.

Table 2.1: Highlight of Project

Sr. No.	Particulates	Details
1.	Project Magnitude & Location (Correspondence address)	Small Scale unit. M/s. Heni Drugs Pvt. Ltd. Plot No. - 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155.
2.	Geographic Position of Project site (Coordinates)	Lat.: 20.303067°N, Long.:72.851107°E
3.	Registered Address	Vikram 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai-400082
4.	(a) Name of Applicant- (b) Address: (i) Postal (ii) E-mail (c) Phone (i) Land line (ii) Mobile (iii) Fax:	M/s. Heni Drugs Pvt. Ltd. As Above (Item No. 1) Kapil.girotra@henichemicals.com +91-22-25836009 +919987053503 +91-22-25820719
5.	Year of Commissioning	The existing unit is under operation since 2014. The proposed expansion unit will be commissioned after

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		obtaining EC, NOC and CC&A.
6.	Nature of project	Expansion project for manufacturing of additional products (Synthetic Organic Chemicals) within the existing premises.
7.	Land Type of Project Site	Industrial plot is situated within the Notified Industrial estate, GIDCSarigam.
8.	Is land procured or to be procured for new project or for expansion?	The land is already acquired for the existing unit. The existing industrial plot is adequate for the proposed expansion. Hence, no procurement of additional land is required.
9.	Screening category (as per SO 1533 as timely amended)	5(f) – “Synthetics Organic Chemicals” Category: “B”
10.	Total area	6700.00 m ²
11.	Land for Green belt	2000.00
12.	Cost of project	420.00 Lakhs
13.	Capital and recurring Cost earmarked for EMP:	Capital Cost: 25.00 Lacks (after proposed expansion) Recurring Cost: 11.35 Lacks/annum
14.	Water requirement & waste water generation with mode of disposal	Total Water Consumption: 33.00 KL/day (Domestic - 4 KL/Day, Industrial- 27 KL/Day, and Gardening- 2 KL/Day). Water will be sourced from GIDC water supply. Domestic waste water –3.50 KLD which will be disposed off through adequate soak pit and septic tank, and The non-metallic industrial waste water streams @4.45 KL/day, will be treated in adequate proposed ETP and then will be discharged through underground drainage to CETP-Sarigam. The metallic industrial waste water streams (II & V) @2.75 KL/day, after metal removal treatment will be sent to evaporator.
15.	Power requirement and source	Existing- 99 kVA Proposed- 160 kVA The power will be sourced from GEB, Gujarat.
16.	Utilities (D.G. Sets, Boilers, Thermopack etc.)	Thermo pack (Existing): 1 lakh kcal/hr thermal Steam Boiler (Proposed) : 1 T/Hr steam (2 Nos. each) D.G. Set (Proposed)- Capacity: 160 KVA
17.	Fuel Requirements	Natural Gas :Capacity: 30 Nm ³ /hr at 8500 kcal/Nm ³ HSD:30 Lit/Hr
18.	Emissions	PM <150 mg/Nm ³ , SO ₂ < 100 ppm, NO _x < 50 ppm Existing: Stack-I: Thermo Pack (Ht.-30 m , Dia.- 3 m) Proposed: Stack-II: DG Set (Ht.-9 m , Dia.- 03 m)

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		Stack-III: Steam Boilers - 2 Nos. (Ht.-30 m , Dia.- 3 m)
19.	Air pollution Control Measures	Not applicable.
20.	Solid / Hazardous waste Generation	Will be managed as per Hazardous Waste (Management, Handling And Trans boundary Movement) Rules-2008.

2.1.1. EXISTING & PROPOSED PRODUCTS

As mentioned in earlier chapter M/s. Heni Drugs Pvt. Ltd .is under operation for manufacturing of **Continuous distillation of crude ethyl Oleate and inorganic Metal salt** by mixing and blending with valid CC&A. The consented products along with production capacity of existing unit as well as the proposed additional products (**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils**) with capacity are presented below in tabular form.

Table 2.2: List of Products with Capacity

Sr. No.	Products Name	Existing Production Capacity (MT/Year)	Proposed Production Capacity (MT/Year)	Total Production Capacity (MT/Year)
1	Continuous distillation of crude EthylOleate	300.00	00.00	300.00
2	Metal salt of copper, cobalt, Nickel, Bismuth, Mercury and Aluminum Magnesium Mix Hydrotalcite salt	900.00	00.00	900.00
3	Esters (Ethyl Oleate / Ethyl Lactate., Benzyl Cinnamte / Salicylate , Geranyl Acetate / Formate, Phenoxy Ethyl Isobutyrate / Isovalerate, Vetiveryl Acetate, Ethy hexyl oleate, Cholesterol oleate Benzyl benzoate, Glycidyl Ester (E10), Dibasic esters)	00.00	250.00	250.00
4	Organics Intermediates ((3H)-Isobenzofuranone,3,3-bis(4-hydroxyphenyl) (IBFH), Tetra bromo -(3H)-Isobenzofuranone,3,3-bis (4hydroxyphenyl), N,N dimethyl amino acrylate(1,3-epoxy-2-propanone)	00.00	45.00	45.00
5	Aromatic Metal Compounds a. Phenyl mercuric acetate b. Phenyl mercuric nitrate c. Phenyl mercuric oleate d. Phenyl mercury dodecenyl succinate	00.00	100.00	100.00
6	Extracts and Oils (Cardamom Oli, Spearmint Oil, Eucalyptus Oil Mentha Oil, Citronella Oil, Geranium Oil Pink Pepper Oil, Vetiveryl Oil, Rose Crystals)	00.00	20.00	20.00
Total		1200.00	415.00	1615.00

2.1.2. JUSTIFICATION OF PROJECT

The proposed additional products have very high demand for manufacturing of for manufacturing of Lubricant, Aroma, and Cosmetics Industries. Proposed product's manufacturing in the country will be very much economical compare to imports of the same and also its export will earn extra revenue for our county. There is a huge demand of the proposed products in the export market as well as local market.

Keeping these in mind, company has identified the demand for the proposed products and with continuous R&D Company found that it can be developed and produce commercially for domestic market as well as for export markets. The proposed project will provide a potential growth opportunity for the company. Export of these products may also increase the foreign revenue.

There will be very good opportunity of employment generation directly and indirectly due to proposed new project.

2.1.3. PROJECT SITE

As described in earlier sections, the proposed expansion project of M/s. Heni Drugs Pvt. Ltd. will be within its existing unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155. The GIDC Industrial estate has all required infrastructure like electricity, roads, transportation etc. Also it is to be noted that the nearby area of the GIDC estate has considerable human resource which is required to be employed for social upliftment of the area. The estate is in Umargaon Taluka in Valsad District of Gujarat State, India. The study area as per the TOR awarded is 5 Km radial area from the proposed project.

The project area is situated in the southern part of Gujarat State and shares some area of UT of Daman and UT of Dadra & Nagar Haveli. The area has global identity for its industrial development since many decades especially in Vapi GIDC, adjoining UTs and Sarigam GIDC. The area has contributed significantly in the development of our Nation's economy through the excellent industrial growth. The area has considerably developed in last few decades by sharing vital input through industrial development and implementation of government actions/plan of development. The area has been selected as the production hub by many large banner industries of chemicals, pharmaceutical, pesticides, and textile & plastic sectors.

The Damanganga River flows west into the Arabian Sea. The river flows through Maharashtra and Gujarat states, as well as the Union territories of Daman and Diu and Dadra and Nagar Haveli. The industrial towns of Vapi, Dadra and Silvassa lie on the north bank of the river, and the town of Daman occupies both banks of the river's estuary.

The map of project area showing the project site and surrounding area as well as various infrastructures is presented below.

Fig.2.1 Location Map in 5 Km radius

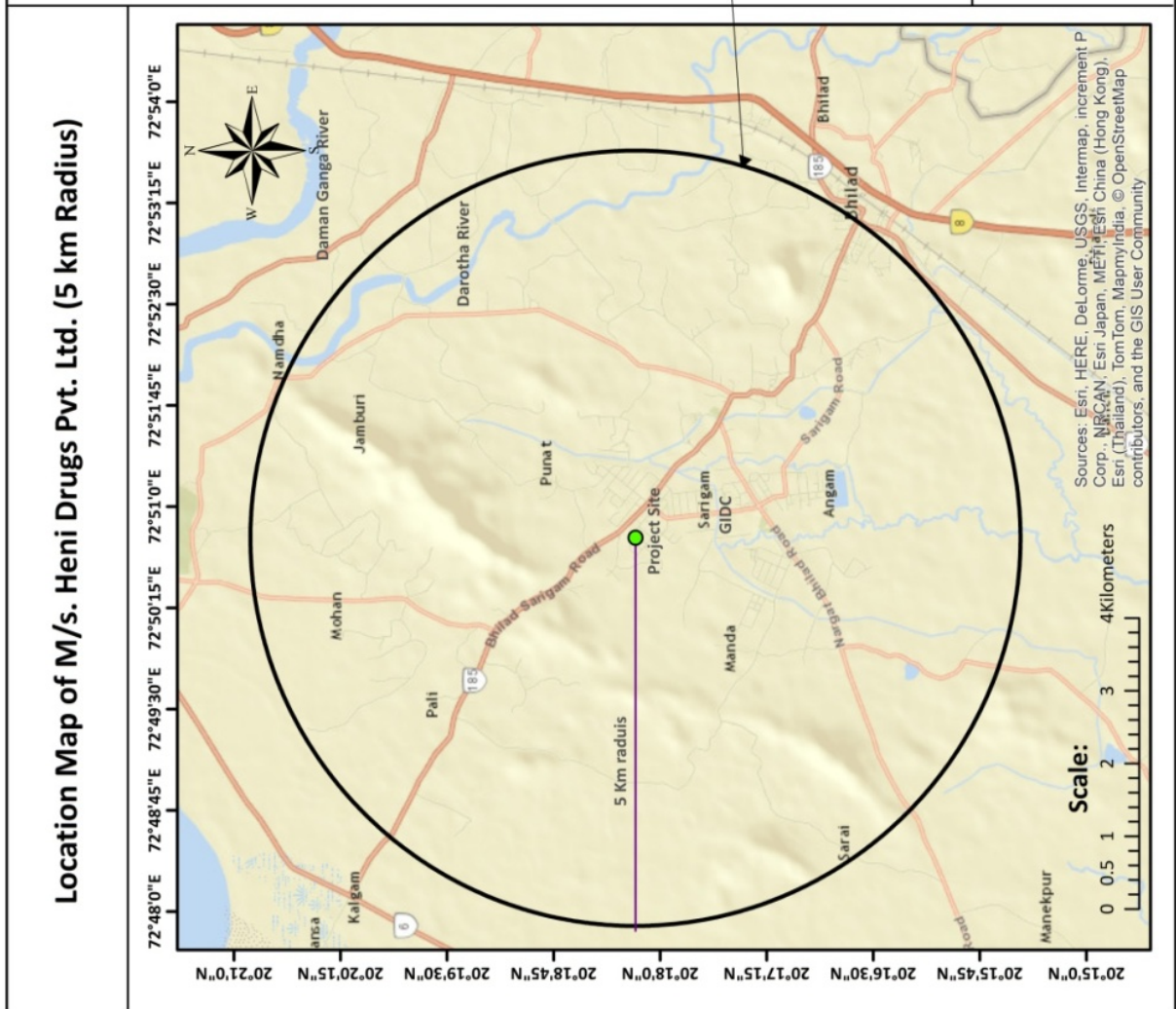
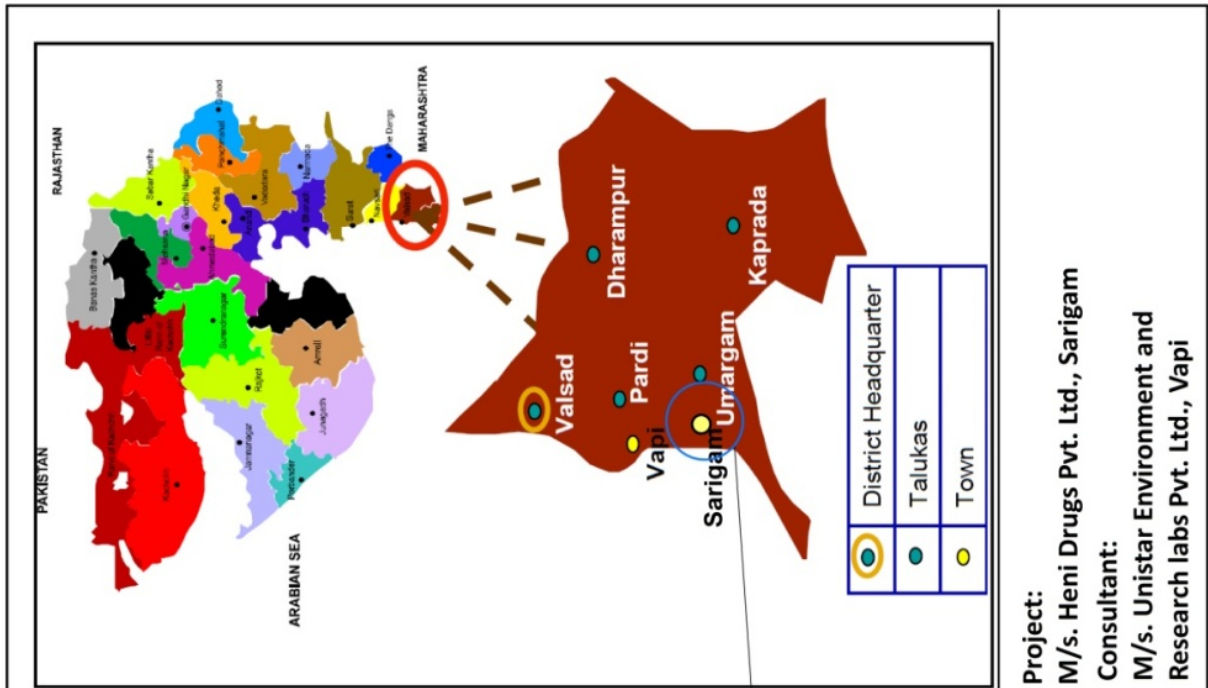
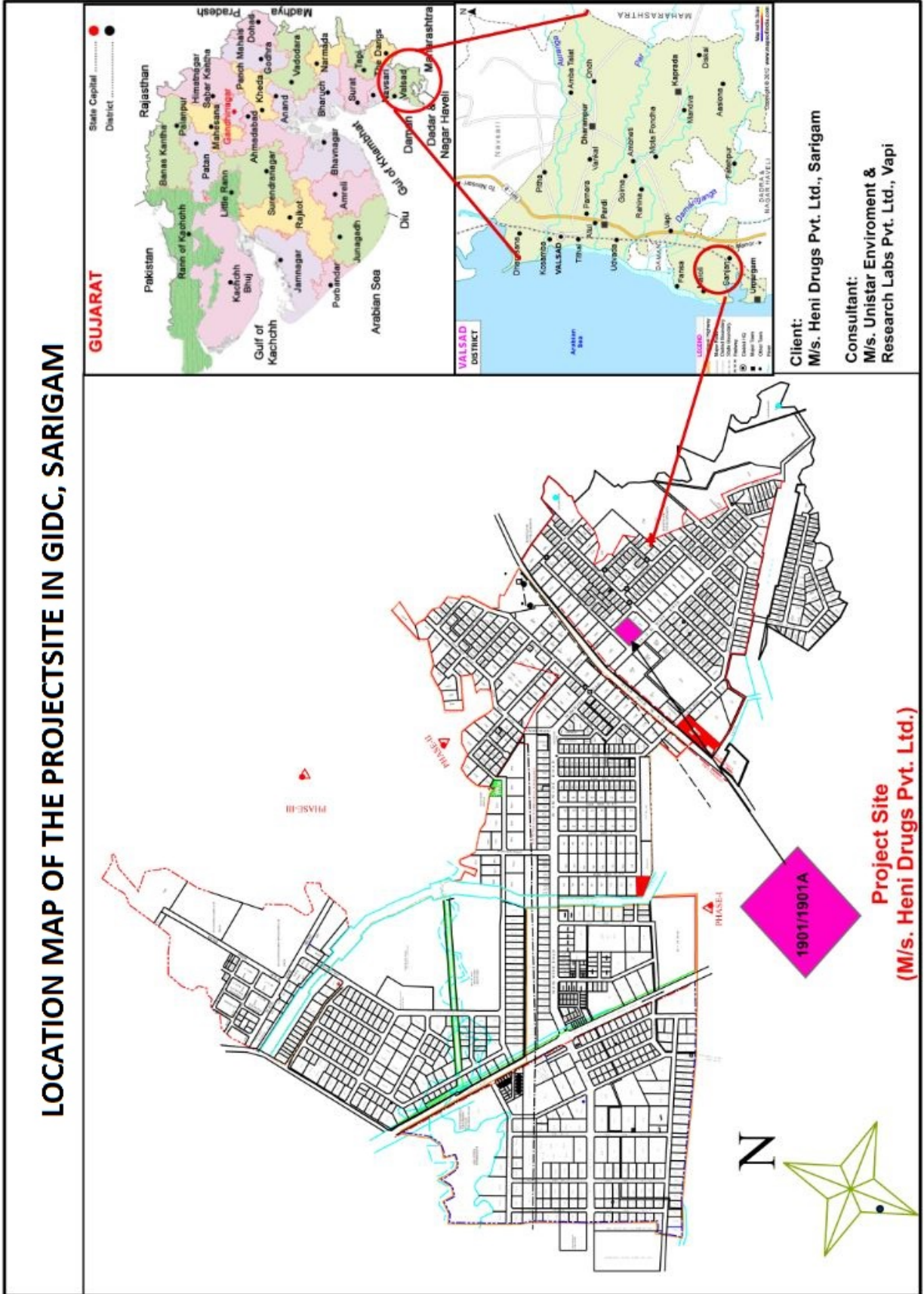


Fig.2.2 Map of Project Site

LOCATION MAP OF THE PROJECTSITE IN GIDC, SARIGAM



2.2. RESOURCE REQUIREMENT

The proposed project is an expansion of its existing manufacturing unit by addition of new products. Hence, many types of resources will be required for setting up the proposed project. The proposed expansion project is to be developed within the existing unit situated in the notified industrial estate hence no additional land is required. The site is already developed with some necessary civil structures & shed as company has acquired the plot from GIDC authority, which was under possession of other industrial unit. Therefore, the proposed unit requires finalizing the incomplete civil structures & shed along with some additional buildings and sheds. Thus considerable resources will be required for development & setting up of the proposed project. The details of the resource requirements of proposed project are presented below in subsequent paragraphs under respective headings.

2.2.1. LAND & BUILDINGS

The proposed project is to be developed within the existing unit located in a plot situated in notified industrial estate of GIDC Sarigam. The plot is already acquired from the GIDC authorities for industrial operation which is admeasuring 6700.00 Sq. m. This land is sufficient for proposed project. In 2000.00 Sq. m. area greenbelt will be developed and 1700Sq. m. area will be kept open. For the buildings & sheds etc. 3000.00 Sq.m. area of the plot will be utilized. The details of the area statement for proposed unit are presented below.

Table 2.3 Plot site Area Statement:

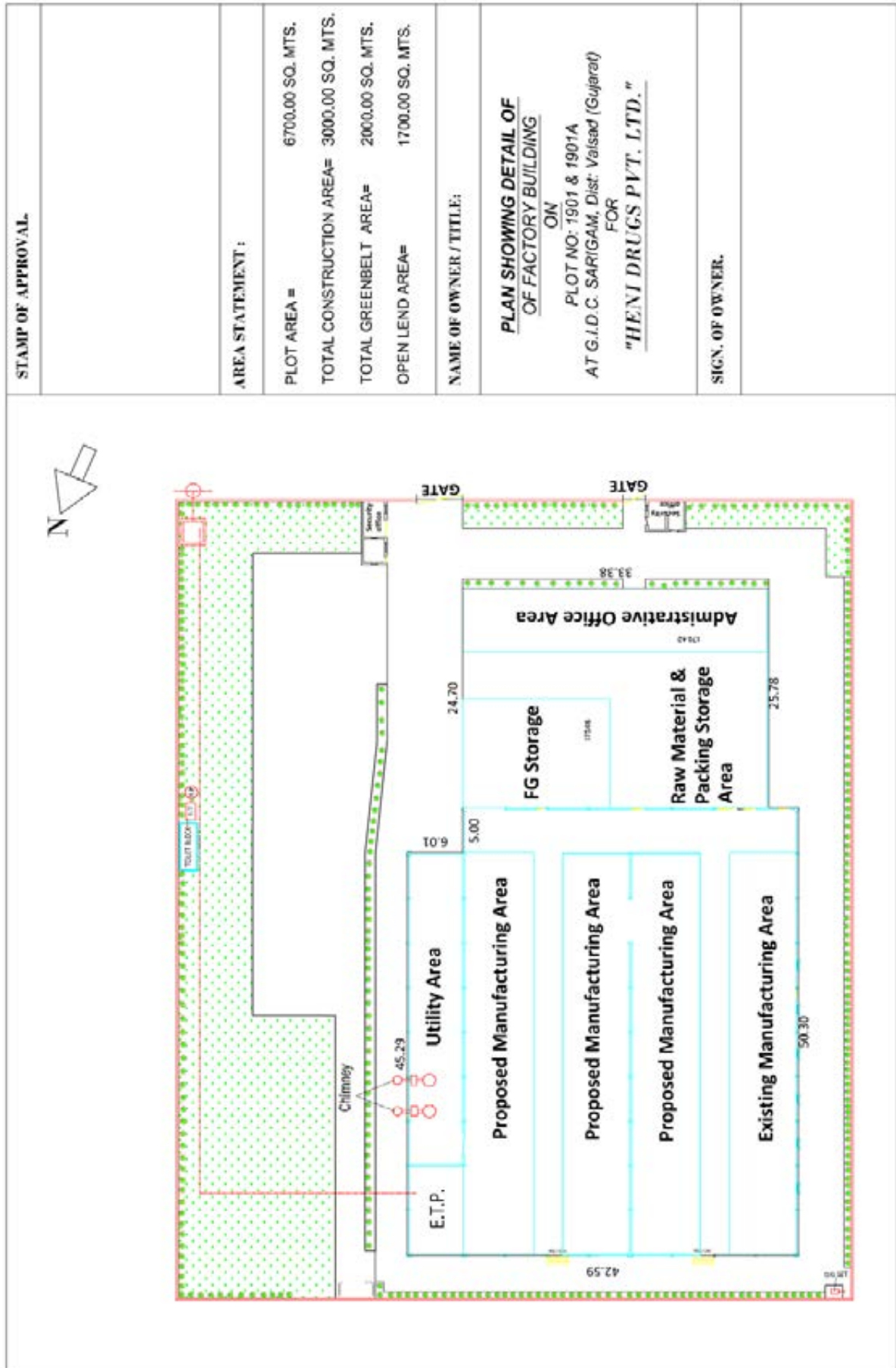
Area Statement	Existing (in m²)	Proposed (in m²)	Area After Proposed Expansion(in m²)
Total Area	6700.00	--	6700.00
Construction Area Factory Shed	2600.00	400.00	3000.00
Open Land Area	2100.00	-400.00	1700.00
Greenbelt Area	2000.00	--	2000.00

Note: The proposed expansion will be within the existing building.

The layout of project premises /site showing existing & proposed buildings & infrastructures including raw materials storage area, production area, utility area, office area, greenbelt area, internal roads and parking area etc. is shown in subsequent figure of plant layout.

The location of site in GIDC industrial estate is presented in subsequent figure of site plant.

Fig. 2.3 Plant Layout



2.2.2. WATER

The existing unit requires 7.00 KLD freshwater which will be met through Water supply pipeline of GIDC Sarigam. The industrial operation of the existing unit uses only 4.00 KLD which will be increased to 27.00 KLD and 2.00 KL/day for Domestic use. After proposed expansion the fresh water requirement will be 33.00 KLD which includes 2.00 KLD for irrigation of greenbelt, 27.00 KLD for industrial operations and 4.00 KLD for domestic uses. The increased water requirement will also be sourced from GIDC water supply Sarigam. The details with necessary break-up for water requirement of proposed unit are presented in subsequent table.

Table 2.4 Water Requirement

Sr. No.	Particulars	Existing Quantity (KL per day)	Proposed Quantity (KL per day)	Total Quantity (KL per day)
1	Domestic	02.00	02.00	04.00
2	Industrial			
	Process & Washing	01.00	06.00	07.00
	Boiler	01.00	09.00	10.00
	Cooling	02.00	08.00	10.00
	Sub Total Industrial	04.00	23.00	27.00
3	Gardening	01.00	01.00	02.00
	Total	07.00	26.00	33.00

Source: Fresh water requirement will be catered from GIDC water supply dept.

2.2.3. ENERGY, FUEL & POWER

For the production of existing product the heat requirement was met by Thermopack (capacity 1 lac.kcal/hr).The production of proposed products requires steam. To meet the steam requirement of the proposed project two NG based Steam Boiler (capacity 1tones/hr x 2) will be installed. NG will be sourced from GSPC Pipeline. Power requirement of the existing unit is around 99 KVA and for the proposed unit 160 KVA is estimated, which will be met from DGVCL. The unit will be proposed to installed one DG set (160 KVA) which will be used only during emergency & failure of power supply by DGVCL. Diesel/HSD will be used as fuel for proposed DG Set. The details of Fuel & Power requirement is presented in tabular form in subsequent table.

Table 2.5 Energy, Fuel & Power Requirement

Components	Existing	Proposed	Sources
Power	99 kVA	160 kVA	Power –Electricity requirement
Heat Requirement	1 Lakh kcal/hr	--	Will be sourced from Thermopack (Capacity 1 Lakh kcal/hr)
Steam Requirement	--	2 tones/hr	Will be sourced from Steam Boiler (capacity 1 ton/hrx2 Nos)
Power during power failure	--	160 KVA	Will be sourced from D.G. Set (Capacity 160 KVA)
Natural Gas	30 Nm3/hr	30 Nm3/hr	GSPC NG Pipeline
HSD	--	30 L/Hr	Local Petroleum Dealer

2.2.4. PLANT & MACHINERY

The company will setup its manufacturing unit having following main machineries & equipment. The details of the proposed machineries & equipment are presented below in tabular form.

Table 2.6 Major Machineries & Equipment

SR.NO.	EQUIPMENT	PROP EQP NO.	VOLUME	MOC
Existing				
1.	REACTOR	RX-201	1000 LTRS	SS 316
2.	SCRUBBER (Pump + Fan)	SC-C01		PP-FRP
3.	REACTOR	RX-202	1000 LTRS	GLR
4.	PAN REACTOR	RX-203	100 LTRS	SS 316
5.	PAN REACTOR	RX-204	100 LTRS	SS 316
6.	PAN REACTOR	RX-205	100 LTRS	SS316
7.	CENTRIFUGE	CF-201	36 INCHS	SS 316
	CENTRIFUGE	CF-202		
8.	DRYER	D-201	Electric Tray	SS 316
9.	DRYER	D-202	Electric Tray	Plastic
10.	REACTOR Heater	RX-206	50 LTR	Glass
11.	REACTOR Heater	RX-207	50 LTR	Glass
12.	REACTOR Heater	RX-208	50 LTR	Glass
13.	REACTOR Heater	RX-209	50 LTR	Glass
14.	REACTOR Heater	RX-210	50 LTR	Glass
15.	REACTOR Heater	RX-211	50 LTR	Glass
16.	PULVERIZER	PU-201	300 kg/hr	SS 316
17.	Blender	BL-201	1 MT	SS316
18.	REACTOR	RX-101	1000 LTR	MS
19.	REACTOR	RX-103	1400 LTR	GLR

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20.	REACTOR	RX-104	5000 LTR	SS 316
21.	CONDENSOR	CN-101	12 sq.m	SS316
22.	CONDENSOR	CN-102	15 sq.m	SS 316
23.	Vessel	V-??	1500 LTR	GLR
24.	ETP	--	10 KLD	-
25.	Cooling Tower with Fan	CT-U01	-	-
26.	Thermo Pack	TP-U01	1 lac K.cal/hr	-
27.	Air Compressor	AC-U01	10 HP	-
28.	DM Water Plant	DM-U01	3KL/hr	-
29.	Water Softner	WS-U01	1.2 KL/hr	-
30.	Distillation Tower	D101	-	-
31.	Vacuum Pump	VP-U01	-	-
32.	Vacuum Pump	VP-U02	-	-
33.	Underground Water Pump		-	
34.	Precipitation Vessel 1	V-201	500 L	HDPE
35.	Precipitation Vessel 2	V-202	500L	HDPE
36.	Liquid Ring Pump	VP-201	-	-
37.	Venturi Vacuum Pump	VP-101	-	HDPE
38.	Filter	F-101A	-	-
Proposed				
1.	REACTOR	RX-102	1000 LTR	MS
2.	REACTOR + Condenser	RX-106	5000 LTR	SS316
3.	REACTOR + Condenser	RX-105	2000 LTR	GLR
4.	ANFD	ANFD-101	2KL	SS316
5.	VESSEL /ANFD	ANFD-102	5KL	SS316
6.	VESSEL	-	1000 L	SS316
7.	VESSEL	V-102	1000 LTr	FRP
8.	CENTRIFUGE/ANFD	ANFD-103	36 INCHS	SS 316
9.	ANF-D/Sparkler	part of ANFD-104	1500 LTR	SS316
10.	CENTRIFUGE/ANFD	ANFD-104	2000 LTR	SS316
11.	Tray- DRYER	-	-	SS 316
12.	DRYER (FBD)	-	-	SS316
13.	PULVERIZER	PU-101	300 Kg/hr	SS 316
14.	BLENDER	B-101	1000 Kg	SS316
15.	BLENDER	B-102	1000 Kg	SS316
16.	Steam Boiler- 2 nos.	SB-U01 & SB-U02	1 Ton each	-
17.	Filter	F-101B	-	-
18.	Filter	F-102	-	-
19.	DG Set	-	160 KVA	-

2.2.5. HUMAN RESOURCE

The company will provide employment to 45 people in different categories for operation of proposed project. The details of the proposed employment structure are presented below in tabular form.

Table 2.7 Human Resource Requirement

Sr. No.	Particular	Employment Nos.
1	Managerial	05
2	Skilled	10
3	Semi-Skilled	10
4	Unskilled	20
	TOTAL	45

2.2.6. CAPITAL

The capital of proposed project has been estimated & budgeted with costs of Rs. 1015.00 lakhs after proposed expansion. The proposed capital includes Rs. 10.00 Lakhs for environmental protection measures. The details of proposed capital costs estimation including land, buildings, plant machineries & equipment, environmental protection measures etc. is presented below in tabulated form.

Table 2.8 Capital Cost

Sr. No.	Purpose	Existing Cost (Rs. In Lakhs)	Proposed Cost (Rs. In Lakhs)	Total Cost (Rs. In Lakhs)
1.	Land	200.00	00.00	200.00
2.	Building and Civil Works	300.00	50.00	350.00
3.	Plant, Machinery and other fittings	100.00	350.00	450.00
4.	Environmental protection measures	5.00	20.00	25.00
	TOTAL :	605.00	420.00	1025.00

2.3. DESCRIPTION OF PROCESS & ALLIED DETAILS

The details of Raw Materials & production process of all products are described in subsequent paragraphs under respective headings.

2.3.1. RAW MATERIALS

All raw materials required for manufacturing of proposed products are easily available indigenously in local market, which will be transported through road. The details of product wise raw material requirement are presented below.

Table 2.9 Product Wise Raw Material Requirement

Sr. No.	Name of the product	Raw Materials	RM Consumption (Kgs/MT)	RM Consumption (MT/Month) [§]
1.	Continuous distillation of crude Ethyl Oleate (Existing)(300 MT/year)	Crude Ethyl Oleate	1000.00	25.00
2.	Metal salt and Aluminum Magnesium Mix Hydrotalcite salt (Existing)(900 MT/year)	Metal (Cu, I, Bi, Co, Ni, Hg)	460.00	35.00
		Strong Acids (Sulphuric acid, Hydrochloric acid & Nitric acid)	180.00	12.00
		Metal Nitrates	240.00	18.00
		Sodium Hydroxide	86.66	6.50
		Potassium Hydroxide	6.66	0.50
		Aluminum Sulphate	120.0	9.00
		Magnesium Sulphate	120.00	9.00
3.	Esters (Proposed) (250 MT/year)	Vegetable Oils	1563.63	32.58
		Fatty Acids	1088.60	22.68
		Alcohols [#]	581.81	12.12
		Activated Carbon	136.36	2.84
4.	Organics Intermediates (Proposed) (45 MT/year)	Phenol	975.00	3.66
		Pthalic Anhydride	775.00	2.91
		Strong Acid (eg. H ₂ SO ₄)	300.00	1.13
		Water	400.00	1.50
		Alcohol [#]	2000.00	7.50
		Clay/Carbon	200.00	0.75
		Soda	300.00	1.13
		Bromine	504.85	1.89
5.	Aromatic Metal Compounds (Proposed) (100 MT/year)	Metal – Salt	400.00	3.33
		Phenyl Ester	314.29	2.62
		Organic Acids (Gallic, Salicyl, Acetic Acid)	140.00	1.17
		Wash Water	7142.86	59.52
6.	Extracts and Oils (Proposed) (20 MT/year)	Natural Seed (Example: Cardamom)	1052.63	1.75
		Distilled Water	7368.42	12.28

Note: § indicates the quantity of raw materials calculated based on annual production of the respective products. AND

indicates use of any one alcohol from the list of alcohols provided in the next Table No. 2.10.

Table 2.10 List of Alcohols

Sr. No.	Material	Sr. No.	Material
1.	Ethanol	2.	Tridecanol
3.	2-Ethyl hexanol	4.	Isotridecanol
5.	Isopropanol	6.	Cetyl alcohol
7.	Trimethylolpropane	8.	Stearyl alcohol
9.	Pentaerythritol	10.	Myristyl alcohol
11.	Neopentyl glycol	12.	Monoethylene glycol
13.	Glycerol	14.	Myristyl alcohol
15.	Cetostearyl alcohol	16.	C12-15 alcohol
17.	Isodecanol		

Table 2.11 List of Hazardous Chemicals as Raw Material with its characteristics

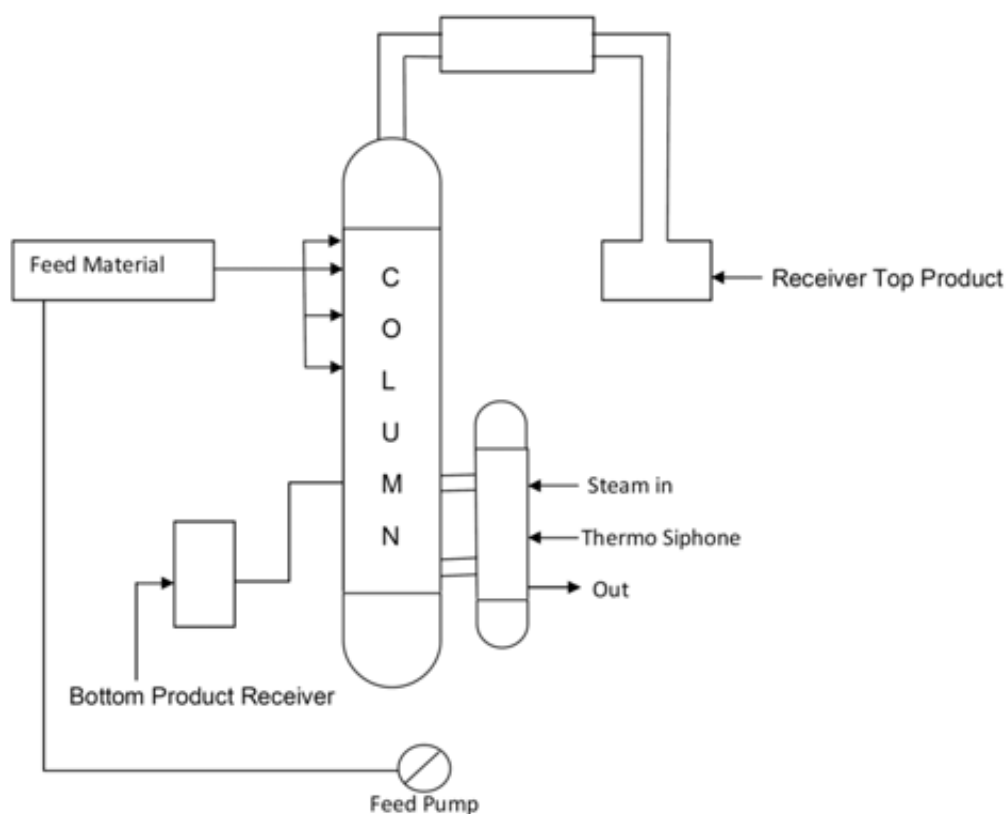
Sr. No	Name of Raw materials	Chemical Classification	Molecular weight (g/mol)	MP (°C)	BP (°C)	FP (°C)	LEL %/UEL %	VD	TLV ppm OR mg/m ³	LD ₅₀ mg/Kg (LC ₅₀ mg/l)
1.	Ethanol	Flammable	46.07	-117.00	78.30	17.80	4.30/19.00	1.59	1000 ppm	7060-LD ₅₀
2.	2-Ethyl hexanol	Flammable Liquid	130.23	-76	184.34	81.00	0.90/9.70	4.50	-	2049 - LD ₅₀
3.	Isopropanol	Flammable Liquid	60.1	-88.50	82.5	11.667	2.00/12.70	2.07	400ppm	5045 - LD ₅₀
4.	Monoethylene glycol	Toxic	62.07	-13.00	198.00	111.11	3.20/-	2.14	100mg/m ³	5890 LD ₅₀ .
5.	Bromine	Corrosive Poison Inhalation	159.81	-7.25°C	58.78	-	-	7.10	0.2ppm	3100 - LD ₅₀
6.	Acetic acid	Toxic / corrosive	60.05	17.00	118.10	44.00	5.40/16.00	2.07	10 ppm	3530 - LD ₅₀ ,
MP – melting point BP – Boiling Point FP – Flash Point VP – Vapour Pressure					VD- Vapour Density LEL- Lower explosive limit UEL- Upper Explosive limit					

2.3.2. PROCESS DETAILS

The products of proposed project are described in earlier section with required raw materials. The company shall use the latest available process technology for the production. This section includes the manufacturing process of the product, chemical reactions, and mass balance of each product.

2.3.2.1. Product: Continuous distillation of crude Ethyl Oleate (300 MT/year)-Existing**a. Manufacturing Process:**

- Take Crude Ethyl Oleate in Thermosiphone which is equipped with 4 meter column, condenser receiver and high vacuum facility.
- The crude Ethyl Oleate which will be yellowish brown in colour will be fed in packed column with random packing.
- The material will be distilled to remove the colour and make it water white liquid. There will be no wastage or generation due to high vacuum during the continuous distillation process. The distilled material will be packed & dispatched for sale.

b. Process Flow Diagram:**c. Mass Balance:**

Sr. No.	INPUT	QTY (Kgs)	OUTPUT	QTY (Kgs)	REMARK
1	Crude Ethyl Oleate	1000.00	Grade-1 product	800.00	Product
2	--	0.00	Grade-2 Product	200.00	Product
	Total	1000.00	Total	1000.00	

d. Chemical Reaction:

No chemical reaction takes place in this continuous distillation process.

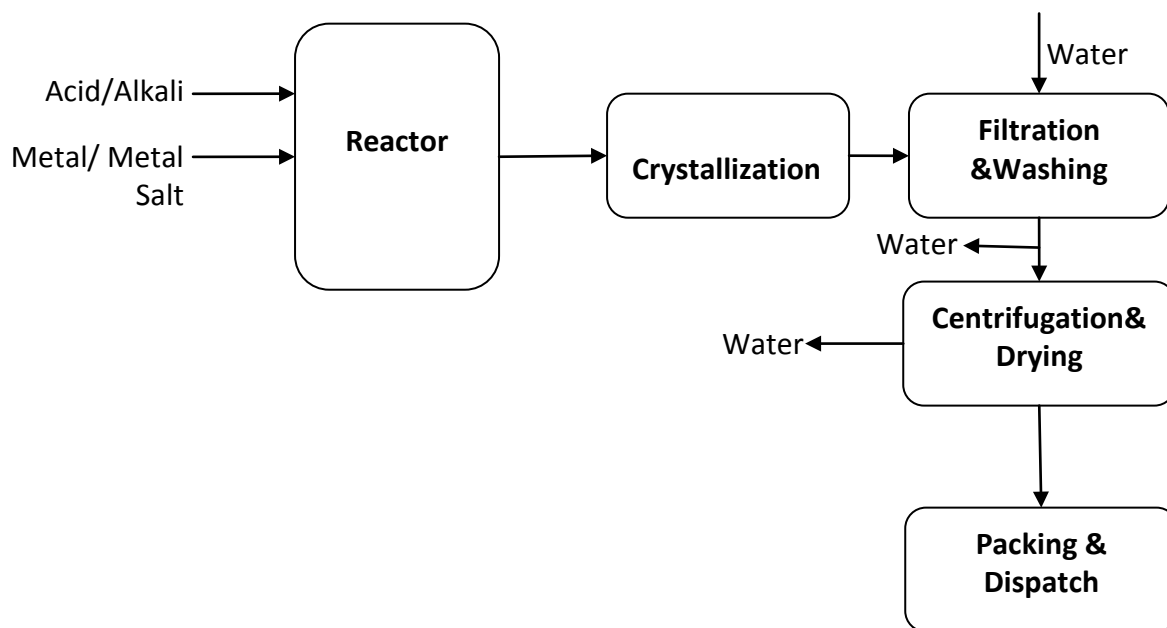
2.3.2.2. Product: Metal Salts (900 MT/year)-Existing

a. Manufacturing Process:

The existing unit produces a range of metal salts for various applications like laboratory reagents, additives and fine chemicals. The plant is a multipurpose plant making metal salts like sulphates, nitrates, oxides, pent oxides, chlorides, iodides, ammoniates, etc. of metals like mercury, bismuth, cobalt, nickel, iodine, aluminium and manganese.

The process for all metals is similar. Desired metal or metal salt is dissolved in either desired acid (HCl / H2SO4 / HNO3) or alkali (NaOH/KOH/ NH4HCO3). There after the solution is filtered and concentrated at desired concentration. Further, this solution is sent for crystallisation & Centrifugation to obtain the desired Metal Salt.

b. Process Flow Diagram:



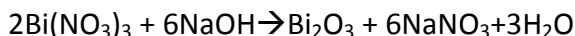
c. Mass Balance:

Sr. No.	INPUT	QTY (Kgs)	OUTPUT	QTY (Kgs)	REMARK
1	Bismuth Nitrate	1690.00	Bismuth Oxide	1000.00	Product
2	Sodium hydroxide	550.00	Sodium Nitrate	1090.00	To TSDF
3	Water	500.00	Water	440.00	To evaporator
4			Evaporation loss	210.00	Drying loss
	Total	2740.00	Total	2740.00	

(Note: The mass balance changes according to the required metal salt product)

b. Chemical Reaction:

Bismuth Oxide:



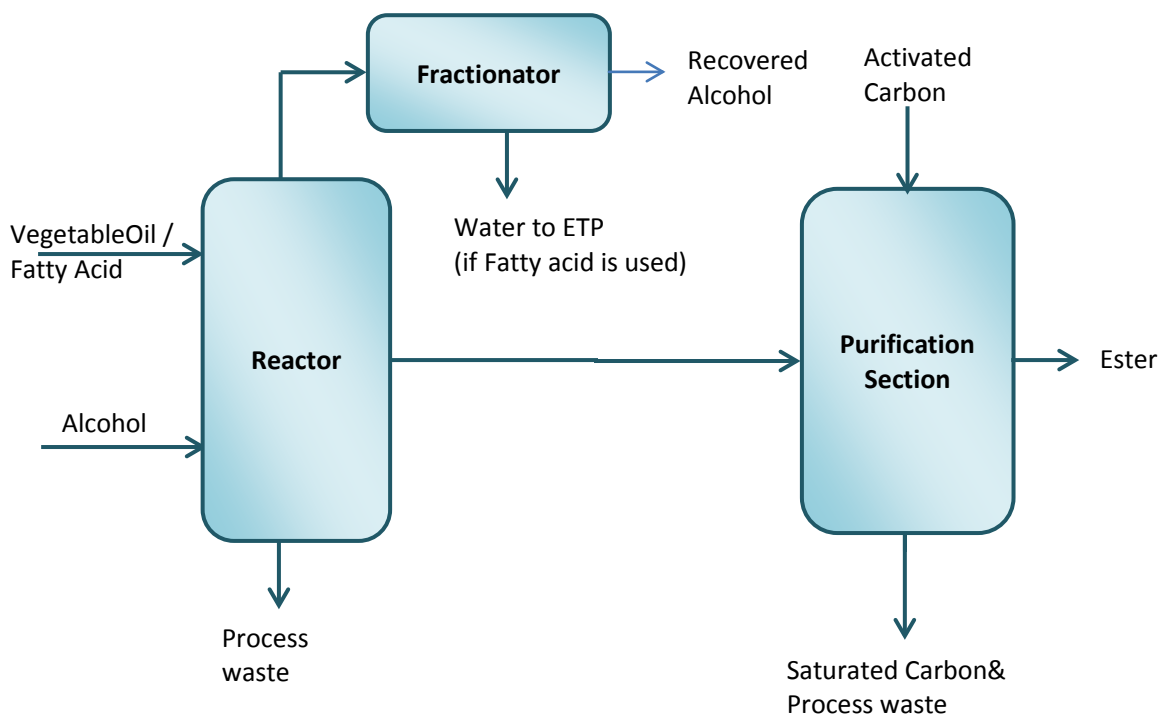
(Note: The reaction changes according to the required metal salt product)

2.3.2.3. Product: Esters (250 MT/year)-Proposed**a. Manufacturing Process:**

- In Esters manufacturing process basic reaction involves substitution of a hydroxyl group with an alkyl. Typically acids are organic acids like oleic acid, linolic acid etc. and the alkyl group is contributed by alcohols, phenols etc. The reactions are typically catalyzed.
- Side stream generated in these processes are non toxic and biodegradable. The biodegradability of esters is one of the main plus points. Side stream is generally glycerin.
- The plant will be suited for multipurpose ester production. The volume expected is in the range of 250 MT/year of finished products. List of potential esters is as below but not limited to the names below:

2-Ethyl hexyl oleate	Tridecyltrimellitate
2- Ethyl hexyl palmitate	Trioctyltrimellitate
2- Ethyl hexyl Stearate	2-Ethyl hexyl benzoate
2- Ethyl hexyl laurate	Ethyl oleate
2- Ethyl hexyl cocoate	Isotridecyl stearate
Isopropyl Palmitate	Pentaerythritoltetrate
Isopropyl Myristate	Pentaerythritoltristearate
Trimethylolpropanetrioleate	Cetyl palmitate
Pentaerythritoltetraoleate	Stearyl stearate
Neopentylglycol di oleate	Myristyl stearate
Glycerol trioleate	Ethylene glycol distearate
Glycerol mono oleate	Ethylene glycol monostearate
Trimethylolpropanetricocoate	MyristylMyristate
Neopentylglycoldicocoate	Cetostearyl stearate
CaprylicCapric triglyceride	Glycerol recinoleate
Trimethylolpropanetricaprylate/caprinate	Glycerol monolaurate
Cetostearyl 2-Ethylhexanoate	C12-15 Alkyl Benzoate
Tri-isodecyltrimellitate	

b. Process Flow Diagram:



c. Mass Balance:

Process Type 1:

Sr. No.	INPUT	QTY (Kgs)	OUTPUT	QTY (Kgs)	REMARK
1	Vegetable Oils	860.00	Ester	550.00	Product
2	Alcohols [#]	320.00	Recover alcohol	260.00	recycle
3	Activated Carbon	75.00	Process waste	325.00	To Incinerator/ co-processing
4			Saturated Carbon	120.00	
	Total	1255.00	Total	1255.00	

Note: #Alcohol can be anyone of the list provided in Table no. 2.10

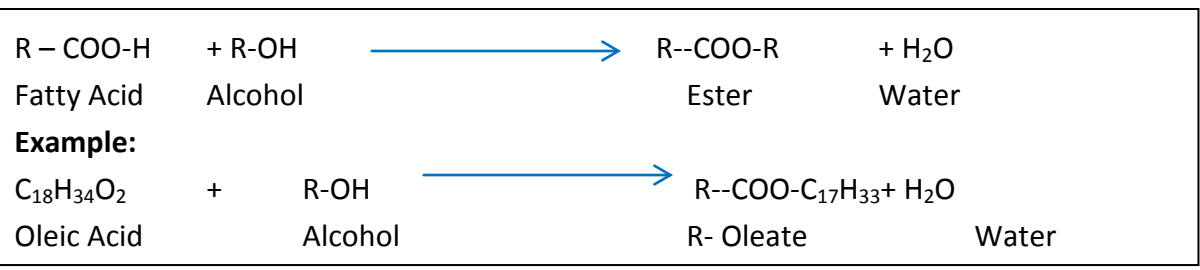
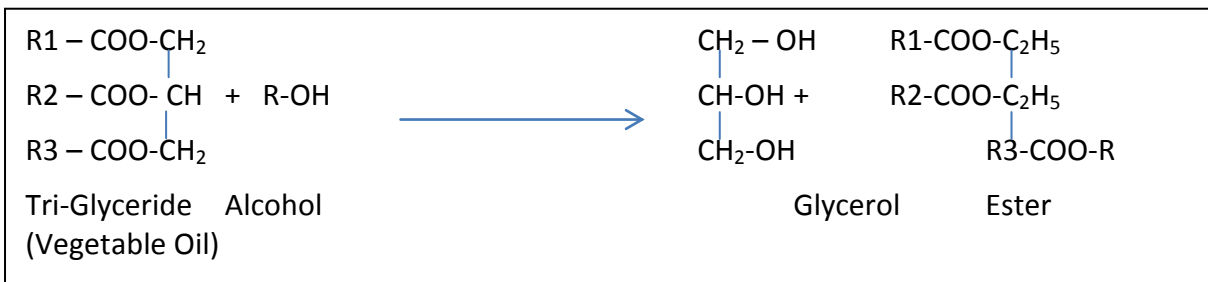
Process Type 2:

Sr. No.	INPUT	QTY (Kgs)	OUTPUT	QTY (Kgs)	REMARK
1	Fatty acid*	860.00	Ester	790.00	Product
2	Alcohols [#]	300.00	Recover alcohol	215.00	recycle
3	Activated Carbon	75.00	Process waste	30.00	To Incinerator/ co-processing
4			Saturated Carbon	85.00	
			Waste water	115.00	To ETP
	Total	1235.00	Total	1235.00	

Note: * Fatty acid can be anyone of Oleic acid, Lenolic acid, Palmitic acid, Stearic acid, Lauric acid, Coconut fatty acid, Myristic acid, CaprylicCapric acid, 2-Ethyl hexanoic acid, Trimellitic anhydride, Benzoic acid, Recinoleic acid

Alcohol can be anyone of the list provided in Table no. 2.10

d. Chemical Reaction:



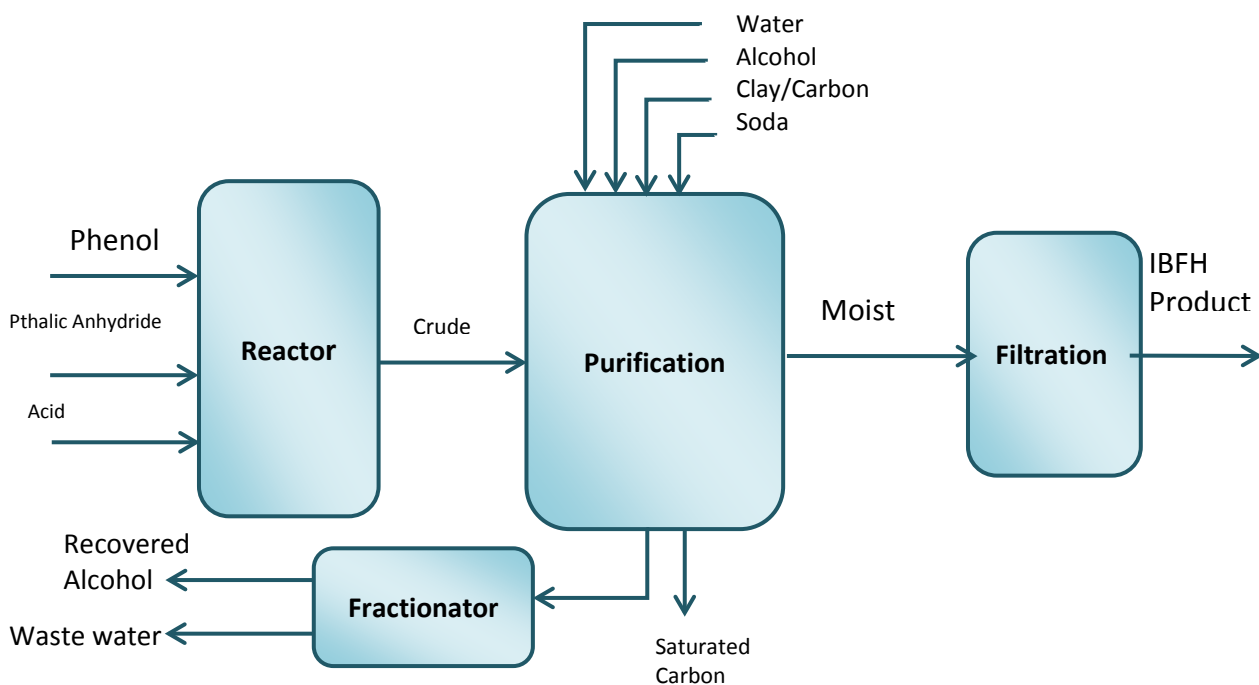
2.3.2.4 Product: Organics Intermediates (45 MT/year)-Proposed

a. Manufacturing Process:

The other products the company proposes to produce are based on various standard reactions like condensation, addition, etc. Generally the last step involves purification using a solvent like alcohol. The capacity of these products will be around 100 MT/year. These products generate a waste water stream with some alkalinity.

- a. (3H)-Isobenzofuranone, 3,3-bis(4-hydroxyphenyl)(IBFH)
- b. Tetra bromo -(3H)-Isobenzofuranone, 3,3-bis(4-hydroxyphenyl) and many such derivatives.(TBIBFH)

b. Process Flow diagram (Product A):



2.3.2.5 Product: Aromatic Metal Compounds (100 MT/year)-Proposed

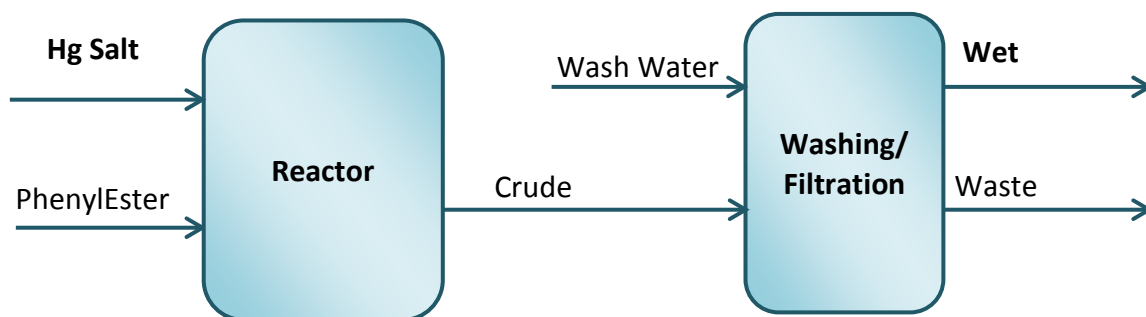
a. Manufacturing Process:

This involves reaction of aromatic salts e.g., phenyl acetate, nitrate, oleate etc. reacting with heavy metals e.g., mercury to form final product that is aromatic metal salt eg: phenyl mercuric acetate, nitrate, oleate. These products only generate waste water due to washing of excess aromatic salt and solvent in case of precipitated salts. Liquid products like oblate do not generate any waste streams.

Example Products in the Family

- a. Phenyl mercuric acetate
- b. Phenyl mercuric nitrate
- c. Phenyl mercuric oleate
- d. Phenyl mercury dodeceny succinate
- e. Mercuric Fulminate

b. Process Flow Diagram

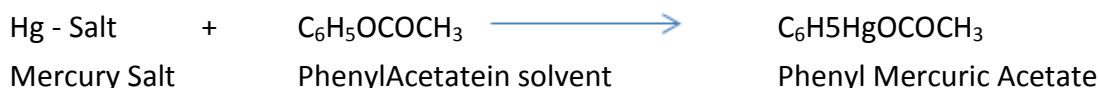


c. Mass Balance

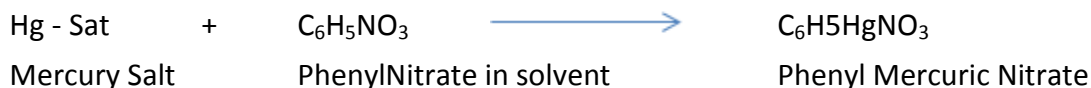
Sr. No.	INPUT	QTY (KGS)	OUTPUT	QTY (KGS)	REMARKS
1	Hg – Salt	56.00	Wet Product	140.00	Product
2	Phenyl Ester	44.00	Waste Water	960.00	To ETP
3	Wash Water	1000.00			
	Total	1100.00	Total	1100.00	

d. Chemical Reaction

Reaction: Product a



Reaction: Product b

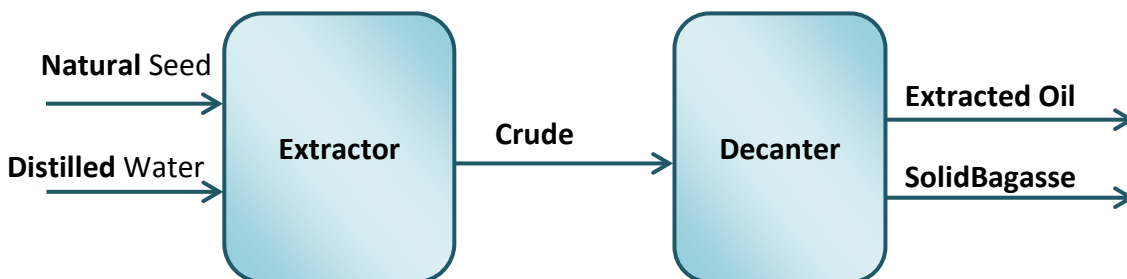


Reaction: Product c



2.3.2.6 Product: Extracts and Oils (20 MT/year) - Proposed**a. Manufacturing Process:**

Natural seed are added to extractor with distilled water. Extract phase is sent to decanter for separation. After complete decantation extracted oil is separated out and pack for selling. Solid bagasse is generated after the extraction of oil.

b. Process Flow Diagram**c. Mass Balance**

SR. NO.	INPUT	QTY. (KG.)	OUTPUT	QTY. (KG.)	REMARK
1	Natural Seed (eg.: Cardamom)	1200.00	Extracted Oil	1140.00	Product
2	Distilled Water	8400.00	Solid Bagasse	60.00	Composting
			Waste water	8400.00	To ETP
	Total	9600.00	Total	9600.00	

d. Chemical Reaction

No chemical reaction only extraction and decantation unit operation involved in the process.

2.4. POLLUTION POTENTIALS & CONTROL MEASURES**2.4.1. Air Pollution Sources & Control**

There is only one source of stationary emission which is Thermopack (1 lac. Kcal/hr, Natural gas fired). Company will install two Steam Boiler (capacity -1 tones/hr x 2, NG Fired) & One DG Set (160 KVA Diesel Fired) which will be the additional sources of stationary emission after proposed project. As the Diesel and Natural Gas (NG) are proposed as fuel, stationary emission will not have any major issues of air pollution. Company has/will provided/provide stacks having adequate height & internal diameter at top. The summarized details of the stationary/utility emissions are presented in tabular form below.

Table 2.12: Utility Emission & Control Measures

Sr. No.	Particulars	Fuel / Power & it's Qty	Probable Pollutants & Limits	Control Measures
1.	Thermopack(1 Nos.) Capacity: 1 lac kcal/hr (Existing)	Natural Gas : 30SCM/hr	PM<150 g/Nm ³ SO ₂ < 100 ppm NO _x < 50 ppm	Chimney Height: 30 m Diameter: 300 mm
2.	Steam Boiler (2 Nos.) Capacity:1 tonnes/hr each (Proposed)	Natural Gas : 157 SCM/hr	PM<150 g/Nm ³ SO ₂ < 100 ppm NO _x < 50 ppm	Common Chimney Height: 30 m Diameter: 300 mm
3.	D.G. Set (1 Nos.) Capacity: 160KVA (Proposed)	HSD: 30 Lit/Hr	PM<150 g/Nm ³ SO ₂ < 100 ppm NO _x < 50 ppm	Chimney Height: 09 m Diameter: 100mm

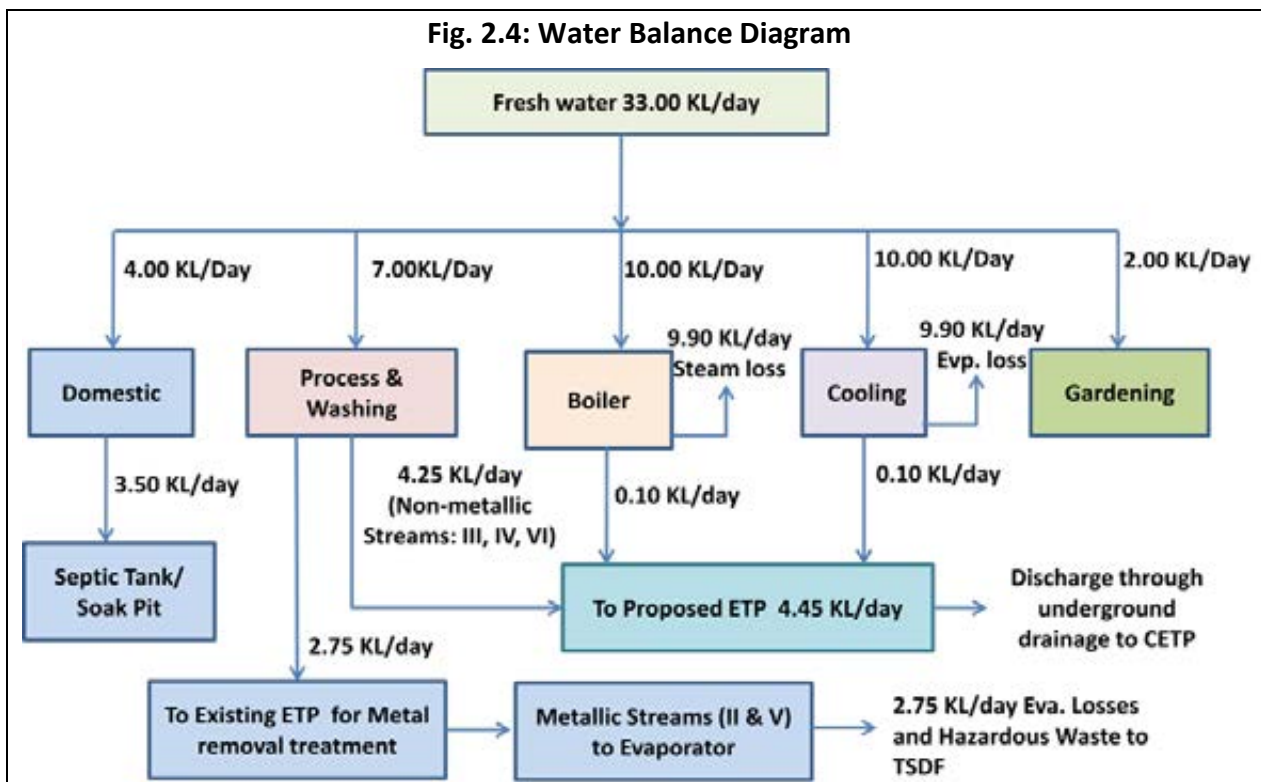
2.4.2. Wastewater Generation & Management

The unit will have industrial effluent generation @ 7.20 KLD from process, washings and cooling blow down. For treatment of effluent having heavy metal (2.75 KLD), evaporator will be provided for evaporation. The industrial effluent will be treated in full-fledged in-house ETP equipped with all required Primary, Secondary & Tertiary Treatment units. The treated wastewater will be disposed off through the underground pipeline of GIDC Sarigam which is going to CETP. The wastewater will also be generated from domestic activities as sewage @4 KLD. Domestic waste water will be disposed off through Septic Tank and soak pit.

The details of wastewater generation are tabulated below whereas the water balance diagram is shown in subsequent figure.

Table 2.13: Details of Wastewater Generation

Sr. No.	Particulars	Existing Quantity (KL per day)	Proposed Quantity (KL per day)	Total Quantity (KL per day)
1	Domestic	01.80	01.70	03.50
2	Industrial			
	Process & Washing	00.90	06.10	07.00
	Boiler	00.05	00.05	00.10
	Cooling	00.05	00.05	00.10
	Sub Total Industrial	01.00	06.20	07.20
	Total	02.80	07.90	10.70



2.4.3. Solid & Hazardous Waste Generation & Management

The hazardous waste from the unit will be generated in form of Used Oil, Saturated Carbon, Discarded Empty containers/Barrels/Liner and ETP waste. The details of all wastes & their management are tabulated below.

Table 2.14: Quantity of Hazardous/ Non-hazardous Waste generation and its management

Types of Waste & Category	Source of Generation	Quantity			Storage Method	Method of Disposal
		Exiting	Proposed	Total		
Used oil (5.1)	Plant machineries	12.50 Lit/M	100.00 Lit/M	112.50 Lit/M	Stored into the closed container	To registered recycler / Reused
ETP Waste (35.3)	ETP	1.25 MT/M	5.00 MT/M	6.25 MT/M	Stored at a specific area as per rule.	To TSDF site.
Discarded containers/barrels/liners (33.1)	Consumed Raw materials and Product packaging.	19500 Nos/Yr	8700Nos/ Yr	28200 Nos/Yr	-do-	Sell to GPCB authorized scrape dealers.
Saturated Carbon (36.2)	Mfg. Processes & ETP	--	5.50 MT/M	5.50 MT/M	-do-	To common Incinerator / co-processing
Process waste (20.4)	Mfg. Processes	--	12.31 MT/M	12.31 MT/M	-do-	
Solid Baggase (Non-hazardous)	Mfg. Processes	--	0.10 MT/M	0.10 MT/M	-	Composting

2.4.4. Noise & Vibration Generation & Control

Noise & Vibration generation is anticipated in utility & production area as well as from operation of pumps, motor & compressors etc. installed at different location within premises. Mainly the high noise & vibration is likely to be generated in utility area from Boiler and DG Set. The noise level in premises ranges from 50 dB(A) to 80 dB(A) depending up on the distance from the noise sources. Noise level outside of production & utility area will never cross the permissible limit for industrial unit as mostly remains below 75 dB(A). All noises will be managed by provision of proper PPEs for working people in the respective areas. Vibrations will be managed by provision of proper fitting, shunting and sturdy non-vibrating foundation with rubber pads.

2.4.5. Greenbelt Development & Rainwater Harvesting

Company has acquired plot admeasuring 6700.00 Sq. Mt. The greenbelt will be developed at the periphery of plant premises as well as in some open area within the proposed premises. The greenbelt will be developed in area admeasuring 2000.00 Sq. Mt. (30% of total plot area) Greenbelt will be maintained by regular fertilization, irrigation & replantation to give thick pasture view considering the guideline of CPCB for three tiers greenbelt development.

The company has decided to provide facilities for Roof top harvesting of the rainwater. The harvested rain water will be stored in the raw water storage tank and then will be utilised to meet the water requirement of the project.

2.5. Occupational Health & Safety**2.5.1. Hazardous Materials & Their Management**

There will be total 6 hazardous materials in the proposed project as per MSIHC Rules (2000). All hazardous materials will be managed in accordance with national & state regulations. Detailed RA study will be conducted for storage and handling of the hazardous materials will be conducted and all necessary measures as suggested in RA report will be implemented for prevention of hazards associated with the hazardous chemicals of the project.

Primarily proponent has planned the following general risk reduction measures for Handling, Storage of Hazardous Materials (Bags, Drums & Tanks) to maintain safe work place & hazard free areas in the proposed unit.

- Adequate ventilation in godown & production area to prevent toxic chemical vapour exposure built-up in workplace and to maintained area below PEL/TLV limits. Air change ratio in these areas will be managed around 1.
- A detailed Mercury Handling, Storage and Transfer Protocol are prepared and all necessary systems and arrangements are made available in plant. The Protocol along with the details of necessary systems & arrangement is presented as **Annexure-XIII**.
- Proper label and identification board /stickers in storage & production area for all chemicals
- Conductive drum pallets will be provided.
- Trolley / stackers/fork lift for heavy goods/drum/bag handling.
- Storage of Materials as per compatibility
- Separate storage area for flammable, corrosive and toxic chemical storage.
- Prohibition/restriction on smoking and other spark/ flame generating item.

- Static grounding points at storage, handling and process area as well as for all storage tanks
- Lower level ventilation exhaust system will be provided in drum storage area.
- Material safety data sheets at storage as well as process and chemical handling area.
- Fire hydrant system & fire fighting equipment in unit as per TAC/NFPA Norms.
- Plant should meet provisions of the Manufacture, storage & Import of Hazardous Chemicals Rules, 1986 & the factories Act, 1948 and The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 (As amended timely).
- Fix piping with supports and clamping for raw material charging and minimum flexible hose connected for charging chemicals in day tank or reactor
- Static grounding to all process vessels and equipment
- Caution note board for all hazardous chemicals
- Safety valve provision to be made on reactor.
- In general, all machines Nip (like rollers, saw blade, cutter blade, chain, v-belt, etc.) shall be protected with appropriate fix safe guard to be prevent amputation of any person's body part.
- Periodic On Site Emergency, Mock Drills in order to train the staff and make them mentally prepared to tackle any emergency
- Safety devices and control instruments should be calibrated once in a year.
- Proper colouring as per IS 2379 in plant to pipeline network, tank and equipment to protect it from corrosion.
- Preventive maintenance schedule for all the equipment and colour code or tagging
- Permit to work system on 100 % basis for hazardous work to be carried out in the plant
- Automated Fire detection system &/or manual call points for fire location identification in storage area as well as plant area
- Compulsory Induction safety course and training of all new employees
- Empty drums & bags will be stored in separate dedicated empty drum & bag storage area. All drums & bags will be neutralized/decontaminated before send it to recyclers.

2.5.2. Occupational Health Management

The proponent company is committed towards ensuring high level of health & safety of its employee and all necessary implementation & actions are noticed well in place in the existing unit of the proponent. Company will follow all statutory guidelines related with occupational health & safety and all necessary facilities & procedures are provided in the existing unit. Health check-up programs will be carried out regularly and all records & documents related with employee health check-up program are maintained. All risk control & prevention measures will be implemented in proposed unit. Management will provided necessary PPEs, safety equipment/ materials as mentioned in above section of risk reduction to ensure healthy & safe work conditions. Regular inspection for the safety procedures and use of PPEs & Safety equipment/material is done by the management/safety cell. Premedical examination and periodical examination will be carried out once in a six month and record will be maintained in Form No-32 & 33 as per GFR. LFT test will be carried out during pre-placement and periodical examination. Training programs & safety audit shall be done on regular basis to prevent impacts of the operational activities on occupational health as well as to improve workplace condition & safe work system. Proponent shall practice similar practices after proposed project & also ensure that all necessary PPEs, Safety materials/ equipment are in place.

CHAPTER: 03

DESCRIPTION OF THE ENVIRONMENT

3.1. GENERAL

M/s. Heni Drugs Pvt. Ltd. is engaged in manufacturing or **Continuous distillation of crude ethyl Oleate and inorganic Metal salt** for Lubricant applications by mixing and blending process. Now the unit has proposed for expansion by addition of new products of **Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils** within its existing unit located at GIDC Notified Industrial Estate of Sarigam Village of Valsad District of Gujarat. As per the new EIA notification SO 1533 (as timely amended) the proposed project falls under scheduled activity of 5 "f" (Category- B1). Considering the legal provisions, the present EIA study has been conducted in line with the awarded TOR as described in earlier chapter-1 & **Annexure II**. As a part of the EIA study, baseline environmental status has been assessed following the approved methods for sampling & analysis of environmental samples. The study was started in November 2015 based on draft Tor as well as discussion held during presentation at SEAC for approval of draft TOR. Up on receipt of the awarded TOR in 7th November 2015 by SEAC, Gandhinagar all conditions of awarded TOR have been referred & accordingly the present baseline study has been conducted during the aforesaid study period.

The details of the baseline study & related aspects have been described in subsequent sections under respective heading.

3.1.1. PURPOSE & OBJECTIVE OF BASELINE STUDY

The present baseline study in EIA has been conducted with the main purpose to determine the existing environmental conditions of the project area for conducting an environmental impact assessment (EIA) in order to determine the potential stress on environment due to the environmental issues of the proposed project of M/s. Heni Drugs Pvt. Ltd. Baseline studies have been conducted during the period of three months of winter season of 2015-16 (November 2015 to January 2016) to fulfil the specific requirements of the Environmental Studies, as required to comply with the awarded TOR as well as the standards timely issued by the concern authority. As such, this practice is intended to help the EIA team to gather and analyse data and information in order to classify the environmental status into several environmental conditions of area types.

Objectives guiding the present baseline environmental studies are as below.

- To delineate the prevailing environmental condition of project/study area as per awarded TOR issued by SEAC, Gandhinagar, Gujarat for EIA study.
- To generate &/or collect the information of physical, chemical & biological properties of the environment of the study area (5 km radial area from site), which includes data indicating quality & prevailing status of air, water resources, soil fertility, noise, flora & fauna, ecological habitats etc.

- To study & generate/prepare the Base Map, LULC map, Topographic map, Digital Terrain Map of 5 km radial area from the site
- To generate &/or collect details regarding climatic conditions of project area.
- To generate &/or collect details regarding socioeconomic & cultural layout (5 km radial area from site)
- To prepare comprehensive statements for citation of existing/prevaling issue of contamination of environmental attributes (5 km radial area from site)
- To facilitate the use of the standard classification of environmental condition of area types (viz. unpolluted zone, polluted zone, critically polluted zone and sensitive zone etc.) with respect to the statutory guidelines of the time of study (5 km radial area from site)
- To facilitate the organization of EIA study & proponent for preparing and updating EIA reports & EMP.

3.1.2. APPROACH & METHODOLOGY OF BASELINE STUDY

The baseline environmental studies have been done for three months of winter season (November 2015 to January 2016) for the EIA of upcoming project of M/s. Heni Drugs Pvt. Ltd. The study has been conducted initially considering the draft TORs proposed for approval and then continued & finalized according to the conditions of awarded TORs as described in Chapter 1 & **Annexure II**. The study has been conducted by following the guidelines & the EIA Manual issued by MoEF. The study has been conducted & finalized by conducting studies during the season of winter November 2015 to January 2016 covering the 5 km radial area for environmental sampling & monitoring and 5 km radial area for mappings to comply with the TOR awarded by the State level Expert Environmental Appraisal Committee (SEAC), Gandhinagar, Gujarat. The details of the study period, frequency of sampling & method of environmental sampling & analysis are shown below in succeeding paragraphs under respective headings.

3.1.2.1. STUDY AREA

The proposed unit of M/s. Heni Drugs Pvt. Ltd. is situated in notified industrial estate of GIDC Sarigam. This is a Village in southern most Taluka - Umbergaon of Valsad District of Gujarat State, India. EIA study was conducted in the area falling within 5 km radius from the project site, situated in Sarigam region of Gujarat considering the draft TOR proposed during TOR application, then continued & verified according to the conditions of awarded TORs from SEAC, Gandhinagar.

The project area is situated in the southern most part of Gujarat State. The area has global identity due to the nearby Industrial estate of Vapi as well as industrial establishments & development in areas around Vapi, Silvassa & Daman. The region is also exhibiting very good agricultural lands & forest areas. DNH wild life sanctuary is also situated in western direction at about 14 Kms. The area has contributed significantly in the development of our Nation's economy through the excellent industrial growth & other businesses like textile & plastic. The area has realized high development in last two decades rapid growth in industrial

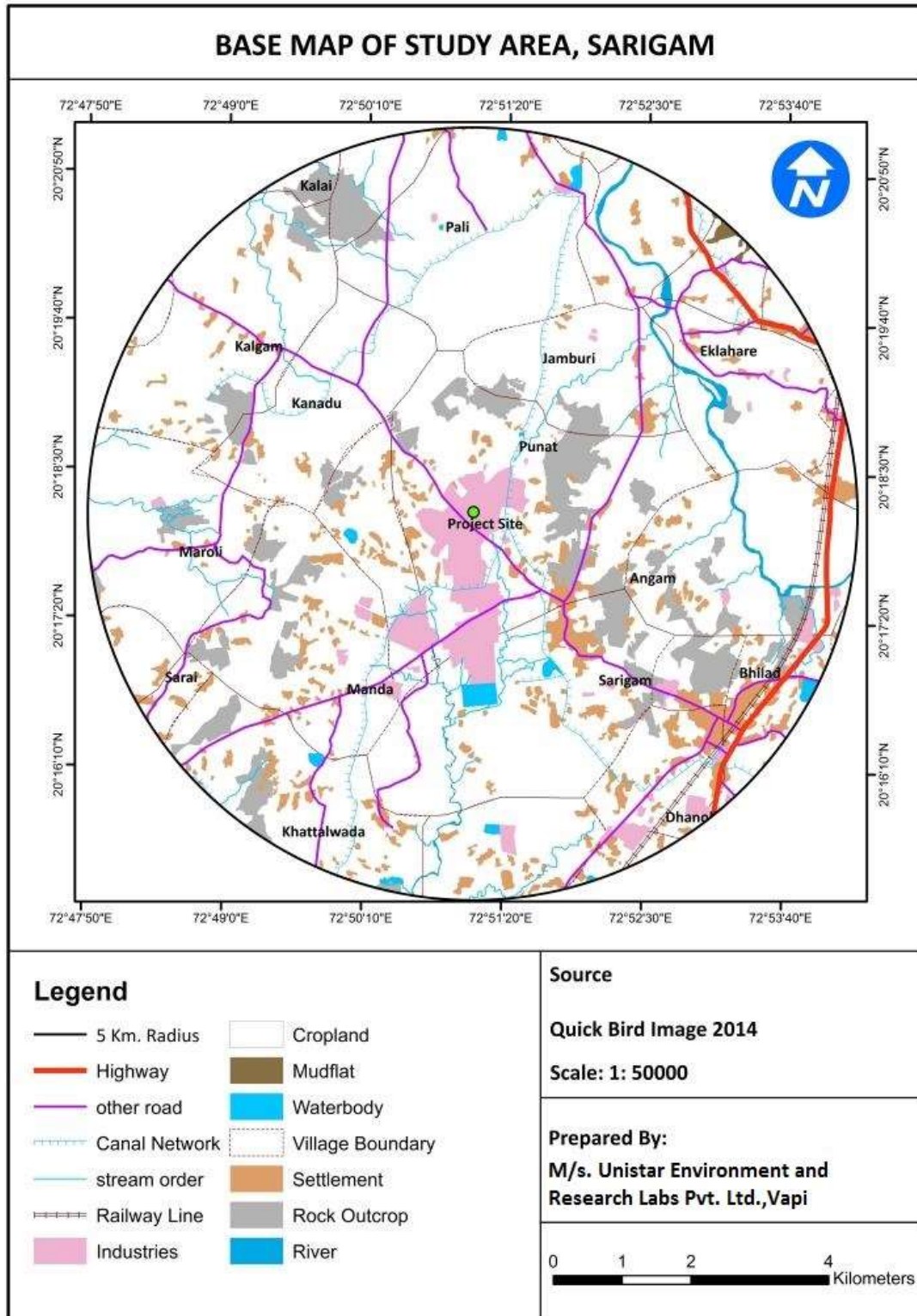
development, urbanization and business operations. The area has been selected as the production hub by many large banner industries of chemicals, plastic & textile.

The map of the study area & sampling locations is illustrated below in Fig. 3.1, whereas the salient features of the project area are tabulated in subsequent Table 3.1.

Table 3.1: Salient Features of Project Area (10 Km)

Sr. No.	Nearest Infrastructure Feature	Distance from Project Site
1	Geographical Position	Lat.: 20.303067°N, Long.:72.851107°E
2	Elevation above Sea Level	32 Meters (Approx.)
3	Nearest Village	Sarigam (1.0 km SE)
4	Nearest Town	Sarigam (1.40 km SE)
5	Nearest National Highway	NH 8 (4.0 Km SSE)
6	Nearest State Highway	GJ SH 5 (1.25 Km SE)
7	Nearer RW Station	Bhilad (3.80 km S)
8	Nearest Airport	Daman (17 Kms NW) Surat (95 Km N)
9	Nearest Surface water Resource/Reservoir	Arabian Sea (18 Km W) Darotha River (6 Km NE)
10	Forest Patches	There are few patches of Reserve Forest within the study area of project site.
11	Location of Archaeologically /Historically important places	--
12	National Park/Sanctuary or Ecologically sensitive Area	D & NH Wild Life Sanctuary Approx. 14 km E
13	National or State Boundary	Dadra & Nagar Haveli – 7 Km E Daman – 8 km N
14	Tourist Places	Dadra & Nagar Haveli – 7 Km E Daman – 8 km N
15	Selection of project Site and Detail of alternate Site.	Proposed project is in the GIDC Notified Industrial area having proper industrial infrastructure hence alternate site consideration is not envisaged.
16	Size or Magnitude of Operation	Small Scale
17	Distance of site from CEPI Area	Vapi- 9.20 Km approx. NE

Fig.3.1- Base Map of Study Area Locations



3.1.2.2. SAMPLING & MONTORING LOCATIONS

The locations for sampling & monitoring were selected within 5 km radial area from site as per the requirements of awarded TOR from SEAC. The locations are selected based on probable effects in project study area considering various guidelines from CPCB. One location of AAQM is selected in downwind direction. Total six locations were selected from the study area falling

within 5 km radial distance for sampling and monitoring of air, noise, soil and groundwater as per terms of reference. The surface water samples were also collected from the water bodies falling within the study area. The details of selected sampling & monitoring locations are presented in table 3.2.

Fig.3.2: Sampling & monitoring Locations (Study Area - 5 Km)

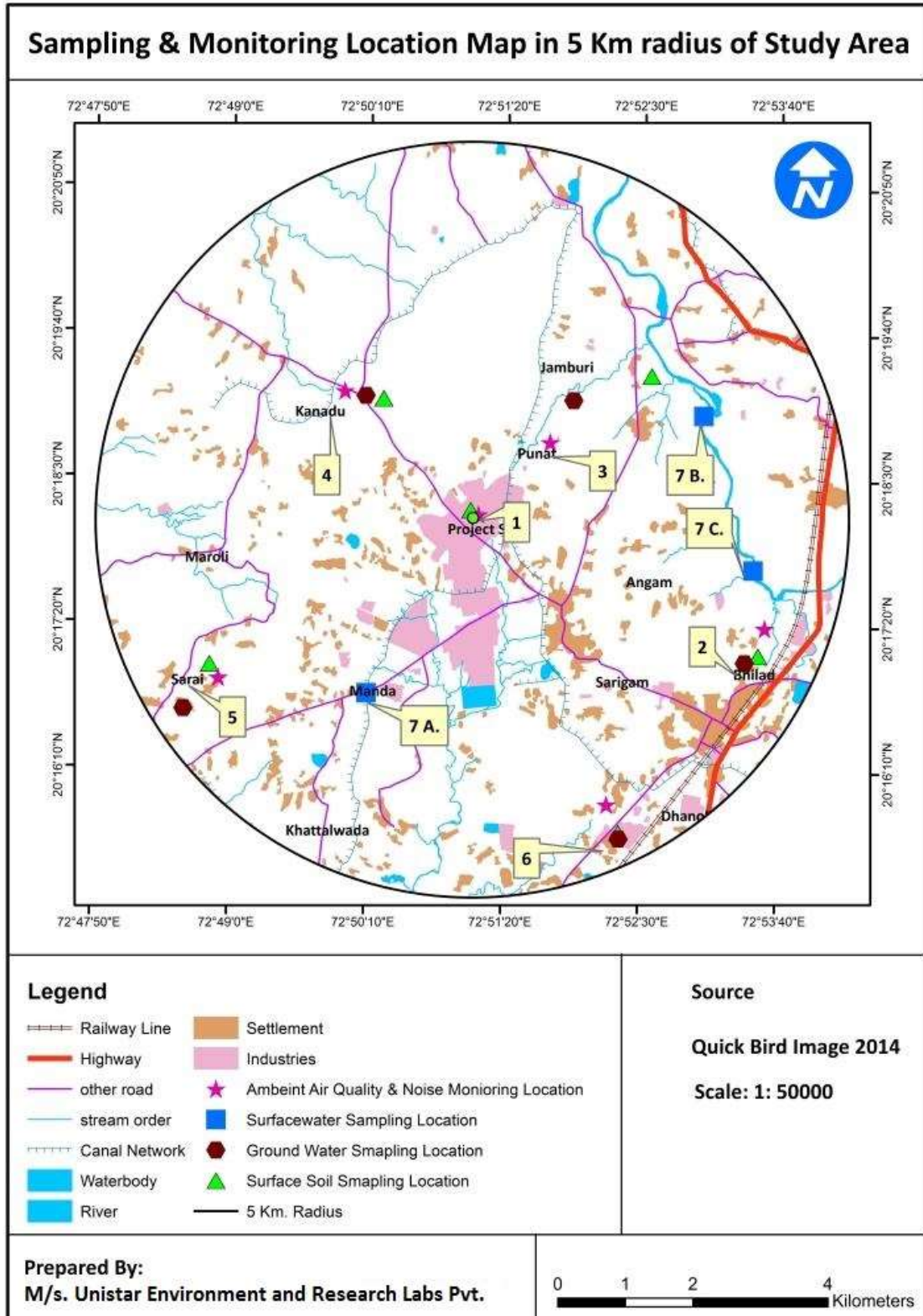


Table 3.2: Sampling & monitoring Locations (Study Area - 5 Km)

Sr. No.	Name of Location	Approx. Aerial Distance from Site (in Km)	Details of Sampling & Monitoring
1	Project Site, 20.303067°N, 72.851107°E 20.303067°N, 72.851107°E 20.302698°N, 72.851333°E	0.0 km Centre of Study Area	Ambient Air Quality, Ambient Noise, Surface Soil.
2	Bhilad Village 20.289052°N, 72.892548°E 20.289052°N, 72.892548°E 20.284075°N, 72.889870°E 20.285040°N, 72.891759°E	4.59 km (NE) 4.59 km (NE) 4.56km (NE) 4.68 km (NE)	Ambient Air Quality, Ambient Noise, Groundwater, Surface Soil.
3	Punat Village 20.326543°N, 72.838510°E 20.326543°N, 72.838510°E 20.321229°N, 72.865060°E 20.324464°N, 72.873051°E	1.68 km (N) 1.68 km (N) 2.57 km (N) 3.30 km (N)	Ambient Air Quality, Ambient Noise, Groundwater Surface Soil.
4	Kanadu Village 20.319878°N, 72.832715°E 20.319878°N, 72.832715°E 20.318777°N, 72.835795°E 20.318436°N, 72.837719°E	2.67 km (NW) 2.67 km (NW) 2.37 km (NW) 2.21 km (NW)	Ambient Air Quality, Ambient Noise, Groundwater Surface Soil.
5	Sarai Village 20.281406°N, 72.815187°E 20.281406°N, 72.815187°E 20.278402°N, 72.812901°E 20.279647°N, 72.812623°E	4.45 km (SE) 4.45 km (SE) 4.67 km (SE) 4.83 km (SE)	Ambient Air Quality, Ambient Noise, Groundwater Soil
6	Dehali Village 20.265012°N, 72.870490°E 20.265012°N, 72.870490°E 20.266511°N, 72.872394°E 20.266511°N, 72.872394°E	4.71 km (SW) 4.71 km (SW) 4.61 km (SW) 4.61 km (SW)	Ambient Air Quality, Ambient Noise, Groundwater Surface Soil.
7	A. Damanganga Main Canal: 20.279561°N, 72.836203°E B. Darotha River , Punat: 20.316779°N, 72.883485°E C. Darotha River, Bhilad: 20.296472°N, 72.890944°E	2.98 km (SW) 3.70 km (NE) 4.21 km (E)	Surface Water Surface Water Surface Water

3.1.2.3. STUDY PERIOD & FREQUENCY OF SAMPLING

The baseline environmental study was done by following the guidelines of MoEF. As described earlier, the study for 5 kms radial area from the project site was finalized in line with the conditions of ToRs approved by the State Level Expert Environmental Appraisal Committee of Gandhinagar, Gujarat. All the necessary maps are prepared for 5 km radial area from the project site. Thus, all primary study completed for monitoring & sampling of Air, Water & Soil samples as well as all mapping done were found complying with the approved TORs awarded by SEAC, Gandhinagar, Gujarat. The details of the study period, frequency of sampling & method of environmental sampling & analysis are shown below in succeeding paragraphs under respective titles.

The period of study determined was 1st November 2015 to 31st January 2016 to collect the one season (winter) data. The frequency of various environmental sampling & analysis was determined following the guidelines provided by MoEF in online EIA Manual. The details of frequency of environmental sampling considered for the study are illustrated in Table – 3.3.

Table 3.3: Frequency of Environmental Monitoring

Attributes	Sampling	
	Locations	Frequency
A. Air Environment		
Meteorological Data	Project Site	Hourly continuous during Study Period
Ambient Air Quality	6 locations in the study area of 5 Kms. radius from site [1 Location within project site & 1 Location in downwind direction.]	24 hourly twice a week during study period
B. Noise	6 Locations from study area (5 kms)	Hourly for one day during Study Period
C. Water		
Ground Water	Grab samples from 5 Locations from Study Area (5 KMs)	Once in Study Period
Surface Water	Grab samples from 3 Locations from Study Area (5 KMs)	Once in Study Period
D. Soil Quality	Surface soil samples from 6 locations within study area (5 Kms)	Once in Study Period
E. Land Use -Land Cover & Topography	Radial area for LULC map (5 Km) Radial area for Topography map (5 Km)	Once in Study Period
F. Ecological Data	Study area (5 Km)	Once in Study Period
G. Socioeconomic Data	Study area (5 Km)	Once in Study Period
H. Other Maps	Study area (5 Km)	Once in Study Period

3.1.2.4. METHOD OF SAMPLING

Selection of method for sampling, preservation and analysis plays very important role in baseline environmental study. With reference to the guidelines of CPCB & EIA Manual of MoEF, methods of sampling & analysis of environmental samples have been selected/ adopted. The method adopted for environmental sampling & analysis are illustrated in following table 3.4.

Table 3.4: Method of Environmental Sampling & Analysis

Attributes	METHOD	
	Sampling / Preservation	Analysis
A. Air Environment		
I. Meteorological Data	Stationary weather station (AWS)	Computer Aided Data Analysis
II. Ambient Air Quality	As per CPCB Guideline (Respirable dust sampler and PM _{2.5} Sampler)	As per IS5182 [Part -(2) & (23)] 2006
B. Noise	Instrument : Noise level meter	Mathematical Calculations
C. Water & Waste Water		
I. Ground Water	Standard methods for examination of water and wastewater analysis published by APHA	Standard methods for examination of water and wastewater analysis published by APHA (latest ed.)
II. Surface Water		
D. Soil Quality	Laboratory Guide for Conducting Soil test & Plant Analysis, by J.Benton Jones, Jr. Soil & Solid waste Analysis- A laboratory manual – By Dr. P.K. Behera	Laboratory Guide for Conducting Soil test & Plant Analysis, by J.Benton Jones, Jr. Soil & Solid waste Analysis- A laboratory manual – By Dr. P.K. Behera
E. Land Use -Land Cover & Topography, geohydrology & Other Maps	Satellite Imageries (1:50,000 scale), collected from NRSA, Hyderabad & Primary Study	Primary image analysis & GIS modelling using Arc GIS & Erdas Imagine software and Primary Study
F. Ecological Data	Secondary data for forest from Forest Dept. & Primary study of basic survey of non-forest area as well as verification of information collected	Necessary study with reference to Scheduled animals as per regulatory provisions and IUCN guideline & information
G. Socioeconomic Data	Census of India 2011 Primary data collection from study area by using various Methods.	Validation of Primary data with reference of Census of India 2011. Descriptive analyses of primary data.

3.2. DESCRIPTION OF BASELINE ENVIRONMENTAL STATUS

As mentioned above, the baseline study for the present EIA was conducted during period of 1st November 2015 to 31st January 2016 in accordance with the draft TORs proposed in Form I as well as final awarded TORs issued by SEAC, Gandhinagar, Gujarat. The study was conducted with reference the draft TORs in initial stage and up on receipt of approved TORs, conditions given in the approved TORs were referred for verification of scope of baseline study to modify the ongoing/completed study as well as to schedule the additional study, as required. All monitoring & sampling have been done for the study area covering 5 km radial distance from site during the study period covered the requirement of awarded TOR whereas all mappings have been done for 5 km radial area.

The details of the studies conducted along with the outcomes of the studies are described with all necessary details & illustration in subsequent sections under respective heading.

3.2.1. LAND ENVIRONMENT

During the present study for land environment Landuse/Landcovers mapping, Geological mapping & study of geological features as well as soil quality has been studied for the present EIA. The details of the conducted studies along with necessary information, analysis and illustrations are described under respective heading below.

3.2.1.1. Geological Features

The study area exposes lava flows of basalts, basaltic andesite and dacite. While lava flows of dacite are exposed in the eastern part, overlying the basaltic lava flows, the basaltic andesite are exposed in the central and western parts, again overlying the basaltic flows. The mutual volcano stratigraphic status of the basalticandesites and dolerite, thus, could not be established. A large number of dykes of dolerite and andesitic rock have been recorded. The low lying areas are generally covered with soil, alluvium and mud. A tentative stratigraphic succession is given below:

Recent to sub-recent		Mud, Soil & alluvium
	Intrusive	Intrusive of basic and intermediate rocks
Deccan Trap Age	Extrusive	basaltic andesitic and dacitic lava flows
	-----	Base not Known -----

Structure: The study area is largely covered with soil and alluvium. Only a few dolerite dykes have been recorded. As a result, not much of structural data could be collected.

Lineaments: The lineaments/mega-joints recorded, show two prominent trends, viz. along ENE-WSW and along NNE-SSW. A few of them are along NNW-SSE direction. Many of the lineaments are found to be along the continuity of dykes, without having been occupied by any intrusive body, or otherwise, the intrusive dykes are not exposed which may be below the surface, along the lineaments.

Dykes: The dykes show two prominent directions, viz. NNW-SSE and ENE-WSW. However, dykes along NE-SW are also recorded. Dykes, with different expositions and granularity, do not

show any preferred orientation. Many dykes are composite in nature, indicating reactivation of intrusive activity along weaker planes.

Economic Geology: The area, mapped, does not have any economic mineral deposit, exposed. However, basaltic rocks are suitable for their use as road-material and construction material.

Local geology: In the project side, no out crops are seen. The area belongs to deccan trap age. The litho logically, the area covered with soil which has 3-5 m thickness. Below the soil the hard rock's present.

3.2.1.2. Topographical Features

The study area is a part of Sarigam, Valsad district and having average elevation of 14 m to 111 m above mean sea level.

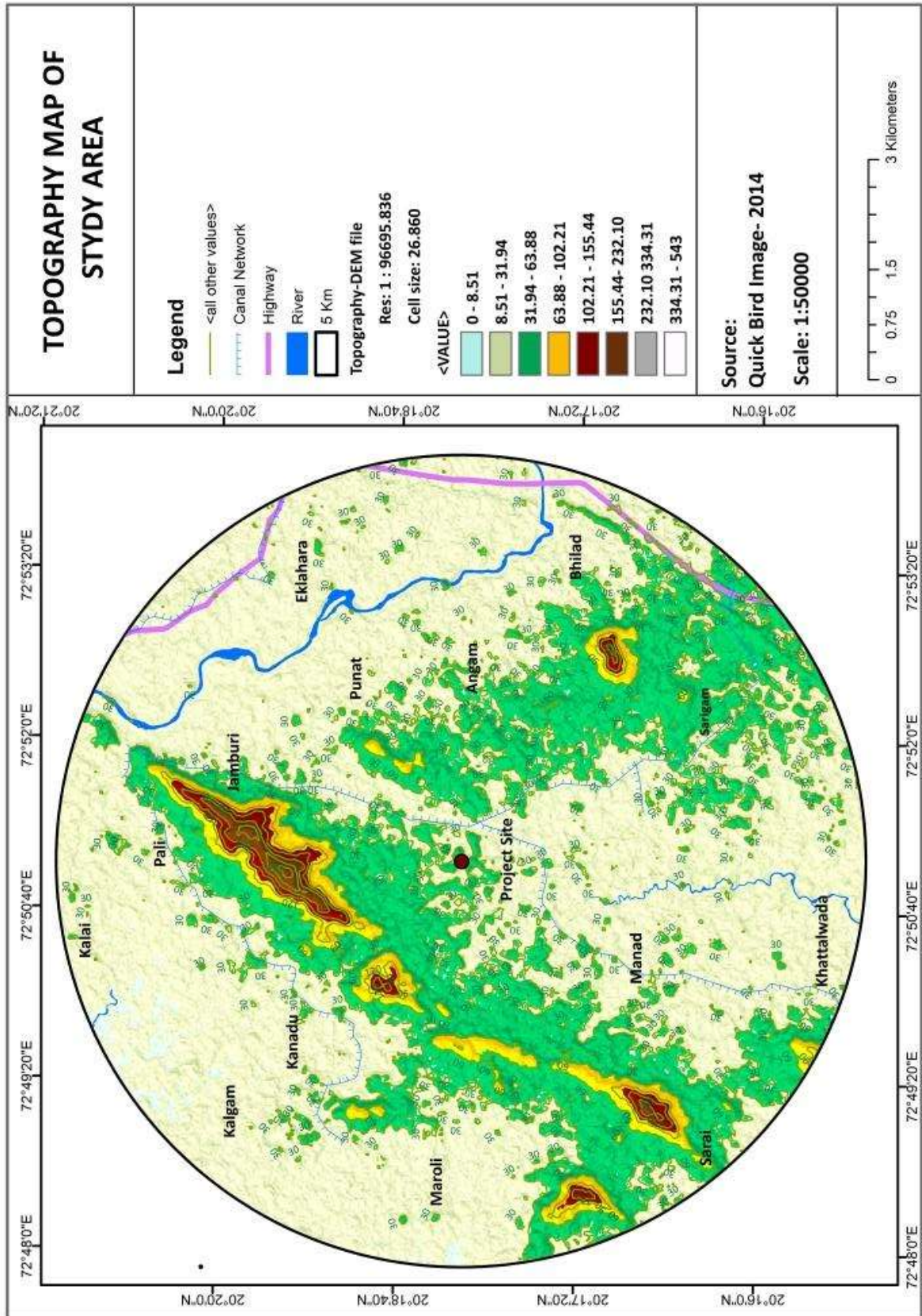
Buffer Zone:-

The topography of this area falls into two distinct types viz. hillock in the west to north and the low lying alluvial patches with mounds and hillock in the east. The altitudes vary from 14 m to over 111 m above msl in the area of study. The higher hill ranges in the western and WN part are over 111m above msl while the alluvial patches of Damanganga river are ± 35 mts from the msl. Most of the alluvial patches have been brought under cultivation. Recent industrial impact in the area has changed the overall look of the once green vegetated area. The major river of the area is Damanganga which has east-west trend till Silvassa and then it takes a sudden northerly trend near the Trachyte-rhyolite complex and flows southnorth till lavachha and then takes a NW trend to drain into Arabian sea near Daman. The major tributaries of Damanganga are Dudhninadi, Sakartondnadi, Dongarkhadinadi, Pipriya and Rati nadi. Major dam on the Damanganga river near Madhubun (close to Silvassa) has solved the problem of water in the western area. The drainage pattern somewhat controlled by the lineaments/mega-joints.

Core Zone:-

In the core zone, the altitudes vary from 36 m msl to 34 m msl. The slope of the area is SW to NE. There are no major nalah and river. The area is flat slop. Vegetation growth is spars in general & basically represent by bushes & grass.

Figure 3.3: Topographic Map of Study Area (5 km)



3.2.1.3 Seismology:

Sarigam (Project site) is located in Zone III of the Bureau of Institute of Seismological Research (ISR) 2011, seismic zone map for India. Zone III is defined as having a maximum intensity expected of around MSK III. This zone is third in severity to zone V (the highest). Zone III is also referred to as the low to medium damage risk zone. Earthquake is highly probable in this area primarily attributed to plate tectonic and fault rupture induced by continuing drift of Indian plate towards the Asian plate. The earthquake history of the Vapi region indicates fairly moderate seismicity for the project area. The tectonic elements of the area are considered capable of generating an earthquake of magnitude 4 on Richter scale.

3.2.1.4 Landuse/Landcover

Landuse /Landcover (LULC) study has been conducted for 5 km Radial area from project site.

The study area is within 5 km radius of M/s. Heni Drugs Pvt. Ltd. located at Sarigam GIDC Estate, village- Sarigam, Umbergaon taluka of Valsad District. Area covers around 37 villages of Umbergaon taluka, part of Union Territory of Dadra & Nagar Haveli and Daman, villages as shown in the Base map. Base map also depicts the major road and railways and river passing through the study area. The boundary of the village locations has been derived from the Census of India maps.

The land use/land cover mapping was carried out using digital satellite image (Bhuvan Image 2013-14, Band 2-3-4, Year 2014) procured from NRSA, Hyderabad. The analysis of data was preceded by collection of ancillary data like the Survey of India, District series maps and Census maps as base information for interpretation. Ground truth study comprises of data collection of ground features along with the respective geographical position in terms of latitudes and longitudes with GPS. Using all the collected information the data was interpreted. Interpretation of the data involved importing the data and clubbing the three layers into the single layer for interpretation. The data was in standard projection system universally followed as UTM.

Finally the proportional presence of different land uses and land cover in terms of statistical percentages was derived for the study area. Appropriate legends were used to represent the various categories of landuse-landcover, and are written on the prepared landuse-landcover maps. Area and distance calculations have been carried out using GIS software after georeferencing the interpreted data.

Based on the tonal variation and pattern in image the land use and land cover map of the area was generated. The eleven land use categories were delineated in this area viz. the Crop land, Rock out crop, Forest patches, Land without Scrub, land with Scrub, River, Water body, Industry and Settlement (Figure). Major portion in the study area is covered by Crop Land. The main crop grown in the area is Paddy which is usually sown during rainy season. On the boundary of the field there was growth of Coconut, Khajur, Tad trees and timber trees like Teak and Sadad. Many villages grow horticulture crops like Mango, Chiku, Sugar cane and Cashew nut. There was also cultivation of Pulses in some villages.

There are areas having sparse vegetation it is mainly covered by grasses these areas are delineated as Scrub. As per the classification based on Forest Survey of India the category denotes land having bushes and poor tree growth with canopy density less than 10 percent and some land with rock out crop. These areas in middle region are mostly elevated region with sparse vegetation. Also where there is no vegetation near coast with complete white reflectance was delineated as barren land.

The vegetation category Open was segregated based on the canopy density of 10 to 40 per cent and Close as greater than 40 per cent canopy cover area. Both open and close vegetation area are in the elevated region. But these areas have not been notified under the Forest Act and being maintained by forest department. On the coastal area there was Casuarina plantation carried out by Forest department. Mostly trees growing in this region are Teak, Australian Acacia, Sadad and Cashewnuts.

There are many small water bodies in the region biggest being at Kalai village (wet land). Within the study area two rivers and its tributaries flowing they are Darotha river and Damanganga river in the west side there is Arabia Sea In the central region there is canal flow. Main industrial center in the region at Sarigam also there are some scattered industrial units in the region.

Near the coastal region there are land use categories like salt pans where there is salt harvesting. Also sandy area and Mangroves class though at laces there are sparse which was seen along the creeks mostly near Darotha river, Ahu village and some patches in Maroli village.

The area statistics of these classes are presented in Table. The major portion of the study region is covered by Crop land i.e. 58.81 percent area. Around 12.61 percent of the area is of settlement and around 7.93 per cent of the area is of Rock out Crop. Forest patches are covering around 7.50 per cent of the area and River is covering 2.31 with 8 per cent being vegetation region. The remaining categories cover 10.84 per cent of the area.

Table 3.5: Land use area details for (5km Radius)

S.No.	LULC Class	Area (Sq.Km ²)	%
1	Built up land (Urban/Rural):		
	Settlement	8.90	11.33
	Industry	3.30	4.19
2	Agriculture Land:		
	Crop land, Plantations / orchards	47.95	61.08
3	Water bodies:		
	River	1.85	2.36
	Water body	0.18	0.22
4	Forest patches	5.65	7.19
5	Scrub Land:		
	Land with scrub	0.97	1.23
	Land Without Scrub	5.10	6.50
6	Others :		
	Rock Out Crop	4.60	5.90

TOTAL	78.50	100
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During ground truthing of study area as per the satellite image (Quick bird image- 2014 and Bhuvan 2D image), it is observed that some villages are develop by increase in settlement area due to community developments.

Fig. 3.4: Landuse area of 5 km radius of Study Area

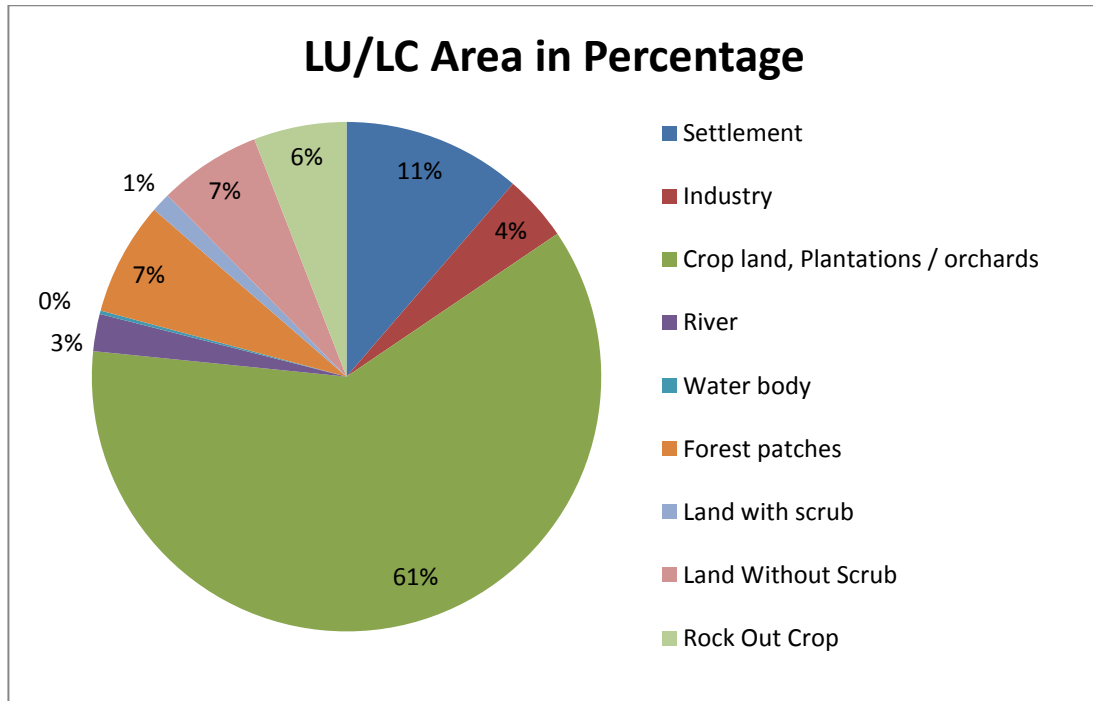


Fig. 3.5: Satellite (Quick bird) Image of Study Area

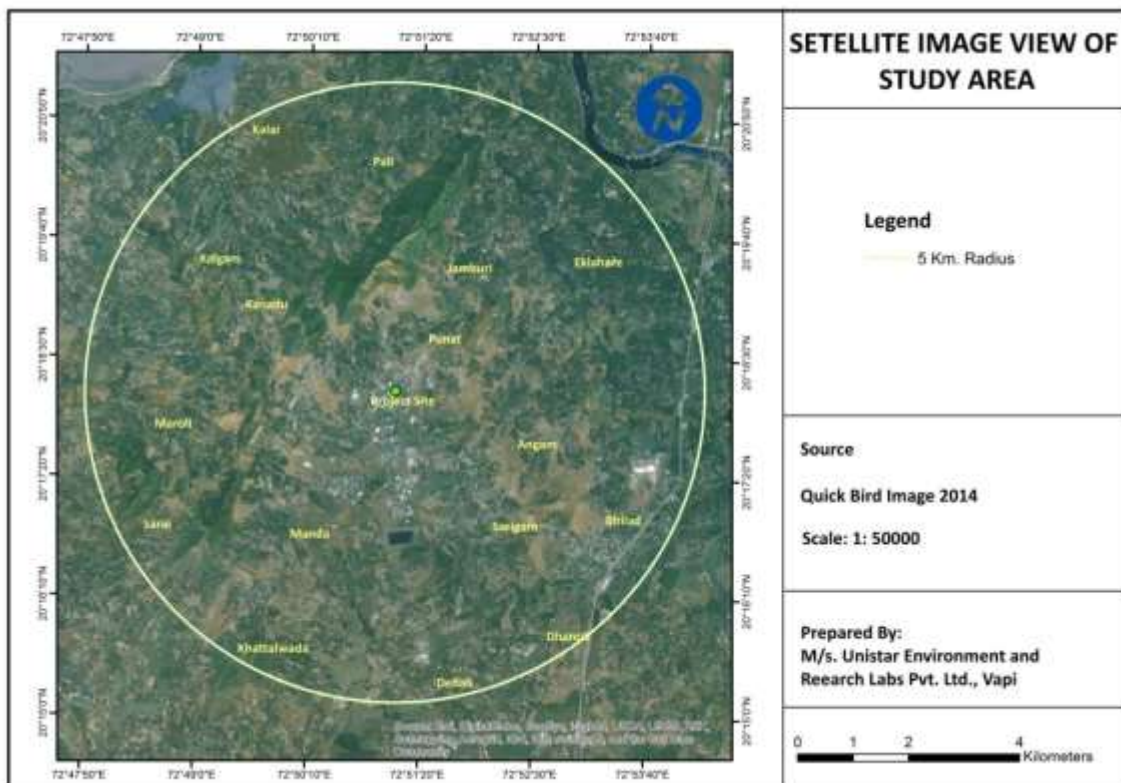
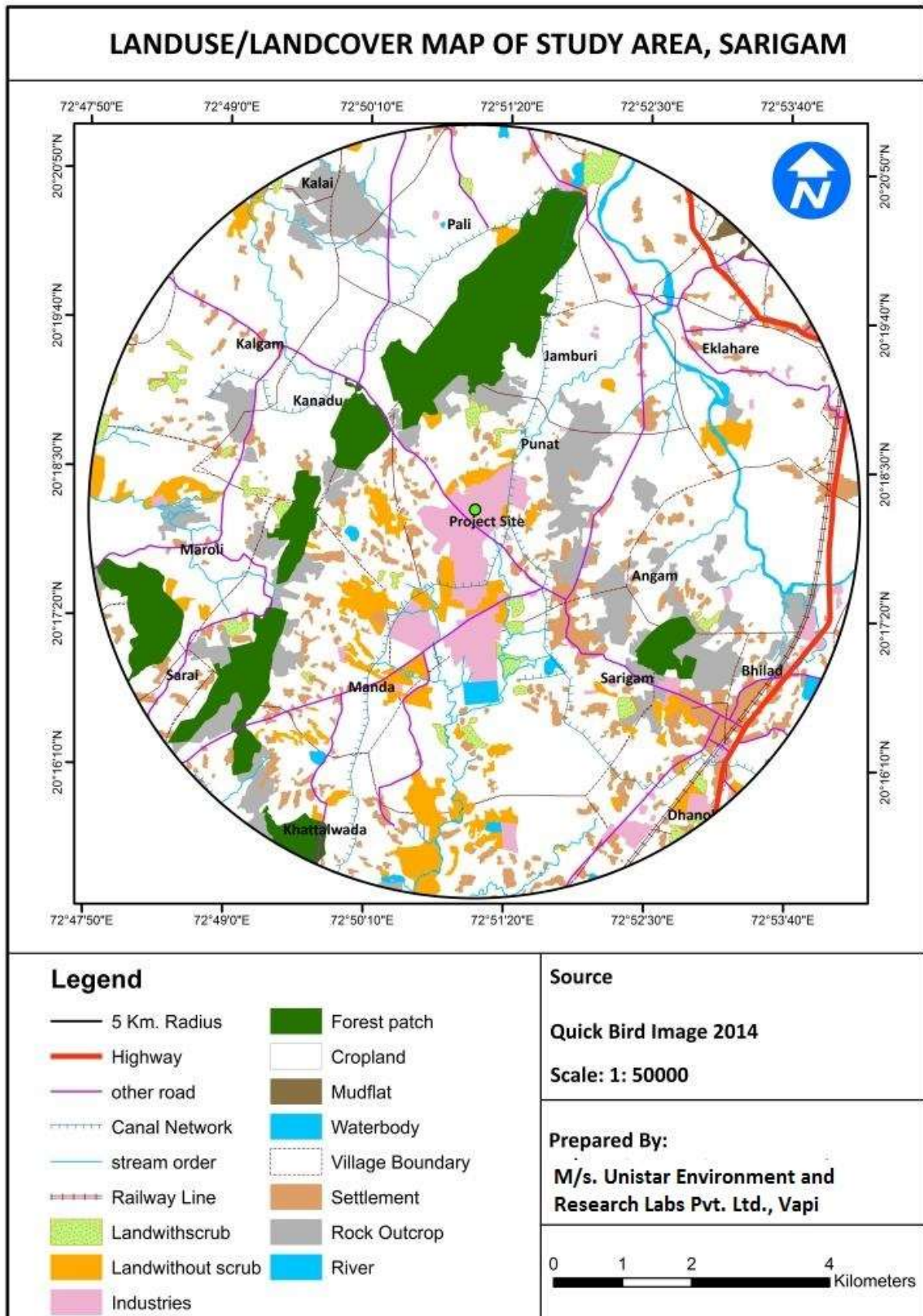


Fig. 3.6: LULC Map of Study Area



3.2.1.5 Soil Quality

Surface soil samples were collected from six locations within study area covering 5 km radial area from proposed site. The soil samples were collected once in study period in the month of December 2015 and the outcome of soil quality studies is tabulated in table given below.

The soil samples were collected from various locations within the 5 Km radial area from the project site. Within the study area, villages are situated in various directions and distance from the project site. Out of these villages few representative soil samples were collected for detailed characterization of the soil of the area. Representative surface soil samples were collected from five villages and one from the project site within 5 Km radial distance from the project site. Soil samples were collected from agricultural field these villages and project site from a depth of 10 to 20 cm below the soil surface to estimate the physic-chemical characteristics of the soil.

Table 3.6: Details of Soil sampling locations

Sr. No.	Stn code	Location	Latitude	Longitude	Elevation (in m)	Approx. Arial Dist. from Proj. Site(in Km)
1.	SS-01	Project site	20.284861°N	72.852269°E	30	0.00
2.	SS -02	Bhilad	20.285040°N	72.891759°E	24	4.68 (NE)
3.	SS -03	Punat	20.324464°N	72.873051°E	26	3.30 (N)
4.	SS -04	Kanadu	20.318436°N	72.837719°E	49	2.21 (NW)
5.	SS -05	Sarai	20.279647°N	72.812623°E	30	4.83 km (SE)
6.	SS -06	Dehali	20.266511°N	72.872394°E	39	4.61 km (SW)

The standard procedures were followed for soil sampling and analysis. The soils in the study area are brown to brownish black in colour and consist of coastal alluvium. The piedmonts at the base of the steep plateaus and dyke ridges are covered with thin soils, which support agriculture in very few areas. The river valley, wherever flat, has good quality soil and is mostly cultivated based on the availability of water. The river valley fills with thick alluvium provides the only area for cultivation. The area being of basaltic formation falls under the broad soil group of black clay soils. The transmission of water through similar parent material seems to have influenced the development of different physiographic characteristics of the soils in the area.

The area in between the hills with sloping lands contains dark yellowish brown to very dark greyish brown gravelly clay loam to clayey soils of shallow to moderate thickness. The dissected hill and steep slopes suffer from severe erosion hazards. The steep hill slopes are almost devoid of soil.

The prevailing climate in the area is Semi-arid to dry sub humid. The Soil texture of the study area varies from fine to moderate fine (i.e., Clayey). The soil type is deep clayey, cracking soil and high water retention capacity. Clay is the prominent texture class. Soils of study area has medium black sandy loam type soil which is highly suitable for crops sugarcane and paddy, in Kharif and chiku, tur, gram, wheat and vegetable in Rabi and Mango in Summer season.

The detailed quality of the collected soil samples are presented below in subsequent table.

Table 3.7: Soil Quality of Study Area (17th-18th December 2015)

Sr. No.	Parameters	Unit	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06
1.	Bulk Density	gm/ml	0.7687	0.9742	0.9725	0.9942	0.9259	0.8621
2.	Salinity	ppt	0.13	0.02	0.05	0.04	0.02	0.01
3.	Porosity	%	52	53	52	51	54	52
4.	Texture Class	-	Clay	Clay	Clay	Clay	Clay	Clay
	Silt	%	13	11	10	12	11	09
	Clay	%	79	78	82	78	81	82
	Sand	%	07	11	08	10	08	09
5.	pH(5% Sol ⁿ)	--	8.24	8.57	7.52	7.26	8.58	8.23
6.	EC	µs/cm	436	235.7	32.5	117.3	104.5	93.3
7.	CEC	meq/100gm Clay	25	22	24	22	23	24
8.	Sodium	mg/Kg	145.7	135.6	112.8	125.7	129.3	117.1
9.	Potassium	mg/Kg	50.8	38.2	44.1	30.2	36.3	40.2
10.	Nitrogen	mg/Kg	99.6	132.2	87.5	117.5	172	124
11.	Magnesium	mg/Kg	19.5	10.8	8.7	10.8	10.8	6.5
12.	Phosphorous	mg/Kg	2525	2600	1155	4385	2760	2925
13.	SAR	--	66.5	77.5	66.2	77.6	77.4	72.2
14.	WHC	ml/100 gm	43	45	42	45	47	44
15.	Iron as Fe	mg/Kg	346.95	407.9	356.95	628.55	381.65	367.5
16.	Copper as Cu	mg/Kg	0.4823	0.6584	0.4704	1.0341	0.6719	0.6431
17.	Zinc as Zn	mg/Kg	0.594	0.680	0.498	0.761	0.553	0.446
18.	Manganese as Mn	mg/Kg	7.590	9.465	5.168	8.485	12.548	9.370
19.	Nickel as Ni	mg/Kg	0.4391	0.6875	0.4584	0.3959	0.4471	0.4321
20.	Mercury as Hg	mg/Kg	N.D.	-	-	-	-	-

Source : UERL Laboratory division, Vapi

Note: EC=Electrical Conductivity, CEC=Cation Exchange Capacity, SAR= Sodium Absorption Ration, WHC=Water Holding Capacity, ppt= Parts per thousand

In the project site the crucial factor was the presence or absence of traces of mercury. And the project site soil sample result reveals that there is no traces of mercury contamination found in the soil. The soil texture of the project site and the study area is clay in nature.

Porosity of the soil in the study area ranges from 51 to 54 % of the soil volume. Hence, it facilitates in the supply of oxygen to organisms decomposing organic matter, humus, and plant roots; as well as the pore space allows the movement and storage of water and dissolved nutrients.

The pH of the soil in the study area is moderately alkaline in reaction having pH in the range of 7.26 to 8.57. This high pH reduces the availability of phosphorus and most macronutrients.

The CEC of the soils in the study area is <30 meq/100 gm. Since the CEC is <30 meq/100 gm , the nutrients are more subject to leaching leading to the possibility of inadequate quantities of nutrient reserves in the soil. CEC is a good indicator of soil quality and productivity. CEC is a relative measure of the nutrient-holding capacity of a soil.

3.2.2 WATER ENVIRONMENT

3.2.2.1 Geohydrology

As per hydro geological investigation, water level near the Project area ranges from 6 m to 18 m below ground level (April, 2015) depending upon topography. The average seasonal fluctuation of water level in the area was reported to be 0.50 m during the year of study and information gathered during hydro geological inventory of the area. In the area, groundwater occurs under unconsolidated to consolidated conditions and is tapped by dug well & tube wells. The yield of these tube wells ranges from 73 to 78 m³/day @ 6 m³/hour for average 12 hours intermittent pumping in a day. The drawdown in the wells is varying from 0.25 to 0.5 m on different pumping rates. The recovery of the wells is varying from one to one and half hour. The general ground water flow direction in the site area is towards northwest.

Table 3.8: Hydro-geological well Inventory of the existing well around the site

Sampling Location	Coordinates of Location	Type of Well	Depth (in m)	Water Level (post monsoon)		Yield (m ³ /hr)	Yield (m ³ /day)	TDS (mg/L)
				mbgl	amsl			
TW-1	20.280314°N 72.860042°E	25	8	29	34	6.14	147.36	270
OW-2	20.295127°N 72.843445°E	8	4 m	33	38	-	-	410
GW-3	20.287821°N 72.861910°E	22	8	34	39	6.53	156.72	440
CANAL-4	20.286344°N 72.839139°E	2	2.8*1.25*5m	-	33	-	-	200

In the area mainly two hydro geological units are present and having different groundwater potential are as follows:

Soil & Alluvium: During pre-monsoon visit and well inventory (open dug well) shows the general water level less than 5-6m meters at most of the places. In the region tube wells were also intervention and most of the tube well attaining the depth of 18-19 meters. There was high discharge from location to location (secondary data) 30 to 70 m³/day, it shows underground development in the area is safe.

Basalt: Basalt aquifer zone having the same water level 5-19 meter in pre monsoon period. A number of dug wells and tube wells are present. Discharge observed (secondary data) is 40-75 m³/day.

3.2.2.2 Water Quality of Study Area

The details of the baseline study for the proposed activities at M/s. Heni Drugs Pvt. Ltd. related to water environment and in the surrounding villages; the water quality survey has been planned through identification of water resources and appropriate sampling locations for both surface and ground water in study area depending on topography, landuse, surface runoff as well as natural and manmade drainage/irrigation canal systems. The prevailing status of water quality has been assessed during winter season (December 2015).

The surface water sampling has been done at three locations. One from Damanganga Main canal and two from Darotha River at Bhilad and Punat. The groundwater sampling has been done at 5 locations well distributed to represent the study area. Sampling locations for surface water and groundwater quality monitoring are shown in Fig. 3.1 and are enlisted in Table 3.9.

As described in earlier section of this chapter, the standard methods (APHA, AWWA - latest ed.) prescribed for surface and groundwater sampling preservation as well as the analytical procedures for individual parameter is followed in this study. The samples were collected on 17th and 18th December 2015 and results are enlisted in Table 3.10 & 3.11.

Table 3.9: Details of Water Sampling Locations

Sr. No.	Stn code	Location	Latitude	Longitude	Elevation (in m)	Arial Dist. from Proj. Site (in Km)
Surface Water Sampling Locations:						
1.	SW-01	Damanganga Main Canal	20.279561°N	72.836203°E	32	2.98 (SW)
2.	SW-02	Darotha River-Punat	20.316779°N	72.883485°E	22	3.70 (NE)
3.	SW-03	Darotha River-Bhilad	20.296472°N	72.890944°E	21	4.21 (E)
Ground Water Sampling Locations:						
1.	GW-01	Bhilad- Hand Pump	20.284075°N	72.889870°E	27	4.56 (NE)
2.	GW-02	Punat -Hand Pump	20.321229°N	72.865060°E	29	2.57 (N)
3.	GW-03	Kanadu- Open Well	20.318777°N	72.835795°E	36	2.37 (NW)
4.	GW-04	Sarai -Hand Pump	20.278402°N	72.812901°E	43	4.67 (SE)
5.	GW-05	Dehali- Hand Pump	20.266511°N	72.872394°E	32	4.61 (SW)

Table 3.10: Surface water Quality of Study Area:

Sr. No.	Parameters	Unit	SW-01	SW-02	SW-03	Limit as per IS:10500-2012
1.	Colour (Pt-Co Scale)	Unit	20	10	10	5 Hazen
2.	Odour	--	Unobjectionable	Unobjectionable	Unobjectionable	Unobj.
3.	Turbidity	NTU	0.1	0.1	0.1	1 NTU
4.	pH	--	8.35	8.26	8.19	6.5 – 8.5
5.	Temperature	^o C	30	29	29	--
6.	TH as CaCO ₃	mg/lit.	106.8	160.2	151.3	200
7.	TDS	mg/lit.	164	294	236	500
8.	Calcium as Ca	mg/lit.	17.8	30.3	24.9	75
9.	Magnesium as Mg	mg/lit.	15.1	20.5	20.6	30
10.	Total Alkalinity	mg/lit.	92	138	128.8	200
11.	Chloride as Cl ⁻	mg/lit.	29.2	80.8	36.3	250
12.	Sulphate as SO ₄ ⁻²	mg/lit.	8.2	13.6	9.2	200
13.	Nitrate as NO ₃	mg/lit.	N.D.(MDL:0.1)	N.D.(MDL:0.1)	0.2	45
14.	Fluoride as F	mg/lit.	N.D.(MDL:0.15)	N.D.(MDL:0.15)	N.D.(MDL:0.15)	1.0
15.	Sodium	mg/lit.	4.6	28.7	17.7	--
16.	Potassium	mg/lit.	N.D.(MDL:1.0)	N.D.(MDL:1)	1.0	--
17.	Total Nitrogen	mg/lit.	N.D.(MDL:5.0)	N.D.(MDL:5.0)	N.D.(MDL:5.0)	--
18.	Total Phosphorous	mg/lit.	0.02	0.02	0.05	--
19.	Dissolved Oxygen	mg/lit.	6.8	6.2	6.7	--
20.	BOD	mg/lit.	N.D.(MDL:5.0)	N.D.(MDL:5.0)	N.D.(MDL:5.0)	--
21.	COD	mg/lit.	N.D.(MDL:5.0)	N.D.(MDL:5.0)	N.D.(MDL:5.0)	--
22.	PC	mg/lit.	N.D.(MDL:0.01)	N.D.(MDL:0.01)	N.D.(MDL:0.01)	0.001
23.	Lead as Pb	mg/lit.	N.D.(MDL:0.003)	N.D.(MDL:0.003)	N.D.(MDL:0.003)	0.01
24.	Arsenic	mg/lit.	N.D.(MDL:0.01)	N.D.(MDL:0.01)	N.D.(MDL:0.01)	0.01
25.	Cadmium	mg/lit.	N.D.(MDL:0.001)	N.D.(MDL:0.001)	N.D.(MDL:0.001)	0.003
Microbiological Test						
26.	Total Coliform	CFU/100 ml	Absent	Absent	93	Absent
27.	E. Coli	CFU/100 ml	Absent	Absent	72	Absent

Source : UERL Laboratory division, Vapi

Note:

- BDL = Below detection limit, TH=Total Hardness, TDS= Total Dissolved Solid, BOD=Bio-Chemical Oxygen, COD=Chemical Oxygen Demand, PC= Phenolic Compound, Unobj.= Unobjectionable, , MDL= Method Detection Limit
- (MDL: Fluoride-0.15 mg/lit, Total Nitrogen-5.0 mg/lit, BOD-5mg/lit, PC-0.01mg/lit, Lead-0.003 mg/lit, Arsenic-0.01 mg/lit, Cadmium-0.001 mg/lit)

As per the CPCB Guideline –designated best used classification, the results of bacteriological analysis of all surface water samples found total Coliform and E. coli exceeding the limit, thus it is not covered in quality class A (Drinking water source without conventional treatment but with chlorination). But, as per quality class B best used for outdoor bathing only. If used for drinking purpose, it requires chlorination.

Table 3.11: Ground water Quality of Study Area:

Sr. No.	Parameters	Unit	GW-01	GW-02	GW-03	GW-04	GW-05	Limit as per IS:10500-2012
1.	Colour (Pt-Co Scale)	Unit	10	<5	<5	10	10	5 Hazen
2.	Odour	-	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
3.	Turbidity	NTU	0.1	1	0.1	0.1	0.1	1 NTU
4.	pH	--	7.09	7.28	6.93	7.25	7.28	6.5 – 8.5
5.	Temperature	⁰ C	29	29	29	30	29	--
6.	Total Hardness as CaCO ₃	mg/lit.	275.9	400.5	213.6	142.4	142.4	200
7.	Total Dissolved Solid	mg/lit.	460	668	364	226	260	500
8.	Calcium as Ca	mg/lit.	71.3	117.7	42.8	24.9	40.0	75
9.	Magnesium as Mg	mg/lit.	23.8	25.9	28.9	20.5	14.9	30
10.	Total Alkalinity	mg/lit.	234.6	266.8	207	128.8	147.2	200
11.	Chloride as Cl ⁻	mg/lit.	51.9	97.3	38.9	30.5	22.7	250
12.	Sulphate as SO ₄ ⁻²	mg/lit.	27.8	66.9	8.7	6.0	8.2	200
13.	Nitrate as NO ₃	mg/lit.	2.5	3.3	N.D.	N.D.	0.4	45
14.	Fluoride as F	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	1.0
15.	Sodium	mg/lit.	19.7	27.5	17.6	12.2	14.9	--
16.	Potassium	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	--
17.	Total Nitrogen	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	--
18.	Total Phosphorous	mg/lit.	0.01	0.01	0.03	0.04	0.02	--
19.	Dissolved Oxygen	mg/lit.	4.4	4.4	3.9	4.0	3.7	--
20.	Bio-Chemical Oxygen	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	--
21.	Chemical Oxygen Demand	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	--
22.	Phenolic Compound	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	0.001
23.	Lead as Pb	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	0.01
24.	Arsenic	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	0.01
25.	Cadmium	mg/lit.	N.D.	N.D.	N.D.	N.D.	N.D.	0.003
Microbiological Test								
26.	Total Coliform	CFU/100 ml	Abs	Abs	04	Abs	Abs	Absent
27.	E. Coli	CFU/100 ml	Abs	Abs	01	Abs	Abs	Absent
Source : UERL Laboratory division, Vapi								

Note:

- BDL = Below Detection Limit , Unobj.= Unobjectionable, , MDL= Method Detection Limit
- (MDL: Turbidity- 0.1 NTU, Fluoride-0.15 mg/lit, Nitrate-0.1 mg/L, Potassium-1.0 mg/L, Total Nitrogen- 5.0 mg/lit, BOD-5mg/lit, COD-5.0 mg/lit, PC-0.01mg/lit, Lead-0.003 mg/lit, Arsenic-0.01 mg/lit, Cadmium-0.001 mg/lit)

Results Obtained for physicochemical characteristics of groundwater during summer season are summarized in Tables 3.11. As per IS -10500- 2012:

- The general water quality parameter like total alkalinity and total hardness as CaCO₃ present in GW-01, GW-02& GW-03 is exceeding the value.
- As per the major ions present in ground water, it is observed that in GW-02 calcium is present in slightly excess and other ions are in within limit

- As per the metals present in ground water i.e., lead, Arsenic, cadmium etc. in all ground water samples all metals are BDL (below detectable limit)
- The results of bacteriological analysis of ground water samples indicates that in all samples total Coliform and E. coli are not found.

As per the above interpretation, if water uses for drinking purpose it requires only primary treatment.

3.2.3 MICRO METEOROLOGY

Site specific micrometeorological data for the project site have been generated at UniStar Environment & Research Laboratories Pvt. Ltd, Vapi GIDC area, which is 9.00 km away from the project site in the direction of South-East. The data were collected on hourly basis throughout the study period viz.; November 2015 to January 2016. The details of the micrometeorology of the site are presented in subsequent paragraphs.

3.2.3.1 Humidity

Average relative humidity of the site area is recorded as 61.69 % with minimum 23.00 % and maximum 99.00 %.

3.2.3.2 Temperature

Maximum temperature during the study period was noticed on 43.35 °C whereas the minimum was recorded on 20.05 °C. The average temperature for the study period was recorded to be 30.91 °C.

3.2.3.3 Rainfall

There was no rainfall during the study period in the study area. However, historical rainfall data for year 2009-2013, as listed on website of IMD indicates that annual rainfall in the region of has been recorded to be around 2100 mm.

3.2.3.4 Mixing Height

Mixing height of the area been estimated from the primary micrometeorological data using RAMMET VIEW developed by Lakes Environmental Software. The estimated hourly average maximum rural mixing height is found to be 1642.44 m. Minimum hourly average rural mixing height is found to be 277.02 m. The seasonal daily average rural mixing height is found to be 1376.13m.

3.2.3.5 Wind Pattern

The data of wind pattern collected during the study period indicates that the wind was blowing dominantly from 238 Degree (NNE) with 43% Hrs. out of 2208 total hours. The average wind speed was noticed to be around 3.04 m/sec. Maximum wind speed has been noticed to be 21.61 m/s. During study period, 51 calm hours has been noticed. The wind speed was mostly noticed between 2.1-3.6 m/s for about 989 Hrs. (44.79%) out of 2157 non-calm Hours. The details of wind pattern in form of wind frequency distribution are presented below in tabular

form as well as in graphical illustration. The wind rose diagram is also presented in subsequent figure.

Table.3.12: Wind Frequency Distribution Data (Source: Weather Station, Primary Data, UERL)

Directions	Wind Classes (m/s)						Total
	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	
337.5 - 22.5	0.0625	0.08197	0.09194	0.00136	0	0	0.23777
22.5 - 67.5	0.09058	0.10553	0.07609	0.00045	0	0	0.27264
67.5 - 112.5	0.08424	0.08469	0.04574	0	0	0	0.21467
112.5 - 157.5	0.02446	0.04257	0.024	0.00091	0	0	0.09194
157.5 - 202.5	0.00906	0.00679	0.00543	0.00045	0	0	0.02174
202.5 - 247.5	0.00951	0.00725	0.00543	0	0	0	0.02219
247.5 - 292.5	0.01449	0.01178	0.00725	0	0	0	0.03351
292.5 - 337.5	0.00996	0.02219	0.03804	0	0	0	0.0702
Sub-Total	0.3048	0.36277	0.29393	0.00317	0	0	0.96467
Calms							0.02582
Missing/Incomplete							0.00951
Total							1

Fig.3.7: Wind Frequency Distribution Chart:

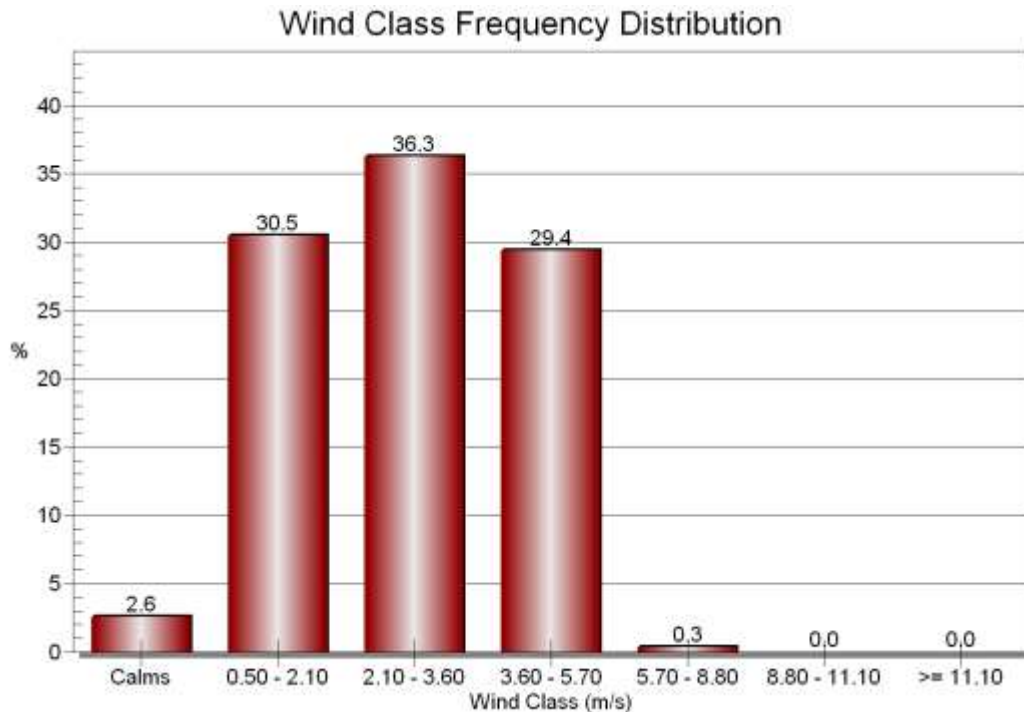
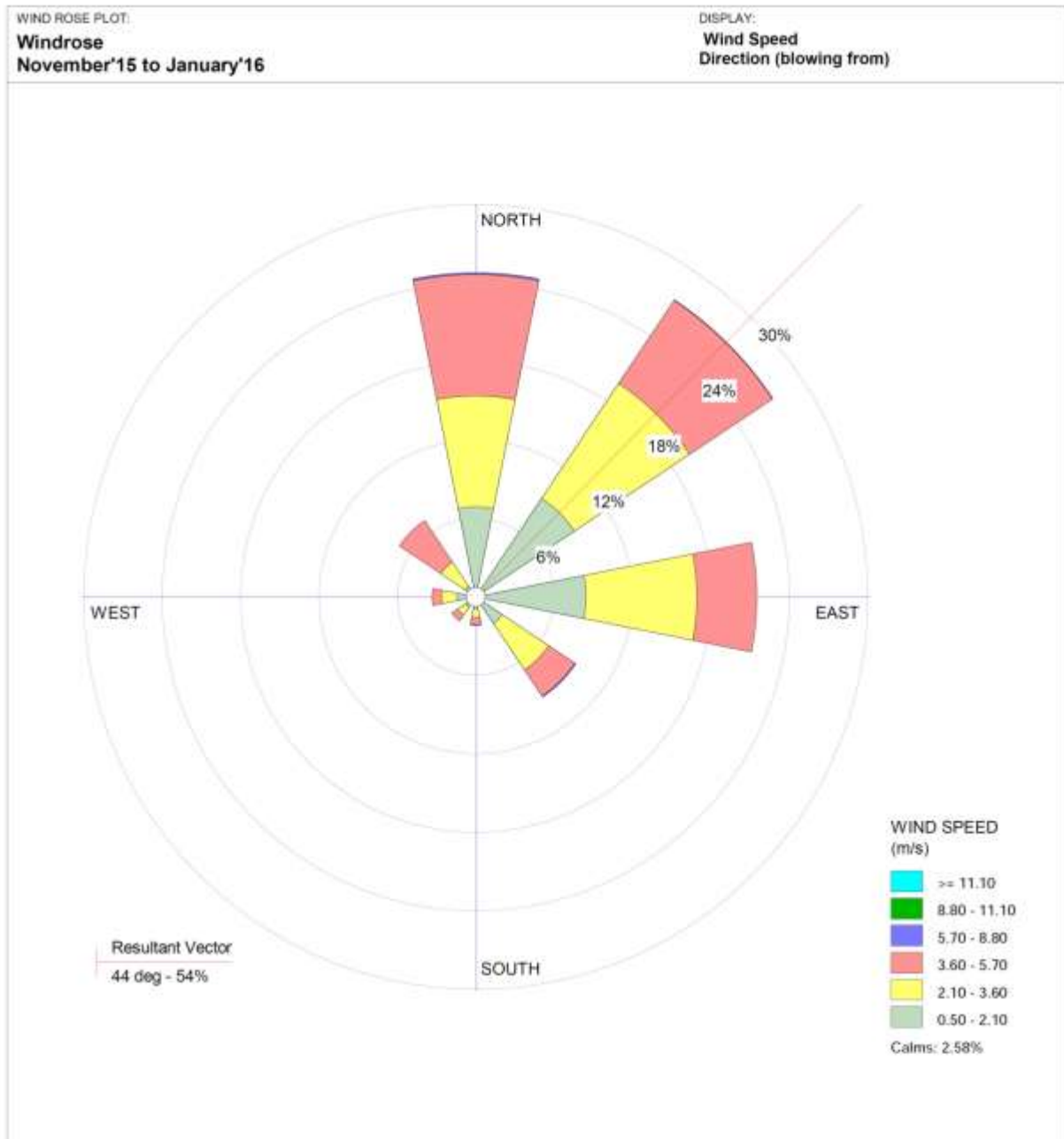


Fig.3.8: Wind Rose Diagram



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 11/1/2015 - 00:00 End Date: 1/31/2016 - 23:00	M/s. Heni Drugs Pvt. Ltd.	
	CALM WINDS:	MODELER:	
	2.58%	M/s. Unistar Environment & Research Labs Pvt. Ltd.	
	AVG. WIND SPEED:	TOTAL COUNT:	PROJECT NO.:
	2.70 m/s	2208 hrs.	EIA

WRPLOT View - Laksee Environmental Software

3.2.4. AIR ENVIRONMENT

As tabulated in earlier section of this chapter, the Ambient Air Quality Monitoring conducted at 6 locations (i.e. 1 location is within the Project site & 5 locations are outside the Project site) within the study area. The details of monitoring locations are presented below in subsequent table as ready reference.

One seasonal ambient air monitoring data was collected during the study period of March 2015 to May 2015.

The parameters monitored for the ambient air quality monitoring are PM₁₀, PM_{2.5}, SO₂, NO_x, and CO. PM₁₀, PM_{2.5}, SO₂ and NO_x have been monitored on 24 hourly basis and CO has been monitored twice in a week on hourly basis at each location.

Respirable dust sampler with gaseous sampling attachment and fine particulate sampler were used for monitoring of PM₁₀, PM_{2.5}, SO₂ and NO_x.

CO was monitored with the help of Gas analyser.

The outcomes of the Ambient Air Quality assessment for the selected locations are presented below in tabular form.

Table 3.13: Ambient Air Monitoring Locations

Sr. No.	Stn code	Location	Latitude	Longitude	Elevation (in m)	Arial Dist. from Proj. Site (in Km)
1.	AQ--01	Project Site	20.303067°N	72.851107°E	31.00	0.0 km
2.	AQ--02	Bhilad	20.289052° N	72.892548° E	21.00	4.59 km (NE)
3.	AQ--03	Punat	20.313300° N	72.861924° E	35.00	1.67 km (N)
4.	AQ--04	Kanadu	20.319878° N	72.832715° E	32.00	2.67 km (NW)
5.	AQ--05	Sarai	20.281406° N	72.815187° E	53.00	4.45 km (SE)
6.	AQ--06	Dehali	20.265012° N	72.870490° E	31.00	4.71 km (SW)

During the study period major direction of the wind blowing from was noticed South-West direction and the average wind speed was observed 2.71 m/s.

Table 3.14: Ambient Air Quality of Study Area

Monitoring Location	Parameter	PM10 µg/m ³	PM2.5 µg/m ³	SO ₂ µg/m ³	NO _x µg/m ³	CO mg/m ³	VOC ppm	Hg µg/m ³
Project Site (AQ1)	Min	71.00	23.00	13.50	16.40	0.08	3.70	N.D.
	Max	98.00	41.00	18.10	22.20	0.20	15.50	N.D.
	Avg	84.08	30.54	15.71	19.41	0.16	10.56	N.D.
	98%	96.62	40.08	17.69	21.88	0.20	15.35	N.D.
Bhilad (AQ2)	Min	64.00	19.00	12.00	15.10	0.08	BDL	N.D.
	Max	95.00	34.00	15.10	17.80	0.20	BDL	N.D.
	Avg	78.46	25.08	13.22	16.38	0.14	BDL	N.D.
	98%	93.62	33.54	14.82	17.57	0.20	BDL	N.D.
Punat (AQ3)	Min	47.00	12.00	10.70	13.50	0.02	BDL	N.D.
	Max	66.00	24.00	13.10	17.30	0.10	BDL	N.D.
	Avg	57.29	18.92	12.04	15.48	0.05	BDL	N.D.
	98%	65.54	24.00	12.96	16.93	0.10	BDL	N.D.
Kanady (AQ4)	Min	52.00	13.00	11.60	12.30	0.02	BDL	N.D.
	Max	78.00	28.00	14.30	17.20	0.12	BDL	N.D.
	Avg	63.21	20.96	12.68	15.48	0.06	BDL	N.D.
	98%	76.62	27.08	14.21	17.15	0.11	BDL	N.D.
Sarai (AQ5)	Min	46.00	14.00	11.60	14.80	0.02	BDL	N.D.
	Max	70.00	25.00	14.20	17.10	0.08	BDL	N.D.
	Avg	57.71	19.38	12.77	15.92	0.04	BDL	N.D.
	98%	67.70	25.00	14.02	17.01	0.07	BDL	N.D.
Daheli (AQ6)	Min	51.00	16.00	11.50	13.10	0.02	BDL	N.D.
	Max	75.00	28.00	15.20	17.30	0.08	BDL	N.D.
	Avg	61.54	22.67	12.97	15.63	0.04	BDL	N.D.
	98%	74.54	28.00	15.15	17.25	0.08	BDL	N.D.
NAAQS (2009)	24 Hr. Avg.	100.00	60.00	80.00	80.00	2.0*	-	-

Source: Source : UERL Laboratory division, Vapi

Note: * means 1 hr. avg. ; Detection limit of VOC is 0.1 ppm;

As presented in above table, there is no sign of critical issue or pollution related with ambient air quality of the six studied location has been observed. At all location the pollutant levels were well below the limits prescribed in NAAQS, 2009.

3.2.5. AMBIENT NOISE

Ambient Noise level for the present EIA study has been done at six locations presented in subsequent table 3.15. The noise level was monitored once in study period at each location for one full day (24 Hrs.). The outcomes of the noise level monitoring are presented in table 3.16.

Table 3.15: Ambient Noise Monitoring Locations

Sr. No.	Stn code	Location	Latitude	Longitude	Elevation (in m)	Arial Dist. from Proj. Site (in Km)
1.	N1	Project Site	20.303067°N	72.851107°E	31.00	0.0 km
2.	N2	Bhilad	20.289052° N	72.892548° E	21.00	4.59 km (NE)
3.	N3	Punat	20.313300° N	72.861924° E	35.00	1.67 km (N)
4.	N4	Kanadu	20.319878° N	72.832715° E	32.00	2.67 km (NW)
5.	N5	Sarai	20.281406° N	72.815187° E	53.00	4.45 km (SE)
6.	N6	Dehali	20.265012° N	72.870490° E	31.00	4.71 km (SW)

Table 3.16: Ambient Noise Level in Study Area

Loc. Code	Location	Day Time			Night Time		
		Min dB (A)	Max dB (A)	Average db(A)	Min dB (A)	Max dB (A)	Average db(A)
N1	Project Site	62.11	66.06	64.08	49.50	54.03	51.76
N2	Bhilad	46.10	51.82	48.96	35.14	38.13	36.64
N3	Punat	49.36	54.77	52.06	36.74	41.41	39.08
N4	Kanadu	44.02	51.56	47.79	35.86	38.11	36.99
N5	Sarai	47.91	54.05	50.98	36.40	41.46	38.93
N6	Dehali	45.98	51.59	48.79	34.94	39.31	37.13
CPCB Standards							
Residential		-	-	75	-	-	45
Industrial		-	-	75	-	-	70

Source : UERL Laboratory division, Vapi

The noise levels at all locations were found well within the limits of Ambient Noise Level stipulated by CPCB. Slight higher night noise level is observed at Project site as the site is situated in industrial estate. No critical issue of noise level in the study area has been observed throughout the study period.

3.2.6. ECOLOGICAL ENVIRONMENT

Study of vegetation was carried out within 5 km radius around proposed site. Observations were made at different sampling points and qualitative as well as quantitative analysis of the vegetation was carried out.

Survey of Avifauna was carried out with the help of binocular and field identification guide. Information related to social forestry, tree plantation programs, indigenous fauna, endangered animals was also collected. Species of fishes available in the study area were also recorded.

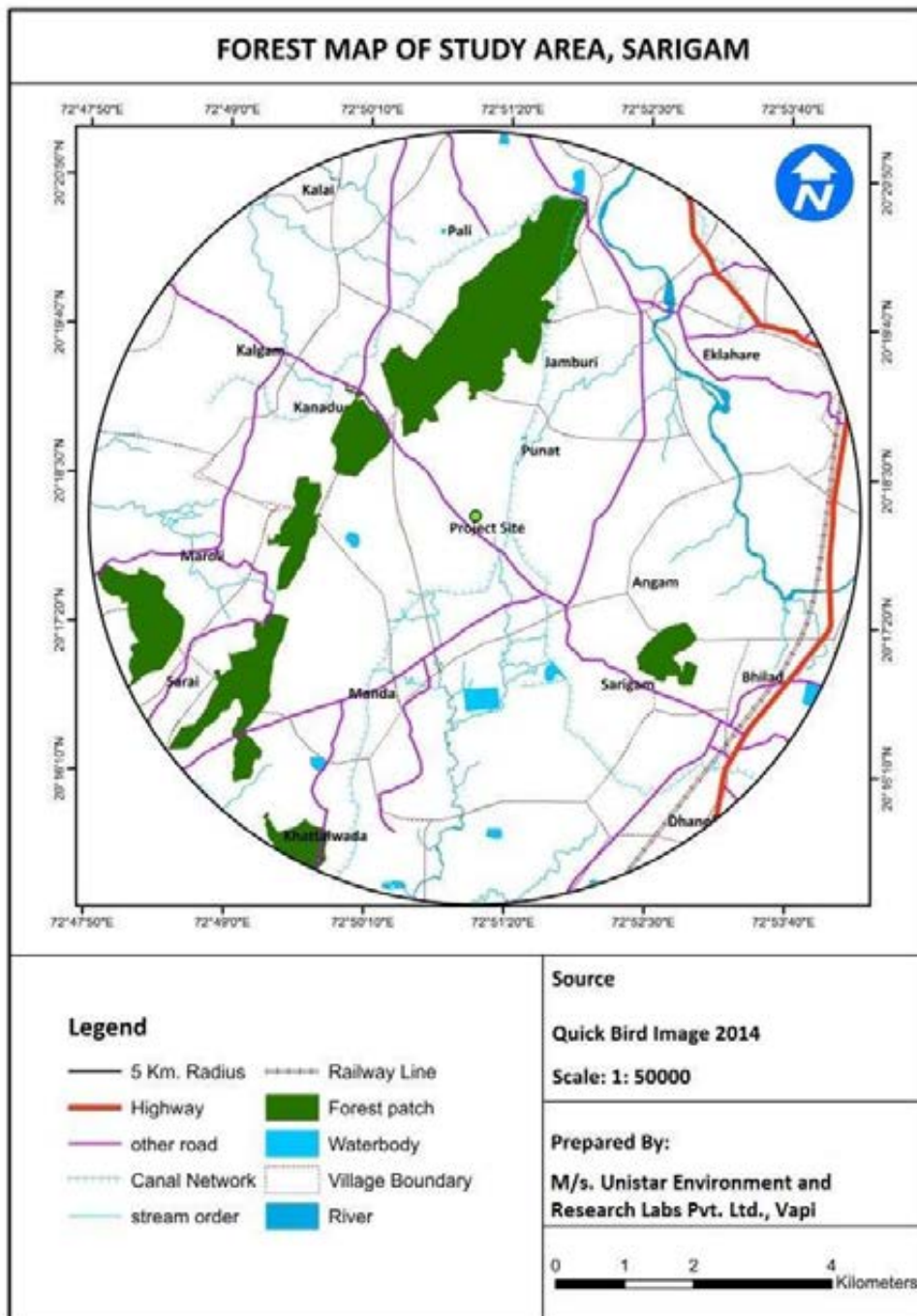
The vegetation mostly comprises of open scrub vegetation. Prosopis juliflora (Jangali Babul) is observed to be dominant in the study area. Some portion of the study area is occupied by rural area, agricultural field, social forestry and limited natural vegetation. Few patches of sparse forest come under study areas which are illustrated in the subsequent figure presenting Forest Cover of study area.

Plants and animals are subjected to many environmental stressors, including the diverse array of industrial activities and industrial chemicals in the environment. The biotic composition in the study region, in particular to Umbergaon taluka indicates richness in species diversity. The details of the ecological layout of the study area are as follows.

3.2.6.1. Ecologically Important/Eco Sensitive Area:

The study area mostly comprises of industrial area since the manufacturing unit is located within the GIDC notified industrial area of Sarigam. The rest of the area comprises of natural landscape, residential area, agricultural land, barren land (disturbed and degraded land). No ecologically important or eco sensitive area falls within the study area.

Fig.3.9: Forest Cover of Study Area



3.2.6.2. Flora of the Study area:

The zone of Umbergoan Taluka shows fairly rich in plant biodiversity having more of annual and perennial herbaceous vegetation. The small hillocks existing in the perimeter of the proposed project site are already degraded forest patches and mainly comprised of planted trees and shrubs. Among the plant biodiversity none of the species belongs to IUCN Red List as well as Schedule species as per Wildlife list.

From the observations of field survey and also from database of the pattern and type of vegetation clearly indicate that the zone is fairly good in plant biodiversity. Ecologically the area has residual impression of forest in the past. The conservation management practice by forest department over the hilly landscape has helped to regain some good forest patches.

The following Tables have listed occurrence of plant species. Biotic interactions among species and abiotic factors (including edaphic and climatic characteristics) influence plant assemblages in many complex ways that lead to the expression of differences at the species, community, and ecosystem levels. Disturbances within the area differ from place to place, the areas near and within RF are having rich species distribution compared to the areas under various land-use.

Following table show the list of reported and observed plant species in the study area:

Table 3.17: List of Major Flora

S. No.	Scientific name	Family	IUCN status
1.	Tectona grandis L.f.	Lamiaceae	LC
2.	Terminalia tomentosa	Combretaceae	LC
3.	Adina cordifolia	Rubiaceae	LC
4.	Ougeinia dalbergioides	Fabaceae	LC
5.	Albizia lebbeck	Leguminosae	LC
6.	Erythrina variegata L.	Leguminosae.	LC
7.	Lagerstroemia lanceolata	Lythraceae	LC
8.	Lannea coromandelica	Anacardiaceae	LC
9.	Garuga pinnata	Burseraceae	LC
10.	Madhuca indica	Sapotaceae	LC
11.	Acacia farnesiana var. farnesiana	Fabaceae	LC
12.	Acacia catechu	Fabaceae	LC
13.	Bridelia retusa	Phyllanthaceae	LC
14.	Mitragyna parvifolia	Rubiaceae	LC
15.	Bombax ceiba	Fabaceae	VU
16.	Sterculia urens	Malvaceae	LC
17.	Anogeissus latifolia	Combretaceae	LC
18.	Heterophragma quadricolor	Bignoniaceae	LC
19.	Holoptelea integrifolia	Ulmaceae	LC
20.	Terminalia bellerica	Combretaceae	LC
21.	Bauhinia variegata	Fabaceae	LC
22.	Grewia tiliaefolia	Malvaceae	LC
23.	Dalbergia latifolia	Leguminosae	VU
24.	Mangifera indica	Anacardiaceae	LC
25.	Gmelina arborea	Lamiaceae	LC

S. No.	Scientific name	Family	IUCN status
26.	Syzygium cumini	Myrtaceae	LC
27.	Cassia fistula	Fabaceae	LC
28.	Ficus glomerata	Moraceae	LC
29.	Mimusops elengi	Sapotaceae	LC
30.	Aegle marmelos	Rutaceae	LC
31.	Pongamia pinnata	Fabaceae	LC
32.	Carissa carandas	Apocynaceae	LC
33.	Cordia dichotoma	Boraginaceae	LC
34.	Semecarpus anacardium	Anacardiaceae	LC
35.	Plumeria alba	Apocynaceae	LC
36.	Borassus flabellifer	Arecaceae	LC
37.	Thespesia populnea	Malvaceae	LC
38.	Samanea saman	Fabaceae	LC
39.	Pandanus odoratissimus	Pandanaceae	LC
40.	Tamarindus indica	Fabaceae	LC
41.	Phoenix sylvestris	Arecaceae	LC
42.	Thevetia peruviana	Apocynaceae	LC
43.	Hyphaene dichotoma	Arecaceae	NT
44.	Typha angustifolia	Typhaceae	LC
45.	Casuarina equisetifolia	Casuarinaceae	LC
46.	Ficus hispida	Moraceae	LC
47.	Polyalthia longifolia	Annonaceae	LC
48.	Mimusops hexandra	Sapotaceae	LC
49.	Achras sapota	Sapotaceae	LC
50.	Anthocephalus cadamba	Rubiaceae	LC
51.	Gliricidia sepium	Fabaceae	LC

Table 3.18: List of Wildly Occurring Flora

S. No.	Scientific name	Family
1.	Blepharis repens	Acanthaceae
2.	Gantelbua urens	Acanthaceae
3.	Haplanthus tentaculatus	Acanthaceae
4.	Hygrophila auriculata	Acanthaceae
5.	Rungia pectinata	Acanthaceae
6.	Rungia repens	Acanthaceae
7.	Alternanthera pungens	Amaranthaceae
8.	Aerva sanguinolenta	Amaranthaceae
9.	Aerva lanata	Amaranthaceae
10.	Achyranthes aspera	Amaranthaceae
11.	Amaranthus blitum	Amaranthaceae
12.	Amaranthus spinosus	Amaranthaceae
13.	Amaranthus tenuifolius	Amaranthaceae
14.	Amaranthus viridis	Amaranthaceae
15.	Celosia argentea	Amaranthaceae
16.	Chenopodium album	Amaranthaceae
17.	Chenopodium murale	Amaranthaceae

S. No.	Scientific name	Family
18.	Digera muricata	Amaranthaceae
19.	Nothosaerva brachiata	Amaranthaceae
20.	Ageratum conyzoides	Asteraceae
21.	Bidens biternata	Asteraceae
22.	Blumea belangeriana	Asteraceae
23.	Blumea eriantha	Asteraceae
24.	Blumea lacera	Asteraceae
25.	Blumea membranacea	Asteraceae
26.	Blumea obliqua	Asteraceae
27.	Caesulia axillaris	Asteraceae
28.	Eclipta prostrata	Asteraceae
29.	Glossocardia bosvallea	Asteraceae
30.	Gnaphalium indicum	Asteraceae
31.	Goniocaulon indicum	Asteraceae
32.	Trianthema portulacastrum	Aizoaceae
33.	Grangea maderaspatana	Asteraceae
34.	Launaea procumbens	Asteraceae
35.	Sclerocarpus africanus	Asteraceae
36.	Sphaeranthus indicus	Asteraceae
37.	Tridax procumbens	Asteraceae
38.	Vernonia cinerea	Asteraceae
39.	Vicoa indica	Asteraceae
40.	Coldenia procumbens	Boraginaceae
41.	Heliotropium indicum	Boraginaceae
42.	Heliotropium supinum	Boraginaceae
43.	Trichodesma amplexicaule	Boraginaceae
44.	Trichodesma zeylanicum	Boraginaceae
45.	Lepidium sativum	Brassicaceae
46.	Roripa indica	Brassicaceae
47.	Vaccaria pyramidata	Caryophyllaceae
48.	Cleome viscosa	Cleomaceae
49.	Commelina benghalensis	Commelinaceae
50.	Commelina diffusa	Commelinaceae
51.	Murdannia nudiflora	Commelinaceae
52.	Cuscuta chinensis	Convolvulaceae
53.	Cuscuta reflexa	Convolvulaceae
54.	Ipomoea fistulosa	Convolvulaceae
55.	Ipomoea indica	Convolvulaceae
56.	Merremia gangetica	Convolvulaceae
57.	Merremia tridentate	Convolvulaceae
58.	Merremia vitifolia	Convolvulaceae
59.	Cyperus brevifolius	Cyperaceae
60.	Cyperus compressus	Cyperaceae

S. No.	Scientific name	Family
61.	Cyperus difformis	Cyperaceae
62.	Cyperus haspan	Cyperaceae
63.	Cyperus iria	Cyperaceae
64.	Cyperus rotundus	Cyperaceae
65.	Fimbristylis microcarpa	Cyperaceae
66.	Fimbristylis miliacea	Cyperaceae
67.	Scirpus lateriflorus	Cyperaceae
68.	Tacca leontopetaloides	Dioscoreaceae
69.	Bergia ammannioides	Elatinaceae
70.	Eriocaulon eleanorae	Eriocaulaceae
71.	Eriocaulon quinquangularis	Eriocaulaceae
72.	Acalypha ciliata	Euphorbiaceae
73.	Acalypha indica	Euphorbiaceae
74.	Chrozophora prostrate	Euphorbiaceae
75.	Chrozophora rottleri	Euphorbiaceae
76.	Euphorbia geniculata	Euphorbiaceae
77.	Euphorbia hirta	Euphorbiaceae
78.	Euphorbia parviflora	Euphorbiaceae
79.	Euphorbia rothiana	Euphorbiaceae
80.	Euphorbia thymifolia	Euphorbiaceae
81.	Aeschynomene indica	Fabaceae
82.	Alysicarpus bupleurifolius	Fabaceae
83.	Alysicarpus longifolius	Fabaceae
84.	Alysicarpus tetragonolobus	Fabaceae
85.	Cassia absus	Fabiaceae
86.	Cassia tora	Fabiaceae
87.	Crotalaria albia	Fabiaceae
88.	Crotalaria calycina	Fabiaceae
89.	Crotalaria filipes	Fabiaceae
90.	Crotalaria linifolia	Fabiaceae
91.	Crotalaria triquetra	Fabiaceae
92.	Cyathocline purpurea	Fabiaceae
93.	Desmodium dichotomum	Fabiaceae
94.	Desmodium gangeticum	Fabiaceae
95.	Goniogyna hirta	Fabiaceae
96.	Indigofera astragalina	Fabiaceae
97.	Indigofera cordifolia	Fabiaceae
98.	Indigofera oblongifolia	Fabiaceae
99.	Indigofera tinctoria	Fabiaceae
100.	Indigofera trita	Fabiaceae
101.	Medicago sativa	Fabiaceae
102.	Melilotus alba	Fabiaceae
103.	Melilotus indica	Fabiaceae

S. No.	Scientific name	Family
104.	Neptunia triquetra	Fabiaceae
105.	Psoralea corylifolia	Fabiaceae
106.	Smithia conferta	Fabiaceae
107.	Smithia sensitiva	Fabiaceae
108.	Tephrosia pumila	Fabiaceae
109.	Tephrosia purpurea	Fabiaceae
110.	Tephrosia strigosa	Fabiaceae
111.	Zornia gibbosa	Fabiaceae
112.	Canscora diffusa	Gentianaceae
113.	Enicostema hyssopifolium	Gentianaceae
114.	Exacum pedunculatum	Gentianaceae
115.	Hoppea dichotoma	Gentianaceae
116.	Hydrolea zeylanica	Hydroleaceae
117.	Leucas aspera	Lamiaceae
118.	Leucas biflora	Lamiaceae
119.	Leucas martinicensis	Lamiaceae
120.	Lindernia antipoda	Linderniaceae
121.	Lindernia ciliata	Linderniaceae
122.	Lindernia crustacean	Linderniaceae
123.	Lindernia multiflora	Linderniaceae
124.	Lindernia oppositifolia	Linderniaceae
125.	Lindernia parviflora	Linderniaceae
126.	Ammannia baccifera	Lythraceae
127.	Ammannia multiflora	Lythraceae
128.	Moschosma polystachyum	Lamiaceae
129.	Salvia plebeia	Lamiaceae
130.	Abutilon indicum	Malvaceae
131.	Corchorus aestuans	Malvaceae
132.	Corchorus capsularis	Malvaceae
133.	Corchorus fascicularis	Malvaceae
134.	Corchorus olitorius	Malvaceae
135.	Hibiscus panduraeformis	Malvaceae
136.	Hibiscus sabdariffa	Malvaceae
137.	Malachra capitata	Malvaceae
138.	Melochia corchorifolia	Malvaceae
139.	Sida acuta	Malvaceae
140.	Sida alba	Malvaceae
141.	Triumfetta rhomboidea	Malvaceae
142.	Triumfetta rotundifolia	Malvaceae
143.	Urena lobata	Malvaceae
144.	Cocculus hirsutus	Menispermaceae
145.	Martynia annua	Martyniaceae
146.	Mollugo pentaphylla	Molluginaceae

S. No.	Scientific name	Family
147.	Glinus lotoides	Molluginaceae
148.	Glinus oppositifolius	Molluginaceae
149.	Boerhavia diffusa	Nyctaginaceae
150.	Ludwigia perennis	Onagraceae
151.	Buchnera hispida	Orobanchaceae
152.	Centranthera indica	Orobanchaceae
153.	Ramphicarpa longiflora	Orobanchaceae
154.	Striga angustifolia	Orobanchaceae
155.	Striga asiatica	Orobanchaceae
156.	Biophytum sensitivum	Oxalidaceae
157.	Oxalis corniculata	Oxalidaceae
158.	Argemone mexicana	Papaveraceae
159.	Phyllanthus maderaspatensis	Phyllanthaceae
160.	Bacopa monnieri	Plantaginaceae
161.	Dopatrium junceum	Plantaginaceae
162.	Polygala chinensis	Polygalaceae
163.	Polygala erioptera	Polygalaceae
164.	Portulaca oleracea	Polygalaceae
165.	Brachiaria ramosa	Poaceae
166.	Cenchrus biflorus	Poaceae
167.	Chloris barbata	Poaceae
168.	Chloris quinquesetica	Poaceae
169.	Coix lachryma-jobi	Poaceae
170.	Cynodon dactylon	Poaceae
171.	Desmostachya bipinnata	Poaceae
172.	Dinebra retroflexa	Poaceae
173.	Echinochloa colonum	Poaceae
174.	Eragrostis diarrhena	Poaceae
175.	Eragrostis tenella	Poaceae
176.	Heteropogon contortus	Poaceae
177.	Ischaemum indicum	Poaceae
178.	Oryza rufipogon	Poaceae
179.	Setaria glauca	Poaceae
180.	Setaria tomentosa	Poaceae
181.	Themeda quadrivalvis	Poaceae
182.	Portulaca quadrifida	Portulacaceae
183.	Anagallis arvensis	Primulaceae
184.	Anotis foetida /Neanotis subtilis	Rubiaceae
185.	Borreria articularis	Rubiaceae
186.	Borreria stricta	Rubiaceae
187.	Cardiospermum halicacabum	Sapindaceae
188.	Sopubia delphinifolia	Scrophulariaceae
189.	Stemodia serrata	Scrophulariaceae

S. No.	Scientific name	Family
190.	Scrophulariaceae	Scrophulariaceae
191.	Sutera dissecta	Scrophulariaceae
192.	Physalis minima	Solanaceae
193.	Solanum nigrum	Solanaceae
194.	Solanum surattense	Solanaceae
195.	Typha angustata	Typhaceae
196.	Pouzolzia zeylanica	Urticaceae
197.	Vahlia digyna	Vahliaceae
198.	Phyla nodiflora	Verbenaceae
199.	Leea edgeworthii	Vitaceae
200.	Leea indica	Vitaceae
201.	Leea macrophylla	Vitaceae
202.	Asphodelus tenuifolius	Xanthorrhoeaceae
203.	Tribulus terrestris	Zygophyllaceae

3.2.6.3. Fauna of the Study area:**Amphibians**

During survey, six species of the amphibians were observed in the study area. Out of these six species, one endemic species namely Leith's Frog was observed in the study area which is endemic to Western Ghat region.

Mammals

During survey, the sighting of wild animals was negligible in the entire study area. The assessment of wild life fauna has been carried out on the basis of information collected from personal interviews with local peoples.

Reptiles

During field survey, common garden lizard, common skink, Garden Lizard was observed repeatedly in the study area. Further, as per the information collected from the villagers there are many snakes belonging to both poisonous and nonpoisonous category. However, the villagers informed that Dhaman or Oriental Ratsnake (*Ptyas mucosus*) found frequently in the study area.

Avifauna

During avifauna survey actual counts of birds were made following the standard survey technique by traveling a known distance in which designated sampling areas occur. Observations were made during a walk through in the chosen transect for sighting the birds. The number of birds observed in one kilometer stretch of the site was directly counted and list was made. The kilometer of the car was used to measure the stretch of the study transect.

Dominant birds in the study area are Red vented bulbul, Common peafowl, Common myna, House sparrow, House crow, Black drongo, Small green bee eater, Spotted dove, Rose ring parakeet, Blue rock pigeon, House swift, common babbler and the other birds are Indian robin, Black ibis, Indian roller, white wagtail, Pond heron, cattle egret. The list Avifauna observed during field survey is depicted in table below.

Table 3.19: List of fauna recorded from Forest Department:

S. No.	Common name	Scientific name	Family	IUCN status
Amphibians:				
1.	Common Indian Toad	Duttaphrynus melanostictus / Bufo melanostictus	Bufoinae	LC
2.	Marbled toad	Duttaphrynus stomaticus / Bufo stomaticus	Bufoinae	LC
3.	Bush frog	Philautus sp. , Philautus Species	Rhacophoridae	LC
		P. sp. nov. 'Amboli Forest'		
4.	Skittering frog	Euphlyctis cyanophlyctis	Dicroglossidae	LC
5.	Indian bull frog	Hoplobatrachus tigerinus	Dicroglossidae	LC
6.	Leith's Frog	Indirana leithii	Ranixalidae	VU
Reptiles:				
7.	Small Indian civet	Viverricula indica	Viverridae	LC
8.	Five striped palm Squirrel	Funambulus pennati	Sciuridae	LC
9.	Flap shell turtle	Lissemys punctata	Trionchidae	LC
10.	Brook's Gecko	Hemidactylus brookii	Gekkonidae	
11.	Common garden lizard	Calotes versicolor	Agamidae	LC
12.	Chameleon	Chameleon zeylanicus	Chamaeleonidae	LC
13.	Common Brahminy skink	Mabuya carinata	Sciuridae	LC
14.	Snake skink	Lygosoma punctata	Scincidae	LC
15.	Common Indian monitor	Varnus bengalensis	Varanidae	LC
16.	Trinket Snake	Elaphe Helena / Coelognathus helena	Colubridae	LC
17.	Rat Snake	Ptyas mucosa	Colubridae	LC
18.	Banded Racer	Argyrogena fasciolatus	Colubridae	LC
19.	Common kukri snake	Oligodon arnensis	Colubridae	LC
20.	Common Bronze back	Dendrelaphis tristis	Colubridae	LC
21.	Vine Snake	Ahaetulla nasuta	Colubridae	LC
22.	Indian cobra	Naja naja	Elapidae	LC
23.	Shaw's sea snake	Lapemis curtus	Elapidae	LC
24.	Russel's Viper	Daboia russelii	Viperidae	LC
Aves:				
25.	Common Crow	Corvus splendens	Corvidae	LC
26.	Indian myna	Acridotheres tristis	Sturnidae	LC
27.	Cattle Egret	Bubulcus ibis	Ardeidae	LC
28.	Hoopoe	Upupa epops	Upupidae	LC
29.	Red wattled lapwing	Vanellus indicus	Charadriidae	LC
30.	Asian Koel	Eudynamis scolopacea	Cuculidae	LC
31.	Common Peafowl	Pavo cristatus	Phasianidae	LC
32.	Little green bee eater	Merops orientalis	Meropidae	LC
33.	Indian tree pie	Dendrocitta vagabunda	Corvidae	LC
34.	Spotted dove	Streptopelia chinensis	Corvidae	
35.	Crimson breasted barbet	Megalaima haemacephala	Ramphastidae	LC
36.	Indian roller	Coracias benghalensis	Haradriidae	LC
37.	Little Egret	Egretta garzetta	Ardeidae	LC
38.	Yellow wattled lapwing	Vanellus malabaricus	Charadriidae	LC
39.	River tern	Sterna aurantia	Laridae	LC
40.	White breasted water hen	Amauromis phoenicurus	Rallidae	LC
41.	Purple Moorhen	Porphyrio porphyrio	Rallidae	LC

S. No.	Common name	Scientific name	Family	IUCN status
42.	Coot	Fulica atra	Rallidae	LC
43.	Red shank	Tringa totanus	Scolopacidae	LC
44.	Curlew	Numenius arquata	Scolopacidae	LC
45.	Black winged stilt	Himantopus Himantopus	Recurvirostridae	LC
46.	Pied Avocet	Recurvirostra avosetta	Recurvirostridae	LC
47.	Blue rock pigeon	Columba livia	Columbidae	LC
48.	Yellow Footed green Pigeon	Treron phoenicoptera	Columbidae	LC
49.	Greater Coucal	Centropus sinensis	Cuvulidae	LC
50.	Blue throated barbet	*Megalaima asiatica (D)	Ramphastidae	LC
51.	Barn Owl	Tyto alba	Tytonidae	LC
52.	House/Little Swift	Apus affinis	Apodidae	LC
53.	White Throated kingfisher	Halcyon smyrnensis	Alcedinidae	LC
54.	Small blue kingfisher	Alcedo atthis	Alcedinidae	LC
55.	Yellow wagtail	Motacilla flowa	Motacillidae	LC
56.	Common Hawk-cuckoo	Cuculus varius	Cuculidae	LC
57.	Spotted owlet	Athene brama	Strigidae	LC
58.	Ling tailed shrike	Lanius schach	Laniidae	LC
59.	Golden Oriole	Oriolus oriolus	Oriolidae	LC
60.	Blackheaded oriole	Oriolus xanthornus	Oriolidae	LC
61.	Gray tit	Parus major	Paridae	LC
62.	Large Cuckoo-Shrike	Coracina melanoptera	Campephagidae	LC
63.	Chloropsis	Chloropsis aurifrons	Chloropseidae	LC
64.	Common ora	Aegithina tiphia	Aegithinidae	LC
65.	Redvented bulbul	Pycnonotus cafer	Pycnonotidae	LC
66.	Yellow eyed babbler	Chrysomma sinense	Timalidae	LC
67.	Common babbler	Turdoides caudatus	Timalidae	LC
68.	Paradise flycatcher	Terpsiphone paradisi	Monarchidae	LC
69.	Fantail flycatcher	Rhipidura albicollis	Rhipiduridae	LC
70.	Tailor bird	Ortotomus sutorius	Sylviidae	LC
71.	Magpie robin	Copsychus saularis	Muscicapidae	LC
72.	Indian robin	Saxicoloides fulicata	Muscicapidae	LC
73.	Gray wagtail	Motacilla caspica	Motacillidae	LC
74.	Purple-rumped sunbird	Nectarinia asiatica	Nectariniidae	LC
75.	Baya weaver bird	Ploceus phillipinus	Ploceidae	LC
76.	House sparrow	Passer domesticus	Passeridae	LC
77.	Indian skimmer	Rynchops albicollis	Laridae	VU
78.	Pheasant tailed jacana	Hydrophasianus chirurgus	Jacanidae	LC
79.	Bronze winged jacana	Metopius indicus	Jacanidae	LC
80.	Stone curlew	Burhinus oedicnemus	Burhinidae	LC
81.	Shikra	Accipiter badius	Accipitridae	LC
82.	Ringed dove	Strptopelia decaocto	Columbidae	LC
83.	Rosy pastor	Psturnus roseus	Sturnidae	LC
84.	Spoonbill	Platalea leucorodia	Threskiornithidae	LC
85.	Little Cormorant	Phalacrocorax niger	Phalacrocoracidae	
86.	Indian reef heron	Egretta gularis	Ardeidae	LC
87.	Gray Heron	Ardea cinerea	Ardeidae	LC
88.	Paddy bird	Ardeola graji	Ardeidae	LC
89.	Night Heron	Nycticorax nycticorax	Ardeidae	LC

S. No.	Common name	Scientific name	Family	IUCN status
90.	Black Ibis	Pseudibis papillosa	Threskiornithidae	LC
91.	Open-billed stork	Anastomus oscitans	Ciconiidae	LC
92.	Dabchick	Podiceps ruficollis	Podicipedidae	LC
93.	Comb duck/Nakta	Sarkidiomis melanotos	Anatidae	LC
94.	Brahming Duck	Tadorna ferruginae	Anatidae	LC
95.	Common Teal	Anas crecca	Anatidae	LC
96.	Mallard	Anas platyrhynchos	Anatidae	LC
97.	Common Pariah kite	Milvus migrans	Accipitridae	LC
98.	Black winged kite	Elanus caeruleus	Accipitridae	LC
99.	Brahminy kite	Haliastur indus	Accipitridae	LC
Mammals:				
100	Indian Flying fox	Pteropus giganteus	PTEROPODIDAE	LC
101	Short-nosed fruit bat	Cynopterus sphinx	PTEROPODIDAE	LC
102	Grey musk shrew	Suncus murinus	Soricidae	LC
103	Indian Pipistrelle / house bat	Pipistrellus coromandra	Vespertilionidae	LC
104	Common house rat	Rattus rattus	Muridae	LC
105	Common house mouse	Mus musculus	Muridae	LC
106	Bandicoot Rat	Bandicota indica	Muridae	LC
107	Common palm civet	Paradoxurus hermaphroditus	Viverridae	LC
108	Common Mongoose	Herpestes edwardsi	Herpestidae	NR
109	Hare	Lepus nigricollis	Leporidae	LC
110	Small Indian mongoose	Herpestes vitticollis	Herpestidae	LC
111	Indian fox	Vulpes bengalensis	Canidae	LC
112	Long tailed tree mouse	Vandeleuria oleracea	Muridae	LC
113	Indian field mouse	Mus booduga	Muridae	LC
114	Small Indian civet	Viverricual indica	Viverridae	LC
115	Five striped palm Squirrel	Funambulus pennati	Sciuridae	LC

Note:

x Vulnerable (VU) - High risk of endangerment in the wild

x Least Concern (LC) - Lowest risk. Does not qualify for more at risk category. Widespread & abundant taxa are included in this category

3.2.7 SOCIO-ECONOMIC ENVIRONMENT

A Baseline data/information on socio-economic front has been collected with the help of 2011 census data, discussion with Tahsildars, Sarpanchs, various Government officials, local heads, etc. as well as by suitable field surveys. The study brings out the following features in this respect.

There are 11 villages coming within the study area of 05 km study area. As per census 2011, the study area has total population of around **95,244** people. As per census total households in study area are 19,810. The demographic status of the study area is reported. From the total population 49,426 are male and 45,818 are females. Among them there are 12,115 populations under age of 0-6 years. A number of the peoples belongs to SC & ST community, from the total population 4,095 SC and 47,300 are belongs to ST community.

- **Research Methodology**

Research Methodology is a crucial part in any research study in order to meet the desired level of outcome pertaining to existing research problem. It starts with identification of research

problem based on objective of the study followed by other methodological processes like identification of data sources, collection of data in terms of qualitative and quantitative, data cleaning, data entry, data analysis, and deriving the significant findings.

Beneficiaries: The main beneficiaries of the study Children -Education and health, Parents and community -Hygiene, awareness and health Women- nutrition for pregnant and lactating mothers ; information to set-up home enterprises, Farmers also get information regarding new schemes for agriculture development. Men- Awareness of general information about sanitation and hygiene, employment, programme and scheme, opportunity for new employment generation etc.

Universe: The study was conducted from 11 villages as per ToR requirements. The proposed Expansion project study area within 5 k.m.

Determination of Sample size: Judgmental and purposive sample method was used for choosing respondents of varies section of society. Total populations are **95,244** people. Two or three Sample were selected from each villages of study area. Judgmental and purposive sample method includes the right cases from the total population that helps to fulfill the purpose of research needs.

Data Collection Method: Data was gathered through primary as well as secondary information.

Source of data:

(I.) Secondary data sources

While conducting study, focus is first on the data available at the secondary level – governance statement, office noting sheet, Panchayat office, Block office, published reports and documents available under the official recording system. Census of India 2011 is our main source data, analyzing this data provides basic findings about the overall aspects of the programme.

(II.) Primary data sources

Primary data was collected by Questionnaire interview, Personal interview. Case study, observations, Focus group discussions will also be conducted within the villages to gather qualitative information. Many old, experienced and intellectuals of the sample village, doctors of the PHC Primary health Centre, ASHA worker, teachers and Talati and Sarpanch of the respective villages were interviewed regarding the matter.

Data analysis and interpretation: Collected data was analyzed through qualitative and quantitative method of analysis. The researcher also design problem tree focusing major problems.

Outcome of Study: According to carried out survey as negative and positives impacts will be occurred on Socio-economic condition. For sustainable development of area, we have suggested mitigation measures for improvement of the society

Limitations: It may be difficult to survey as localities move early morning for work and many of them were not available during day time. Language may be one of the important barriers to reach to the reality of the problem as the total crowd was Tribal, so keeping in mind the team included the linguistic experts to overcome the issue.

3.2.8 Demography

The demographic structure of the study area was derived primarily from data of Census record of valsad district covering two Talukas. As per census 2011, the study area has total population of around 95,244 people. From the total Population 49,426 are male and 45,818 are female reported in study area. Among them 12,115 population is belongs to age of 0 to 06. As per census 2011 there are 19, 810 households in study area. Apart from two towns rest of 9 belongs to rural area vast different between them in such like infrastructure, education facility, health facility, transportation facility etc. Due to industrial activity source of income also huge different from rural area. Sarigam and Bhilad are main towns of the study area where all the basic amenities available. Mainly tribal community belongs to rural area among them 49.66 % belongs to ST Community.

Fig.3.10: Village map of Study Area

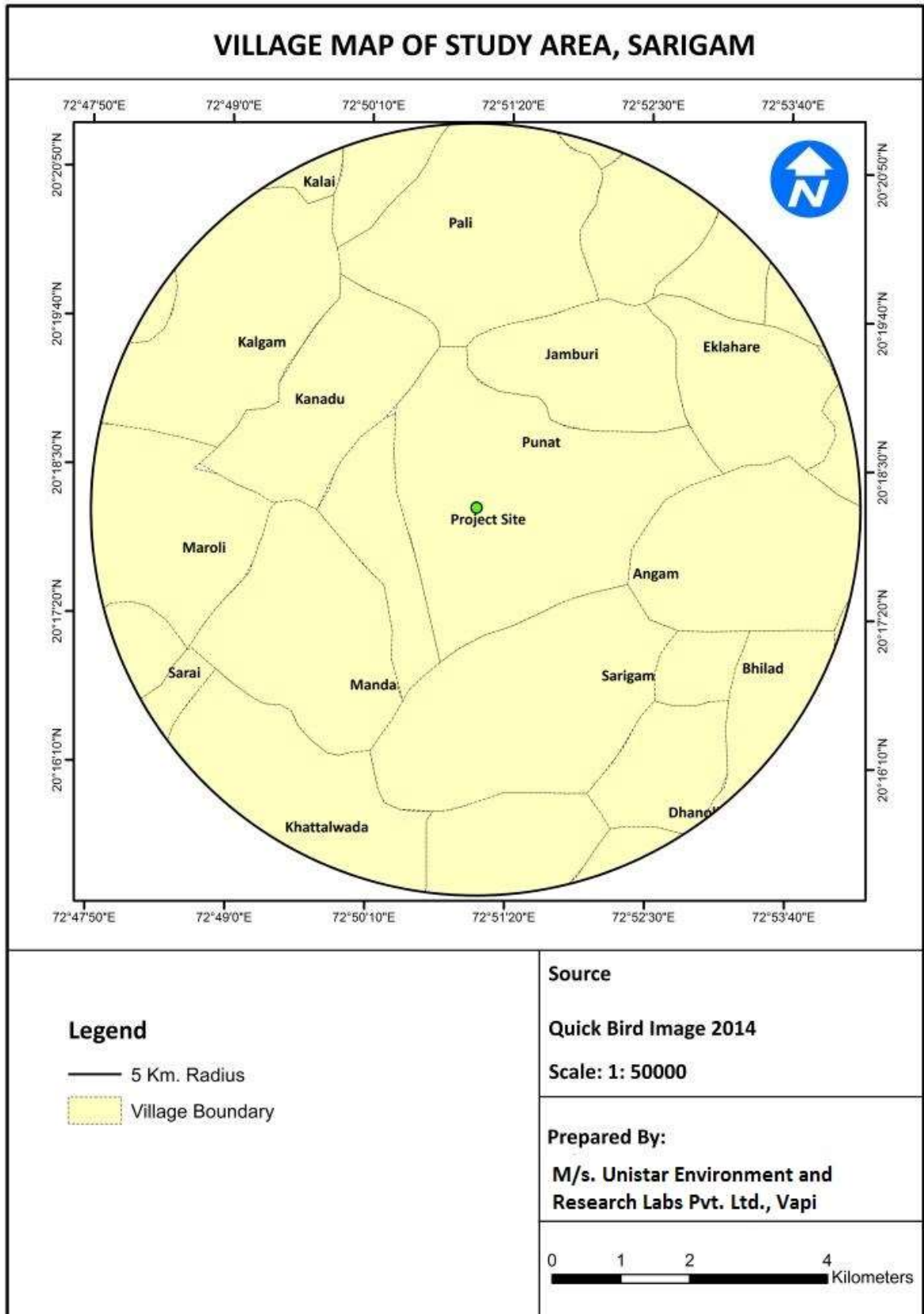


Fig.3.11: Total population of Study Area

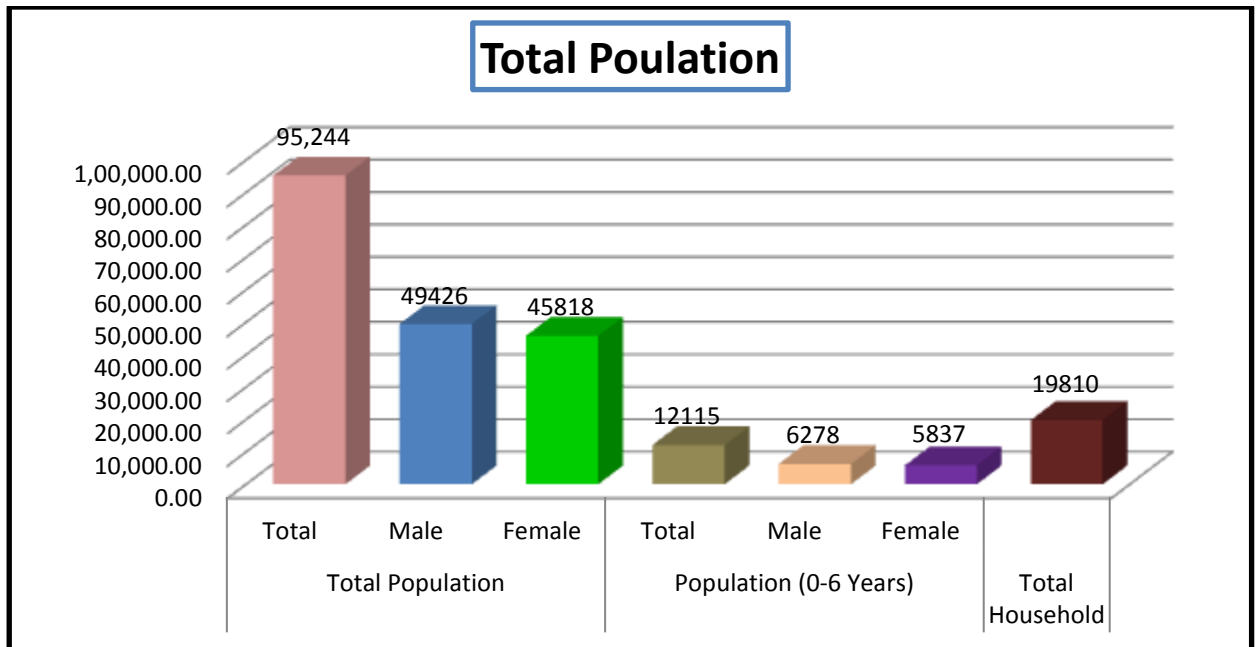
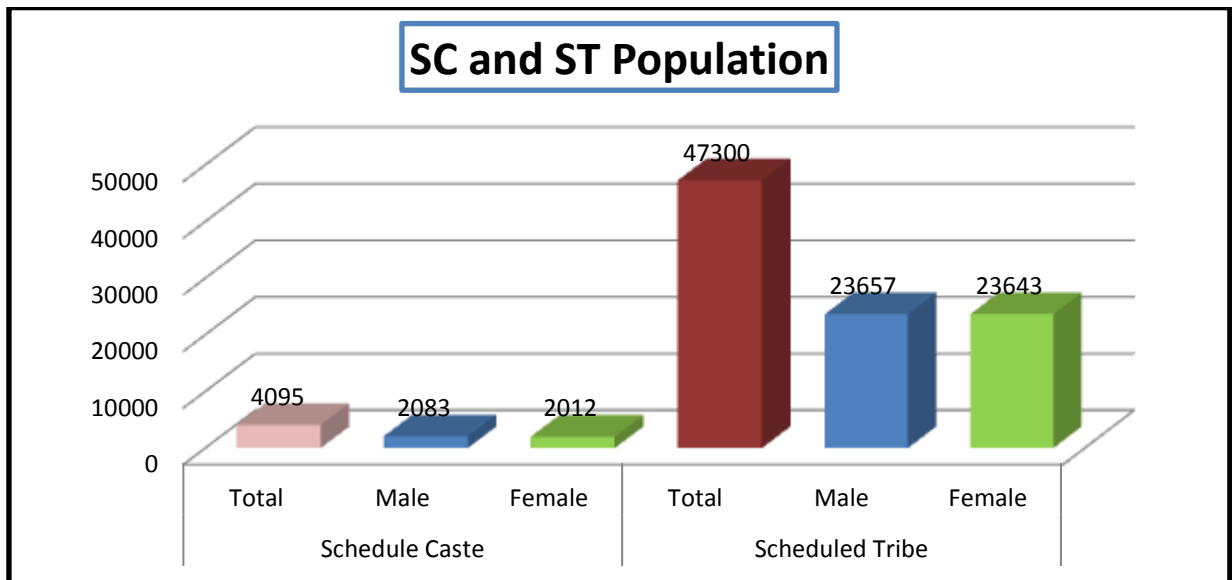


Fig.3.12: Scheduled Caste and Scheduled Tribes



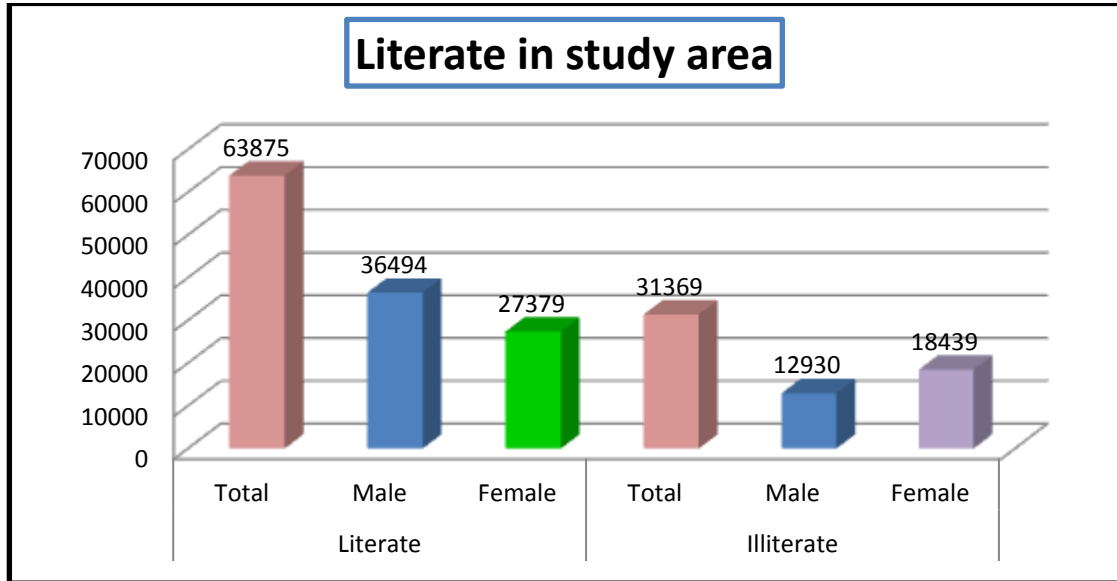
Scheduled Caste and Scheduled Tribes Population: Out of Total Population SC and ST community populations are 04.29 % and 49.66 % respectively. Most of them are engaged in Traditional farming activity. And some of them are working in nearest industries as skill and unskilled labourer.

3.2.9 LITERACY

An understanding of education and literacy profile in the region is relevant in order to understand whether better jobs due to the proposed project could utilize the existing human resource in the area. Overall literacy rate for the 11 villages as per the census 2011 was 66.06 % literate. And 32.93 % are illiterate. The locality is equipped with adequate private schools.

Highest literacy rate was found in case of Sarigam Town. Due to adequate education facility this area literacy rate is quite moderate. Collage and Training Institute facilities are available in Sarigam and Bhilad Villages only.

Fig.3.13: Literacy details



3.2.10 Occupational Structure

The occupational structure of the area shows total among the total population of **95,244** the total number of workers are 36,635. And total non-worker population is 58,609. Main workers are 32,566 and marginal workers are 3,095. Data shows that majority of the population are engaged in industrial activities. The people are also engaged in fishing and other secondary jobs apart from cultivation so they are not dependent on seasonal employment of agriculture. Some of them are working Private and Government service sector. Due to Sarigam GIDC Industrial area Employment Generation opportunity is high so More than 38.46 % population are working population.

Fig.3.14: Occupational Layouts

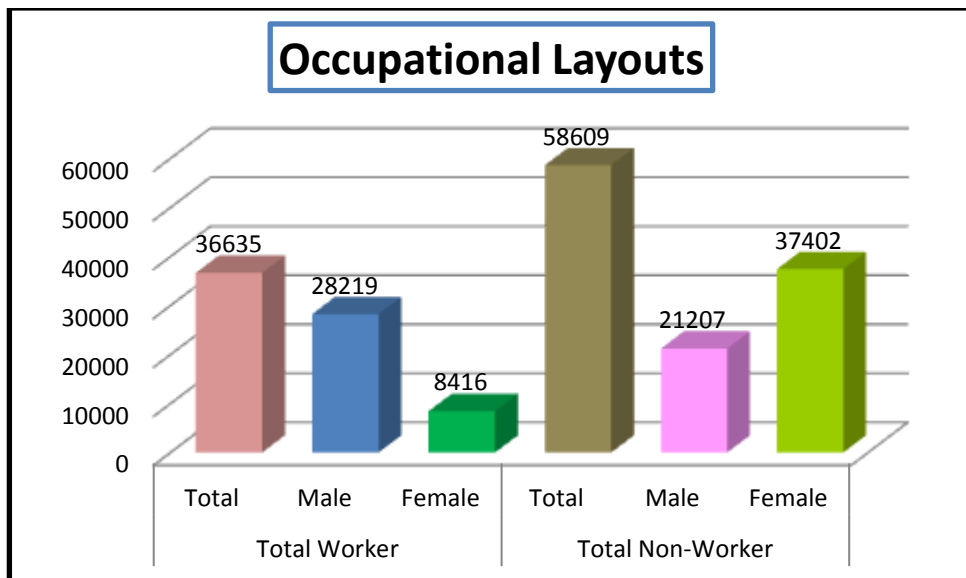


Fig.3.15: Main Workers

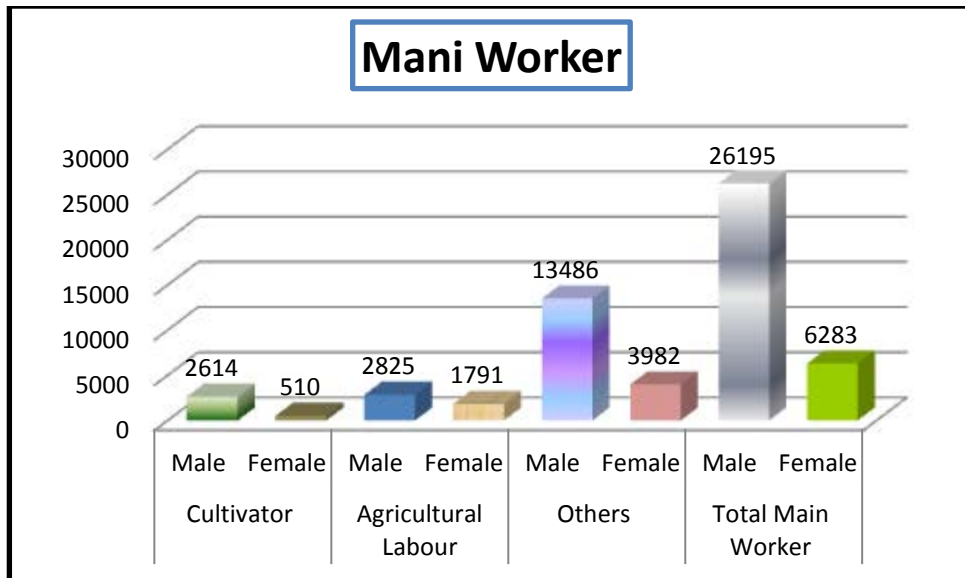
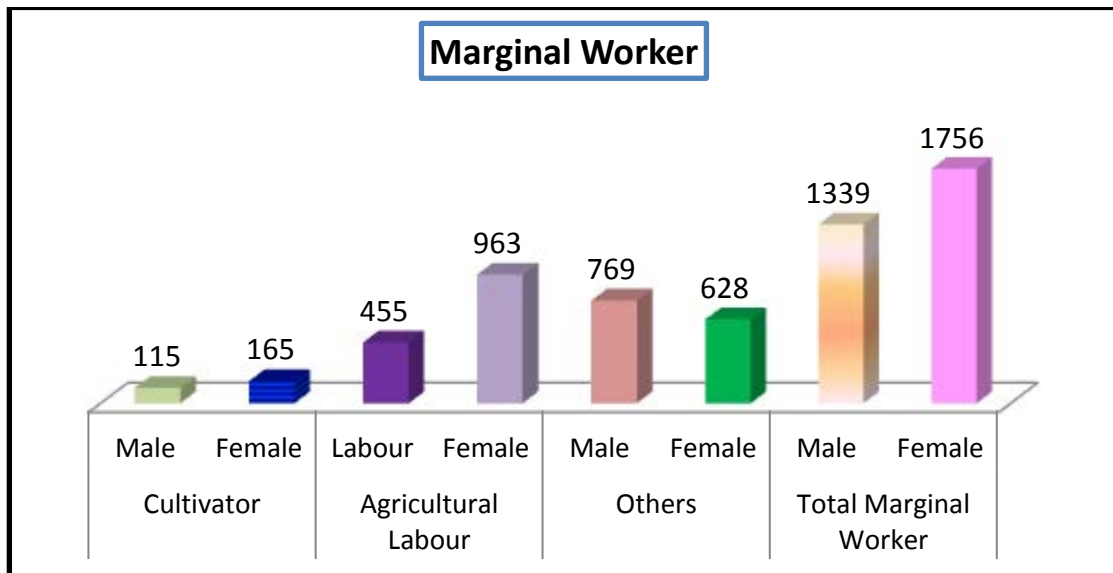


Fig.3.16: Marginal Workers



Source: Census of India-2011

3.2.11 Public Amenities

As per the 2011 census, the area is well developed in terms of schooling, drinking water facilities and banking facilities. All the facilities available in the area are presented in subsequent Tables.

As per our survey have found that all Kind of Facility like Medial /Primary Health care, Drinking water Primary/ Secondary Education, Communication & Transportation, Banking & Credit society, Power supply are available in Study area Details of All Amenities describe in table no **3.24 to 3.27.**

Table – 3.20: Amenities of Study Area-Education

Sr. No	Vill Name	P_Sch	M_Sch	S_Sch	College
1.	Sarigam	Yes	Yes	Yes	Yes
2.	Bhilad	Yes	Yes	Yes	Yes
3.	Daheli	Yes	Yes	(0-5)	(0-5)
4.	Manda	Yes	Yes	(0-5)	(0-5)
5.	Khattalwada	Yes	Yes	(0-5)	(0-5)
6.	Dhanoli	Yes	(0-5)	(0-5)	(0-5)
7.	Punat	Yes	Yes	(0-5)	(0-5)
8.	Angam	Yes	Yes	(0-5)	(0-5)
9.	Maroli	Yes	Yes	Yes	(0-5)
10.	Sarai	Yes	Yes	Yes	Yes
11.	Jamburi	Yes	Yes	(0-5)	(0-5)

Table – 3.21: Amenities of Study Area-Drinking & Irrigation Water

Sr. No	Vill Name	Tap	Well	Tube well	Hand pump	River	Canal
1.	Sarigam	Yes	Yes	Yes	Yes	Yes	Yes
2.	Bhilad	Yes	Yes	Yes	Yes	Yes	(0-5)
3.	Daheli	Yes	Yes	Yes	Yes	(0-5)	(0-5)
4.	Manda	Yes	Yes	Yes	Yes	(0-5)	(0-5)
5.	Khattalwada	Yes	Yes	Yes	Yes	Yes	(0-5)
6.	Dhanoli	Yes	Yes	Yes	Yes	(0-5)	(0-5)
7.	Punat	Yes	Yes	Yes	Yes	(0-5)	(0-5)
8.	Angam	Yes	Yes	Yes	Yes	(0-5)	(0-5)
9.	Maroli	Yes	Yes	Yes	Yes	(0-5)	(0-5)
10.	Sarai	Yes	Yes	Yes	Yes	(0-5)	(0-5)
11.	Jamburi	Yes	Yes	Yes	Yes	(0-5)	(0-5)

Table – 3.22: Amenities of Study Area-Communication & Transport

Sr.no	Vill. Name	Post Off	Mobile	Rang-PC	PV_Fac	BS_Fac	Rang_RS
1.	Sarigam	Yes	Yes	Yes	Yes	Yes	(0-5)
2.	Bhilad	Yes	Yes	Yes	Yes	Yes	Yes
3.	Daheli	Yes	Yes	(0-5)	Yes	(0-5)	(0-5)
4.	Manda	Yes	Yes	(0-5)	Yes	(0-5)	(0-5)
5.	Khattalwada	Yes	Yes	Yes	Yes	Yes	0-5)
6.	Dhanoli	(0-5)	Yes	(0-5)	Yes	0-5)	0-5)
7.	Punat	Yes	Yes	(0-5)	Yes	(0-5)	(0-5)
8.	Angam	Yes	Yes	(0-5)	Yes	(0-5)	(0-5)
9.	Maroli	Yes	Yes	(0-5)	Yes	Yes	Yes
10.	Sarai	Yes	Yes	Yes	Yes	Yes	0-5)
11.	Jamburi	(0-5)	Yes	(0-5)	Yes	0-5)	0-5)

Table – 3.23: Amenities of Study Area-Communication & Transport

Sr. No	Vill. Name	Bank_Fac.	App_PR.	App_MR.	Power_Supl.
1.	Sarigam	Yes	Yes	Yes	Yes
2.	Bhilad	Yes	Yes	Yes	Yes
3.	Daheli	(0-5)	Yes	Yes	Yes
4.	Manda	(0-5)	Yes	Yes	Yes
5.	Khattalwada	Yes	Yes	Yes	Yes
6.	Dhanoli	(0-5)	Yes	Yes	Yes
7.	Punat	(0-5)	Yes	Yes	Yes
8.	Angam	(0-5)	Yes	Yes	Yes
9.	Maroli	Yes	Yes	Yes	Yes
10.	Sarai	(0-5)	Yes	Yes	Yes
11.	Jamburi	(0-5)	Yes	Yes	Yes

Table – 3.24: Medical facility in Study area

Sr. No	Vill. Name	PHC.	HC	FWC	RMP	CHW
1.	Sarigam	Yes	Yes	Yes	Yes	Yes
2.	Bhilad	Yes	Yes	Yes	Yes	Yes
3.	Daheli	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
4.	Manda	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
5.	Khattalwada	Yes	(0-5)	(0-5)	(0-5)	(0-5)
6.	Dhanoli	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
7.	Punat	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
8.	Angam	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
9.	Maroli	Yes	(0-5)	(0-5)	(0-5)	(0-5)
10.	Sarai	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)
11.	Jamburi	(0-5)	(0-5)	(0-5)	(0-5)	(0-5)

Table – 3.25: Abbreviations for Amenities

Educational facility	Medical facility	Approach Road	Communication
P = Primary School	PHC = Primary health Centre	PR = Pucca Road	MO =Mobile
M = Middle School	HC = Health centre	MR = Mud Road	PV =Private vehicle
S = Secondary School	FWC = Family welfare Centre	KR = Kuchha Road	BS = Bus (State transport)
C = Collage	RMP = Registered Private Medical Practitioner		RS = Railway station
	CHW = Community Health Center		PC = Private courier
Distance in k.m(0-5)	Bank Facility		
Facility Available in 0 to 05 K.m Area	BA =Bank		

Education Classes up to class 7th included in Primary schools. Classes from eighth to tenth included in Higher Secondary School classes 11th and 12th are included in senior secondary School. As per Census survey 2011 village directory record, all villages having education facility in the form of primary school. The study found that technical institution and collage are available in Bhilad.

LAXMI VIDYAPEETH located at Sarigam in providing quality education to this tribal region that would make better humans and better citizens. Spread over 120 acres in a serene, natural and lush green surroundings, the LAXMI VIDYAPEETH endeavors to create a world class infrastructure for Engineering, Para Medical and Professional courses; Primary and Secondary Education; Research and Food Processing in a phased manner.

Medical facilities in terms of health workers, primary health sub centers and primary health centers are existing villages. The primary health centers, private hospitals, clinic are existing in Sarigam, Bhilad. Apart from this a doctor comes to visit 2 or 3 day in week along with nurse. The primary health center are providing treatment for basic illnesses like cough, cold, fever, infections, malaria, dengue, typhoid and hepatitis. Complicated case is to be referred to the nearest hospitals Vapi, Pardi, Surat, Valsad etc. While the service is include curative medicine, the focus on preventive medicine and maternal child health as well.

All villages having water facility in the record of census 2011. Main source of water is Tap water, Tube well, Well, Hand pump, rivers, and others sources are Tank water. The water facility of the region is good. Some of the village getting purifies water by paying a small amount.

Sanitation facility in these villages is poor because according to the survey report, only 60% people are having toilets facility. People are used to open defecation. Most of the villagers in the study area are Tribal. Now onwards sanitation facility being built by government authority Under “*Swachh Bharat Abhiyan*”

Respondents are satisfied with the existing transportation facility. The study area is well connected with NH.08. and SH 05. All the villages are covered under state transportation bus service. Buses have frequency of two or three times in a day and some villages have Road approaches are in all form like mud road, footpath etc. From the study area Bhilad town is well connected with western railway and frequency of the trains are excellent. The Gujarat State Road Transport Corporation (GSRTC) has started minibuses service to ferry people between the taluka headquarters and the villages in the tribal district of the state.

All villages in the region are electrified and electricity is available for domestic as well as commercial, agriculture purpose in all the villages.

3.2.12 Other Socio- economic indicators

The proposed expansion project study area is 05 K.m. from the Periphery of the core zone, consists of 08 rural villages and 2 towns in 2 Taluka namely Vapi and Umbergaon which are falling in Valsad district. Socio-economic survey was conducted in various villages within the study area and details are provided in the report.

Agriculture

Agriculture is the main source of occupation and about 73.76% land is under agriculture. Main Kharif crops are cotton, Paddy, maize tur (Pigeon peas) and mug. The small area is covered with vegetables. The majority of the agricultural field is clay in texture. Agriculture is a major activity in the core area from the proposed site and it is found that most land come under irrigated agricultural land. Some of farmers also depend on motor Pumps for irrigation. Govt. has provided separate power grid lines of electricity for farmers as irrigation purpose. The main crops are Paddy, sugarcane, cotton, banana, vegetables in the surveyed area. Irrigation facility is also very good condition in some of the area Due to canal facility.

Livestock

The multiple benefits to rural livelihoods from the use of livestock goods and services are manifest in several ways, both economic and social. Home use represents direct cash saving, and trade provides additional cash income. Locally traded goods and services are sold at lower prices than via commercial outlets, providing a saving to the purchaser. Most of villages have good numbers of livestock, which are the most essential part of rural live hood. There is a variety of type of livestock like poultry, goat, cow, Buffalo, etc.

Fishery Activity

Many local villagers engaged in fishery activity as seasonal worker. Main markets are available in Daman and Umbergaon costal area. Fish production as cool winter season and other oceanographic condition offers good facilities for marine fishing. Fishing is done round the year in the district. Mostly Maroli and Khattalwada villager are engaged in fishery activity. The main fishes are available in the study area are bumla, ghol, dara, karkaru, zinga, levta and magru etc.

Addiction

According to survey addiction is major problems in study area. It is one of anti-social activity which is directly or indirectly affected to development of the society. A study found that most ST community having Alcoholism level is too high.

Migration

Even construction laborers in the area majorly come from the Dahod district of Gujarat. Mostly the houses of villagers are of 'kaccha' type. I.e. they are made of mud and raw material. As per observation most of houses were well constructed. Most of migrant industries labor are staying

in Sarigam, Bhilad, Sanjan, Umbergaon, Vapi, An industrial laborer in the area majorly come from Uttar pradesh, Bihar, Maharashtra, and varies part of Gujarat state.

3.2.13 Conclusive Socio-economic Status.

Most of the villages have basic infrastructural facilities like drinking water supply, medical, power supply, P & T and communication. Electricity for lighting is available on 24 hrs basis in all the villages under “*Jyoti Gram Yojana*” Scheme by Government of Gujarat.

The salient observations recorded during survey in the study area are:

- The official language of region is Gujarati and people mostly speak gujarati but in town due to migrant people *hindi* as secondary language in area. And also havening their own dialects.
- Sugarcane is the major cash crop of the area and sugarcane farming employees majority of migrant labours from Maharashtra for 5-6 months every year in November month. They are dwelling in peripheral areas of study area.
- Agriculture is the main occupation. The main crop is paddy the surveyed area while few respondents are having job in private sector or either government sector.
- Education facilities are available up to primary school. For middle, secondary and higher studies people avail the facility from the nearest town or block and district.
- Mainly wood is used as fuel in some household of backward & labour community.
- Most of the areas are having electricity facility both for agricultural and domestic purpose.
- Literacy level among the respondents is good. This is mainly because of better educational facilities.
- Communication and transportation facilities are good in most of the villages. Maximum villages having bus service as well as Private vehicle facility.
- As per Survey record of study area banking facility is adequate for public. As they having nationalized and co-operatives banks exist in Bhilad and Sarigam Town.
- Most of villages fare shops are available and distribute ration on fare price to BPL and APL Families.

3.2.14 Need identification:

Detailed socio-economic development activity including community welfare program should be carried out in the project area for the overall improvement of the environment. Based on conducted survey we have identified some local need based activity for development of area.

Table – 3.26: Need identification of some local need based activity.

Sr. No	Sector	Activity should be carried out
1.	Education	I. To Improvement of school infrastructural facility II. To give Financial help to deserving students III. Provision of uniforms, books, and stationery. IV. To give financial assistance. V. To promote computer literacy. VI. Provide Vocational training VII. To give scholarship to bright student
2.	Health	I. To Offering specialized support services to the physically handicapped and mentally challenged people. II. To Support the health units/hospitals in the region by proving infrastructural facilities III. To arranged medical help checkup programme. IV. To give financial help for medical treatment to needy person.
3.	Water and Sanitation	I. To provide safe drinking water in water crises circumstances. II. Provide RO water or facility to villager. III. To Build or provide water storage structures. IV. Sanitation facility provide by building toilet. V. Financial contribution to build toilet on public contribution.
4.	Women Development activities	I. To develop skill of women for self-reliant II. To arrange Training and awareness for self-help groups for income. III. Awareness programme on women development.
5.	Other Social Welfare Activities	I. Provide financial assistance in natural calamities. II. Provide farmer development training for better agriculture activities.

CHAPTER: 04

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 GENERAL

The present environmental impact assessment study has been conducted for the proposed expansion project of M/s. Heni Drugs Pvt. Ltd. at Plot No.: 1901/1901A GIDC Notified Industrial Estate, Village. Sarigam, Tal. Umbergaon, Dist.: Valsad (Gujarat) India for manufacturing of “**Continuous distillation of Crude Ethyl Oleate and Metal salt**”. The company will manufacture synthetic organic chemicals (**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils**) at the rate of 415 MT/Year in addition to the existing capacity of 1200 MT/Year. As mentioned in chapter 1, as per the EIA notification- 2006 (as amended timely) products are covered under any category 5(f) and hence the company needs to acquire Prior Environmental Clearance before inception of the production of products with enhanced capacity. Proponent has appointed M/s. Unistar Environment & Research Labs Pvt. Ltd., Vapi for the present EIA study which has been conducted by the EIA study team accredited & approved by NABET. All necessary details of proposed project has been studied & referred carefully to determine the anticipated impacts of the proposed project. The whole study has been conducted in line with the awarded TORs issued by SEAC, Gujarat.

The details of the Impacts Assessment study as well as planning of mitigation measures for anticipated impacts of the proposed project are described in subsequent sections of the present chapter under respective headings.

4.1.1. PHASES OF IMPACTS ASSESSMENT STUDY

In the opening phase of impact assessment, the study was conducted for screening & scoping by EIA Team for further scheduling of the EIA Study by study of records, documents & details provided by the proponent-M/s. Heni Drugs Pvt. Ltd. At the later stage of the screening & scoping, FORM-I of EIA notification SO 1533 was filed along with the Prefeasibility report & Draft TOR and application to SEAC, Gujarat for approval of the draft TORs. The Draft TOR proposed in Form-I was considered for further actions to start the EIA study. The Questionnaire for the proposed project was dully filled for better outcome & determination of further line of actions for EIA study. As described in sections of baseline environmental status of area, study for environmental quality of the area was initially started with reference to the Draft TOR and up on receipt of the approved TOR from SEAC, Gujarat all completed & ongoing studies were verified & confirmed with reference to the awarded TOR to comply with the conditions of awarded TOR issued by SEAC, Gujarat. Simultaneously, the reporting of the study was also started for extensive study & review of work accomplished time to time. The study was conducted for 5 KM radial area from site during the winter season in months of November 2015 to January 2016.

Primarily, studies for Identification & prediction of impacts were conducted by following assessment of baseline environmental quality with special reference to the project activities/components and their potential stress on the environment. Further ground reality survey by site inspections, meetings with associated technical & administrative persons, technical data /document study as well as cross referencing with various subject references was done for the purpose throughout the study period. All possible impacts / stresses are identified for further study and citation of primary mitigation measures for each identified impacts/stresses. The Environmental Impact Assessment was conducted by following Checklist Method using the Questionnaire, Analysis & Interpretation of document/record & Data by expert of EIA Team and Technical Experts of Proponent, Scientific & Technical referencing for Identification & interpretation of probable impacts. Activity-Impact relation approach for identification of impact has been used for the present study and presented in diagrammatic form in subsequent section.

After Identification, prediction of the major impact, viz., emissions & Air pollution has been done using mathematical modeling software for quantitative determination of probable impacts of emissions. In the later stage EIA was conducted by the thorough study for preparation of description of potential environmental Impacts & mitigation measures as well as by following Matrix Analysis for identified impacts. The Matrix Analysis was conducted for construction as well as operation phase of the proposed. Further Matrix was formulated for two scenarios: with mitigation measures & without mitigation measures.

With the necessary details of components of EIA study & necessary document review the Draft EIA report was prepared and reviewed for necessary update for adequate and efficient presentation of the proposed project activities, environmental impacts, mitigation measures, safety & management plan etc. in EIA Report. Finally on receipt of Approved TOR from State Level Expert Appraisal Committee, Gujarat; completed studies for EIA was reviewed and verified against the Approved Terms of reference for EIA. All recommendations & requirement sited by SEAC, Gujarat were carefully studied to finalize the EIA Report for submission to SEAC along with EC Application. A detailed report for the compliance of Approved TOR was prepared and covered in the EIA report as Annexure-II.

4.1.2. ENVIRONMENTAL ATTRIBUTES & PARAMETER

Selection of environmental attributes and parameters for impact assessment study is the main & most important task. The quality outcomes of impacts assessment can only be achieved by carefully selected environmental attributes & parameters. With this fundamental requirement, in the very inception stage the environmental attributes & parameters relevant to the proposed project have been selected. The main attributes & parameters selected for the present impact assessment study are listed below.

1. Land Environment:

- Potential of land use & Land cover change
- Potential of Land Contamination & Control Measures
- Soil Quality

2. Water Environment:
 - Water Consumption & Waste water generation
 - Water & Wastewater Management System & Technology
 - Environment, Health & Safety Management Strategies
 - Water & Waste Quality
3. Air Environment:
4. Emission Sources & Quantity
5. Emission Control Measures/Technology
6. Environment, Health & Safety Management Strategies
7. Emission & Ambient Air Quality
8. Ecology/Biological Environment:
 - Biotic Components (Flora & Fauna) of the area
 - Change in Habitat and Vegetation
 - Control Measures & Ecological Management Strategies
 - Environment, Health & Safety Management Strategies
9. Socio Economic Environment:
 - Demographic Characteristics
 - Amenities & Infrastructure
 - Management Strategies & Planning for Social / Community Welfare
 - Occupational /Community Health & Safety Management
10. Noise & Vibration:
11. Ambient Noise Condition
12. Major Sources of Noise from Project
13. Control Measures and Environment, Health & Safety Management Strategies
14. Occupational Health & Safety:
15. Emission Sources & Quantity
16. Emission Control Measures/Technology
17. Environment, Health & Safety Management Strategies

4.2 IDENTIFICATION OF IMPACTS

Study for identification of impacts has been carried out in two parts. Firstly the identification of impacts has been carried out by determination of impacting activities of the proposed project. Then based on the outcome of the first part, further classification of impacts based on types & nature has been carried out to identify all probable impacts in details. The details of the impact identification study carried out are presented below in two different sections under respective headings.

4.2.1. IMPACTING ACTIVITIES, PROBABLE IMPACTS & MITIGATIONS

In the beginning of identification of the probable impacts of the proposed project, isolation of activity phase & groups of the proposed project has been performed for identification of impacting activities as well as impacts of specific activities. With such task, the project activities have been segregated in two main phases: Construction Phase & Operation Phase. Further, the activities of the construction & operation phase have also been distributed in main groups to aggregate activities of similar type & nature in single group for easy appraisal of probable impacts.

The construction activities were considered in three main groups: site preparations, civil works and fabrication & fitting works. The proposed project being new unit necessary infrastructures and building will be constructed. Major site preparation works are not required for setting up the proposed project as the plot is situated in an industrial plot of a notified industrial estate which is almost prepared & ready for construction works. Construction of buildings & sheds, fabrication & fitting of plant will be required for the proposed project which will be completed in considerably short time. Thus the environmental impacts likely to arise during the phase will be minor & acceptable occurring for short time and the probable impacts of construction will not be significant as the site is in an industrial area.

Further, in very inception of the EIA study data of the project activities & component as well as study of operation has been done very cautiously & systematically. This has revealed that there would not be any major impacts on environment due to the proposed project except the impacts of emissions and major accident scenarios which may extend out of the plant area.

It is also noticed that the impacts due to wastewater & emissions are of main concern for the EIA study for the proposed project. However, it is marked that the impacts of the emission from the utilities will be acceptable & insignificant as NG is proposed as fuel for the utilities of the proposed project. Also the impacts of the wastewater generation will be minimized to considerable extent by in-house adequate treatment & disposal of treated effluent to CETP, Sarigam through underground pipeline of GIDC. Further, hazardous waste generation from proposed project will be ETP sludge, used oil & discarded containers/barrels/ bags which will be managed as per regulatory requirement. The used oil & empty containers/bags/drums will be sold to authorized recycler or re-conditioners and the ETP sludge will be sent to TSDF. Thus not considerable impacts of hazardous waste generation & management are anticipated from proposed project.

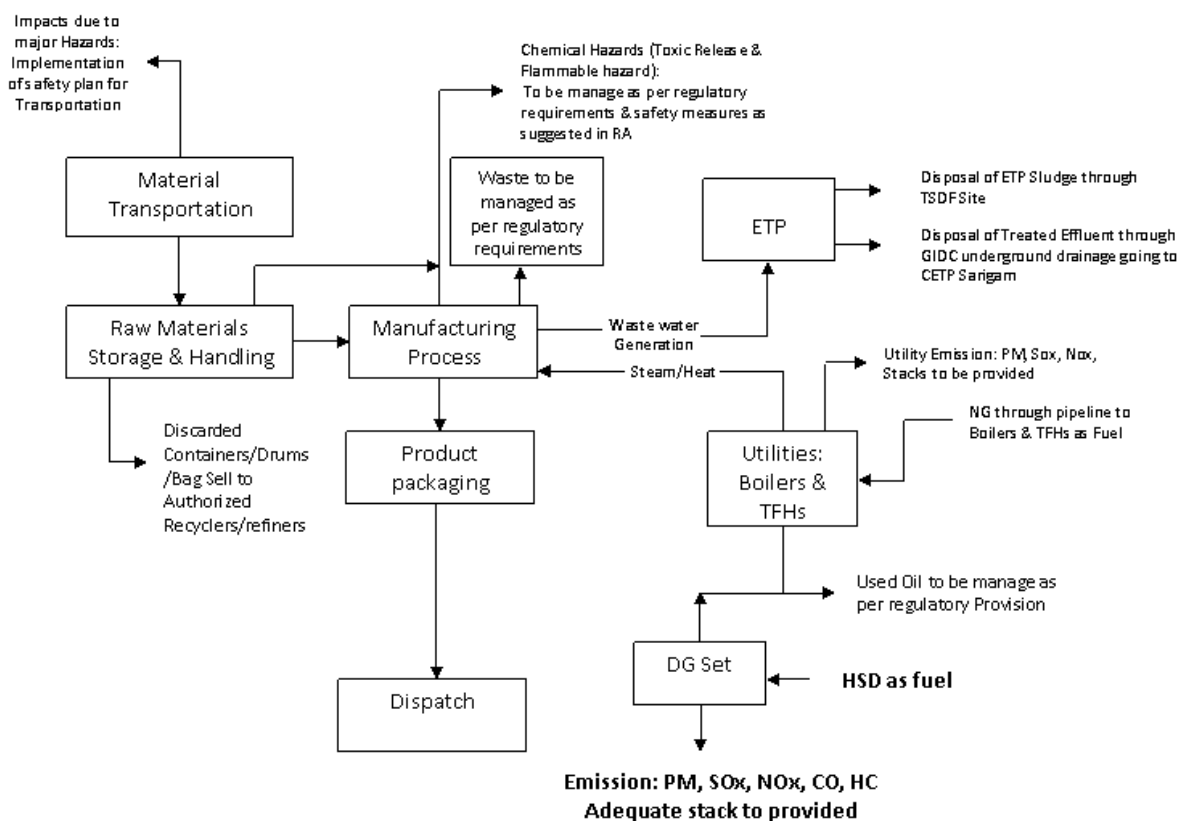
In addition to these, it has been noticed that significant impacts are likely to occur due to the hazards associated with the industrial operations and hazardous chemicals of the project. It is revealed in risk assessment study that the impacts of hazards associated with proposed project is likely to be major in case of catastrophes only. Minor incidents of spill/leak will not have serious impacts on occupational health & safety but will be controllable with adequate safety practices & preventive measures.

With these project details & remarks of EIA team, major details of handling-storage-transportation of raw materials & finished products, production processes, operation & use of

utilities, use of water & overall management practices of proposed project were collected and studied from the records made available by the proponent.

The diagrammatic presentation has been prepared to identify the probable impacts after review of project operation & documents as well as by discussions with the officials & experts of proponent. The main activities of the project and associated environmental impacts identified for further study are depicted below as illustration in figure 4.1 whereas the detailed description regarding the anticipated impacts along with necessary details of identification, prediction & significance as well as mitigation measures are presented in subsequent sections under respective headings.

Figure 4.1: Probable Impacts & Mitigation of Project Activities



4.2.2. TYPES & NATURE OF IMPACTS

The second important step & task of the impact assessment study which determines necessity of further study is classification of nature & types of impacts identified for the proposed project. This task serves as the base platform for further study. Considering this, the impacts identified for the proposed project activities are studied to determine the type & nature of the impacts. The summarized description of the types & nature of the identified impacts are presented below in tabular form.

Table 4.1: Type & Nature of Identified Impacts

Sr. No.	Activities	Types & Nature
1.	Storage and transportation of fuels, raw materials and finished products	<ul style="list-style-type: none"> ▪ Short term minor & controllable impacts of chemical hazards (mainly Hazardous/toxic chemicals) which can be short term major impact in case of catastrophes ▪ Beneficial to economy due to employment, trades & contracts, ▪ Adverse to air, land, water, occupation health, ecology & socio-economy due to fugitive emissions & hazards (mainly lead & VOCs) which can be short term major impact in case of irregular or abnormal operations & disaster ▪ Conditionally acceptable with control measures & mitigations with adequately designed EMP and Safety & emergency manuals ▪ Direct as well as indirect depending up on source of impacts & targeted receiver
2.	Consumption of resources (raw-materials, water, fuel, power etc.)	<ul style="list-style-type: none"> ▪ Short term and reversible in case of water (as GIDC Water Supply from the Perennial River of area exhibiting annual rainfall above 1800-2000mm) ▪ Short term & controllable for chemical hazards, can be major impacts in case of catastrophes or major incidents resulting in long term major adverse impacts ▪ Conditionally acceptable with control /preventive measures & mitigations with adequately designed EMP and Safety & emergency manuals ▪ Direct in case of water & fuel, Chemical hazards, can be short term major impacts in case of catastrophes ▪ Indirect adverse in case of power from electricity department& direct adverse in case of power supply by DG set operation
3.	Process operations of proposed project	<ul style="list-style-type: none"> ▪ Short term on regular basis during process operations (mainly hazardous / toxic chemicals), can be major in case of major incident or catastrophes ▪ Adverse to air (fugitive & process emissions), occupation health & socioeconomic layout (process/fugitive emission, chemical risks & other hazards), ecology (fugitive & process emissions, risks & hazards),

Sr. No.	Activities	Types & Nature
		<ul style="list-style-type: none"> ▪ Conditionally acceptable with the efficient provisions of safe operation through adequate handling & process operations, ▪ Beneficial to economy ▪ Direct (air & water, socio-economy, occupational health) , Indirect (occupation health, ecology & socioeconomic layout)
4.	Wastewater generation & disposal	<ul style="list-style-type: none"> ▪ Long term adverse impacts due to improper treatment & disposal of wastewater ▪ Acceptable with provision of septic tank & soak pit for sewage management and ETP for treatment of industrial effluent and drainage connection to CETP Sarigam for final treatment and disposal. ▪ Direct (air & water, ecology, occupational health) , Indirect (occupation & public health, ecology & socioeconomic layout)
5.	Handling of hazardous substances	<ul style="list-style-type: none"> ▪ Short term limited to the incident tenure (mainly hazardous/toxic chemicals-Mercury), can be short term major in case of catastrophes ▪ Adverse (fire/ explosion in NG PRV Station & toxic hazard due to storage of flammable & toxic substances and accidental release of hazardous / toxic chemicals), ▪ Irreversible in case of major damage or casualty; reversible in case of repairable damage & curable injury/ health effects (e.g. serious toxic effects of Phenolic compounds and lead etc.) ▪ Conditionally acceptable (automated proper handling & transfer, preventive steps followed, safety measures implemented etc.), ▪ Direct as well as Indirect (both type of impacts on occupation health, air, physical structures, ecology, socioeconomic layout etc.) ▪ MSD due to repetitive tasks, lifting /pulling of heavy load & working with OSD/DSD.
6.	Air emissions & fugitive emissions	<ul style="list-style-type: none"> ▪ Short term continuous for operation tenure (mainly lead & VOCs), can be short term major in case of catastrophes ▪ Adverse (increased load on atmosphere & contamination of workplace air), ▪ Reversible

Sr. No.	Activities	Types & Nature
		<ul style="list-style-type: none"> ▪ Conditionally acceptable (provision of APCDs, the emission norms maintained), ▪ Direct (air quality, socio-economy, occupational health)/ indirect (ecology, occupation health, socio-economy etc.)
7.	Hazardous/ Non-Haz. waste – storage, handling and reuse/ disposal	<ul style="list-style-type: none"> ▪ No considerable impacts, ▪ Acceptable with Adequate storage area and reuse/recycle and/or sell to authorized recycler & re-conditioners as per statutory requirements &CPCB Guidelines,
8.	Noise generation	<ul style="list-style-type: none"> ▪ Short term continuous during operations tenure, ▪ Conditionally acceptable (with provision of proper engineering controls& PPEs), ▪ Direct (occupational health, ecology, socioeconomic layout)
9.	Greenbelt development& CSR	<ul style="list-style-type: none"> ▪ Long term, ▪ Beneficial, ▪ Acceptable, ▪ Direct/ indirect
10.	Temporary break-down of control equipment	<ul style="list-style-type: none"> ▪ Short term/ Long term, ▪ Adverse ▪ Irreversible/ Reversible ▪ Not acceptable – to be controlled immediately ▪ Direct/ Indirect
11.	End use of the products	<ul style="list-style-type: none"> ▪ Long term, ▪ Beneficial, ▪ Acceptable, ▪ Direct / Indirect

4.3 DESCRIPTION OF ANTICIPATED IMPACTS & MITIGATIONS

The proposed synthetic organic manufacturing project being an expansion project by addition of new products within the premises of existing unit located in Notified Industrial area of GIDC Sarigam, requires considerable quantity of water, power, fuel, human resources, machineries & utilities etc. The details of all major resources required for proposed project are described in earlier sections under respective headings. Considering the above mentioned details of resource requirements and potentials of pollution as well as above tabulated identified impacts on environment; impact statements have been prepared after necessary detailed study. The

impacts statements for the proposed project as predicted & assessed are described in subsequent section under respective headings.

4.3.1. IMPACT DUE TO AIR POLLUTION & ON AIR QUALITY

Impacts on air are anticipated due to the emission from the Baby boiler and DG sets. The proponent has already planned efficient control measures to prevent / minimise the impacts on air environment. However, to ascertain residual impacts of the proposed project, detailed study has been carried out as described below.

A. Possible Source of Environmental Impact:

During Construction Phase

- Dusting due to movement of construction vehicles on earthen road and open ground
- Fugitive emission from construction materials storage & handling.
- Exhaust from construction machineries and vehicles
- A dusting would be due to proposed construction activity.
- Particulates being air borne from construction site

During Operation Phase

- Fugitive emission from Storage, Transfer & handling of chemicals
- Toxic particulate emission
- Emission from Utilities: Existing NG Fired Thermopack (1 No., 1 lac. Kcal/hr). Proposed NG Fired Steam Boiler (2 Nos., capacity -1 tones/hr. each) & Diesel Fired DG Set (1 No., 160 KVA).
- Toxic volatile emission during spill/leak & catastrophic disaster in storage & production area

B. Anticipated Impact:

During Construction Phase

- Particulates are likely to be emitted from storage and handling operation which will result in increase in level of Particulate matters in ambient air of the area of vicinity. Especially the impacts of increased level of PM10 & PM2.5 have significant impacts on air quality.
- Similarly, air borne particulates are likely to arise from construction work which will also increase the level of PM in the ambient air of vicinity.
- This increased in level of PM may have many health issues in people in area of close vicinity. Also the visibility of the site and nearby area may reduce slightly.
- The exhaust from construction vehicles and machineries may result in temporary increased level of CO, HC, SO₂ and NO_x in ambient air of the area in vicinity. However, this change in ambient air quality will not be major to cause any major health issues or environmental issues.

During Operation Phase

- The increased level of PM10 & PM2.5 may result in serious health effects like respiratory problem, decreased lung function, aggravated asthma, eye problems etc.

- The increase in PM level may also reduce the visibility range in the area.
- The increased level of CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. It may also cause myocardial ischemia, chest pain (angina) etc.
- Increased level of SO₂ and NO_x may cause many health issues like bronchitis, irritation to eye & respiratory tract, damage to thoracic & lung tissues etc. However, these health issues may not be major as the level may not rise beyond acceptable level during the construction phase.
- Beside of the stationary emissions, impacts on air quality may also occur due to accidental emission due to spill/leak of the chemicals of the project. This emission may result in increased level of PM and VOCs.
- Also some toxic emissions are likely to arise due to the spill/leak of hazardous chemicals. These will have serious impacts in form of pollution of ambient air.
- The VOCs emitted to environment causing air pollution will have many adverse effects on human health as well as health of fauna of the area depending up on the individual content of VOCs as described in RA report. This emission may also have adverse effects on flora.
- Beside of VOCs, emission of bromine is extremely toxic and will have serious health effects on human as described in the RA report.
- The bromine in ambient air being highly corrosive may corrode still/iron structures, equipment and reactors etc. which may eventually result in major disaster.
- To ascertain the exact impacts of emissions from proposed project on ambient air quality of the project area, detailed modeling study has been done. The modelling study has been carried out using the Aermid View software of Lake's Environmental Inc., Canada. The details of the modelling study have been elaborated with necessary information of input parameters as well as outcome in form of Incremental GLCs and Predicted Ambient Air Quality in the subsequent description & illustrations.

○ **Source Input:**

Table 4.2 Details of Source Input

Stack Attached To	UTM Coordinates For ISCST3 Input		Height, Mt	Exit Gas Temp. ⁰ K	Exit Gas Velocity, mt/sec	Diameter At Top, Mm
	X, mt	Y mt				
Stack 1: Thermpack (1 No., Existing), 1 lac kcal/hr	275455.96	2246482.00	30	423	8.00	300
Stack 2: Steam Boilers (2 Nos., Proposed), 1 ton/Hr each	275302.06	2246482.00	30	423	8.00	300
Stack 3: DG Set (1 No., Proposed), 160 KVA	275168.67	2246482.00	09	523	19.11	100

○ **Emission Input:**

Table 4.3 Details of Emission Input

Stack ID	UTILITY	POLLUTANT	EMISSION RATE (gm/sec)		APCD EFFICIENCY	EMISSION QUALITY		NORMS
			W/O APCD	WITH APCD		ppm	mg/Nm ³	
1	Thermopack,	SO ₂	0.00003*	--	--	0.02	0.06	<100 ppm
		NO _x	0.00024	0.00012*	Low NO _x Burner*	0.11	0.21	--
		PM	0.00041*	--	--	--	0.72	<150 mg/Nm ³
2	Steam Boiler	SO _x	0.00042*	--	--	0.28	0.74	<100 ppm
		NO _x	0.00308	0.00154*	Low NO _x Burner*	1.44	2.72	< 50 ppm
		PM	0.00530*	--	--	--	9.38	<150 mg/Nm ³
3	DG Set	SO _x	0.01385*	--	--	35.27	92.33	<100 ppm
		NO _x	0.10222*	--	--	362.2 2	681.48	--
		PM	0.00333*	--	--	--	22.22	<150 mg/Nm ³

(Note: *indicates 50% Efficiency)

○ **Receptor Input:**

Table 4.4 Details of Receptor Input

Village/Receptor Grid	Coordinate(UTM Zone 43N)		Remarks
	X, mt	Y, mt	
Discrete Cartesian Receptors			The Discrete Cartesian Receptors selected are the location selected for the ambient air quality monitoring for baseline environmental study.
AQ (Project)	275607.68	2246479.86	
AQ (Bhilad)	279916.74	2244872.28	
AQ (Punat)	276752.30	2247598.21	
AQ (Kanadu)	273710.90	2248366.37	
AQ (Sarai)	271823.72	2244130.70	
AQ (Daheli)	277578.10	2242240.09	
Uniform Cartesian Grid Origin	265607.68	2236479.86	Grid Size: 20,000mt X 20,000mt, No. of X & Y receptors: 21 Nos. each Grid Spacing: X=1000 Mt, Y=1000 Mt.
Origin for Discrete Polar Receptors @ 500 Mt distance	275455.96	2246482.00	20 Discrete Cartesian Receptor are selected in downwind direction (224 Degree Clock wise from N) from representative source stack.

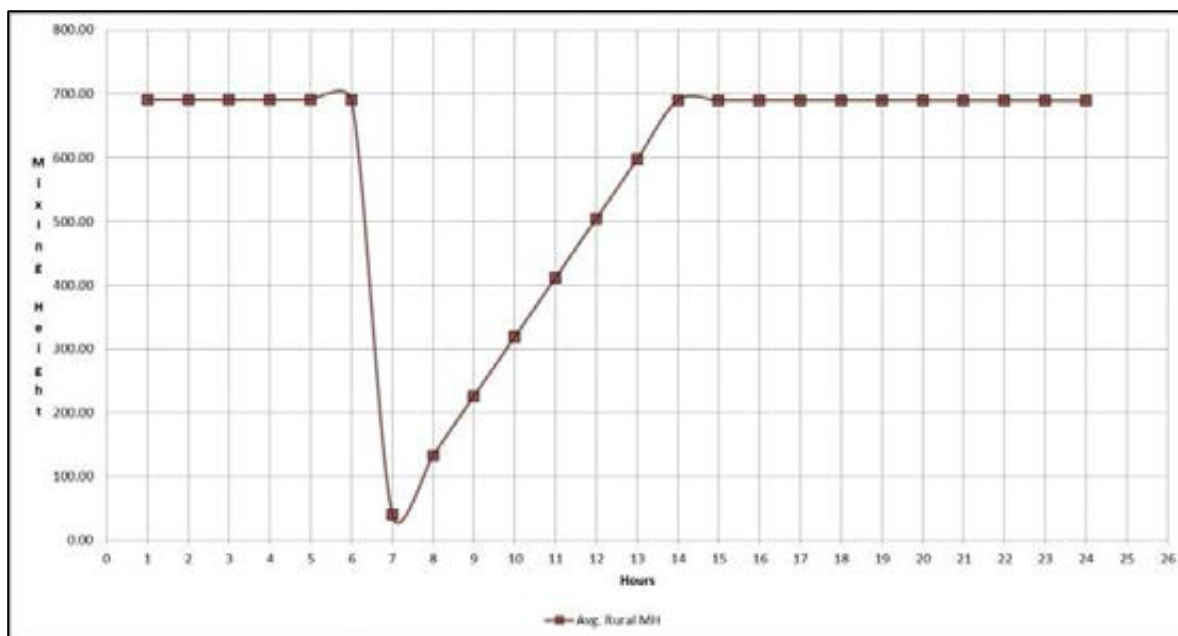
○ **Meteorological Input:**

Table 4.5 Details of Meteorological Input

Sr. No	Directions	Wind Classes (m/s)						Total
		0.50- 2.10	2.10- 3.60	3.60- 5.70	5.70- 8.80	8.80-11.10	>= 11.10	
1	337.5 - 22.5	0.0625	0.0820	0.0919	0.0014	0.0000	0.0000	0.2378
2	22.5 - 67.5	0.0906	0.1055	0.0761	0.0005	0.0000	0.0000	0.2726
3	67.5 - 112.5	0.0842	0.0847	0.0457	0.0000	0.0000	0.0000	0.2147
4	112.5 - 157.5	0.0245	0.0426	0.0240	0.0009	0.0000	0.0000	0.0919
5	157.5 - 202.5	0.0091	0.0068	0.0054	0.0005	0.0000	0.0000	0.0217
6	202.5 - 247.5	0.0095	0.0073	0.0054	0.0000	0.0000	0.0000	0.0222
7	247.5 - 292.5	0.0145	0.0118	0.0073	0.0000	0.0000	0.0000	0.0335
8	292.5 - 337.5	0.0100	0.0222	0.0380	0.0000	0.0000	0.0000	0.0702
Sub-Total		0.3048	0.3628	0.2939	0.0032	0.0000	0.0000	0.9647
Calms								0.02582
Missing/Incomplete								0.00951
Total								1

- **Mixing Height Input:** The mixing height data were also estimated using RAMMET VIEW developed by Lakes Environmental Software. The details of estimated mixing height are presented below as graphical illustration along with average value of particular hours of the days. The estimated hourly average maximum mixing height is found to be 691.05 m. Minimum hourly average mixing height is found to be 40.02 m. The seasonal average hourly mixing height is found to be 581.83m.

Figure 4.2: Estimated Mixing Height Profile of Study Area



- **Additional Inputs & Details:** In addition to the above input details, terrain was also considered as input data for the modelling. The input terrain details for the modelling have been presented in earlier chapter 3, Fig. 3.2 & 3.3 (Digital Terrain Model & Topographic Map respectively). The details of site specific Meteorological data Annexure-III & Air quality modelling Result are also attached in Annexure-IV.
- **Output Selection**
 - Detailed report for Modelling for 1 Hourly & 24 Hourly outcomes
 - 1st highest 24 Hourly Average Incremental GLC
 - Contour Indicating 1st 24 Hourly highest Incremental GLC for Cartesian grid area showing Discrete Cartesian receptor.
 - 1st highest 1 Hourly Average Incremental GLC for 20 Discrete Polar Receptors at 500 mt interval in downwind direction (Graph)
 - 1st highest 24 Hourly Average Incremental GLC for 20 Discrete Polar Receptors at 500 mt interval in downwind direction (Graph)

○ **Predicted Incremental GLCs**

Table 4.6 Outcome of Model: Predicted Incremental GLC

Village	Coordinates, mt.		Predicted Highest 24hr. Avg. Incr. GLC, $\mu\text{g}/\text{m}^3$		
	X Axis	Y Axis	PM ₁₀	SO ₂	NO _x
1st Highest	272607.68	2244479.86	0.08062	-	-
	277702.84	2243462.45	-	0.30643	-
	274607.68	2246479.86	-	-	2.26083
AQ (Project)	275607.68	2246479.86	0.01986	0.03437	0.25024
AQ (Bhilad)	279916.74	2244872.28	0.00631	0.02591	0.19118
AQ (Punat)	276752.30	2247598.21	0.0021	0.00392	0.02859
AQ (Kanadu)	273710.90	2248366.37	0.0129	0.05268	0.38875
AQ (Sarai)	271823.72	2244130.70	0.04076	0.16885	1.24617
AQ (Daheli)	277578.10	2242240.09	0.00813	0.03375	0.24912

○ **Predicted Ambient Air Quality**

Table 4.7 Predicted Ambient Air Quality

Location	Particular	PM ₁₀ , $\mu\text{g}/\text{m}^3$	SO ₂ , $\mu\text{g}/\text{m}^3$	NO _x , $\mu\text{g}/\text{m}^3$
CPCB Limit	Residential Area	100		80
Project Site	Baseline	87.75	15.47	20.45
	Incremental GLC	0.02	0.03	0.25
	Predicted Air Quality	87.77	15.50	20.70
Bhilad	Baseline	78.46	13.22	16.38
	Incremental GLC	0.01	0.03	0.19
	Predicted Air Quality	78.47	13.25	16.47
Punat	Baseline	57.29	12.04	15.48
	Incremental GLC	0.00	0.00	0.03
	Predicted Air Quality	57.29	12.04	15.51
Kanadu	Baseline	63.21	12.68	15.48
	Incremental GLC	0.01	0.11	0.39
	Predicted Air Quality	63.22	12.79	15.87
Sarai	Baseline	57.71	12.77	15.92
	Incremental GLC	0.04	0.17	1.25
	Predicted Air Quality	57.75	12.94	16.17
Daheli	Baseline	61.54	12.97	15.63
	Incremental GLC	0.01	0.03	0.25
	Predicted Air Quality	61.55	13.00	15.88

Figure 4.3: Contour of Predicted 24 Hourly Incremental GLC of PM₁₀:

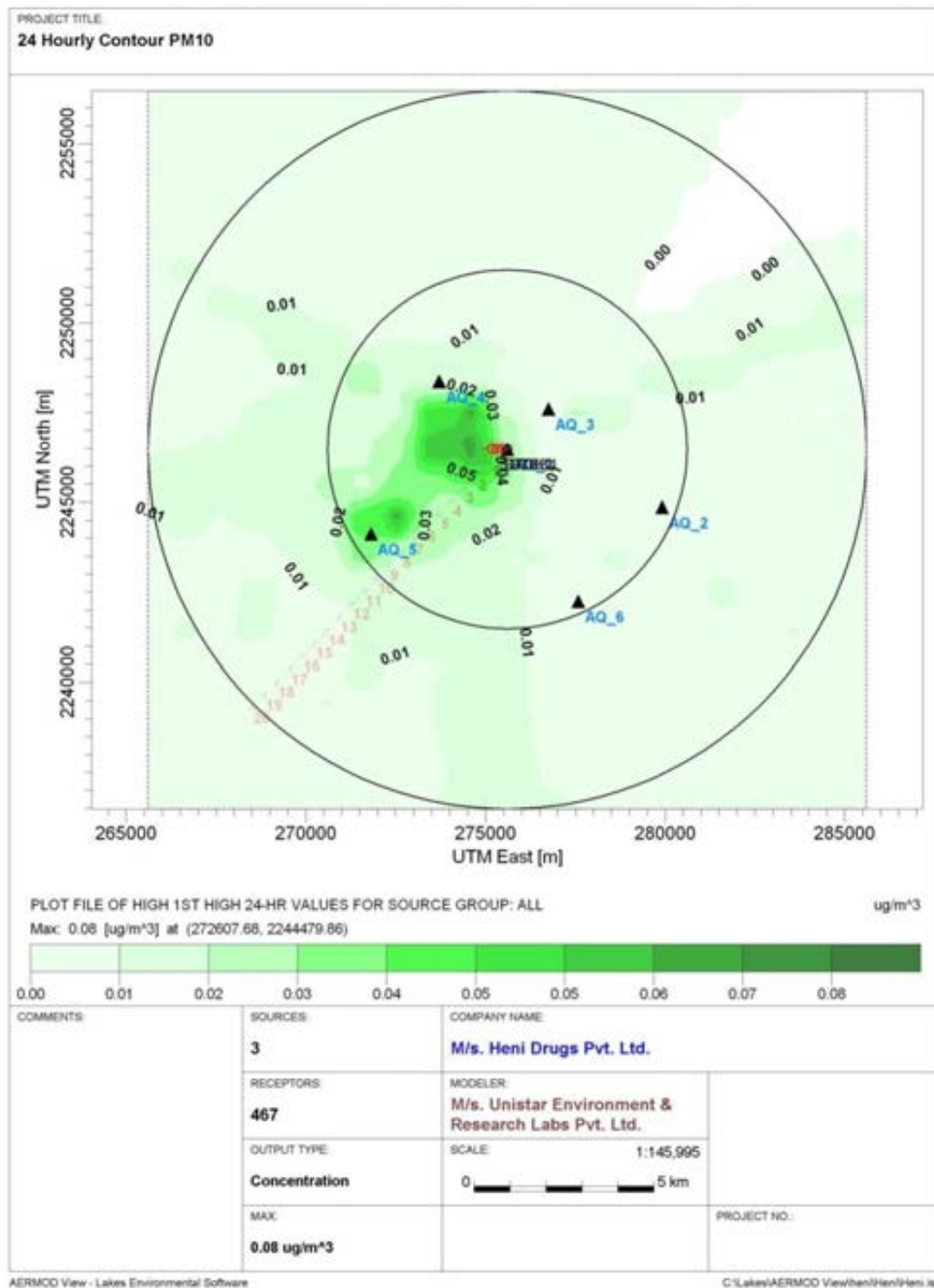


Figure 4.4: Contour of Predicted 24 Hourly Incremental GLC of SO_x:

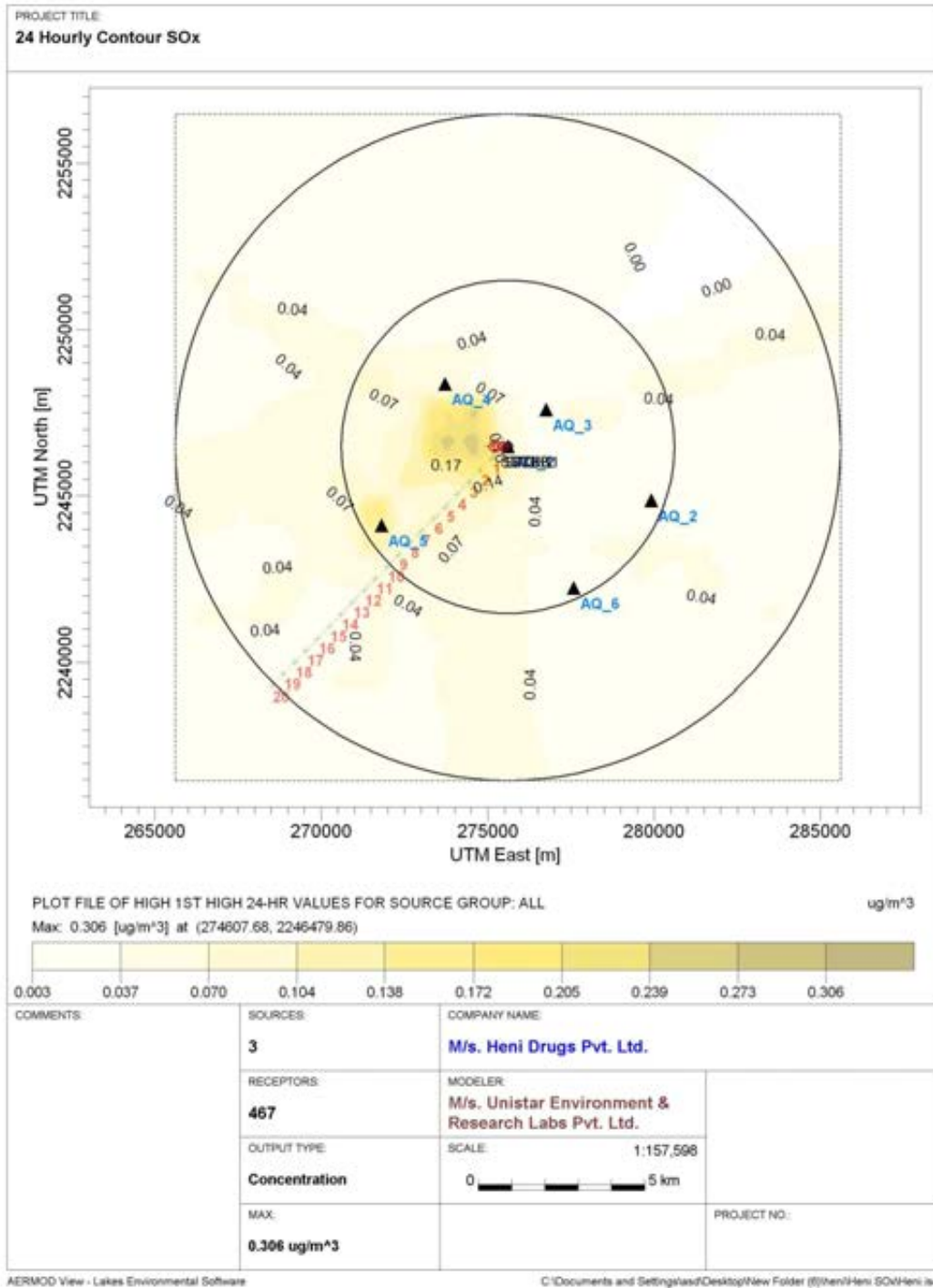


Figure 4.5: Contour of Predicted 24 Hourly Incremental GLC of NO_x:

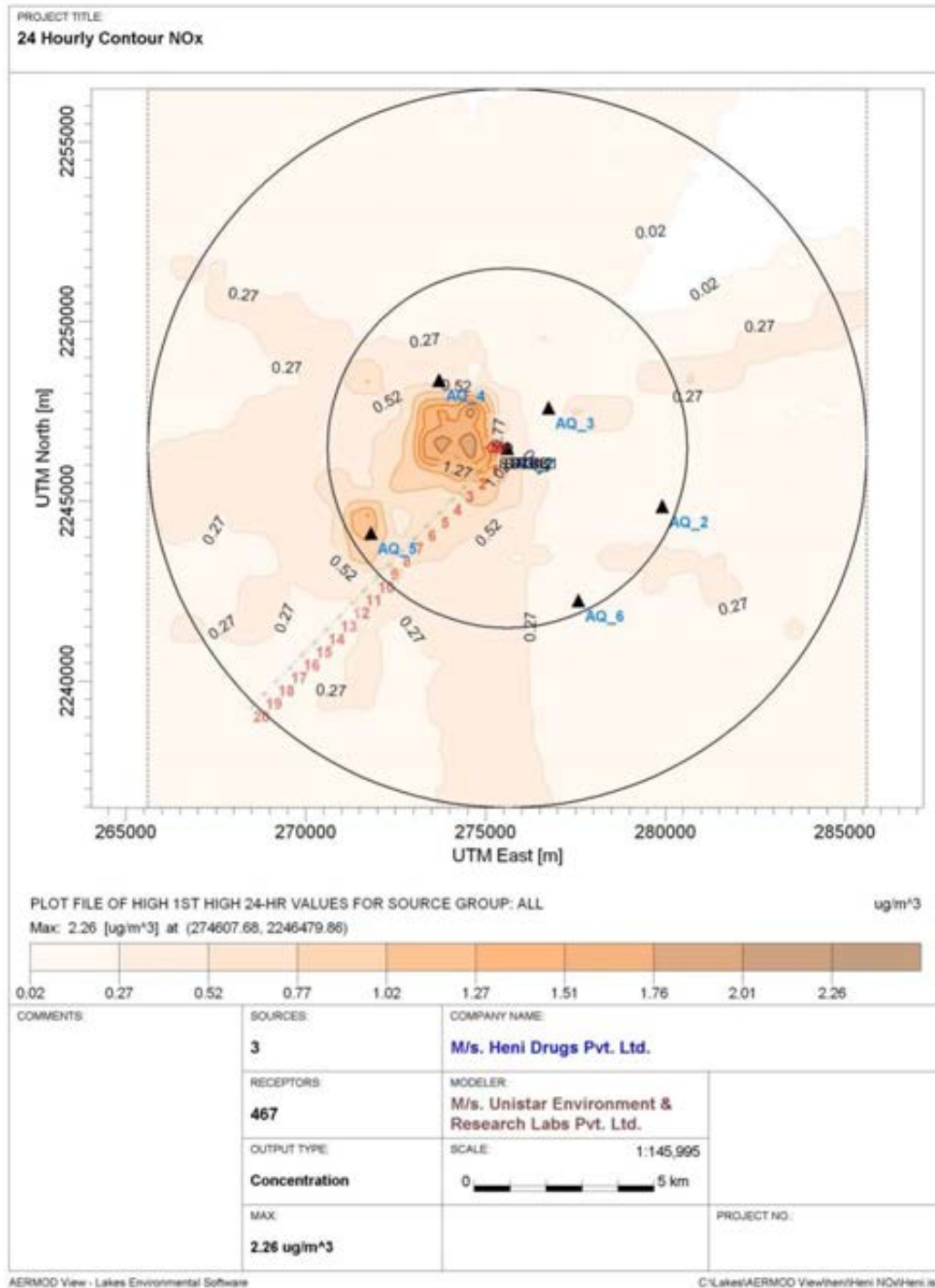


Figure 4.6: Graph of 1st highest 24 Hourly Average Incremental GLC for 20 Discrete Polar Receptors at 500 mt interval in downwind direction

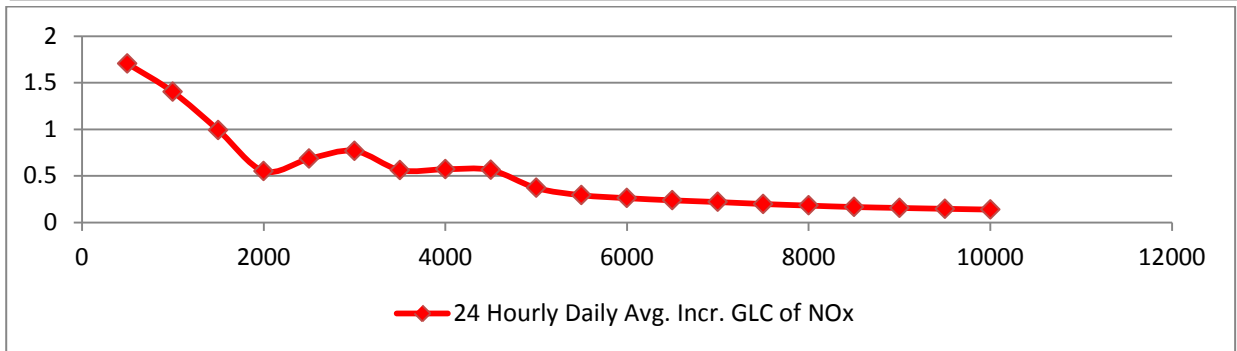
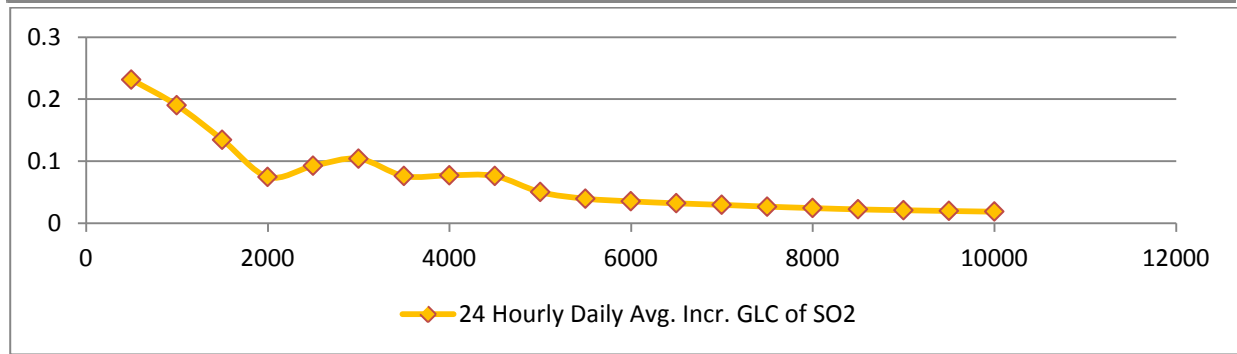
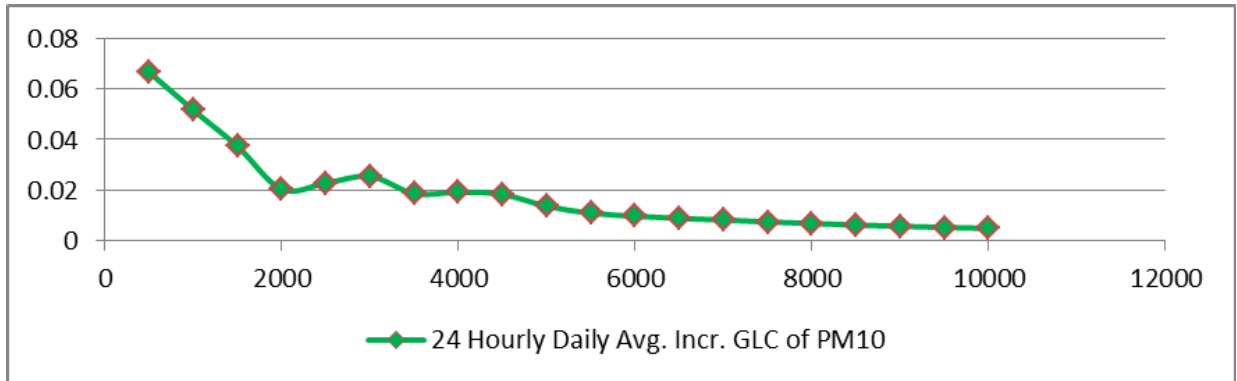
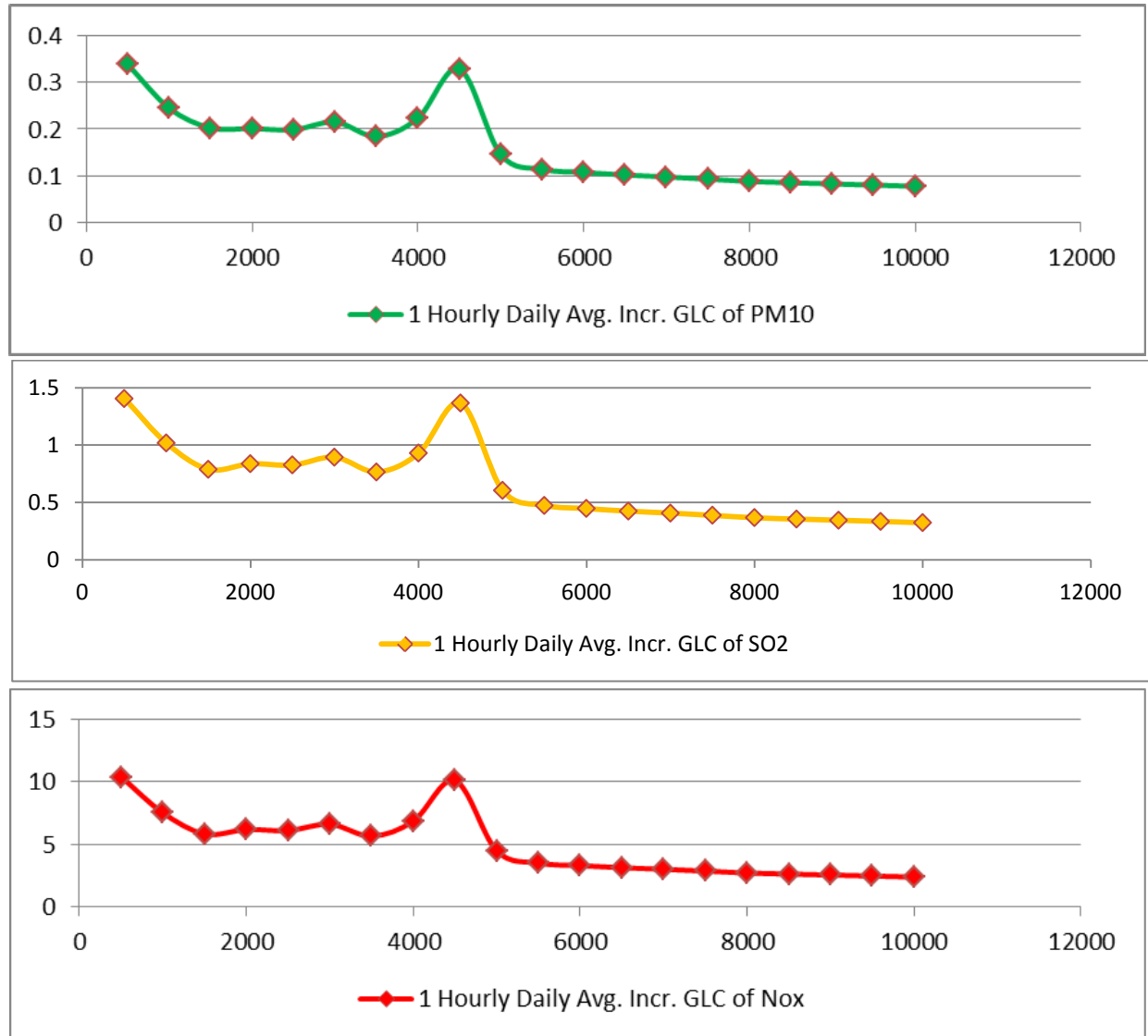


Figure 4.7: Graph of 1st highest 1 hourly Average Incremental GLC for 20 Discrete Polar Receptors at 500 mt interval in downwind direction



C. Mitigation Measures:

During Construction Phase

- Water sprinkling on land / loose soil, road and stocked piles of excavated earth shall be done.
- Utmost care shall be taken for storage of materials like cement and adequate closed storage facility shall be provided to prevent air borne cement particle which may have impacts on air quality.
- Safe work procedure shall be followed by the workers which will help in minimisation of the identified minor impact. Except the safe work procedures & designated area for specific works, there would not be any requirement for mitigation measures.

During Operation Phase

- DG sets shall be used only during the failure of power supply from DGVCL Grid.
- Stacks of adequate height shall be attached to all TFH, DG sets and Boiler.

- The company shall provide all necessary PPEs to employee & regular workplace monitoring programs.
- Properly designed enclosed storage vessels made of suitable materials and adequate handling & transfer system preferably closed system operated through the automation like PLC shall be provided.
- Regular monitoring of Stack emission, Ambient Air and workplace air shall be done as per Monitoring plan
- Transportation must be done in closed approved vehicles only. All safety & control measures shall be provided to prevent spill, leak and accident during transportation.
- All transport vehicles shall comply with HAZMAT guidelines & statutory requirements

4.3.2. IMPACTS DUE TO WATER POLLUTION

Impacts on water are anticipated due to the accidental discharge of mercury or high concentrated effluent. The proponent has already planned efficient control measures to prevent / minimise the impacts on water environment. However, to ascertain residual impacts of the proposed project, detailed study has been carried out as described below.

A. Possible Source of Environmental Impact:

During Construction Phase:

- Construction activity for proposed expansion.
- Water will be require for construction activity like concrete mixing and slurry preparation, various construction works, washing etc.
- Waste water generated from washing of construction equipment.

During Operation Phase:

- Unit has permission for increased water supply from GIDC. The water consumption will increase from existing 7 to 37 KL/day after proposed expansion in which Domestic water requirement will be 4 KL/day and water requirement for Industrial activity will be 27 KL/day. For gardening purposed 2 KL/Day will be used.
- The total wastewater generated from domestic use would be 3.50KL/day after proposed project.
- The waste water will be generated from manufacturing processes of proposed products/day: Easters (0.12 KL/T), Organic Intermediates (0.65 KL/320 Kgs), Aromatic metal compound (0.55 KL/80 Kgs) and Extracts and oils (0.5 KL/64 Kgs) and washing of existing (0.90 KL/Day) and proposed (4.28 KL/Day).
- There is 1.00 KL/day industrial waste water generation mainly from the Process and washing, boiler and Cooling blow down activity of existing plant. In proposed expansion project Industrial waste water is 6.20 KL/day which will be generated mainly from the Process and washing, boiler and Cooling blow down activity. The waste water is bifurcate in two streams (i) the High concentrated COD and TDS and (ii) Low concentrated COD and TDS waste water.

- Solid waste storage area for ETP waste.

B. Anticipated Impact:**During Construction Phase**

- The peak demand would be approx. 5 KLD depending up on the intensity of daily construction work load using concrete. This water will be catered from pipeline of water supply department of GIDC Sarigam. Hence the impacts on ground water as well as surface water will not occur due to use of water for construction work.
- During Construction activity waste water will be generated which can be assimilated with the adjacent streams and produce water as well as land contamination. There is no any surface water body near by the project site. Hence, no impact on surface water quality during construction works.
- Construction materials can contain chemical, colours etc. which need to be stored & handled appropriately on site. Any accidental spillage or leakages of such materials can degrade the quality of water.
- Impacts may arise due to disposal of untreated sewage.

During Operation Phase:

- Source for water requirement is GIDC water supply; hence no impact ground water due to drawl of ground water.
- During manufacturing of proposed product probability of Leakage or spillage wastewater especially mercury containing wastewater may have impact on Top soil contamination which may affect the ground water quality.
- Impacts on water resources may also occur as secondary impact due to contamination of soil caused by runoff of contaminated water from the premises resulted due to the spill/leak of hazardous chemicals. In such case, colour, pH, BOD, COD, TDS, Hardness, Alkalinity, Phenol and Mercury etc. may increase in ground water which may cause problems of digestive system, neurological disturbances, memory problems, skin rash and kidney abnormalities etc.
- Contamination of ground water and surface water body due to disposal of high concentrated wastewater from mfg. process and washing and its disposal.
- Wastewater generated from clean-up operation undertaken during emergency/major disaster of chemical spill (mercury)/leak may contaminate ground water and /or surface water upon disposal without proper treatment.
- Ground water may be contaminated due to leakage or spillage of leachate from stored ETP sludge.

C. Mitigation Measures:**During Construction Phase**

- Water requirement shall be met only from GIDC water supply pipeline.

- Bund/barrier around construction area.
- Designated washing area for construction equipment
- Adequate soak pit and septic tank.
- Closed storage area with concrete floor.

During Operation Phase:

- No use of ground water and no use of surface water from nearby canal.
- Water requirement shall be met only from GIDC water supply pipeline.
- Domestic effluent will be disposed of through adequate soak pit and septic tank.
- Adequate effluent treatment plant for high concentrated and low concentrated effluent.
- Emergency storage tank/ guard pond for wastewater.
- Hazardous waste storage area and disposal as per the regulatory guideline/ provisions.
- Impervious lining of floor of chemical storage and production area.
- High concentrated waste water (from Metallic Streams) shall be send to multiple effect evaporators and Low concentrated wastewater (from Non-metallic streams) shall be sent to in house ETP. The Treated waste water from in house ETP shall be disposed off through CETP.
- No disposal of poorly or untreated effluent generated from Industrial operations and clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Provision of alternative treatment option for effluent generated clean-up operation undertaken during emergency/major disaster of chemical spill /leak.

4.3.3. IMPACTS ON HYDROLOGY, GROUNDWATER & WATER CONSERVATION

Impacts on ground water are anticipated due to contamination of soil by accidental discharge of inorganic mercury or high concentrated effluent. The proponent has already planned efficient control measures to prevent / minimise the impacts on hydrology, groundwater environment. However, to ascertain residual impacts of the proposed project, detailed study has been carried out as described below.

A. Possible Source of Environmental Impact:**During Construction Phase**

- No impact during construction phase

During Operation Phase

- The water consumption shall increase from existing 7 to 33 KL/day after proposed expansion which Domestic waste requirement will be 4 KL/day and water requirement for Industrial activity is 27 KL/day. For gardening purposed 2 KL/Day will be used. Unit has permission for increased water supply from GIDC.

- Aspect of Surface water and groundwater may be contaminated with metal salts from wastewater discharges or by direct contact with metals-contaminated soils, sludge in emergency condition.
- Rain Water Harvesting is not planned as it is not feasible; since, the project site is situated in the chemical zone of GIDC, Sarigam and there is a very much possibility of groundwater contamination.

B. Anticipated Impact:**During Construction Phase**

- The proposed site is situated in GIDC having adequate storm water drainage and the site is already prepared for construction, hence no impact on drainage pattern of study area.
- Water consumption will be increased due to proposed construction activity and water will be met from GIDC water supply, hence no impact on aquifer and water table.
- As the water requirement for construction is very less, the impact will be minor as the capacity of ultimate surface water resource (Daman ganga River) is quite adequate to cater the demand.

During Operation Phase

- Water consumption will increased due to proposed expansion project which increase the overall load of water consumption from GIDC. Such increase in water consumption will result in impact on surface water hydrology due to increase load. However, it has been noticed that impact will be minor as the capacity of ultimate surface water resource (Daman ganga River) is adequate to cater the demand.
- The unit is use mercury as raw material to manufacturing of Metal salt. Surface water and Ground water will be contaminated with Mercury salts from wastewater discharges or by direct contact with mercury salt-contaminated soils, sludge in emergency condition.

C. Mitigation Measures:**During Construction Phase**

- Water requirement of proposed construction works shall be met only through drawl from GIDC water supply pipe line.
- Water demand during construction should be reduced by use of premixed Concrete, curing agents and other best practices referred.

During Operation Phase

- Water requirement of proposed construction works shall be met only through drawl from GIDC water supply pipe line.
- Make the surface of plant area cover by concrete floor to prevent the contamination of mercury on ground water.

4.3.4. IMPACTS ON LAND USE& LAND COVER**A. Possible Source of Environmental Impact:****During Construction Phase**

- Proposed expansion project is to be located coming within the existing plant premises situated in GIDC notified industrial area and no additional land classified in other land use pattern will be required.
- During construction phase activity include construction of building to setup of project which may release airborne particles
- During leveling of open area at the proposed site may result in dusting.
- Greenbelt development in and around premises.

During Operation Phase

- Major accident in material storage area mainly the discharge of inorganic mercury and fire.
- Disposal of polluted effluent on land for irrigation of green belt mainly high concentrated effluent discharge which contain mercury salt.
- The contamination of soil by solid/hazardous wastes (saturated carbon from mfg. Process) and untreated sewage.
- Particulates Emission and other pollutants.

B. Anticipated Impact:**During Construction Phase**

- There will be no impact on LU/LC due to the project as the project will be developed within the existing plant premises situated in GIDC notified industrial area.
- Dusting arising from site preparation activity may lead to hindrance in photosynthesis of vegetation of local area up on deposition. This may result in partial change in Land use due to loss/ degradation of vegetation in these areas.
- Similar to above, the airborne construction material may travel in atmosphere and will get deposited on vegetation in plantation area, cropland and forest area. This may also result in partial change in Land use due to loss/ degradation of vegetation in these areas.
- The green belt development within premises and around the periphery of project site will enhance the local land cover status.

During Operation Phase

- As a result of development of industry in GIDC, the neighbouring areas will be developed for commercial use. The infrastructure services e.g. roads, state transport, post and telegraph, communication, education and medical facilities, housing, etc. will be improved in the surrounding areas that will have potential of change in LULC.
- LULC impact would occur due discharge of polluted effluent on land for irrigation of green belt mainly high concentrated effluent discharge which contain mercury salt which may result in deformation of vegetation and infertility of soil
- LULC impact would occur due to fire & explosion of hazardous chemical at raw material storage area which may cause the loss of develop greenbelt in and around the project site.

This may result in partial change in localized land cover due to loss of vegetation in affected greenbelt areas.

- Similar impact on land cover of surrounding area may also occur due to burning /drying of vegetation during fire& explosion hazards. However such probability is very less because it has been found out in RA study that effect of fire & explosion hazards will spread maximum up to about 20 m.
- Declined growth of vegetation would occurs due to disposal of polluted effluent and solid / hazardous waste on land which may result in impact on localized land cover status.
- Airborne particles arising from transport, storage, handling and process may travel in atmosphere and will get deposited on vegetation of plantation area, cropland and forest area of study region. This may also result in partial change in LULC due to loss/ degradation of vegetation in these areas.

C. Mitigation Measures:**During Construction Phase**

- Dust prevention measures like water sprinkling and curtaining around construction area
- Adequate management for transportation and Proper handling & storage facilities for the construction materials to prevent airborne particles
- Greenbelt development in at least 30% area of the plot.

During Operation Phase:

- Adequate management for transportation and Proper handling & storage facilities for the construction materials to prevent airborne particles
- Greenbelt maintenance in at least 30% area of the plot throughout project operation time
- The preventive measures for fire hazards shall be followed as described in risk assessment report of proposed project.
- No disposal off effluent and solid/hazardous waste on land.

4.3.5. IMPACTS ON SOIL**A. Possible Source of Environmental Impact:****During Construction Phase**

- Site preparation activities.
- Transportation, storage and handling of construction materials.
- Concrete preparation and civil works
- Mechanical works for shed development and installation of plant and machinery.
- Deposition of air borne construction materials.
- Runoff from construction activities and haphazard dumping/ disposal of construction waste.

During Operation Phase

- The utility emissions generated from D.G. Set of 160 KVA capacity and one number of Steam boiler having the capacity of 2 ton/hr.

- Generation of Industrial waste water @ 7.20 KL/Day after the proposed expansion project, which is mainly generated from the process and washing, boiler and cooling blow down activities.
- Solid and hazardous waste generated (Used oil @ 100 L/Month, ETP waste @ 5 MT/Month, Discarded containers/barrels/liners @ 8700 Nos./Yr and saturated carbon @ 5.5 MT/Month).
- Mercury salt is being used as raw material for manufacturing Aromatic Metal Compounds. This may contaminate the surface soil.
- Transportation, Storage and handling of hazardous raw materials used.

B. Anticipated Impact:**During Construction Phase**

- Construction material may contain chemical, colours, etc. These materials upon deposition on land may affect the quality of the surface soil in the project site.
- Construction materials spilled / leaked on land may contaminate the soil of affected area.
- Runoff from construction activities and haphazard dumping/ disposal of construction waste can affect the soil quality of the area of disposal.
- Runoff from construction site may cause erosion of soil of area covered by runoff.

During Operation Phase

- The utility emissions may not have considerable impact as HSD and NG are proposed as fuel for utilities.
- Particulates generated from manufacturing process, transportation, storage and handling may have considerable impact on soil in form of contamination of soil of affected area upon deposition of the particulate.
- Untreated / poorly treated waste water may lead to depletion of vital micronutrients available in the soil by changing its pH value.
- Untreated / poorly treated waste water if goes to soil will affect the soil quality. Such change in soil quality is likely to affect soil quality parameters like salinity, EC, Soil alkalinity/ acidity, CEC, SAR, carbon content, C/N ratio, sulphate, chloride, ammonia, phosphorus and Chromium.
- Solid and hazardous waste generated, if not properly managed lead to soil contamination.
- Improper Transportation, Storage and handling of hazardous raw materials as well as hazards associated with these materials will have chances of toxic contamination of soil.
- The contamination of soil caused by hazards associated with project, disposal of effluent and solid /hazardous waste may result in decrease in soil fertility.
- The aforesaid contamination of land may be slightly to very toxic and such toxicity of contaminated soil may result in secondary impact on flora, subsoil water and aquifer quality.
- Mercury salt can enter the aquatic environment via weathering, dissolution and biological processes. Although extremely useful to man, mercury is also highly toxic to the human organism, because it cannot be excreted and therefore acts as a cumulative poison.

C. Mitigation Measures:**During Construction Phase**

- Minimize the production and Proper management of construction waste generated.
- Barrier around the construction are to restrict dusts.
- Closed storage area with concrete flooring.

During Operation Phase

- Domestic waste water should be disposed off through adequate soaks pit.
- Industrial wastewater should be treated in an efficient ETP to meet the discharge norms of CETP.
- Implementation of possible recycling / reuse of treated waste water.
- Proper stack height and Dust collector as air pollution control system should be installed to control the dust being generated from pulveriser.
- Stack with adequate height and diameter should the installed to control the probable pollutants from utilities.
- Proper impervious lining of raw material and finished product storage area is to be done for preventing the contamination of surface soil.
- Closed system should be proposed for solvent handling.

4.3.6. IMPACT DUE TO NOISE**A. Possible Source of Environmental Impact:****During Construction Phase**

- Additional shed preparation activity within existing premises.
- Transportation of construction materials.

During Operation Phase

- Running of DG Set, Thermopack and Boiler.
- Running of Plant and Machinery.
- Transportation of vehicles.

B. Anticipated Impact:**During Construction Phase**

- Operation of construction equipment/machinery will result in increase in noise level which will affect the normal hearing capacity of the construction employees engaged in the area of these sources. Such increase in noise will also affect the birds dwelling in the construction area.
- It is assumed that transportation of material and construction equipment to the site will increase the movements of truck which in turn will increase the noise level. The increased noise level in such way will have effects on sleeping of people as well as fauna of the transport route.

During Operation Phase

- Operation phase will not have any considerable impacts on the noise level of the area as the project would not have any high noise generating equipment or machinery.

- The boiler of proposed project is a Baby Boiler which will not have too high noise. Hence issue of major effects on the person exposed to the noise generated from the boiler will not arise.
- The DG Set will be the sources of noise. The noise generated by these sources will be confined within the source area. The noise level outside the DG Set area will be slightly higher which will have effects on normal hearing of the person engaged in the nearby area. Continuous exposure to the increased noise level may also result in head ache in the person exposed to the noise at/near DG set area.
- The maximum noise level outside the premises will remain below 65-70 dB (A) at any time and the site is situated within the industrial estate. Hence no major issue related with adverse effects on noise of human and other fauna of the area is anticipated.
- Transportation of raw material and products will increase the movements of truck which in turn will increase the noise level. The increased noise level in such way will have effects on sleeping of people as well as fauna of the transport route.

C. Mitigation Measures:**During Construction Phase**

- Turning off of engine of equipment/machinery not in use.
- Minimum transportation in night time on route passing from residential area
- Restriction on Loud Horns

During Operation Phase

- Proper non-vibrating foundation for rotating/vibrating equipment/machinery
- Housing of high noise generating equipment/machinery in closed area
- Provision of acoustic enclosure & silencer for DG set
- Regular maintenance & lubrication of the equipments & machineries
- A greenbelt in and around the premises to create barrier for noise propagation
- Minimum transportation in night time on route passing from residential area
- Restriction on Loud Horns

4.3.7. HAZARDOUS WASTE & INDUSTRIAL SOLID WASTE**A. Possible Source of Environmental Impact:****During Construction Phase**

- Generation of Construction Waste
- Generation of Used Oil
- Generation of Excavated Earthen Materials
- Generation of empty bags of cement

During Operation Phase

- Generation of ETP Waste @ 5.0 MT/Month
- Generation of Used Oil @ 100 Lit/Month
- Generation of Empty Drums/Barrels/Liners @ 8700 Nos./Yr
- Generation of Saturated carbon @ 5.5 MT/Month

- Generation of Toxic/Hazardous waste materials during clean up procedure after accident in material storage/handling/transportation/production area.

B. Anticipated Impact:**During Construction Phase**

- Solid waste arising out from construction works can contaminate the soil upon improper disposal. Such waste may also contaminate air upon being airborne.
- Excavated earthen material if not stored properly may result in dusting in ambient environment which may adversely affect human health.
- Used oil may contaminate the soil & water upon mixing of this waste with water or soil of area where the oil is spilled/leaked.
- Empty cement bag if not handled properly may result in increase in level of particulate matter in ambient air which may have adverse effects on human health.

During Operation Phase

- The hazardous waste generated after accident in unit will have many adverse impacts according to the content of the waste. Such waste upon mixing with soil may contaminate soil and if mixed with water it may contaminate the water. If any person exposed to such toxic waste beyond tolerable limit may get serious health effects. The volatile content of this waste can contaminate air of the area where the waste is stored or dumped.
- The ETP waste as well as the hazardous and non-hazardous waste from process may contain many toxic organic loads as well as other constituent which may contaminate water, soil and air upon release/mixing. This waste can badly affect human health upon exposure to it. It may also have serious adverse effects on the flora of area having contaminated soil due to afore said wastes.
- Used oil may contaminate the soil & water upon mixing of this waste with water or soil of area where the oil is spilled/leaked.
- Empty drums/barrels/liner of hazardous materials can contaminate air upon release of the residual volatile materials in these containers. Such contamination of air may badly affect the human health as well as other living beings.

C. Mitigation Measures:**During Construction Phase**

- Proper storage area for construction waste (Concrete, Waste sand & cement etc.)
- Proper handling & storage of used oil generated from construction equipment / machinery
- Proper location within premises for storage of excavated soil
- Sprinkling of water in stock pile of excavated soil & Construction waste.
- Reuse of excavated soil & construction waste.

During Operation Phase

- Proper designated storage area for solid/hazardous waste as per regulatory/statutory guidelines
- Proper Solid & Hazardous waste handling & transfer facilities to prevent exposure of employees engaged in operation

- Transportation of waste to permissible disposal site only through the registered vehicles
- Disposal of solid/hazardous waste as per regulatory/statutory requirements
- Reuse/Recycling of wastes like used oil & empty drums/barrels/liners
- Saturated carbon will sent to the common incineration site.

4.3.8. IMPACTS ON OCCUPATIONAL HEALTH& SAFETY

A. Possible Source of Environmental Impact:

During Construction Phase

- Working on Height
- Working with heavy goods and equipment
- Working with rotating machinery
- Material Transportation & Transfer
- Construction activities & Fabrication works
- Plant erection & commissioning

During Operation Phase

- There will be 7 hazardous Raw Materials for production of the proposed project.
- Any hazards occurred in the storage and production area will have impacts on environment
- Any accident like fall, slip, trip, burn etc. can have serious impacts on occupational health
- Exposure to the hazardous materials can have impacts on occupational health
- Ergonomic issues related with workplace
- Heavy lifting and material transfer operation.

B. Anticipated Impact:

During Construction Phase

- Serious injury or death is anticipated during period of construction works due to fall from height.
- MSD (Musculo-Skeleton Disease) and other injury are likely to occur due to lifting or shifting of heavy goods and equipment.
- Rotating machinery can cause serious injury (like cut, fracture of bone, crushing of hand etc.) to the employee engaged in operation of the machinery.
- During material transportation activities, normal to serious fatal accident of public & employee is envisaged.
- Material Transfer activities can result in Musculo-Skeleton Disease (MSD) &/or other serious to minor injury to the employee engaged in material transfer.
- Construction activities can emit particulates of construction materials like cement and soil which up on inhalation or contact with skin can cause serious health issues like problem of respiratory system, skin roughness & allergy etc.
- Similarly the fabrication works can pose threat of serious injury like cut, burn, fracture etc. Fabrication works can also pose threat of respiratory problems due to inhalation of gaseous & particulate emission from welding operation etc.

- During phase of plant erection & commissioning, employees & public of nearby area can be affected due to unexpected higher emission from utility as well as due to chemical exposure during hazardous material handling/storage/transfer.

During Operation Phase

- As observed, there will be 7 hazardous materials in the project which may create serious threat to environment and occupational and public health up on release in environment.
- Release of these materials during any hazard occurred in the storage area or during handling activities will result in toxic dispersion which can have serious issues related with air pollution and public/occupational health. The probable health hazards are described in RA report given in chapter 7.
- To assess the probable impacts on environment and occupational health & safety and to ascertain the hazard area detailed Risk assessment study has been conducted for the hazardous materials. The outcome of RA study has been described in later chapter-7 of the EIA report.
- Besides, issues of Musculo-Skeleton Disease (MSD) can be occurred in employees facing problem of improper ergonomic workplace and employee engaged in heavy lifting/transfer.
- It is also observed that due to fall, trip, slip, heavy lifting/transfer and other operations can result in minor to severe injury to the employee engaged in project operation.
- It is also noted that flammable hazards may occur in storage area especially in storage area for bromine, methanol, ethanol, Acetone and IPA can have serious effects (like burn/death) on person in affected area.
- The detailed study for the impacts of the chemicals of the project are studied separately and presented in form of RA Study Report which is presented in Chapter 7.
- The summarized details of impacts and mitigation measures for the chemicals of major concern are presented below in tabular form.

Table.4.8 Impacts of Hazardous Chemicals and control measures

Sr. No.	Short description of Scenario (Worst case and one MCA* scenario)	Chemicals Involved	Types of risks such as Fire, Explosion	Severity (Type of injury or damage possible)	Concentration & Damage distance from source (meters)	No injury distance with criteria	Risk control measures provided
1	Toxic Dispersion, Flammable area of vapour cloud, Over Pressure due to explosion	Ethanol	Class 3, Flammable	Possible flame pocket area/flash fire Life threatening health effect	IDLH: 3300 ppm : 19 m over pressure-LNE LEL: 33000 ppm (10 % LEL – 27 m , 60 % LEL- 11 M) UEL: 190000 ppm	isolate spill or leak area for at least 50 meters	Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. Employees are provided with and required to use impervious clothing, gloves,

Sr. No.	Short description of Scenario (Worst case and one MCA* scenario)	Chemicals Involved	Types of risks such as Fire, Explosion	Severity (Type of injury or damage possible)	Concentration & Damage distance from source (meters)	No injury distance with criteria	Risk control measures provided
							face shields and other appropriate protective clothing/equipment
2	Toxic Dispersion, Flammable area of vapour cloud, Over Pressure due to explosion	Isopropanol	Class 3, Flammable, irritant	Possible flame pocket area/flash fire Life threatening health effect	IDLH: 2000 ppm & 12 m , 13080 ppm = 60% LEL & 11 m, less than 10 m over pressure-LNE	isolate spill or leak area for at least 50 meters	Employees are provided with and required to use impervious clothing, gloves, face shields and other appropriate protective clothing/equipment Wear positive pressure self-contained breathing apparatus (SCBA). - Structural firefighters' protective clothing will only provide limited protection.
3	Toxic Dispersion	Hydrochloric Acid	Class-8, Toxic, corrosive	Life threatening health effect	IDLH: 50 ppm & 405 m	isolate spill or leak area for at least 800 meters	Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
4	Toxic Dispersion	Bromine	Corrosive Poison Inhalation Hazard	Life threatening health effect	IDLH: 3 ppm : 20 m	isolate spill or leak area for at least 150 meters	Wear appropriate personal protective clothing to prevent skin contact. Wear appropriate eye protection to prevent eye

Sr. No.	Short description of Scenario (Worst case and one MCA* scenario)	Chemicals Involved	Types of risks such as Fire, Explosion	Severity (Type of injury or damage possible)	Concentration & Damage distance from source (meters)	No injury distance with criteria	Risk control measures provided
							<p>contact.</p> <p>Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection.</p>

C. Mitigation Measures:

During Construction Phase

- All construction safety procedures and equipment shall be provided to all concern employees.
- Scaffolding safety shall be ensured before initiation of works on height.
- Employees working with cement shall be provided with safety gloves and mask.
- Transportation safety shall be ensured throughout the tenure of material transportation activities.
- All rotating equipment/machineries shall be provided with safety measures like safety guard around rotating part.
- All heavy lifting activities shall be done using appropriate material transfer facilities like trolley & fork lift.
- For lifting & shifting of very heavy equipment/machinery without transfer facilities, crane or fork lift shall be provided.
- All necessary mitigation measures like proper & adequate chemical storage, APCD & stack of adequate height for emission control, ETP for wastewater treatment etc. shall be provided before erection & commissioning of plant.

During Operation Phase

- Floor of plant & storage shall be non-slippery and it shall be ensured that there is no liquid spilled on floor.
- All rotating equipment/machineries shall be provided with safety measures like safety guard around rotating part.
- All workplace shall be ensured with proper ergonomic condition to ensure safe & non-tiring work place conditions.

- All activities of lifting & shifting of very heavy materials shall be done using trolley or fork lift.
- Chemical safety plan shall be prepared & implemented before commissioning & routine operation of the plant.
- RA study for the proposed project shall be conducted & all necessary hazard/risk control/prevention measures shall be implemented before erection & commissioning of plant. (RA Study is conducted for proposed project, Refer Chapter 7, Section 7.3)
- Proper storage shall be provided for all hazardous materials and there shall be adequate isolation between two materials as required for safe storage condition.
- All fittings in area having flammable materials shall be flameproof and all necessary fire-fighting facilities shall be ensured in this area.
- In all area first aid kit shall be available.
- Regular occupational health check program shall be conducted. Pre-employment & Annual post-employment health check-up of all employee shall be done. Health check of affected employee shall be done when any employee is significantly exposed to hazardous material.

4.3.9. IMPACTS ON ECOLOGY AND BIODIVERSITY

A. Possible Source of Environmental Impact:

During Construction Phase

- Process of excavation of soil,
- Transportation, storage and handling of construction materials,
- Concrete preparation,
- Civil and mechanical work.

During Operation Phase

- Continuous Noise generating on running of DG set.(As standby)
- Solid and hazardous waste generated (Used oil @100 L/Month, ETP waste @5 MT/Month, Discarded containers/barrels/liners @8700 Nos./Yr, Saturated Carbon @5.5 MT/Month)
- Wastewater generation from proposed project @7.20 KLD.
- Transportation, Storage and handling of hazardous raw materials used.
- The impacts on local ecological factors may occur during the major catastrophic incident in hazardous materials storage area resulting in Fire & explosion hazard and toxic dispersion.

B. Anticipated Impact:

During Construction Phase

- During construction phase no considerable impact is likely to arise as site is situated in notified industrial estate and is far away from eco sensitive area.
- Only some temporal, localized (within project site) and minor impact may occur due to dusting, noise generation and transportation activity.

During Operation Phase

- Since no eco sensitive area is situated within 10 Km radial area from the project site except the agricultural area and few forest patches and the proposed project is within the notified

industrial area; the issue of diversion of forest land or agricultural land and impacts on ecology is not anticipated.

- Even the emissions from the proposed project would not cause any harm to the local terrestrial ecological component as the predicted level of pollutants likely to be emitted from project are found to be well within ambient air quality norms prescribed by CPCB.
- Untreated Industrial waste water generated with neutral to basic pH, high TDS and COD value if goes to water body may disturb the aquatic habitat. pH changes can tip the ecological balance of the aquatic system and excessive acidity can result in the release of hydrogen sulphide. Water with a pH > 8.5 indicates that the water is hard and most metals become more water soluble and more toxic with increase in acidity.
- Night Transportation and hazard associated with Storage and handling of hazardous raw materials used may cause damage to ecological layout of area on accidental release.
- The toxic effects of mercury depend on its chemical form and the route of exposure.
- Impact of proposed project on ecology is anticipated mainly due to the toxic and fire hazards of chemicals; like Phenol, Ethanol, Pthalic anhydride, Hydrochloric acid, Sodium hydroxide, Acetic acid, etc..
- Mainly the Acetic acid would have considerable impact on ecological layout of the project area. On short exposure it may cause serious temporary injury to the fauna exposed to it. Ocular exposure can produce severe conjunctival irritation and chemosis, corneal epithelial defects, limbal ischemia, permanent vision loss and in severe cases perforation. Quantities greater than 1 liter should be stored in tightly sealed metal containers in areas separate from oxidizers. Primary routes of exposure to the general population are through consumption of foods and inhalation of air.
- In addition to the acetic acid, following chemicals will have minor impact on ecology as potential of exposure of flora and fauna of chemicals are less.
- Hydrochloric acid is highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Thus its accidental dispersion has life threatening health effect on the fauna of the area affected by the dispersion.
- Fumes of sulphuric acid upon inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns, or death.
- Possible Mercury pollution is of particular importance due to its deleterious effects on aquatic plants and animals. When mercury is deposited in lakes or waterways, bacteria convert it to methyl mercury. Methyl mercury accumulates in algae and is eaten by smaller fish, which in turn are eaten by larger fish. Fish at the top of the aquatic food chain can have methyl mercury concentrations as high as 130,000 times that of the surrounding water.
- In addition to the above mentioned toxic effect on ecology, impact on ecology due to fire and explosion hazard is likely to occur due to hazardous incidence in storage of Ethanol. Fire and explosion hazards in storage area of these chemicals can have serious impacts on local ecological layout (greenbelt) due to burning or drying of flora in the greenbelt.

C. Mitigation Measures:

During Construction Phase

- Transportations of vehicles during the night should be restricted.
- Development of dense Greenbelt within and around the premises is suggested.

During Operation Phase

- All hazardous materials shall be stored, transferred and handled as suggested in the RA report.
- All necessary control & prevention measures for all hazards associated with the project shall be implemented prior to inception of the project activities as mentioned in the RA Report.
- Disaster/Emergency Management Plan shall be prepared & implemented.
- Implementation of all mitigation measures as suggested for control of air pollution, water pollution, land pollution and noise pollution shall be ensured by proponent.
- Maintenance of dense greenbelt in and around the company premises which will act as sink to the noise pollution and air born pollutants.
- Disposal of untreated effluent and solid & hazardous waste on land and in water bodies should be avoided.

4.3.10. SOCIO-ECONOMICS**A. Possible Source of environmental Impact:****During Construction phase:**

- Land acquisition for the proposed project.
- Proposed expansion project is to be located within the existing plant premises situated in GIDC notified industrial area and no requirement of additional land outside of the existing industrial premises.
- Construction activity includes construction of building to setup of project which may lead to the issues of some pollution like increase in amount of particles in air, gas emission from construction utilities/ machineries / equipment, water pollution and soil pollution.
- Considerable load on ground water availability for domestic & socioeconomic activities of the local people if the water requirement of proposed construction works is met through consumption of groundwater or surface water resources of the area.
- Water supply by GIDC water supply dept. through the industrial water supply pipeline.
- Employment opportunity will arise for unskilled/skilled labour, technical staff (like welder, electrician, plumber etc.) and managerial staff.
- Opportunity of business will arise for contractors and transporters as well as for small business like tea stall, provision store, and tyre works etc.

During Operation Phase

- Chances of pollution of air, pollution of water, pollution of soil and noise pollution due to proposed project operation and transportation.

- Considerable load on ground water availability for domestic & socioeconomic activities of the local people if the water requirement of proposed project operations is met through consumption of groundwater or surface water resources of the area.
- Water supply by GIDC water supply dept. through the industrial water supply pipeline.
- Considerable potential of hazards (toxic dispersion and fire & explosion hazards) associated with chemicals of the proposed project.
- Increase in road traffic due to transportation of materials for proposed project.
- Minor employment opportunity for unskilled/skilled labour, technical staff (operator, technicians, maintenance staff etc.) and managerial staff as well as increased opportunity of business.

B. Probable Impact Identified & Assessed:**During Construction phase:**

- The land acquisition for proposed project can have impacts on socio economic layout of the project if agricultural land is acquired but such issue will not arise as the proposed project is to be developed in existing industrial premises situated in notified industrial estate.
- During period of construction works of the proposed project dusting from the works will increase which will have negative impacts on crops of agricultural land of vicinity. Such dusting will also have effects on health (issues like respiratory problem, eye problems etc.) of local people being affected by the dusting arising from proposed construction works.
- There will be minor issue of gaseous emission from the construction machineries/equipment during proposed construction works. But such pollution will have negligible potential to cause effect on health of local people, local agricultural land and public infrastructure & houses.
- During construction works traffic on road will be increased due to transportation activities for construction materials. Such increase in traffic will result in temporary nuisance, problems of difficult traveling and increase in travelling time. Such increase in traffic may also cause damages to local minor roads resulting in poor quality of road networks.
- Huge quantity of water will be required for proposed construction works which can result in issues related with water availability for local people from groundwater & surface water resources of local area. However it has been noticed that proposed construction works will be done using water supplied by GIDC water supply pipeline for industrial water supply. Hence issue of availability of water to local people will not arise.
- Issues of availability of the labour for local domestic and agricultural activities will arise due to employment of the local labour in construction works of the proposed project. Such issue will create many problems for local people and farmers. Such issue may also result in economic losses of the local farmers due to unavailability of labour.
- Employment of unskilled/skilled labour, technical staff (like welder, electrician, plumber etc.) and managerial staff for proposed construction, though it is less and temporary, will have some beneficial impacts on economic condition of the local labour/people.

- Increase opportunities of business potential will have temporary beneficial impacts on economic condition of local contractors, supplier of construction materials, transporter and small business owners (like tea stall, provision store etc.).

During Operation Phase:

- As a result of development of industry in GIDC, the neighbouring areas will be developed for commercial & industrial use.
- The pollution of air may have impacts on health local people & crop yield in the nearby areas of the project site.
- Increase noise level due to the proposed project may have impacts in terms of annoyance in sleep as well as other noise related health problem like head ache. However such probability will be less as the noise from the proposed project will have impacts in close vicinity of the site and there is no residential area in the areas likely to be affected by high noise.
- Increase noise level & traffic on local road passing through the residential areas will have impacts on local people in terms of annoyance due to noise, disturbed sleep, increased travelling time and annoyance due to heavy traffic.
- The increased traffic may have impacts in terms of damage to local minor road due to heavy load of the transport vehicles. Due to this the quality of local road will be affected which will ultimately result in impacts on local people's lives.
- If the project operation utilises the ground water or local surface water resource to meet the water requirements of the proposed project, impacts on local area & people may occur due to poor availability of water for their domestic and agricultural activities. But it is observed that such impacts will not occur as the water requirement will be met through industrial water supply pipeline by GIDC water supply dept.
- If any contaminated runoff from project site during major accident in hazardous materials storage area falls in any of the surface water resources, impacts on local socioeconomic activities (agriculture & fisheries) and public health of local area will occur as significant impacts.
- The impact on land would occur due to fire & explosion of hazardous chemical at raw material storage area which may cause the problem of health of local people and domestic animals. Due to such hazards loss or damage of crop of nearby agricultural fields may also occur.
- Many chemicals are toxic in nature, which will have serious issues of health of local people of closed vicinity as well as local people employed in project being affected by these chemicals. Such issues if not managed with utmost care will result in very serious health issues and economic issues in the local area.
- If during catastrophic accident in hazardous materials storage and production area is occurred, contaminated runoff may occur which may come out of the project premises and may contaminate the agriculture land and ground water & surface water resources of the local area. Such contamination will result in economic loss due to poor productivity of affected crop land as well as poor fish availability from affected water resources. Further,

issue will also result in serious health issue in the people upon consumption of such affected crop and fish catch.

- If any major problem (like pollution and catastrophic disaster, occupational health issues) related with local people occurs during the project operations, conflict will arise between project authority and local people which will result in many social issues. Also such problem will result in many economic issues related with proposed project and local people.
- Issues related with availability of labour for local socioeconomic activities like agriculture etc. due to engagement of local labour in operation works of the proposed project. Such impacts will be long term impacts. Such issues will result in economic losses of local farmers and other people but will be beneficial to the local people employed in the proposed unit.
- Economic benefits to local people will occur due to increased opportunity of contractual and regular recruitment for project as well as increased potential of business of local contractors, transporters and other small business owners (like tea stall owner, tyre works owners, provision store owners etc.)

C. Mitigation Measures Suggested

During Construction Phase:

- Proper closed storage facilities for the construction materials
- Prevention of dust
- No use of groundwater or local surface water resources
- Adequate management for transportation activities.

During Operation Phase:

- Implementation of Chemical Safety Plan, Emergency Action & Disaster Management Plan.
- Pollution prevention measures for prevention & control of environmental pollution.
- No use of ground or surface water resources of the local area.
- Implementation of all hazards and risk prevention & control measures as suggested in Risk Assessment report.
- Prevention of contaminated runoff from proposed project.
- Regular medical check-up of people likely to be affected by the toxic chemicals.
- Safe & well planned raw materials / chemical transportation.
- Adequate management for transportation.
- Proper public relation to prevent conflicts with local people.
- Regular CSR activity for Social welfare & upliftment of local people.

4.4 EVALUATION OF RESIDUAL IMPACTS

Matrix methods are basically generalized checklists where one dimension of a matrix is a list of environmental, social & economic factors likely to be affected by a proposal. The other dimension is a list of actions associated with development. These relate to both construction and operation phases. Making cells representing a likely impact resulting from the interaction of a facet of the development with an environmental feature identifies impacts. With some matrices qualitative representation of impact importance and magnitude are inserted in individual cell.

Matrices provide cause-effect relationships between the various project activities and their impacts on the numerous environmentally important sectors or components. Matrices provide a graphic tool for display of impacts to their audience in a manner that can be easily comprehended. The impact of different project activities on various environmental components like ecology, environmental pollution, aesthetics and socio-economic have been summarized in a form of a matrix.

To show the potentials of impact, a two-dimensional MATRIX System has been employed with impact magnitudes of an each cause. All the impacts are confined to the study region of 5-km radius from the unit. The summary shows the influence of the Environment Management Plan (EMP) also i.e. impact predicted for both, with and without EMP. The environmental indices identified can be classified into the following:

Physical Parameters	:	Surface water quality Ground water quality Air quality & Climate Soil Quality Land use pattern & Topography
Ecological Parameters	:	Forests/ Parks/ Sanctuary Flora & Fauna Aquatic ecosystem
Social Parameters	:	Aesthetics Local Housing structure Services Health & Safety
Economic Parameters	:	Agriculture Fisheries Industries Employment

The assessment of the impact of the general impacting activities on the above parameters of environmental indices can be done by establishing a co-relation by “Cause and effect relationship” with the help of impact matrices.

The matrices for both the construction and operation phase are presented. The environmental impact matrices can be prepared for two conditions:

- Without mitigation/control measures.
- With proposed mitigation measures for adverse / beneficial effects.

The criteria for evaluation of qualitative matrix are presented herewith:

1. **No Impact (0)**: This indicates that the project activity is unlikely to have any impact on an environmental attribute.

2. **Negligible Adverse Impact (-1) / Negligible Beneficial Impact (+1)** :It signifies that the actions have minor effect, adverse or beneficial, on the environmental parameters concerned.
3. **Significant Adverse Impact(-2) / Significant Beneficial Impact (+2)** :The activities and their environmental Impacts are judged to be significant if they create, or have the potential to create concern in the public or professional community.
4. **High Adverse Impact(-3) / High Beneficial Impact (+3)**:The action that can create or have a potential to create controversy in the public or professional community due to its long-term effect. They may be at times irreversible.

The criteria for Overall evaluation of qualitative matrix are presented below:

- | | |
|--|--------------------------------------|
| A. Highly Negative overall Impacts: | If Total Score= Above -350 |
| B. Moderately Negative overall Impacts: | If Total Score= -176 to - 350 |
| C. Slightly Negative overall Impacts: | If Total Score= -1 to -175 |
| D. Neutral overall Impacts: | If Total Score = 0 |
| E. Slightly Positive overall Impacts: | If Total Score= 1 to 175 |
| F. Moderately Positive overall Impacts: | If Total Score= 176 to 350 |
| G. Highly Positive overall Impacts: | If Total Score = Above 350 |

The environmental Impact evaluation matrix without mitigation/ control measures during the construction phase is given as **Table 4.2**, while the matrix with proposed mitigation measures during the construction phase is given in **Table 4.3**.

The environmental Impact evaluation matrix with mitigation/ control measures during the operation phase is given as **Table 4.4**, while the matrix with proposed mitigation measures during the operation phase is given in **Table 4.5**.

Table 4.9: Matrix Evaluation of impacts for construction phase without mitigation measures

IMPACT SOURCES	Excavation	Water Requirement	Civil Work	Mechanical Works	Noise Generation	Machine Operation	Landscaping & Greenbelt	Surface Paving	Transportation activities	Domestic activities	TOTAL
PHYSICO-CHEMICAL PARAMETERS:											
Surface Water	0	-2	-1	0	0	0	0	0	0	-2	-5
Ground Water	0	0	0	0	0	0	0	0	0	-1	-1
Air Quality & Climate	0	0	-2	-2	0	-2	+1	0	-2	-1	-9
Soil Quality	0	0	-2	-1	0	-1	+1	0	-1	-1	-5
Landuse pattern	0	0	0	0	0	0	0	0	0	0	0
ECOLOGICAL PARAMETERS:											
Forest/ Park/ Sanctuary	0	0	0	0	0	0	0	0	0	0	0
Flora & Fauna	0	0	-1	-1	-1	-1	+1	0	-1	-1	-5
Aquatic Ecosystem	0	0	-1	0	0	0	0	0	0	0	-1
SOCIAL PARAMETERS:											
Aesthetics	0	0	-1	-1	-1	-1	0	0	-2	0	-6
Local housing structure	0	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	-1	-1
Health & Safety	0	0	-2	-2	-1	-2	0	-1	-2	0	-10
ECONOMIC PARAMETERS:											
Agriculture	0	-1	-1	0	0	0	0	0	0	0	-2
Fisheries	0	0	0	0	0	0	0	0	0	0	0
Industries	0	0	0	0	0	0	0	0	0	0	0
Employment	0	0	+1	+1	0	0	0	0	+1	0	+3
TOTAL	0	-3	-10	-6	-3	-7	+3	-1	-7	-8	-42

Table 4.10: Matrix Evaluation of impacts for construction phase with mitigation measures

IMPACT SOURCES	Excavation	Water Requirement	Civil Work	Mechanical Works	Noise Generation	Machine Operation	Landscaping & Greenbelt	Surface Paving	Transportation activities	Domestic activities	TOTAL
PHYSICO-CHEMICAL PARAMETERS:											
Surface Water	0	-1	0	0	0	0	0	0	0	0	-1
Ground Water	0	0	0	0	0	0	0	0	0	0	0
Air Quality & Climate	0	0	-1	-1	0	-1	+1	0	-1	0	-3
Soil Quality	0	0	-1	0	0	0	+1	0	0	0	0
Landuse pattern	0	0	0	0	0	0	0	0	0	0	0
ECOLOGICAL PARAMETERS:											
Forest/ Park/ Sanctuary	0	0	0	0	0	0	0	0	0	0	0
Flora & Fauna	0	0	0	0	0	0	+1	0	0	0	+1
Aquatic Ecosystem	0	0	0	0	0	0	0	0	0	0	0
SOCIAL PARAMETERS:											
Aesthetics	0	0	0	0	0	0	0	0	-1	0	-1
Local housing structure	0	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0	0
Health & Safety	0	0	-1	-1	0	-1	0	0	-1	0	-4
ECONOMIC PARAMETERS:											
Agriculture	0	0	0	0	0	0	0	0	0	0	0
Fisheries	0	0	0	0	0	0	0	0	0	0	0
Industries	0	0	0	0	0	0	0	0	0	0	0
Employment	0	0	+1	+1	0	0	0	0	+1	0	+3
TOTAL	0	-1	-2	-1	0	-2	+3	0	-2	0	-5

Table 4.11: Matrix Evaluation of impacts for operation phase without mitigation measures

IMPACT SOURCES PARAMETERS	Plant Operation & Process	Water Requirement, wastewater generation & Disposal	Sewage discharge	Air emissions	Fugitive emissions	Noise	Waste generation & Disposal	Material Storage & Handling	Spills & Leaks	Breakdown of Control Equipments	Transportation activities	TOTAL
	PHYSICO-CHEMICAL PARAMETERS:											
Surface Water Quality	-2	-3	0	-1	0	0	-2	0	-1	-2	0	-11
Ground Water Quality	0	-2	0	0	0	0	-1	0	-2	0	0	-5
Air Quality & Climate	-1	0	0	-1	-2	0	0	-2	-1	-3	-1	-11
Soil Quality	-2	-2	0	-1	0	0	-2	0	-2	-2	-1	-12
Landuse pattern	-1	0	0	0	0	0	-1	-1	-1	0	0	-4
ECOLOGICAL PARAMETERS:												
Forest/ Park/ Sanctuary	0	0	0	0	0	0	0	0	0	-2	-1	-3
Flora & Fauna	0	-3	0	-2	0	0	-3	-2	0	-3	-1	-14
Aquatic Ecosystem	0	-1	0	0	0	0	0	0	0	-3	0	-4
SOCIAL PARAMETERS:												
Aesthetics	0	-1	0	0	-2	0	-1	-1	-1	-1	-1	-8
Local housing structure	0	0	0	0	0	0	0	0	0	0	0	0
Services	-1	0	0	0	0	0	0	0	0	0	0	-1
Health & Safety	-1	-2	-1	0	-2	-1	-2	-3	-2	-3	-2	-19
ECONOMIC PARAMETERS:												
Agriculture	0	0	0	0	0	0	0	0	0	-2	-1	-3
Fisheries	0	0	0	0	0	0	0	0	0	0	0	0
Industries	0	0	0	0	0	0	0	0	0	0	0	0
Employment	1	0	0	0	0	0	0	0	0	0	1	2
TOTAL	-7	-14	-1	-5	-6	-1	-12	-9	-10	-22	-7	-93

Table 4.12: Matrix Evaluation of impacts for operation phase with mitigation measures

IMPACT SOURCES PARAMETERS	Plant Operation & Process	Water Requirement, wastewater generation & Disposal	Sewage discharge	Air emissions	Fugitive emissions	Noise	Waste generation & Disposal	Material Storage & Handling	Spills & Leaks	Breakdown of Control Equipments	Transportation activities	TOTAL
	PHYSICO-CHEMICAL PARAMETERS:											
Surface Water Quality	0	0	0	0	0	0	0	0	0	-1	0	-1
Ground Water Quality	0	0	0	0	0	0	0	0	0	0	0	0
Air Quality & Climate	0	0	0	-1	0	0	0	-1	-1	-1	0	-4
Soil Quality	0	-1	0	0	0	0	0	0	-1	-1	0	-3
Landuse pattern	0	0	0	0	0	0	0	0	0	0	0	0
ECOLOGICAL PARAMETERS:												
Forest/ Park/ Sanctuary	0	0	0	0	0	0	0	0	0	-1	0	-1
Flora & Fauna	0	0	0	0	0	0	0	0	0	-1	0	-1
Aquatic Ecosystem	0	-1	0	0	0	0	0	0	0	-1	0	-2
SOCIAL PARAMETERS:												
Aesthetics	0	0	0	0	0	0	0	0	0	-1	0	-1
Local housing structure	0	0	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0	0	0
Health & Safety	0	0	0	0	0	0	0	-1	-1	-1	0	-3
ECONOMIC PARAMETERS:												
Agriculture	0	0	0	0	0	0	0	0	0	-1	0	-1
Fisheries	0	-1	0	0	0	0	0	0	0	0	0	-1
Industries	1	0	0	0	0	0	0	0	0	0	0	1
Employment	2	0	0	0	0	0	0	0	0	0	2	4
TOTAL	3	-3	0	-1	0	0	0	-2	-3	-9	2	-13

As seen in the tables 4.2 & 4.3, overall impacts of the construction phase of the proposed project without mitigation measures would be (-42) which would reduce to minor negative impacts (-5) by provision of mitigation measures. It is also seen from the table that the adverse impacts on environment would occur mainly due to impacts on occupation health & safety as well as contamination of ambient air. It is also observed that the adverse impacts would occur mainly due to the civil works during construction phase which will be reduce to acceptable level after necessary mitigation measures.

Further, as seen in the tables 4.4& 4.5, overall impacts of the operation phase of the proposed project without mitigation measures would be -93 which would be reduced to -13 by provision of mitigation measures. It is also seen from the table 4.4 that the adverse impacts on environment would occur mainly due to impacts on occupation health & safety as well as impacts on ambient air quality. It is also observed that the adverse impacts would be mainly due to the breakdown of control equipment.

The study for the proposed project of M/s. Heni Drugs Pvt. Ltd. at Sarigam GIDC has revealed that the upcoming activities of manufacturing of synthetic organic chemicals will not cause any considerable major negative impacts.

The fuel for boilers will be Natural Gas which is eco-friendly fuel and does not emit any considerable load pollutant. Hence, there would not be any considerable emission. Besides, the hazardous waste generation includes almost all recyclable waste except ETP sludge and all these hazardous waste will be managed as per MoEF&CC/CPCB/GPCB guidelines. Hence issues of environmental contamination due to hazardous waste are not envisaged.

Further the water consumption will be met through the drawl of water from pipeline of GIDC water supply department. Groundwater will not be abstracted for water requirement of proposed project. Hence the impacts due to the water consumption are not envisaged as the supply source exhibits very good condition and has enough capacity to meet the demand. Moreover these, proponent has planned to install well designed ETP which will be efficient for adequate wastewater treatment to meet the norms for disposal through underground drainage of GIDC going to CETP Sarigam. The ETP process adopted by the proponent is adequate to remove the pollutants from the waste water. Thus issue of water or land/soil pollution due to disposal of treated wastewater is also not envisaged.

The proponent has planned to plant varieties of trees & shrubs in the premises of proposed unit. The condition of Greenbelt will be ensured in excellent condition all the time which will be giving visual of dense vegetation. The proponent will manage the greenbelt with all possible care & attention to improve environmental condition. Thus the beneficial impacts due to the dense greenbelt are envisaged.

Other than these aspects, it is also found that the high noise generation sources will not be the part of proposed project. At any point of process plant the noise level at work place will remain below 80 dB (A) which will be further mitigated by provision of PPEs and shift management. The noise level out of the premises is envisaged to be 70 dB(A) in day and 58-60 dB(A) in night as maximum. Hence impacts of noise are not envisaged.

Company will regularly conducts the social /welfare activities especially for social welfare & upliftment of the status of the locals. As part of the management practices, it will regularly

conduct employees' welfare, training, awareness and motivation programs. Necessary documents & records of all activities at Unit for adequate production & management will be kept on regular basis. Necessary upgradation in the management system as well as work procedures will be regularly done. All aspects of safety are adequately being managed and required safety material, equipments and facilities will be provided to all employees, contractor & visitors.

Thus looking all the management procedures/action, environmental management activities and other allied functions of management system, it is concluded that there will not be any adverse impacts on environment. However, significant direct or indirect beneficial impacts are envisaged due to proposed project.

CHAPTER: 05

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1. GENERAL

The analysis of alternatives is an important tool for the selecting the best of the technologies and project location.

Alternative analysis is the process of analyzing the proposed locating for suitability for basic necessities to operate the plant safely, this analysis also covers the environmental aspect of pollution prevention and improvement in quality of life nearby the project vicinity. The project alternative is the course of action in place of another, that would meet the same purpose and need, but which would avoid or minimize negative impacts and enhance project benefits.

Such projects may result in specific impacts which can be avoided or mitigated by adherence to certain predetermined performance standards, guidelines or design criteria. Alternative approaches may therefore be more effective in integrating environmental and social concerns into the project planning process.

5.2. SITE SELECTION

M/s. Heni Drugs Pvt. Ltd. is an existing company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155. Now the company proposes to manufacture additional new products. This expansion is by addition of new products, and will be carried out within the premises of existing unit.

Since the unit is located within the Notified Industrial area of GIDC with all required infrastructure facilities, communication, transportation, medical facilities, fuel, water, power, skilled and unskilled manpower, raw materials, road networks; hence, the location of project is best suited to expand the proposed manufacturing activities. So, no alternative site is analyzed for the proposed project.

5.3. ALTERNATIVE TECHNOLOGIES

The manufacturing process of the proposed product is well established and proven technology. The accuracy and operability of the processes are judged to be proven based on consistency of production, specification of products, safety as well as environmental advantages. Hence, we are using best suited technologies for our proposed project.

CHAPTER: 06

ENVIRONMENTAL MONITORING PROGRAM

6.1 GENERAL

M/s. Heni Drugs Pvt. Ltd. has proposed expansion of its existing unit by addition of new products. As the project requires obtaining prior environmental clearance, present EIA study has been conducted as per provision of SO 1533 (as timely amended). As described there would be some minor impacts on environment due to the operation of proposed project. Considering the probabilities of impacts on environment, detailed impacts evaluation study has been conducted as presented in earlier chapter. Based on the predicted & assessed impacts as well as the baseline environmental status of the project area, present environmental monitoring plan has been designed, suggested & planned for implementation as post project environmental monitoring program as described below in subsequent sections under respective headings.

6.1.1 OBJECTIVE OF ENVIRONMENTAL MONITORING PROGRAM

As described in earlier chapter, the proposed project will have only acceptable minor impacts due to emission, sewage disposal, contamination of workplace air due to fugitive & process emission and toxic contamination of air due to major accident in storage & transportation activities releasing toxic/hazardous chemicals. Noise & vibration generation will not be a major issue as the noise level in plant will always remain well below the stipulated standard & limits prescribed by CPCB/GPCB and NIOSH/OSHA. Necessary mitigation has been suggested by EIA team and all major points have been covered in EMP for prevention, control & mitigation of these probable impacts.

For regular tracking of the effectiveness of mitigation measures & EMP at specific interval, regular monitoring of the necessary environmental parameters is required to keep the records updated for review and revision of EMP as & when required. With this vision, the present environmental monitoring program has been prepared with due consideration of the baseline status of the project area, various components of project & environmental attributes likely to be affected.

The Environmental Monitoring Program has been scheduled for the following major objectives:

- To comply with the statutory requirements of monitoring for compliance with conditions of EC, NOC and CC&A
- To comply with the provision of Factory Act & MSIH Rules
- Assessment of the changes in environmental conditions, if any, during the project operation/activities.
- Monitoring & tracking the effectiveness of Environment Management Plan & implementation of mitigation measures planned.

- Identification of any significant adverse transformation in environmental condition to plan additional mitigation measures; if & as required

The environmental monitoring program designed with the above objective and understandings have been described in the present chapter in subsequent sections under respective heading. M/s. Heni Drugs Pvt. Ltd. shall implement the environment monitoring programs in line with the planned schedule. The company shall ensure that the necessary requisite & facilities are made available and necessary arrangement including budgetary provision has been made as & when required to ensure regular efficient environmental monitoring activities.

6.2 ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program has been prepared in five different sections covering all necessary guidelines & plan for effective & efficient monitoring of the environmental conditions to ensure that EMP is implemented efficiently to prevent/minimize the anticipated impacts as described in earlier chapter-4. All required aspects including location, parameters, interval/frequency as well required documentation & records and budgetary provisions has been covered in the planned environmental monitoring program. The details are of the programs are presented below under respective headings.

Monitoring of environmental samples shall be done as per the guidelines provide by MoEF&CC/ CPCB. The method followed shall be recommended/ standard method approved/ recommended by MoEF&CC/CPCB. List of preferred method of sampling/ monitoring and analysis of environmental samples in provided in the Annexure- V of environmental method.

For monitoring of workplace area methods suggested / published by NIOSH or any other authorities shall be adopted.

The sampling/monitoring points/location, frequency& responsibility, parameter and method of components of significance shall be as following:

Table 6.1: Monitoring Points/Locations & Components

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
1.	Ambient Air : At minimum 2 location within the plant premises having 1 location in downwind direction preferably at between 500 m. & 1 km distance from plant boundary.	Monthly - In-house lab. or External MoEF&CC recognized lab	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , VOCs*
	In case of accidental leak & spill of volatile hazardous chemical: At maximum spots likely to be affected.	When accidental spillage/ leakage occurs - In-house lab. or External MoEF&CC recognized lab	VOCs*
2.	Stationary Emission: All Stacks including stacks of Thermopack, Steam boilers, DG Set and process area stacks	Monthly- In-house lab. or External MoEF&CC recognized lab	PM, SO ₂ , NO _x , VOCs*
3.	Workplace areas:	Monthly -	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x ,

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
	RM Storage and Production areas	In-house lab. or External MoEF&CC recognized lab	Bromine, VOCs*, Temperature, Humidity, Light and Noise
4.	Ambient Noise: At all sources (DG set, Steam boiler, Thermopack, Production Utilities/machineries, Pumps, Compressors etc.) and at deferent areas (Production area, Storage area, transportation area, Administrative area, security area, utility house, ETP etc) within premises	Weekly – In House lab.	Equivalent Noise Level - dB (A) (At least 1 hr. continuous)
5.	Untreated waste water from high concentrated stream	External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Untreated waste water before inlet to ETP	Daily- In-house lab. External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Treated waste water for disposal to CETP	Daily- In-house lab. External MoEF&CC recognized lab	Parameters in CETP discharge norms.
	In case of accidental spillage/leak, water samples from the area likely to be affected.	When accidental spillage/ leakage occurs.- External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphates, Phosphate, Ammonia, Chromium, Manganese, Mercury.
6.	Surface Soil: At Two locations from storage	Quarterly or after accidental spillage/	pH, EC, Moisture, Organic matter, Hg, N, P, K, SO ₄ -2,

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
	&greenbelt area in case of accidental spillage/leak, soil of the affected area from various spots & depth.	leakage - External MoEF&CC recognized lab	Cl-, Ca+2, Mg+2 & Na+
7.	Greenbelt/Vegetation Cover: Greenbelt Area at Boundary & Garden	Throughout Year at regular interval: In House by EHS Executive & other EMC members	Number of plantation (Units), Number of Survived Plants/Trees, Number of Poor Plant/Trees
8.	Annual Environmental Audit:	Yearly (In-house by MD, Environment Manager & other EMC members; External only If required by statutory provision through Approved Lab)	As per Direction of Honorary High Court, Gujarat (if applicable)
9.	Employee Medical/Health Checkup:	Yearly- Through Approved Medical Officer & Doctor as per OHS Plan	As per statutory provision & requirement
10.	Social Aspects:	Throughout year- by PRO or HR Manager or Designated person.	Employee social status and issues, Disbursement of fund for CSR, Socio-economic requirement of the area as informed by local people.

Note: *VOCs are to be monitored in terms of Chemicals of Proposed project

Monitoring to check any contamination of workplace shall be done as per statutory requirements; if any. In case of accidental spill & leak of hazardous chemicals, monitoring of the environment as needed for detection of the spilled/leaked chemical shall be done in the affected area. In such case, soil sample & groundwater sample of the affected area as mentioned in earlier section shall be collected and analyzed for detection of the spilled / leaked chemicals at regular interval for the period as required to ensure safe level of contamination.

6.3 DOCUMENTATION& REPORTING

The records of the monitoring program shall be kept on regular basis for all aspects of the monitoring. Separate records for water, wastewater, solid waste, air, emission, soil & manure shall be prepared and preserved regularly.

Immediately upon the completion of monitoring as per the planned schedule, report shall be done & necessary documents shall be forwarded to the concern person.

Methodology of monitoring (sampling & analysis) shall be prepared as separate documents as SOP (standard Operating Procedure) wherever required.

The records showing results/outcome of the monitoring programs shall be prepared as per the requirement of the schedule mentioned above.

Regularly these documents & records shall be reviewed for necessary improvement of the monitoring plan/mitigation measures/environmental technologies as well as for necessary actions of environmental management cell.

Environmental statements &/or performance report/compliance report/audit report as per conditions of EC and CC&A shall be prepared and submitted to the concern authority as per the guidelines provided by the authorities within the stipulated timeframe. CC&A and other statutory permission/consents must be obtained & renewed timely as per legal provision & guidelines. Similarly, all necessary report & forms shall be prepared and submitted to the concern authority as per the statutory requirement of Environmental Acts/rules, Factory Act & MSIHC rules. Reporting of accident & other requirements shall be made in prescribed format well within stipulated time frame as per statutory requirements & guidelines.

As per the requirements of state pollution control board documentation and report shall be done as below on regular basis.

- To obtain Consent to Operate (CC&A) renewal under the Water Act – 1974, Air Act – 1981 & Authorization under Hazardous Waste (M, H & T) Rules, 2008 as amended.
- To file monthly patrak online as per requirement.
- To submit the Environmental Audit Statement (Form V) for the previous year.
- To file regular annual return as per Hazardous Waste (M, H & T) Rules, 2008 as amended and Water Cess Assessment.
- To submit required justifiable reply against observation made by SPCB officers during the inspection, as and when required.

CHAPTER: 07

ADDITIONAL STUDIES

7.1. GENERAL

As per the provision of EIA Notification - SO 1533 (as amended timely), additional studies are the vital component of EIA especially when specific additional study is awarded as approved TOR condition by the concern authority: EAC or SEAC during the scoping for EIA. This section / chapter of additional studies of EIA report comprises mainly the Risk Assessment, Public Participation and Social Studies for R&R plan as per the generic structure of EIA report as mentioned in the SO 1533.

In case of the present EIA study for proposed project of M/s. Heni Drugs Pvt. Ltd., Risk Assessment as additional studies has been given as condition in awarded TOR, which needed to be included in the EIA study & report. The Risk Assessment Study for the upcoming project has been conducted by Risk Assessment expert of the EIA team. In addition to the RA, disaster & emergency management plan is also prepared by expert after necessary modification in the existing plan provided by the proponent.

The public hearing is not required as the proposed project is to be developed within the Notified Industrial Zone/Estate, established before 2006. Similarly, Social Studies for R&R plan have not being conducted for the proposed project as the unit is saturated within notified industrial estate of GIDC-Sarigam and no additional land outside the industrial estate is required; and hence Rehabilitation & Resettlement is not required.

The details regarding the additional studies have been described below under respective heading with reference to relevant Annexure of present EIA report.

7.2. PUBLIC CONSULTATION

As per statutory requirements, Public consultation is not applicable to the proposed project as the project is to be developed in the premises situated within the notified industrial area of GIDC Sarigam which is established before 2006 (Ref. OM Dated 10/12/2014). Therefore, as prescribed by SEAC in letter of awarded TOR, Public hearing is not required for the proposed project and hence, public hearing is not conducted.

7.3. RISK ASSESSMENT & DISASTER MANAGEMENT

The Risk Assessment Study for the upcoming project of M/s. Heni drugs has been conducted by functional area expert (Risk Assessment & Hazard Management) of EIA Team. The risk assessment has been carried out with consideration of some probable worst case scenarios like Fire, explosion and flammable cloud & toxic dispersion. The major hazards are noticed to be associated with 06 chemicals of the project, which can have worst case scenarios of fire & explosion as well as dispersion of toxic vapour & flammable cloud. As, the proposed project is

of manufacturing of synthetic organic chemicals using some organic chemicals, impacts are likely to occur due to some other chemical hazards also. Thus with such probabilities & considerations of hazards & risk, Risk Assessment Study has been carried out by proponent as pre-project conceptual RA study. The Onsite and offsite disaster plan & Emergency Management plan of hazardous chemicals have been prepared as a part of RA study assignment shown in Annexure-VI.

7.3.1 Identification of Hazardous Area

A study of process for manufacturing of synthetic chemicals as given in project report indicates the following:

- Process plant will be Batch process and multipurpose and multi utility base plant due to that at a time inventory of raw materials at production area will be very less.
- Batch size requirement of raw chemicals will be charged into day tank or reactor. After this, the valves of supply line will be closed &/or empty drums will be sent back to RM store for neutralization and disposed off. Thus the inventory of the raw material in process area will be limited and for limited time.
- Drums will be stored in drum storage area as per statutory requirements. Maximum one month's requirement of raw material inventory will be kept in drum storage area.
- List of hazardous chemicals identified as per the MSIHC Applicability is provided in 7.1.
- Some highly hazardous (flammable) chemicals will be stored in isolated tank farm area as per statutory requirements. The tank farm area will be provided with fire hydrant & other safety measures like efficient grounding, dyke wall etc.
- All pumps & motor will be flameproof to prevent incidence of fire & explosion
- Gas skid area is isolated near main gate with all required safety measures as per statutory requirements & fire hydrant system.

Considering the above Tank Farm Area, Gas Skid Area, RM Storage area for Drum storage are identified as main hazardous area related with hazardous materials storage, handling & transfers.

Table 7.1: Hazardous Raw Materials Identification as per MSIHC Rules (2000)

Sr. No.	Name of Raw material	Physical state	Storage Capacity	MSIHC Applicability	Storage Temp. & Pressure	Location & MOC	Probable Hazards
1.	Ethanol	liquid	12.00 KL	Sh-I,Part-II,248	Atm. T & P	Drums, RM	Class 3, Flammable
2.	2-Ethyl hexanol	liquid	2.80 KL	Sh-I,Part-II,254	Atm. T & P	Drums	Class 3, Irritant
3.	Isopropanol	Liquid	1.40 KL	Sh-I,Part-II,334	Atm. T & P	Drums	Class 3, Flammable, Irritant
4.	Mono ethylene glycol	Liquid	0.60 KL	Sh-I,Part-II,267	Atm. T & P	Drums	Class 9, Toxic
5.	Bromine	Liquid	27 kg	Sh-I,Part-II,84	Atm. T & P	SS drum with glass lining	Toxic

Sr. No.	Name of Raw material	Physical state	Storage Capacity	MSIHC Applicability	Storage Temp. & Pressure	Location & MOC	Probable Hazards
6.	Acetic acid	Liquid	0.4 kL	Sh-I,Part-II,2	Atm. T & P	Drums	Class 8, Corrosive

As the applicability of MSIHC rules as amended in 2000 are to be verified, raw materials are described below for necessary regulatory requirement like threshold limit of storage at any time of operation phase as well as applicability of relevant act & rules. 24 raw materials will be required for manufacturing of the proposed organic products. The materials may fall under the definition of hazardous material/chemicals either due to flammability or toxicity and even some chemicals are namely covered in MSIHC rules as hazardous materials. The details of schedule I are referred for identification of hazardous materials of the project. Total 6 raw materials are identified as hazardous as per MSIHC Rules, as amended in 2000. The summarized details of applicability of MSIHC Rules along with the hazardous raw materials as per MSIHC Rules, as amended in 2000 are listed below in tabular form.

7.3.2 Failure Frequencies

Hazardous material release scenarios can be broadly divided into 2 categories

- I) catastrophic failures which are of low frequency and
- II) Ruptures and leaks which are of relatively high frequency.

Releases from failure of gaskets, seal, rupture in pipelines and vessels fall in the second category whereas catastrophic failure of vessels and full bore rupture of pipelines etc. fall into the first category

Table 7.2: Typical failure frequencies

Item	Mode of failure	Failure frequencies
Atmospheric storage	Catastrophic failure	10 ⁻⁹ /yr
	Significant leak	10 ⁻⁵ /yr
Process Pipelines		
< = 50 mm dia	Full bore rupture	8.8 x 10 ⁻⁷ /m.yr
	Significant leak	8.8 x 10 ⁻⁶ /m.yr
> 50 mm <=150mm dia	Full bore rupture	2.6 x 10 ⁻⁷ /m.yr
	Significant leak	5.3 x 10 ⁻⁶ /m.yr
< 150 mm dia	Full bore rupture	8.8 x 10 ⁻⁸ /m.yr
	Significant leak	2.6 x 10 ⁻⁶ /m.yr
Hoses	Rupture	3.5 x 10 ⁻² /m.yr

Table 7.3: Failure Rates for Pressure Storage/Transfer

Event	Frequency or Probability
Catastrophic failure of vessel: <ul style="list-style-type: none"> • Complete failure • Failure equivalent to 6in nozzle 	3E-6 occ/vessel.yr 7E-6 occ/vessel.yr
Fracture in liquid line: <ul style="list-style-type: none"> • Pipework • Fittings 	3E-7 occ/m.yr 5E-6 occ/item.yr
Release due to overfilling	1E-4 occ/vessel.yr
Fracture of vapour line	3E-6 occ/m.yr
Serious leak (1kg/s): <ul style="list-style-type: none"> • 6in pipework • 3in pipework • Flange • Pump seal 	6E-6 occ/m.yr 6E-5 occ/m.yr 3E-4 occ/m.yr 5E-3 occ/m.yr
Release in course of draining or sampling (1.5kg/s) <ul style="list-style-type: none"> • Release per operation • Draining operations • Sampling operations • Failure to recover during draining • Failure to recover during sampling 	1E-4 (release/operation) 50 occ/yr 100 occ/yr P=1E-1 P=1E-2

7.3.3 CONSEQUENCE ANALYSIS

For the purpose of determination of possible risk of the probable hazards of chemical storage, consequences analysis was done. The analysis was done for 6 chemicals only. Consequences analysis was not done for other hazardous chemicals because the required input chemical properties for modelling were not available. The details of the selected Consequences analysis are presented below in tabular form.

Table 7.4: Scenario Considered for RA

Sr.	Chemical	Qty.	Pool Fire	Toxic Dispersion	Flammable Vapour Cloud Dispersion	Vapour Cloud Explosion
Worst Case Scenarios: For Total Quantity Stored						
1.	Ethanol	12.00 KL	✓	✓	✓	✓
2.	Acetic Acid	0.40KL	✓	✓	✓	✓
3.	2-Ethyl hexanol	2.80 KL	✓	✓	✓	✓
4.	Isopropanol	1.40 KL	✓	✓	✓	✓
5.	Hydrochloric Acid	0.70 KL	NA	✓	NA	NA
6.	Bromine	27 kg	NA	✓	NA	NA

MCA Scenarios: For Unit Storage Quantity (Quantity of single Drum/Barrel)						
1.	Ethanol	200 L	✓	✓	✓	✓
2.	Acetic Acid	200 L	✓	✓	✓	✓
3.	2-Ethyl hexanol	200 L	✓	✓	✓	✓
4.	Isopropanol	200 L	✓	✓	✓	✓
5.	Hydrochloric Acid	200 L	NA	✓	NA	NA
6.	Bromine	3 kg	NA	✓	NA	NA

Note: ND- model is not considered as details of chemical properties (i.e. Thermodynamic Properties) are not available; NA- Not Applicable

The definition and abbreviation used in modelling are as below:

A. ERPG (Emergency Response Planning Guidelines):

ERPGs estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for 1 hour. (Sensitive members of the public—such as old, sick, or very young people—aren't covered by these guidelines and they may experience adverse effects at concentrations below the ERPG values.) A chemical may have up to three ERPG values, each of which corresponds to a specific tier of health effects.

The three ERPG tiers are defined as follows:

- ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.
- ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.
- ERPG-1 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient health effects or perceiving a clearly defined, objectionable odor.

B. IDLH:

The National Institute of Occupational Safety and Health (NIOSH) defines an immediately dangerous to life or health condition as a situation "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment."

The IDLH limit represents the concentration of a chemical in the air to which healthy adult workers could be exposed (if their respirators fail) without suffering permanent or escape-impairing health effect.

C. TWA:

The National Institute of Occupational Safety and Health (NIOSH) defines an immediately dangerous to life or health condition as a situation "that poses a threat of exposure to

airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment."

D. TLV:

The National Institute of Occupational Safety and Health (NIOSH) defines an immediately dangerous to life or health condition as a situation "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment."

E. Flammable Area:

The flammable area is the part of a vapor cloud where the concentration is in the flammable range, between the Lower and Upper Explosive Limits (LEL and UEL). (These are also known as the Lower and Upper Flammability Limits.) These limits are percentages that represent the concentration of the fuel (that is, the chemical vapor) in the air. If the chemical vapor comes into contact with an ignition source (such as a spark), it will burn only if its fuel-air concentration is between the LEL and the UEL—because that portion of the cloud is already pre-mixed to the right mixture of fuel and air for burning to occur.

F. Thermal Radiation:

Thermal Radiation is also known as Heat Flux which is the rate of heat energy transferred per surface unit area.

G. Overpressure:

A major hazard associated with any explosion is overpressure. Overpressure, also called a blast wave, refers to the sudden onset of a pressure wave after an explosion. This pressure wave is caused by the energy released in the initial explosion—the bigger the initial explosion, the more damaging the pressure wave. Pressure waves are nearly instantaneous, traveling at the speed of sound. Although a pressure wave may sound less dangerous than a fire or hazardous fragments, it can be just as damaging and just as deadly. The pressure wave radiates outward like a giant burst of air, crashing into anything in its path (generating hazardous fragments). If the pressure wave has enough power behind it, it can lift people off the ground and throw them up against nearby buildings or trees. Additionally, blast waves can damage buildings or even knock them flat—often injuring or killing the people inside them. The sudden change in pressure can also affect pressure-sensitive organs like the ears and lungs. The damaging effects of the overpressure will be greatest near the source of the explosion and lessen as you move farther from the source

Based on the above selection consequences analyses were done using ALOHA software developed by Office of Emergency Management, EPA, USA & Emergency Response Division, NOAA, USA. (source: <https://www.epa.gov/comeo/aloha-software>). The details of necessary modelling using ALOHA are presented in subsequent section.

1. INPUT DETAILS**I. COMMON INPUTS:****A. SITE DATA:**

- Location: SARIGAM, INDIA
- Building Air Exchanges Per Hour: 0.49 (sheltered single storied)
- Time: February 29, 2016 1418 hours ST (using computer's clock)

B. ATMOSPHERIC DATA:

- Wind: 2.71 meters/second from NE at 25 feet
- Ground Roughness: urban or forest
- Inversion Height: 1376 mt.
- Cloud Cover: 5 tenths
- Air Temperature: 28.67° C
- Stability Class: F
- Relative Humidity: 56%

II. CHEMICAL & SOURCE STRENGTH DATA & OUTCOME OF SCENARIO MODELING**A. ETHANOL:****CHEMICAL DATA:**

- Chemical Name: ETHANOL
- Molecular Weight: 46.07 g/mol
- IDLH: 3300 ppm TWA: (8Hr.): 1000 ppm TLV: 1000 ppm
- ERPG-1: 1800 ppm ERPG-2: 3300 ppm ERPG-3: N/A
- LEL: 33000 ppm UEL: 190000 ppm
- Ambient Boiling Point: 78.2° C
- Vapor Pressure at Ambient Temperature: 0.096 atm
- Ambient Saturation Concentration: 96,792 ppm or 9.68%

SOURCE STRENGTH: WORST CASE SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 300 square meters
- Puddle Volume: 12000 liters
- Ground Initial Puddle Temperature: Air temperature
- Flame Length: 14 meters
- Burn Duration: 19 minutes
- Burn Rate: 496 kilograms/min
- Total Amount Burned: 9,391 kilograms

SOURCE STRENGTH: MCA SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 40 square meters
- Puddle Volume: 200 liters
- Ground Initial Puddle Temperature: Air temperature
- Flame Length: 7 meters
- Burn Duration: 2 minutes
- Burn Rate: 66.1 kilograms/min
- Total Amount Burned: 157 kilograms

SOURCE STRENGTH: WORST CASE SCENARIO

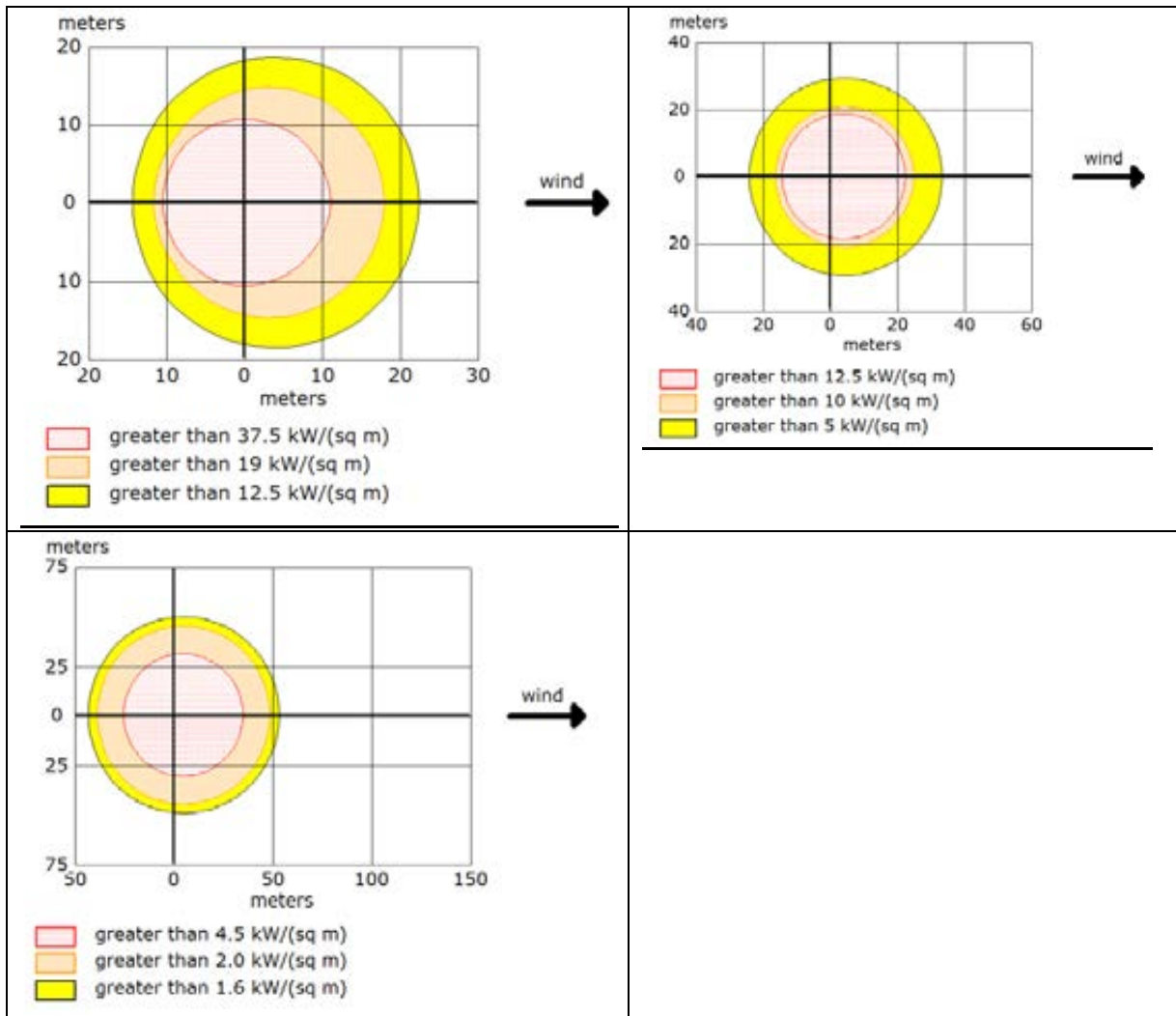
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 300 square meters
- Puddle Volume: 12000 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 18.3 kilograms/min (averaged over a minute or more)
- Total Amount Released: 883 kilograms

SOURCE STRENGTH: MCA SCENARIO

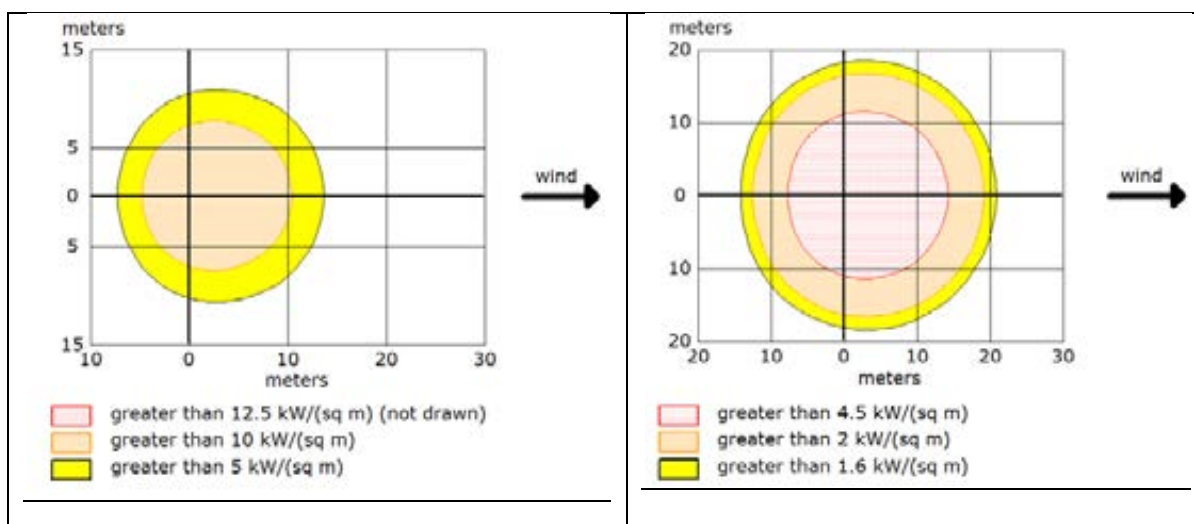
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 40 square meters
- Puddle Volume: 200 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 2.8 kilograms/min (averaged over a minute or more)
- Total Amount Released: 118 kilograms

THREAT ZONE CONTOUR FOR OUTCOME OF CONSEQUENCES ANALYSIS: ETHANOL

Ethanol Worst Case (12000 Lit): Pool Fire:



Ethanol MCA (200 Lit): Pool Fire:



Threat zone for other LOC was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Ethanol Worst Case (12KL) & MCA (200 Lit): Toxic Vapour Dispersion:

Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Ethanol Worst Case (12KL) & MCA (200 Lit): Flammable Area of Vapour Cloud

Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Ethanol Worst Case (12KL) & MCA (200 Lit): Vapour Cloud Explosion

No explosion: no part of the cloud is above the LEL at any time

B. ACETIC ACID:

CHEMICAL DATA:

- Chemical Name: ACETIC ACID
- Molecular Weight: 60.05 g/mol
- IDLH: 50 ppm TWA: (8Hr.): 10 ppm TLV: 15 ppm (STEL)
- ERPG-1: 5 ppm ERPG-2: 35 ppm ERPG-3: 250 ppm
- LEL: 40000 ppm UEL: 199000 ppm
- Ambient Boiling Point: 80.2° C
- Vapor Pressure at Ambient Temperature: 0.15atm
- Ambient Saturation Concentration: 147,998 ppm or 14.8%

SOURCE STRENGTH: WORST CASE SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 80 square meters

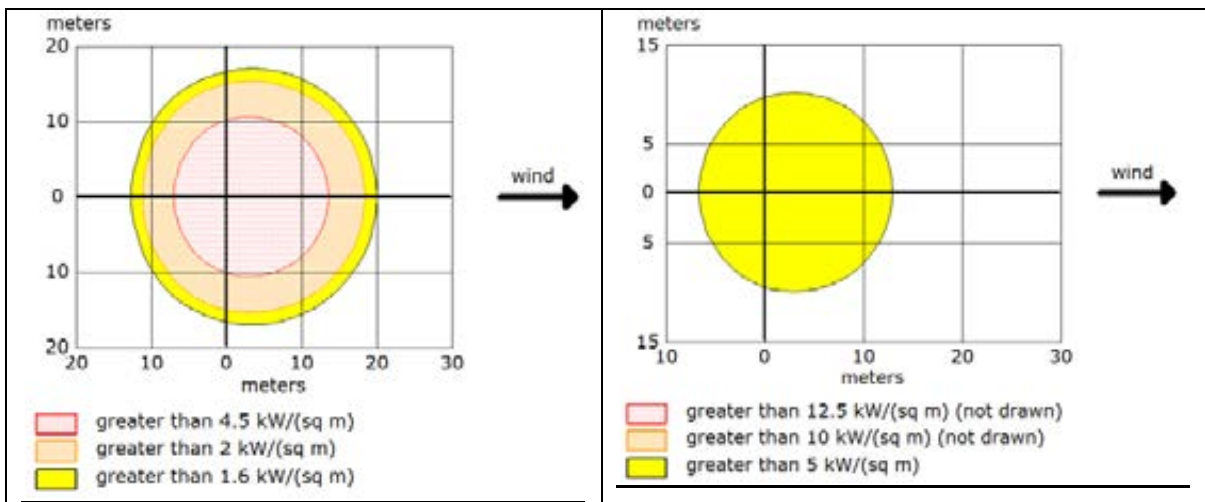
SOURCE STRENGTH: MCA SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 40 square meters

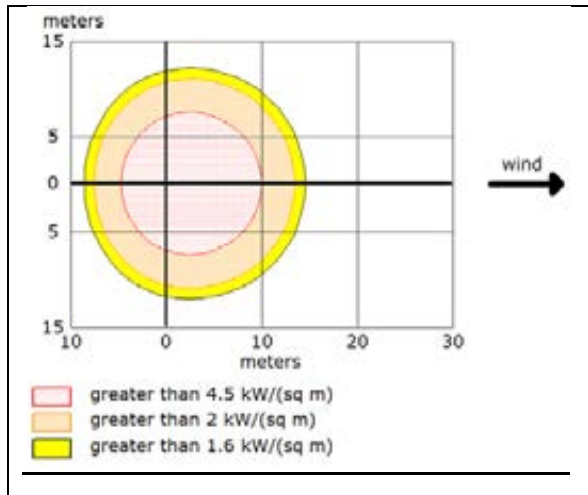
<ul style="list-style-type: none"> • Puddle Volume: 400 liters • Ground Initial Puddle Temperature: Air temperature • Flame Length: 8 meters • Burn Duration: 4 minutes • Burn Rate: 109 kilograms/min • Total Amount Burned: 415 kilograms 	<ul style="list-style-type: none"> • Puddle Volume: 200 liters • Ground Initial Puddle Temperature: Air temperature • Flame Length: 6 meters • Burn Duration: 4 Minutes • Burn Rate: 54.7 kilograms/Min • Total Amount Burned: 208 kilograms
<p>SOURCE STRENGTH: WORST CASE SCENARIO</p> <ul style="list-style-type: none"> • Evaporating Puddle (Note: chemical is flammable) • Puddle Area: 80 square meters • Puddle Volume: 400 liters • Ground Type: Concrete • Ground Temperature: 28.67° C • Initial Puddle Temperature: Ground temperature • Release Duration: ALOHA limited the duration to 1 hour • Max Average Sustained Release Rate: 1.77 kilograms/min (averaged over a minute or more) • Total Amount Released: 101 kilograms 	<p>SOURCE STRENGTH: MCA SCENARIO</p> <ul style="list-style-type: none"> • Evaporating Puddle (Note: chemical is flammable) • Puddle Area: 40 square meters • Puddle Volume: 200 liters • Ground Type: Concrete • Ground Temperature: 28.67° C • Initial Puddle Temperature: Ground temperature • Release Duration: ALOHA limited the duration to 1 hour • Max Average Sustained Release Rate: 913 grams/min (averaged over a minute or more) • Total Amount Released: 52.1 kilograms

THREAT ZONE CONTOUR FOR OUTCOME OF CONSEQUENCES ANALYSIS: ACETIC ACID

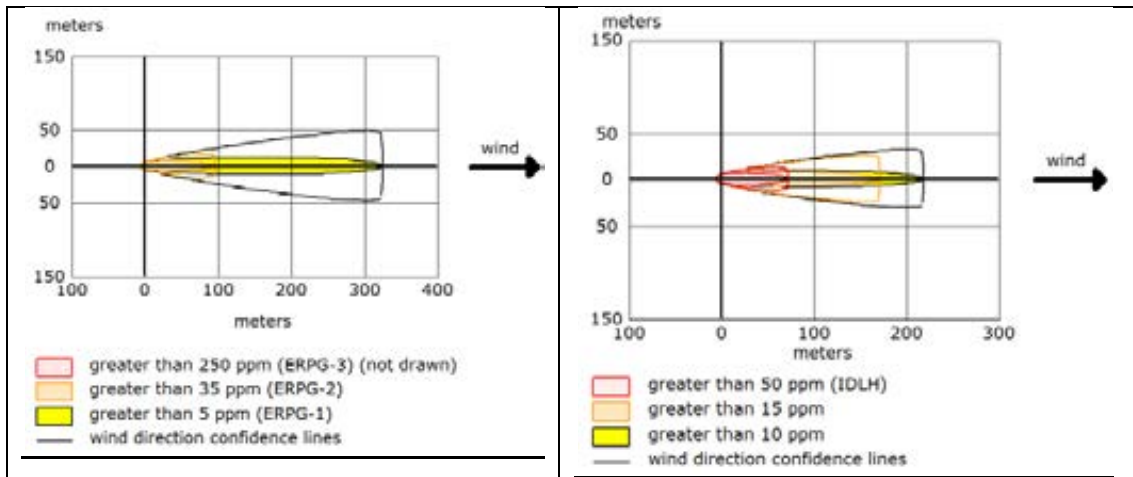
Acetic Acid Worst Case (400 Lit): Pool Fire:



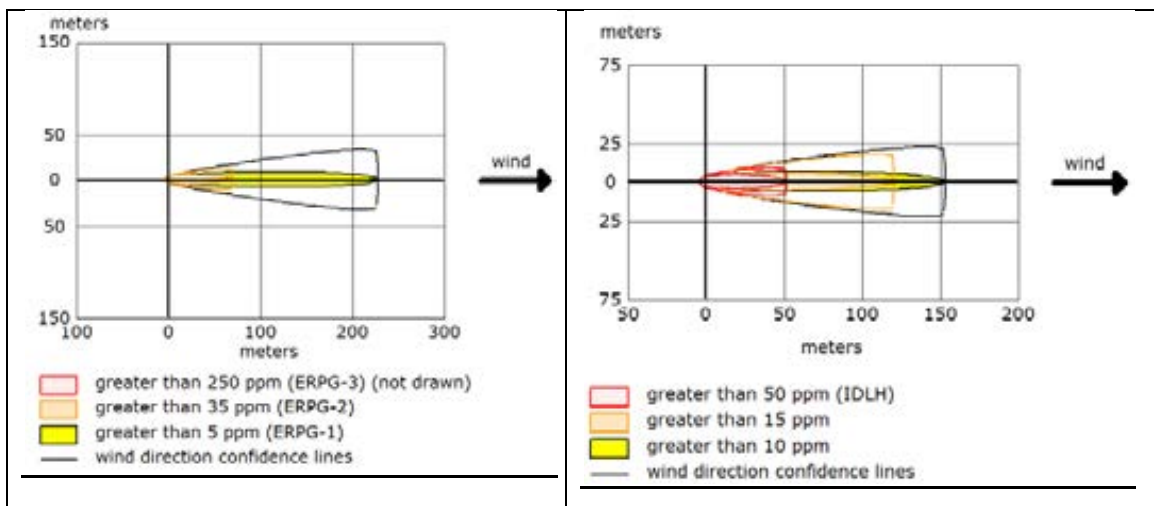
Acetic Acid MCA (200 Lit): Pool Fire:



Acetic Acid Worst Case (400 Lit): Toxic Vapour Dispersion:



Acetic Acid MCA (200 Lit): Toxic Vapour Dispersion:



Acetic Acid Worst Case (400 Lit) & MCA (200 Lit): Flammable Area of Vapour Cloud:

Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Acetic Acid Worst Case (400 Lit) & MCA (200 Lit): Vapour Cloud Explosion

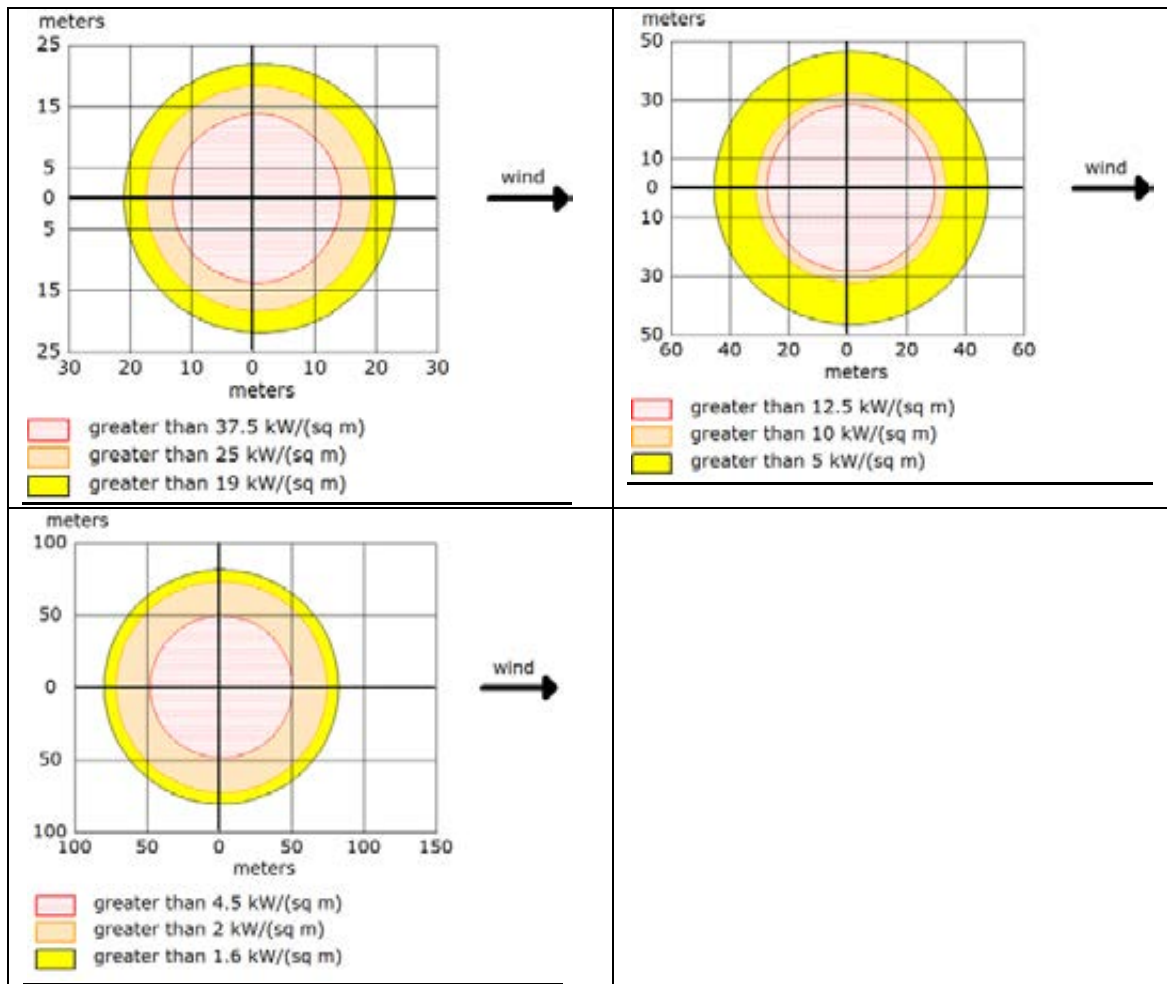
No explosion: no part of the cloud is above the LEL at any time

C. 2-ETHYL HEXANOL:

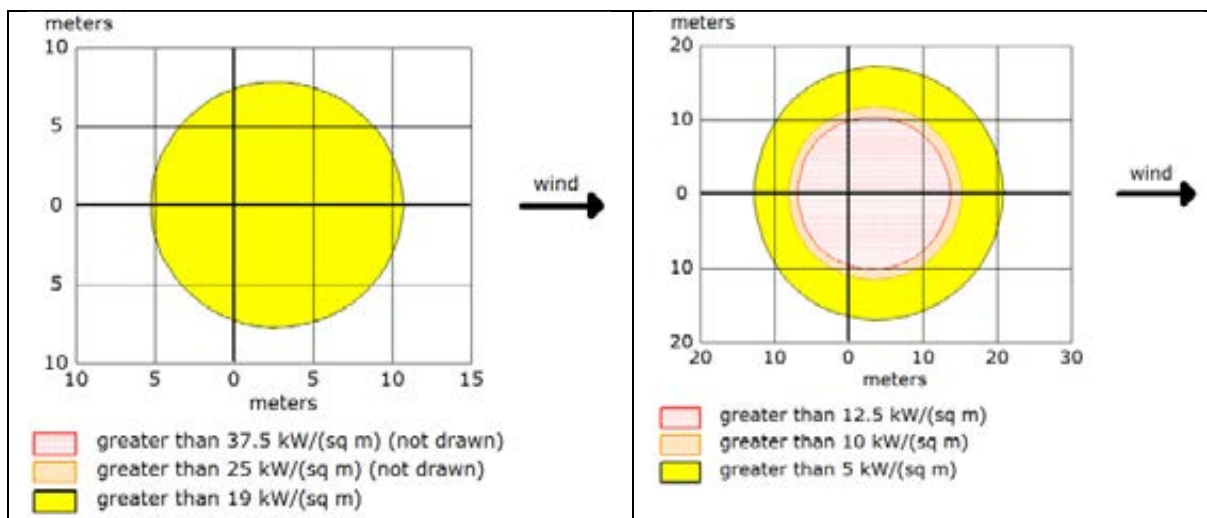
CHEMICAL DATA:	
<ul style="list-style-type: none"> • Chemical Name: 2-ETHYL HEXANOL • Molecular Weight: 130.23 g/mol • IDLH: Data Not Available TWA: (8Hr.): Data Not Available TLV: Data Not Available • ERPG-1: 0.1 ppm ERPG-2: 100 ppm ERPG-3: 200 ppm • LEL: 8800 ppm UEL: 97000 ppm • Ambient Boiling Point: 184.5° C • Vapor Pressure at Ambient Temperature: 2.71e-004 atm • Ambient Saturation Concentration: 272 ppm or 0.027% 	
SOURCE STRENGTH: WORST CASE SCENARIO	SOURCE STRENGTH: MCA SCENARIO
<ul style="list-style-type: none"> • Burning Puddle /Pool Fire • Puddle Area: 300 square meters • Puddle Volume: 2800 liters • Ground Initial Puddle Temperature: Air temperature • Flame Length: 23 meters • Burn Duration: 3 minutes • Burn Rate: 924 kilograms/min • Total Amount Burned: 2315 kilograms 	<ul style="list-style-type: none"> • Burning Puddle /Pool Fire • Puddle Area: 40 square meters • Puddle Volume: 200 liters • Ground Initial Puddle Temperature: Air temperature • Flame Length: 11 meters • Burn Duration: 1 Minutes • Burn Rate: 123 kilograms/Min • Total Amount Burned: 165 kilograms
SOURCE STRENGTH: WORST CASE SCENARIO	SOURCE STRENGTH: MCA SCENARIO
<ul style="list-style-type: none"> • Evaporating Puddle (Note: chemical is flammable) • Puddle Area: 300 square meters • Puddle Volume: 2800 liters • Ground Type: Concrete • Ground Temperature: 28.67° C • Initial Puddle Temperature: Ground temperature • Release Duration: ALOHA limited the duration to 1 hour • Max Average Sustained Release Rate: 133 grams/min (averaged over a minute or more) • Total Amount Released: 7.76 kilograms 	<ul style="list-style-type: none"> • Evaporating Puddle (Note: chemical is flammable) • Puddle Area: 40 square meters • Puddle Volume: 200 liters • Ground Type: Concrete • Ground Temperature: 28.67° C • Initial Puddle Temperature: Ground temperature • Release Duration: ALOHA limited the duration to 1 hour • Max Average Sustained Release Rate: 19.2 grams/min (averaged over a minute or more) • Total Amount Released: 1.12 kilograms

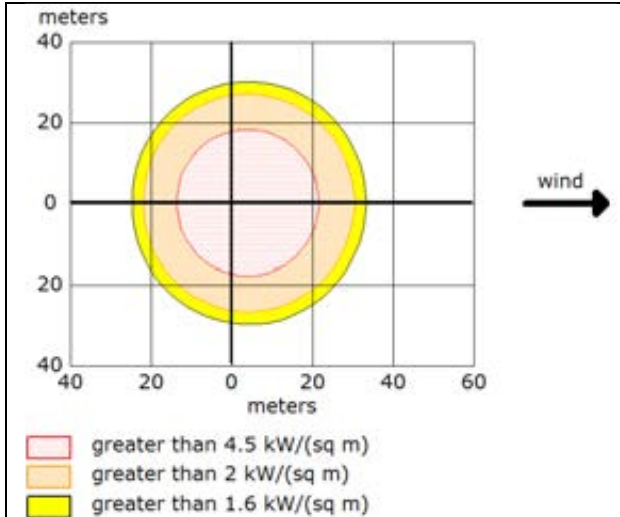
THREAT ZONE CONTOUR FOR OUTCOME OF CONSEQUENCES ANALYSIS: 2-ETHYL HEXANOL

2-Ethyl Hexanol Worst Case (2800 Lit): Pool Fire:

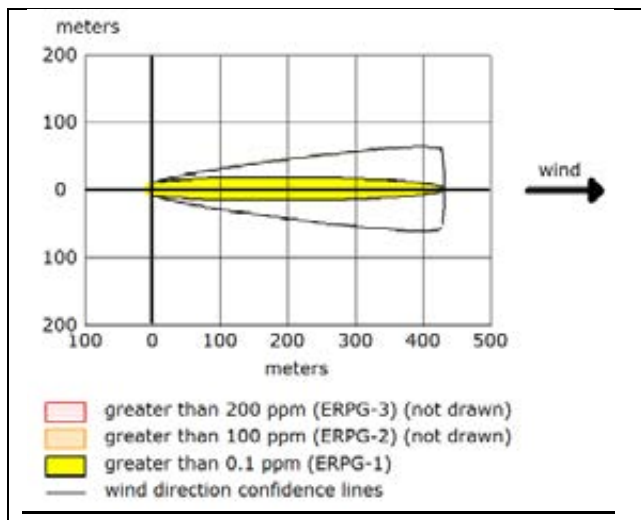


2-Ethyl Hexanol MCA (200 Lit): Pool Fire:

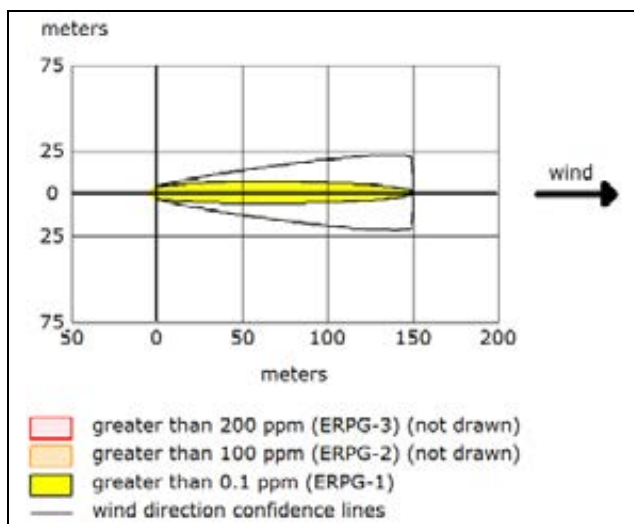




2-Ethyl Hexanol Worst Case (2800 Lit): Toxic Vapour Dispersion:



2-Ethyl Hexanol MCA (200 Lit): Toxic Vapour Dispersion:



2-Ethyl Hexanol Worst Case (2800 Lit) & MCA (200 Lit): Flammable Area of Vapour Cloud:

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

2-Ethyl Hexanol Worst Case (2800 Lit) & MCA (200 Lit): Vapour Cloud Explosion:

No explosion: no part of the cloud is above the LEL at any time

D. ISOPROPANOL:**CHEMICAL DATA:**

- Chemical Name: ISOPROPANOL
- Molecular Weight: 60.10 g/mol
- IDLH: 2000 ppm TWA: (8Hr.): 400 ppm (OSHA) TLV: 500 ppm (STEL- NIOSH)
- ERPG-1: Data Not Available ERPG-2: Data Not Available ERPG-3: Data Not Available
- LEL: 20000 ppm UEL: 127000 ppm
- Ambient Boiling Point: 82.0° C
- Vapor Pressure at Ambient Temperature: 0.072 atm
- Ambient Saturation Concentration: 72061 ppm or 7.21%

SOURCE STRENGTH: WORST CASE SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 280 square meters
- Puddle Volume: 1400 liters
- Ground Initial Puddle Temperature: Air temperature
- Flame Length: 18 meters
- Burn Duration: 2 minutes
- Burn Rate: 628 kilograms/min
- Total Amount Burned: 1090 kilograms

SOURCE STRENGTH: MCA SCENARIO

- Burning Puddle /Pool Fire
- Puddle Area: 40 square meters
- Puddle Volume: 200 liters
- Ground Initial Puddle Temperature: Air temperature
- Flame Length: 9 meters
- Burn Duration: 2 Minutes
- Burn Rate: 89.7 kilograms/Min
- Total Amount Burned: 156 kilograms

SOURCE STRENGTH: WORST CASE SCENARIO

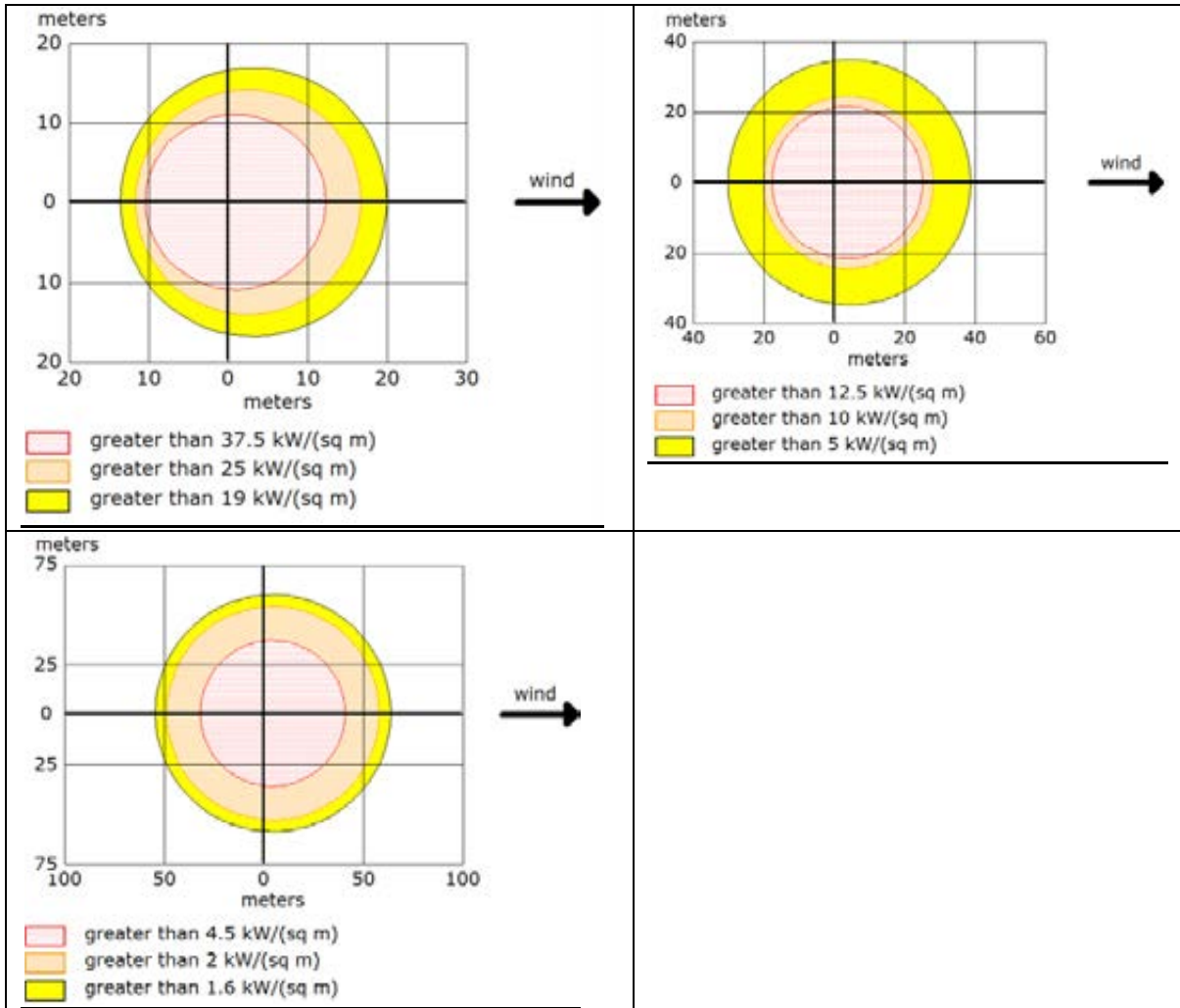
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 280 square meters
- Puddle Volume: 1400 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 16.8 Kilograms/min (averaged over a minute or more)
- Total Amount Released: 750 kilograms

SOURCE STRENGTH: MCA SCENARIO

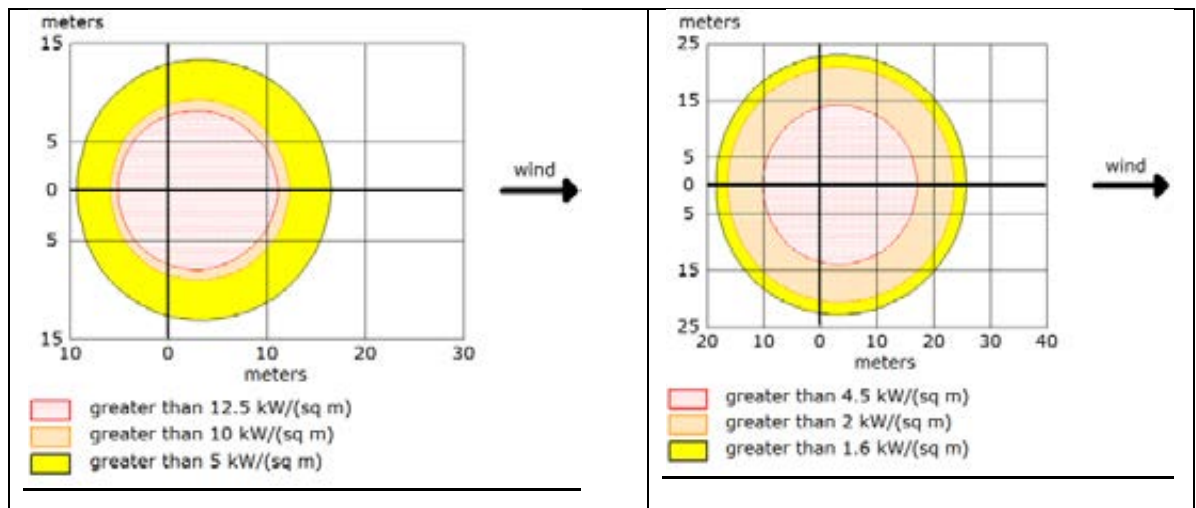
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 40 square meters
- Puddle Volume: 200 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 2.62 Kilograms/min (averaged over a minute or more)
- Total Amount Released: 115 kilograms

THREAT ZONE CONTOUR FOR OUTCOME OF CONSEQUENCES ANALYSIS: ISOPROPANOL

Isopropanol Worst Case (1400 Lit): Pool Fire:



Isopropanol MCA (200 Lit): Pool Fire:



Note: Threat zone for some Level of Concern was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Isopropanol Worst Case (2800 Lit) & MCA (200 Lit): Toxic Vapour Dispersion:

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Isopropanol Worst Case (2800 Lit) & MCA (200 Lit): Flammable Area of Vapour Cloud:

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Isopropanol Worst Case (2800 Lit) & MCA (200 Lit): Vapour Cloud Explosion:

No explosion: no part of the cloud is above the LEL at any time

E. HYDROCHLORIC ACID:**CHEMICAL DATA:**

- Chemical Name: HYDROCHLORIC ACID
- Solution Strength: 37% (by weight)
- Ambient Boiling Point: 50.7° C
- Partial Pressure at Ambient Temperature: 0.32 atm
- Ambient Saturation Concentration: 319,963 ppm or 32.0%
- Hazardous Component: HYDROGEN CHLORIDE
- Molecular Weight: 36.46 g/mol
- IDLH: 50 ppm TWA: (8Hr.): NA TLV: 2 ppm (Ceiling Limit-NIOSH)
- ERPG-1: 3ppm ERPG-2: 20 ppm ERPG-3: 150 ppm

SOURCE STRENGTH: WORST CASE SCENARIO

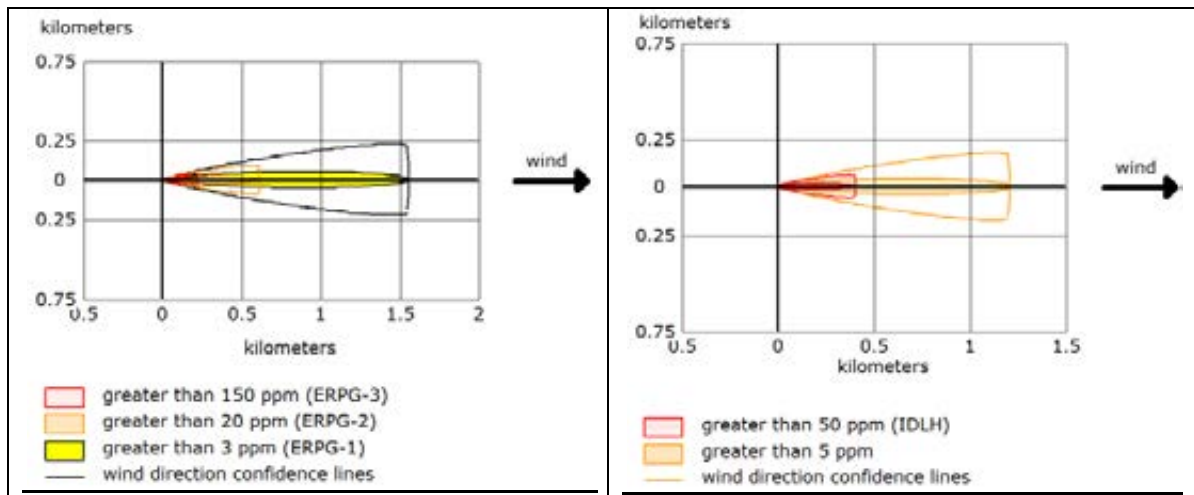
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 135 square meters
- Puddle Volume: 700 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 18.1 Kilograms/min (averaged over a minute or more)
- Total Amount Released: 118 kilograms

SOURCE STRENGTH: MCA SCENARIO

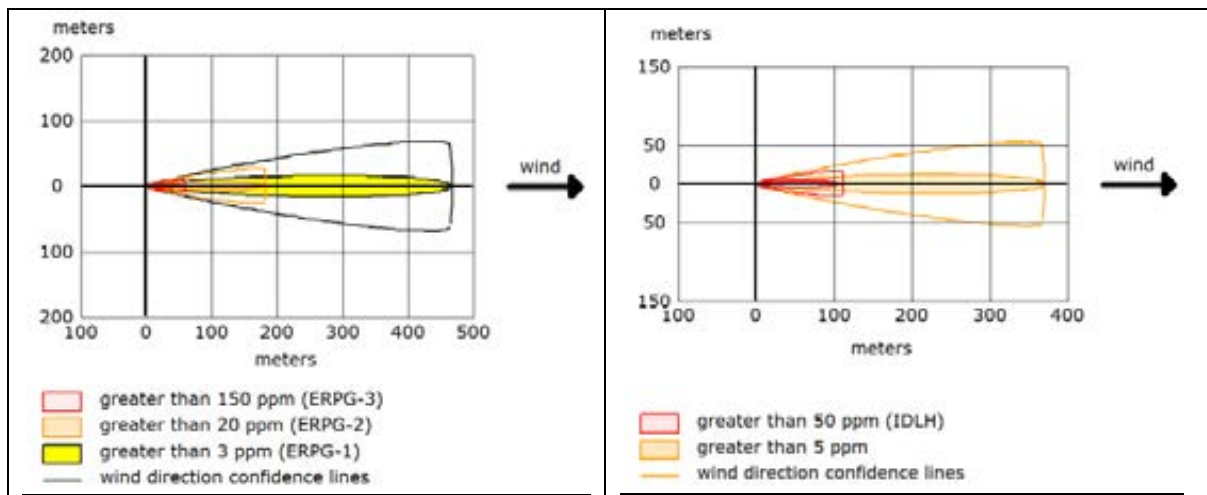
- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 10 square meters
- Puddle Volume: 50 liters
- Ground Type: Concrete
- Ground Temperature: 28.67° C
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 1.45 Kilograms/min (averaged over a minute or more)
- Total Amount Released: 8.79 kilograms

THREAT ZONE CONTOUR FOR OUTCOME OF CONSEQUENCES ANALYSIS: HYDROCHLORIC ACID

Hydrochloric Acid Worst Case (1400 Lit): Toxic Vapour Dispersion:



Hydrochloric Acid Worst Case (1400 Lit): Toxic Vapour Dispersion:



F. BROMINE

CHEMICAL DATA:

- Chemical Name: BROMINE
- Molecular Weight: 159.81 g/mol
- AEGL-1 (60 min): 0.033 ppm
- AEGL-2 (60 min): 0.24 ppm
- AEGL-3 (60 min): 8.5 ppm
- IDLH: 3 ppm
- Ambient Boiling Point: 58.6° C
- Vapor Pressure at Ambient Temperature: 0.28 atm
- Ambient Saturation Concentration: 281,990 ppm or 28.2%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

- Wind: 3.5 meters/second from NE at 3 meters
- Ground Roughness: urban or forest
- Cloud Cover: 5 tenths
- Air Temperature: 25° C
- Stability Class: D
- No Inversion Height
- Relative Humidity: 50%

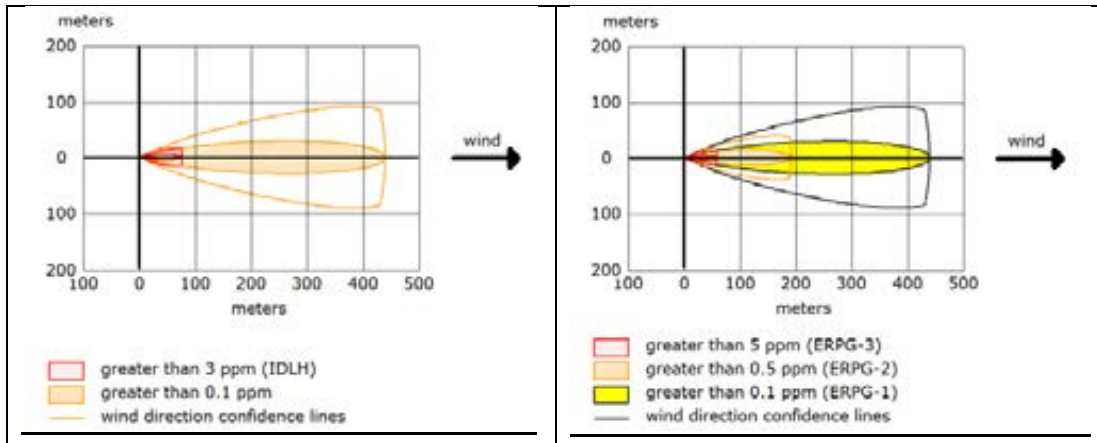
SOURCE STRENGTH: WORST CASE SCENARIO

- Evaporating Puddle
- Puddle Area: 1 square meters
Puddle Mass: 27 kilograms
- Ground Type: Concrete
Ground Temperature: 25° C
- Initial Puddle Temperature:
Ground temperature
- Release Duration: 45 minutes
- Max Average Sustained Release Rate: 867 grams/min
(averaged over a minute or more)
- Total Amount Released: 27.0 kilograms

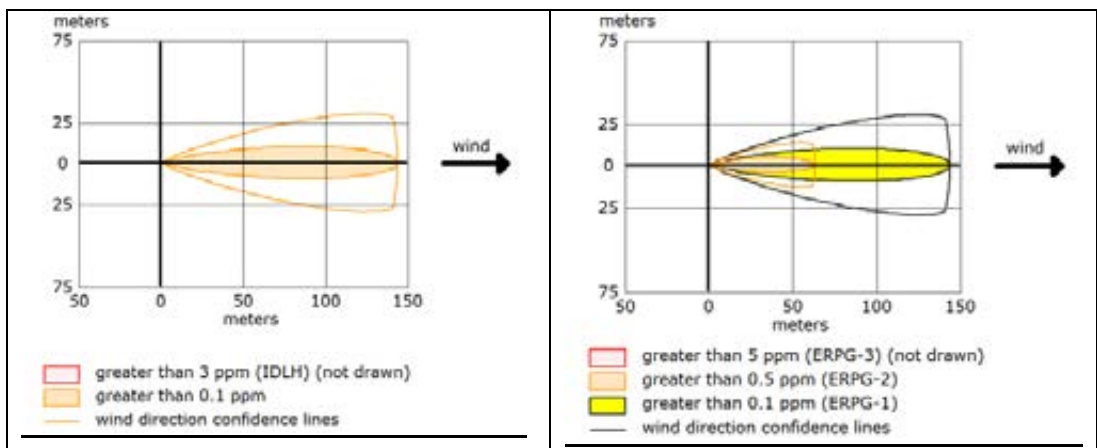
SOURCE STRENGTH: MCA SCENARIO

- Evaporating Puddle
- Puddle Area: 0.1 square meters
Puddle Mass: 3 kilograms
- Ground Type: Concrete
Ground Temperature: 25° C
- Initial Puddle Temperature:
Ground temperature
- Release Duration: 47 minutes
- Max Average Sustained Release Rate: 97.8 grams/min
(averaged over a minute or more)
- Total Amount Released: 3.00 kilograms

Bromine Worst Case (27 kg): Toxic Vapour Dispersion:



Bromine MCA Case (3 kg): Toxic Vapour Dispersion:



2. SUMMARY OF OUTCOME OF CONSEQUENCES ANALYSIS

Table 7.5: Result Of Consequences Analysis For Thermal Radiation From Pool Fire

Sr. No.	Chemical	Thermal radiation from Pool Fire (kW/m ²), Distance in Meter								
		37.5	25.0	19.0	12.5	10.0	5.0	4.5	2.0	1.6

Sr. No.	Chemical	Thermal radiation from Pool Fire (kW/m ²), Distance in Meter								
		37.5	25.0	19.0	12.5	10.0	5.0	4.5	2.0	1.6
Worst Case Scenarios: For Total Quantity Stored										
1	Ethanol, (12 KL)	11	18	23	23	25	34	35	49	53
2	Acetic Acid (400 Lit)	<10	<10	<10	<10	<10	13	14	18	20
3	2-Ethyl Hexanol (2.8KL)	14	19	23	30	34	48	50	74	82
4	Isopropanol (1.4 KL)	12	17	20	25	28	39	41	58	64
MCA Scenarios: For Unit Storage Quantity (Quantity of single Drum/Barrel)										
1	Ethanol (200 Lit)	<10	<10	<10	<10	10	14	14	19	21
2	Acetic Acid (200 Lit)	<10	<10	<10	<10	<10	<10	10	13	15
3	2-Ethyl Hexanol (200 Lit)	<10	<10	11	14	15	21	22	30	33
4	Isopropanol (200 Lit)	<10	<10	<10	11	12	17	17	24	26

Effects of Thermal Radiation from Pool Fire:

- 37.5: Damage to process equipment, 100% lethality in 1 min. 1% lethality in 10 sec.
- 25.0: Minimum energy required to ignite wood at indefinitely long exposure without a flame, 50% Lethality in 1 min. significant injury in 10 sec.
- 19.0: Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment
- 12.5: Minimum energy to ignite with a flame; melts plastic tubing, 1% lethality in 1 min.
- 10: potentially lethal within 60 sec
- 5: 2nd degree burns within 60 sec
- 4.5: Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
- 2: pain within 60 sec
- 1.6: Causes no discomfort on long exposures

(Source: Techniques for Assessing Industrial Hazards by World Bank)

Table 7.6: Result Of Consequences Analysis For Area of Toxic Vapour Dispersion

Sr. No.	Chemical	Toxic Dispersion Distance in Meter					
		IDLH	TWA _{8Hr}	TLV	ERPG 1	ERPG 2	ERPG 3
Worst Case Scenarios: For Total Quantity Stored							
1	Ethanol (12 KL)	19	35	35	26	19	NA
2	Acetic Acid (400 Lit)	73	219	172	326	98	19
3	2-Ethyl Hexanol (2.8KL)	NA	NA	NA	432	<10	<10
4	Isopropanol (1.4 KL)	21	50	43	NA	NA	NA
5	Hydrochloric Acid (0.7 KL)	405	NA	1200	1600	620	226
6	Bromine	78	NA	440	440	193	60
MCA Scenarios: For Unit Storage Quantity (Quantity of single Drum/Barrel)							
1	Ethanol (200 Lit)	<10	14	14	<10	10	NA
2	Acetic Acid (200 Lit)	52	154	121	14	70	228

Sr. No.	Chemical	Toxic Dispersion Distance in Meter					
		IDLH	TWA _{8Hr}	TLV	ERPG 1	ERPG 2	ERPG 3
3	2-Ethyl Hexanol (200 Lit)	NA	NA	NA	151	<10	<10
4	Isopropanol (200 Lit)	<10	20	17	NA	NA	NA
5	Hydrochloric Acid (50 Lit)	112	NA	371	469	183	61
6	Bromine	26	NA	144	144	64	20

Note: NA- Values not available for the chemicals.

Table 7.7: Result Of Consequences Analysis For Flammable Area of Vapour Cloud

Sr. No.	Chemical	Flammable Vapour Cloud Dispersion, (kW/m ²), Distance in Meter			
		10% LEL	60% LEL	LEL	UEL
Worst Case Scenarios: For Total Quantity Stored					
1	Ethanol (12 KL)	27	11	10	<10
2	Acetic Acid (400 Lit)	<10	<10	<10	<10
3	2-Ethyl Hexanol (2.8 KL)	<10	<10	<10	<10
4	Isopropanol (1.4 KL)	29	12	<10	<10
MCA Scenarios: For Unit Storage Quantity (Quantity of single Drum/Barrel)					
1	Ethanol (200 Lit)	11	<10	<10	<10
2	Acetic Acid (200 Lit)	<10	<10	<10	<10
3	2-Ethyl Hexanol (200 Lit)	<10	<10	<10	<10
4	Isopropanol (200 Lit)	11	<10	<10	<10

Table 7.8: Result of Consequences Analysis For Overpressure from Vapour Cloud Explosion

Sr. No.	Chemical	Overpressure (psi) from Vapour Cloud Explosion, Distance in Meter								
		1.0	2.4	3.0	5.0	7.0	10.0	12.2	14.5	29.0
Worst Case Scenarios: For Total Quantity Stored										
1	Ethanol (12 KL)	NE	NE	NE	NE	NE	NE	NE	NE	NE
2	Acetic Acid (400 Lit)	NE	NE	NE	NE	NE	NE	NE	NE	NE
3	2-Ethyl Hexanol (2.8 KL)	NE	NE	NE	NE	NE	NE	NE	NE	NE
4	Isopropanol (1.4 KL)	NE	NE	NE	NE	NE	NE	NE	NE	NE
MCA Scenarios: For Unit Storage Quantity (Quantity of single Drum/Barrel)										
1	Ethanol (200 Lit)	NE	NE	NE	NE	NE	NE	NE	NE	NE
2	Acetic Acid (200 Lit)	NE	NE	NE	NE	NE	NE	NE	NE	NE
3	2-Ethyl Hexanol (200 Lit)	NE	NE	NE	NE	NE	NE	NE	NE	NE
4	Isopropanol (200 Lit)	NE	NE	NE	NE	NE	NE	NE	NE	NE

Note: LNE-Level of Concern never exceeded

Level of damage expected at specific overpressure values	
Overpressure* (psig)	Expected Damage
0.04	Loud noise (143 db); sonic boom glass failure.
0.15	Typical pressure for glass failure.
0.40	Limited minor structural damage.
0.50-1.0	Windows usually shattered; some window frame damage.
0.70	Minor damage to house structures.
1.0	Partial demolition of houses; made uninhabitable.
1.0-2.0	Corrugated metal panels fail & buckle. Housing wood panels blown in.
1.0-8.0	Range for slight to serious laceration injuries from flying glass and other missiles.
2.0	Partial collapse of walls and roofs of houses.
2.0-3.0	Non-reinforced concrete or cinder block walls shattered.
2.4-12.2	Range for 1-90% eardrum rupture among exposed populations.
2.5	50% destruction of home brickwork.
3.0	Steel frame buildings distorted and pulled away from foundation.
5.0	Wooden utility poles snapped.
5.0-7.0	Nearly complete destruction of houses.
7.0	Loaded train cars overturned.
9.0	Loaded train box cars demolished.
10.0	Probable total building destruction.
14.5-29.0	Range for 1-99% fatalities among exposed populations due to direct blast effects.
* These are peak pressures formed in excess of normal atmospheric pressure by blast and shock waves.	
Lees, Frank P. 1980. <i>Loss Prevention in the Process Industries</i> , Vol. 1. London and Boston: Butterworths.	

7.3.4 Safety Plan & Disaster Management Plan

Detailed chemical safety plan and emergency response guideline has been prepared to overcome the issues of the hazards and risk associated with the 6 nos. of hazardous chemicals. In this plan & guidelines, all necessary information like hazard identification, storage condition, exposure limits, health effects & treatment after exposure, firefighting procedures and cleanup & disposal procedures are covered for all hazardous chemicals. The "Chemical Safety Plan & Emergency response Guideline" is enclosed here in the EIA report as Annexure-VII.

Do's & Don'ts For Safety Management

Do's

- Always remember the three 'A's of acid handling - Always Add Acid to water or base slowly.
- Do remember the following :
 - Acid handling requires the use of latex gloves

- Solvent and chemicals in miscellaneous category require the use of polythene gloves
- Check the gloves for any pin-holes prior to use
- Wash your hands before eating, even if gloves were used while handling the chemical
- Always treat any liquid in chemical area as acid because few acids like HF may look and feel like water.
- All spills and leakage should be cleaned up immediately.
- Safety equipment such as fire extinguishers, Eye wash basin and safety showers shall be kept clean and readily accessible.
- Required safety equipment like plastic sleeves, aprons, rubbers, boots, safety glasses, fume hoods, fume shields etc. shall be used even while handling small quantities or hazardous chemicals.
- Demarcate separate areas for storing acids, base, solvents, wet chemicals, dry chemicals etc.
- Working alone shall be avoided when handling dangerous chemicals.
- Before draining any chemical in the central drain, ensure the compatibility of the chemical with the material of which the drain is made of and other chemicals normally flowing through that drain.
- Always rinse empty bottles of chemicals before disposing them of in the well-designated areas.

Don'ts

- Do not mix acids with solvents or flammables. A violent reaction may occur pour solvents down the sink.
- Do not drain.
- Do not dip your hand into a chemical even when wearing gloves.
- Do not inter-change the caps/lid. Put the same cap/lid back on the making sure that it is tight.
- Do not store chemicals near heat source.
- Do not store chemical containers (empty or full) at a height more than three feet above floor level.
- Do not store acids and solvents together.
- Do not wait to see whether the chemical you spill over you gives burn or not. Rinse the affected areas for 15-20 minutes and then report to a doctor. Also alert others so that they can help you in rinsing the chemical off you and in cleaning up the spill.
- Do not take hazardous chemicals if you are under the influence of Alcohol/drug etc. or are feeling sleepy.
- Don't come in direct contact with hazardous chemicals while in use/working.

CHAPTER: 08

PROJECT BENIFITS

8.1. IMPROVEMENT IN INFRASTRUCTURES

M/s. Heni Drugs Pvt. Ltd is an existing Company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155 manufacturing **“Synthetic Organic Chemicals (i.e. Continuous distillation of crude ethyl Acetate and Metal salt) @ 1200 MT/Year”**. Now the unit proposes expansion by manufacturing of new products **“Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils “@ 415 MT/Year** which are Synthetic Organic Chemicals. The expansion project will be within the premises of existing unit. For the proposed new project, the company intends to procure the available latest technology for manufacturing the proposed products. The project requires to obtain EC and the present study has been carried out for the same.

The project benefits will be significant in terms of benefit to the local socio-economic status as well as economic conditions of state & country. The proposed project site is well linked with national highway and is situated in close proximity of the Industrial estate of GIDC Sarigam having all required infrastructures. Therefore infrastructural development because of proposed project will not be major but improvement in public infrastructure due to CSR is anticipated.

8.2. EMPLOYMENT POTENTIAL

The proposed peak manpower requirement during construction and commissioning would be around 10-15 persons. Besides, for operation of the proposed project about 45 persons will be employed directly with priority given to the local people. Thus, the activities of proposed will require considerable manpower which will be beneficial to employment structure of local area as maximum recruitments will be done from local area.

Further, the indirect employment via contractual works, transportation activities & local economic activities like food stall and other shops will also add in the employment potential of the proposed project. Thus the potential of employment will be considerably beneficial to the local people.

8.3. OTHER TANGIBLE & INTANGIBLE BENEFITS

As mentioned earlier sections, the proposed project is to setup for production of synthetic organic chemicals which are the materials of good market potentials. These products of company will have winning competition with other producer or open market supply. Considering this, company can have good share in state's & country's economic status. The products have also good demand in foreign market and company is looking forward to explore the possibilities of export to many foreign countries. Up on successful achievement of export by company, the proposed project will result in benefit to the country in form of foreign revenue, duties etc. Also the development of industrial in vacant plot of a notified industrial estate will significantly beneficial to the local industrial development.

CHAPTER: 09

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1. Environmental Cost Benefit Analysis

As per EIA Notification 2006, this Chapter of the 'Environmental Cost Benefit Analysis' is applicable only if it is recommended at the Scoping stage.

As per the ToR points issued by SEAC, Gujarat vide TOR Letter Ref. No. EIA-10-2015-7132-E.7236 dated: 7th November, 2015, for the proposed project; the Environmental Cost Benefit Analysis is not applicable and hence has not been prepared.

CHAPTER: 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1. GENERAL

M/s. Heni Drugs Pvt. Ltd is an existing Company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155 operating performing Continuous distillation of crude Ethyl Oleate and production of inorganic Metal salts) @ 1200 MT/Year”.

Now M/s. Heni Drugs Pvt. Ltd. proposes the expansion of their production by addition of new products of “**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year**”.

For the proposed expansion project, the company intends to procure the available latest technology for manufacturing the proposed products.

With due considerations of requirements cited by EIA team to prevent &/or control/minimize the probable impacts in line with the present EIA study, Environmental Management Plan for the proposed project has been prepared as a part of the EIA report as per the requirement cited SO 1533. All the team members, after the impacts assessment study, have cited the necessary mitigation for the probable impacts after further study of details of the proposed project and necessary references for citing adequate & efficient EMP to eliminate / minimize or prevent the likely impacts of the proposed project. The detailed descriptions of the formulated EMP, as finalized by the FAEs under guidance of coordinator have been presented in the present chapter under subsequent section with respective heading.

10.1.1. SOURCE & SIGNIFICANCE OF CONSIDERED IMPACTS

As studied during the present EIA study many impacts would likely to occur during operation phase of the project. The impacts of the construction phase would not be major to consider for formulation of EMP as the site is situated in a notified industrial area and the construction work required is not major. Considering this, the present EMP has been prepared in consideration of the impacts of operation phase of the proposed project. The impacts as described in earlier chapter and summarized below are considered for formulation of the present EMP.

(i) Air Quality

Sources of Impact

- Sources of impact on air quality are emission from equipment/utility (Steam boiler and DG Sets) requires combustion of fuels- NG and HSD.
- Transportation, storage & handling of hazardous raw materials having potential to be airborne resulting in fugitive emission
- Major hazards associated with hazardous raw materials & products

Significant Impacts

- Emission from utilities –Steam boiler using NG may not have any major issue of pollution as NG is considered as green fuel
- Emission from DG set using Diesel/HSD may not have any significant considerable impacts on ambient air of project area as DG sets will be used for short tenure only during failure of power supply from grid
- Fugitive emission from storage & production area may result in increase in PM₁₀ / PM_{2.5}, VOCs level in ambient air of project area & Workplace air
- The hazardous material entered in to the environment during any major disaster/accident may have serious threat on ambient air quality of the area of the incident

(ii) Water Environment**Sources of Impact**

- Use of water for industrial operations of the project and domestic use
- Sewage & effluent generation & disposal
- Spill/leak/unmanaged disposal of hazardous materials & wastes

Significant Impact

- Drawl of groundwater is not proposed hence any impact on groundwater is not anticipated.
- Total water requirement of the proposed project will be met through pipeline of GIDC water supply department –Sarigam, which is an adequate source; hence issue of impacts of water usage on water environment will be minor
- Disposal of industrial effluent through underground drainage of GIDC going to CETP may have some impacts on water environment if not treated properly before final disposal.
- Sewage if not disposed off without adequate treatment through proper disposal system can result in contamination of water resources especially, pathogens, organics and nutrients like phosphate & nitrate etc.
- Groundwater resource contamination may also occur due to unmanaged /haphazard disposal of solid/hazardous waste as well as spill/leak of hazardous materials/chemicals as an eventual impact due to soil contamination.

(iii) Contamination of land**Sources of impact**

- Spill & leak during transport, handling, storage activities for hazardous materials including raw materials, products & wastes
- Spill of oil & fuel during maintenance of equipment, machineries & vehicles
- Improper Disposal /Haphazard dumping of wastes
- Seepage & percolation of leachate from raw materials, fuel & waste storage areas
- Contaminated runoff from site and contaminated drain from storage areas mixing with soil

Significant Impacts

- Land contamination as a result of leaks or spills of hazardous materials & fuel
- Land contamination due to temporary fuel /oil spill / leak not managed properly during

maintenance activities.

- Land contamination as a result of improper dumping of wastes.

(iv) Noise and Vibration**Sources of Impact**

- Sources of impact for noise and vibration are operation of equipment & utility like DG set, Steam boiler; Operation of pumps & compressors & blowers etc.
- Noise is also expected due to transportation activities scheduled for material transport.

Significant Impacts on Environment

- The noise sources will have the potential impacts as annoyance & disturbance to noise sensitive receptors (i.e. individuals in work area).
- The potential impacts of noise on surrounding area are not anticipated.
- Impacts will be restricted within source area (up to 50-100mt).

(v) Flora and Fauna**Sources of Impact**

- No major source of impacts on ecology is anticipated; however the identified probable sources are as below:
 - Emission from utilities & process
 - Noise from utilities, machineries & equipment
 - Creation of greenbelt (beneficial impacts)
 - Spill/leak of hazardous materials from storage area as well as during transportation
 - Hazard occurred in hazardous materials storage area as well as during transportation

Significant Impacts

- Noise generation may result in disturbance & annoyance to fauna
- Minor impacts on flora and fauna due to emission may occur but will not hazardous or threatening to life as the pollutant level will be negligible and the AAQ of the area will remain always below the prescribed norms of ambient air quality.
- Significant impacts on flora & fauna may occur due to Spill/leak of hazardous materials and due to hazardous incident occur during transportation and storage activities.
- Creation of good habitat for fauna in form of greenbelt

(VI) Occupational & Public Health & safety**Sources of Impact**

- Storage & Handling operations of hazardous materials & fuel
- Probable hazards like toxic dispersion, fire & explosion
- Effects of pollutant in workplace environment mainly (Toxic VOCs, PM₁₀ & PM_{2.5})
- Noise in Production, Steam boiler & DG set areas
- Ergonomic issues & heavy works
- Catastrophic destructions & damages due to major disaster & accident like fire & explosion, earthquake, Flood etc.

Significant Impacts

- The risk to occupational & public health is also associated with operational hazards

associated with the transport-storage-handling of hazardous materials as well as worst case incidence like toxic dispersion, fire & explosion in hazardous material storage area.

- Incidence like fall, slip, trip, fire, non-ergonomic condition of works, contamination of air due to materials and road accidents may result in issues related with health & safety.
- Hearing impairment resulting due to high noise
- MSD problems may arise due to lifting/handling of heavy goods as well as ergonomic issues
- Occupational health & safety issues are also anticipated in case of contamination of workplace environment by particulates & VOCs from materials & process.
- Casualty and other risks associated with catastrophic & major disasters

(vii) Socioeconomic & demographic conditions

Sources of Impact

- Major accidental incident occurred in hazardous material transportation & storage
- Transportation of raw materials, products & fuels
- Noise from industrial activities
- Improvement in business prospects of the area
- Direct & indirect recruitment of workforce for proposed project
- CSR activities of proposed project

Significant Impacts on Environment

- Damage & effects on social factors may occur due to toxic materials, heat radiation, explosion due to major hazards & catastrophic accident occur in hazardous material storage area
- The hazardous materials entered in to the environment may have serious effects on public health as well as social factors of the region
- The proposed project will generate significant opportunity for direct & indirect employment and business growth for local communities. The direct & indirect employment can result in improvement in socio-economic conditions of area.
- Disturbance due to transportation as well as noise of vehicles & construction activity may result in some social impacts like disturbance in sleep, headache, hearing issues
- The proponent has planned many CSR activities for social welfare & upliftment which will be beneficial to the local area.

10.1.2. OBJECTIVE & SCOPE OF EMP

The present Environmental Management Plan is prepared with the main objective of enlisting all the requirements to ensure effective mitigation of adverse impacts for all the components of the proposed project. The objectives taken into account in preparation of EMP are summarized here as follows:

- a) The prevention, control and abatement of pollution, i.e. air pollution, water pollution, hazardous/ non-hazardous wastes and noise pollution,
- b) To comply with the stipulated techno-legal requirements and standards related with environmental management & protection,

- c) To direct the steps to be followed, for effective maintenance and regulation of environmental management system,
- d) To ensure the better and safe work environment through pre-meditated planning of prevention and control of hazards,
- e) To direct the investments towards sustainable development by considering the cost of effluent treatment, emission control, waste disposal, social development, green belt development and health & safety in the planning stage only,
- f) To account for recycling and reusing measures, proposed or required to be adopted for minimization of consumption of resources and generation of pollutants.

The present EMP has been prepared to meet the requirements of pollution control from proposed project as an integrated environment management plan. The present EMP may not suitable & feasible for any other upcoming activities other than those mentioned in earlier chapter for the proposed project. Hence, the scope of the present EMP does not contain any environment management plan for activities not considered in the present EIA report. Also the scope the present EMP is limited to the sources of impacts as well as type of impacts considered and mention above. The EMP does not cover scope of management of hazardous substance as it forms the key part of RA Report prepared separately.

10.2. BUDGETARY PROVISION FOR EMS

The company has made provision of Rs. 25.00 Lakhs for the environment management system. Company has also made provision of recurring cost for EMS. The details of these budgetary provisions are presented below.

Table 10.1 Budgetary Provision for EMS

Sr. No.	Particulars	Amount (In Lakhs)
Capital Cost		
1	Air Pollution Control	3.00
2	Wastewater Management	20.00
3	Hazardous Waste Management	2.00
TOTAL		25.00
Recurring Cost per annum		
1	Wastewater Management	5.00
2	Air Pollution Control	1.00
3	Solid/Hazardous Waste Management	2.00
4	Occupational Health & Safety	2.00
5	Greenbelt	1.00*
6	CSR Activities	0.35
TOTAL		11.35
Note: * indicates provision of Rs. 1 Lakh for first year Greenbelt Development activities.		

10.3. ENVIRONMENTAL MANAGEMENT CELL (EMC)**10.3.1 ENVIRONMENTAL POLICY**

- HENI is committed to comply with all relevant applicable existing and future environmental laws/ regulations/ rules and other standards.
- HENI will continually make efforts to step forward towards sustainable development through various actions for environmental protection, conservation & improvement.
- HENI will effectively communicate with interested and affected parties and for that company will ensure that Personal Relation Officer is appointed throughout the project life.
- HENI will follow the necessary national & international guidelines & standards to work towards continual improvement of environmental management.
- HENI will ensure co-ordination of EMS with other organizational policies like quality policy, and occupational health & safety policy.
- HENI will give priority to prevention of pollution and ecological degradation, as well as the degradation of cultural and social resources & structures.
- HENI is committed to take cognizance of and to realise the needs and concerns of communities during the design, construction, operation and maintenance phases of the project.
- HENI is committed to comply with environmental standards, to mitigate negative impacts that are unavoidable, and to minimize impacts on affected communities wherever possible and reasonable.
- HENI is committed to address all environment issue timely for compliance with statutory requirements. For such requirements, company will form the Environmental Management Cell (EMC) and necessary procedures for addressing the non-conforming issues has been made within EMS covering roles & responsibilities of all members of (EMC Environmental Management Cell).
- HENI will ensure that the safety and security of the passengers, the public and employees is maintained throughout the duration of the construction, operational phases.
- The environmental policy will be communicated to all employees and contractors of the company, and also made available to the public upon demand/requirements.

10.3.2 ENVIRONMENTAL MANAGEMENT CELL

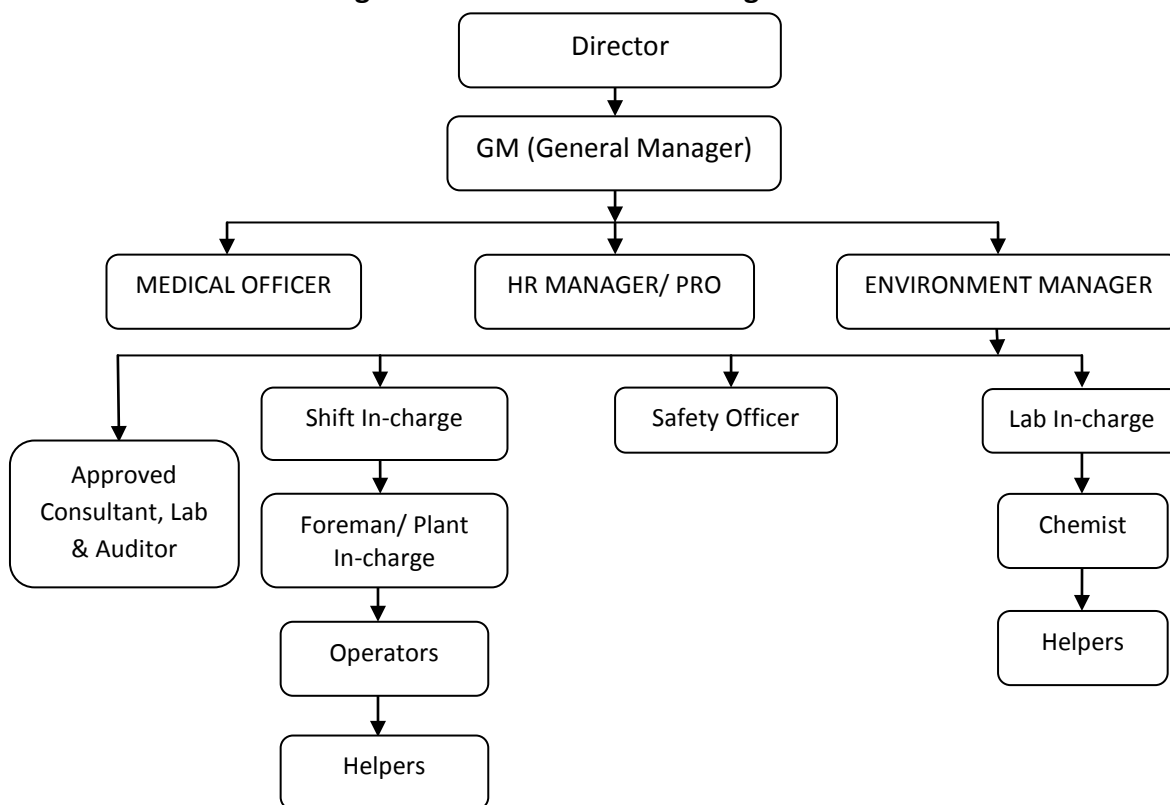
The company has formulated the environment management cell with vision to improve the efficiency of EMC and to operate the planned EMP requirements as suggested in the present chapter, Environmental Management Cell has to be formed for efficient & easy operation of environment management system & operations that of. The illustrative presentation of the suggestive EMC is presented below in Fig- 10.1.

As indicated in organogram, the Director of the company will lead the EMS as head of the Environmental Management Cell. Director will be assisted by GM for day to day activities of EMC. GM will guide the subordinate staff members- Environment Manager, Medical Officer & PRO/ Welfare officer for necessary action plan & activities of environmental management plan. PRO will look after the operation related with government offices, public and other stakeholders for necessary operation including statutory proceedings. The technical operations including environmental monitoring and efficient operations & maintenance of pollution control equipment/machineries etc. The Lab in charge will look after the operations of in-house monitoring & analysis of environmental samples. Approved environmental laboratory/consultant will also be appointed for the operations related with third party environmental monitoring, environmental audit (as & when required) and other techno-legal environmental services. The plant & shift in charge will look after the plant / department level operations including ETP operation, APCD Operation, Process and Utility operations to ensure that all instructions & action plans issued by superior authorities are efficiently followed & implemented to prevent environmental pollution & operational hazards. Primarily the Environment manager will be responsible for all technical non-conformities of EMS and he/she is responsible to prepare necessary documents & report for day to day compliance to stipulated EMS, CC&A Conditions as well as other statutory & voluntary requirements.

All necessary standard operating procedures for technical matters of EMS will be prepared by Environment Manager whereas the standard operating procedures administrative operation will be prepared by PRO. The standard operating procedures will be prepared well before the inception of operation phase of the project and the GM will check these SOPs. After necessary corrections, GM will forward these SOP to the Director for approval and approved SOP will be controlled by responsible personnel. The approved copy of these SOP will be issued to concern personnel for day to day operations.

Up on citation of any non-conformities/non-compliance in EMS and related operations, he/she will immediately report to the GM with necessary report/document. The GM then will call up a meeting on urgent basis and will issue an action plan to close the non-compliance/non-conformity. If the issue of non-conformities/non-compliance is cited to be serious or major GM will consult Director of the company and according to the instruction of the Director, further action plan will be issued by GM to all members of EMC. The environment manager by help of other personnel of EMC and company will start operation to resolve the issue of non-conformities/non-compliance and he/she will regularly update the GM for the current status. Similarly GM will give instruction to PRO for necessary actions required to be initiated at administrative level including necessary proceeding with other organization, govt. offices

&public etc. All official declaration about the non-conformities will be made by the Director. Such declaration can also be made by GM after authorization by the Director. Whenever required information or report of non-conformities will be submitted or issued to govt. offices or public by PRO in line with the necessary instructions given by GM.

Figure10.1: Environment Management Cell

10.4. ENVIRONMENTAL MANAGEMENT PLAN

As described in above section, the operation stage will give rise to some minor negative impacts on environment, which would not be significant to cause serious threat. Considering the above description of major identified impacts & significance of the impacts, almost all structural measures are already planned by the proponent to prevent / minimize the impacts on environment. With all necessary details, the following are the management plan designed for operation phase to ensure elimination / minimization of probable impacts of proposed project.

10.4.1. AIR QUALITY AND AIR POLLUTION CONTROL

Construction Phase

Structural Measure:

- Sprinkling of water will be providing for suppression of dust generated from material handling & storage.
- By providing wet Curtain/ tarpaulin barrier around the construction site from prevention of particulate emission.

Non-structural Measure:

- To establish proper design method to reduce airborne particles from transportation, storage & handling of materials.
- Allowing only PUC certified vehicles who will be engaged in construction work.
- Maintenance of construction equipment, machineries & utilities to reduce emissions.
- Stack Monitoring shall be done during the commissioning phase on regular basis to prevent high emission from utility.
- Provision of necessary PPEs for employees engaged in activities of storage, transportation & handling of materials as well as construction & commissioning operations

Operation Phase**Structural Measure:**

- Adequate Stack height & internal diameter are provided for proper dispersion of emission from proposed Steam Boilers & D.G. Set.
- Proper sampling port & monitoring point shall be provided to all stacks.
- To reduce the loss of resources by ensuring proper operation of production & storage to get high production efficiency and to reduce PM & VOC emission
- Provision of FD/ ID fan with utilities/ stack if/as required to maintain desired velocity of exit gas
- Hazardous material storage tanks shall be designed adequate and manufactured by suitable material for reduction of Hazards.
- The storage area shall be adequately design with efficient air change ratio. The raw material, products & fuel handling and transport facilities shall be provided.
- Provision of Safety valve on reactors and to prevent accidental emissions shall be provided Safety arrangements, facilities.
- Internal roads shall be constructed from concrete/ asphalt for prevention of dust during vehicular movement
- Adequate greenbelt coverage, in & around the plant shall be developed as per the guideline.
- Low emission vehicles shall only be used for transportation

Non-structural Measure:

- Transportation, handling & storage of the hazardous materials shall be done as per statutory requirements, HAZMAT and guidelines issued by concerned authorities.
- The trucks/vehicles used for the transportation of hazardous materials shall be approved by concerned authority and the driver shall be well trained to overcome the safety issues occur during the transportation.
- NG Fired steam boiler shall be installed for the proposed project.
- HSD/Diesel fired DG sets shall be run only in emergency power requirement / power supply failure from electricity department.
- Stacks of adequate height & internal diameter at top should be provided for all utilities to control and manage the emission ensuring lowest possible pollutant levels in emission. All applicable standards of emission quality as timely issued/amended/corrected shall be

strictly complied.

- Hazardous material storage area shall be provided with fire detection system (if possible) & firefighting facilities like hydrant & fire extinguishers.
- Proper & adequate handling facilities & procedures shall be provided to prevent fugitive emission from handling of all materials & wastes of the project.
- The hazardous materials storage tanks shall be provided with dyke wall to prevent spreading of materials during incident of leak, spill and other hazards.
- Regular monitoring of ambient air and emission of utility shall be conducted as per environment monitoring plan.
- To ensure that DMP & RA is prepared efficiently covering all necessary action plan to prevent all major probable threats associated with the hazardous materials of the project.

Management Period

- Properly designed storage area / tanks & production area, Dyke wall for storage tanks shall be provided during construction/installation & commissioning phase. And before inception of project operation, stacks of adequate height & internal diameter (at top) shall be provided for Boiler and DG sets. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions shall be initiated with inception of commissioning stage to practice as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in-charge, safety & environment Officer & engineers, Contractors & operators.

10.4.2. WATER POLLUTION**Construction Phase**Structural Measure:

- Connections for drawl of water from GIDC water supply line and raw water storage facilities
- Proper sanitation facilities with septic tank & soak pit for disposal of sewage
- Adequate structural facilities for prevention of any kind of contaminated runoff from construction area causing impacts outside premises
- Proper drinking water supply facilities construction personal
- Temporary short phase, hence no other major structural measures

Non-Structural Measure:

- Ground water shall not be used to meet water requirement of the project. All water requirements shall be met only from GIDC water supply pipeline.
- Water consumption shall be optimized by reduction of wastage, unnecessary drawl and by preventive leakage from Taps/ Valves/ Pipeline.

- Runoff from construction site would be controlled by providing bund/barrier around construction area.
- The construction equipment will be washed properly only at designated washing area.
- Domestic effluent will be disposed of through adequate soak pit and septic tank.
- All construction materials having potential of being cause of soil contamination and hence water contamination shall be stored in closed storage area with concrete floor.

Operation Phase:**Structural Measure:**

- Intake facilities from Source: GIDC Water Supply
- In-house fresh water storage facilities.
- Adequately ETP will be designed for treatment of High concentrated effluent containing inorganic mercury.
- Provision of effluent collection line in storage and production area for contaminated waste steam generated due to spill/ leak of hazardous chemicals mainly mercury as well as container/ vessel washing.
- Provision of Emergency storage tank/ Guard pond for temporary storage of effluent.
- Proper arrangement for effluent disposal line connected to GIDC Underground drainage to CETP-Sarigam.
- Efficient of ETP for treatment of industrial effluent (Annexure-VIII) and guard pond.
- Proper sanitation facilities with septic tank/ soak pit system for domestic wastewater discharge.
- Provision of properly lined storage area for hazardous materials (especially mercury) & wastes to prevent contamination of water.
- Provision of adequate storm water drainage lines.

Non-Structural Measure:

- Ground water and surface water from nearby canal shall not be utilized for proposed project and the whole water requirement shall be met only from GIDC water supply pipeline.
- Reduce wastage in domestic activities by preventing leak/spill from pipes, taps/valves etc.
- Regular recording of water consumption using flow meter.
- Regular inspection ground water nearby /around the project site to check the quality of Ground water regarding presence of mercury.
- Reduction of wastewater generation rate by minimal use of water for various industrial activities and by prevention of leakage from tap/valve and pipeline.
- Continuous attempts to reduce pollutant load in effluent.
- Domestic effluent shall be disposed of only through adequate septic tank and soak pit.
- Effluent treatment plant having adequate capacity for efficient treatment of waste water generated from industrial operation shall be provided.
- The ETP for proposed project shall be provided as per the proposal made in Treatability report (Annexure-VIII).
- Other Treated effluent shall be disposed off only through the common effluent disposal pipeline going to CETP of Sarigam GIDC.

- Emergency storage tank/ Guard pond shall be provided for temporary storage of wastewater to overcome issues related with treatment arising during failure of ETP and emergency/major disaster of chemical spill /leak.
- Contaminated waste stream generated due to spill/ leak of hazardous chemicals as well as container/ vessel washing shall be temporarily stored in guard pond and efficient treatment in ETP prior to discharge shall be ensured.
- In condition of inefficient operation/failure of ETP and emergency waste water generated from industrial activity shall be temporarily stored in guard pond.
- In any condition, poorly or untreated effluent shall not be disposed off.
- Hazardous waste storage area and disposal as per the regulatory guideline/ provisions shall be ensured prior to inception of industrial operations of proposed project.
- Impervious lining of floor of chemical storage and production area shall be provided to prevent /eliminate the issues of land and hence subsoil water contamination.
- No disposal of poorly or untreated effluent generated from clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Provision shall be made for alternative treatment option for effluent generated clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Adequate operation & maintenance of ETP for efficient treatment of effluent.
- Regular quality assessment of treated effluent from ETP before disposal.
- Maintaining records of water consumption, effluent generation, effluent discharge, water characteristics, treated and untreated effluent characteristics.
- Maintenance of good housekeeping to avoid contamination of storm water.

Budgetary Provision

- Capital Cost for ETP and other structural measures for prevention of water pollution: 20 lakhs
- Recurring Cost for ETP Operation and other operational measures for prevention of water pollution: 5 lakhs per annum.

Management Period

- The structural measures like water storage tank, Dyke wall for storage tanks, Septic tank & soak pits and Full-fledged ETP shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- Proper installation of pumps, motors and piping for drawl of ground water shall be provided well before commissioning to prevent wastage & efficient use of groundwater.
- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors.
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.3. HYDROLOGY, GROUNDWATER & WATER CONSERVATION

Construction Phase

Structural Measure:

- Connections for drawl of water from GIDC water supply line and intake of water to storage.
- Leak proof Taps should be maintaining.

Non-Structural Measure:

- Water requirement to be met only from GIDC Water supply line.
- Optimization of water consumption by reducing unusual runoff from construction activity area
- Proper arrangement & maintenance and regular inspection of water supply line to prevent leak from pipes & Taps/Valves
- Use of ready mix concrete to reduce on-site water requirement and wastage of water from preparation of concrete

Operation phase

Structural Measure:

- Intake facilities from Source: GIDC Water Supply
- In-house fresh water storage facilities
- Proper arrangement for effluent disposal line connected to GIDC Underground drainage to CETP.
- Provision of adequate storm water drainage line.
- Provision of concrete flooring on whole plant area.

Non-Structural Measure:

- Water requirement to be met only from GIDC Water supply line.
- Reduce drawl of fresh water from GIDC water supply pipe line by prevention of leakage from pipe/valve/ Tap and by increasing recycling /reuse of treated waste water to maximum extent.
- Regular checking and maintenance of pipeline /valve/Tap and storage tank to prevent water loss trough leakage and seepage.
- Hazardous materials storage shall be at an isolated designated location, bund/dyke walls shall be provided for storage tanks for mercury to avoid any kind of accident during storage and handling of mercury.

Budgetary Provision

- Capital Cost for water intake facilities (water storage tank, water pipelines & taps/valves, flexible pipes) and shall be made in project capital cost:
- Recurring Budget for intake as per OPEX provision.

Management Period

- The structural measures like pipeline, storage tank valves, Taps etc...shall be provided in operation phase

- Operation measures like recycling/ reuse of treated waste water, checking and maintenance of pipeline /valve/Tap and storage tank shall be performed through the project operation time starting from construction phase.

Responsible Authority

- Structural: MD, Project manager, accounting head/manager, Site Officer & engineers, Contractor
- Non-Structural: MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.4. LAND USE & LAND COVER**Construction Phase**

- Proper handling & storage facilities shall be provided for the construction materials.
- Adequate management for transportation to ensure that materials in transport vehicles are covered to prevent spill & leak on ground as well as transportation is done in minimum frequency.
- Greenbelt development in about 30% Area of the plot as per Greenbelt Development Plan.

Operation phase

- All transportation of raw materials especially mercury and products shall be done in closed truck/tanker approved as per statutory requirement to prevent volatile and particulate emissions as well as leak/spill during transportation.
- Fire & explosion prevention /control measures shall be provided as per the suggestions made in RA report.
- Firefighting system shall be provided as per the suggestions made in RA report.
- Mitigation measures for prevention and control of particular emission shall be provided as suggested in RA report as well as in section of air pollution control.
- Adequate ETP for treatment of effluent & arrangement of disposal through underground drainage of GIDC going to CETP, Sarigam and for high concentrated effluent will send to MEE.
- Statutory guidelines & requirements for Hazardous waste management shall be followed in any condition/ situation.
- Effluent and solid /hazardous waste shall never be disposed off on land.
- Greenbelt development & management to ensure healthy & dens greenbelt/pasture throughout the life of the project.

Budgetary Provision

- Capital Cost for irrigation facilities (water pipelines & taps/valves, flexible pipes) and shall be made in project capital cost:
- Recurring Budget for First Year Activities: 1.00 Lakhs
- Recurring Budget for Second to Fifth Year Activities: 0.50 Lakhs

Management Period

- The structural measures like adequate storage area, firefighting system and ETP and effluent disposal line connected to underground drainage of GIDC going to CETP, Sarigam etc. shall be provided in operation phase
- The operational measures shall be performed throughout the project operation time starting from construction phase

Responsible Authority

- Structural: MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.5. SOIL CONSERVATION**Construction Phase**Structural Measure:

- Proper sanitation facilities with septic tank & soak pit for disposal of sewage
- Adequate structural facilities for prevention of any kind of contaminated runoff from construction area causing impacts outside premises.
- Temporary short phase, hence no other major structural measures.

Non-structural Measure:

- Runoff from construction site would be controlled by providing bund/barrier around construction area.
- Domestic effluent will be disposed of through adequate soak pit and septic tank.
- All construction materials having potential of being cause of soil contamination and hence water contamination shall be stored in closed storage area with concrete floor.

Operation PhaseStructural Measure:

- Provision of effluent collection line in storage and production area for contaminated waste steam generated due to spill/ leak of hazardous chemicals as well as container/ vessel washing.
- Provision of Emergency storage tank/ Guard pond for temporary storage of effluent.
- Arrangement for discharge of treated effluent meeting the CETP discharge norms through underground drainage line connected of GIDC to CETP Sarigam.
- Efficient of ETP for treatment of industrial effluent and guard pond
- Proper sanitation facilities with septic tank/ soak pit system for domestic wastewater discharge
- Provision of impervious lining of storage area for hazardous materials & wastes to prevent contamination of water
- Provision of adequate storm water drainage lines.

Non-structural Measure:

- Reduction of wastewater generation rate by minimal use of water for various industrial activities.
- Continuous attempts to reduce pollutant load in effluent
- Domestic effluent shall be disposed of only through adequate septic tank and soak pit.
- Effluent treatment plant having adequate capacity for efficient treatment of waste water generated from industrial operation shall be provided
- Emergency storage tank/ Guard pond shall be provided for temporary storage of wastewater to overcome issues related with treatment arising during failure of ETP and emergency/major disaster of chemical spill /leak.

- Contaminated waste stream generated due to spill/ leak of hazardous chemicals as well as container/ vessel washing shall be temporarily stored in guard pond and efficient treatment in ETP prior to discharge shall be ensured.
- In any condition, poorly or untreated effluent shall not be disposed off.
- Hazardous waste storage area and disposal as per the regulatory guideline/ provisions shall be ensured prior to inception of industrial operations of proposed project.
- Impervious lining of floor of chemical storage and production area shall be provided to prevent /eliminate the issues of land and hence subsoil water contamination.
- No disposal of poorly or untreated effluent generated from clean-up operation undertaken during emergency/major disaster of chemical spill /leak
- Regular quality assessment of treated effluent from ETP before disposal
- Maintenance of good housekeeping to avoid contamination of storm water.

Management Period

- The structural measures like water storage tank, Dyke wall for storage tanks, Septic tank & soak pits and Full-fledged ETP shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.6. NOISE & VIBRATION CONTROL**Construction Phase**Structural Measure:

- No structural measures are required as there will not be any source of high noise

Non-structural Measure:

- Engines of idle vehicles/equipment/machinery shall be turned off
- Loud horn shall be prohibited for all vehicles
- Ear plug/muff shall be provided to the construction staff engaged in the high noise area
- Night transportation from the residential/eco sensitive area shall be avoided

Operation PhaseStructural Measure:

- Properly designed building to reduce noise propagation as well as noise level within building
- Provision of silencer/noise attenuator wherever suitable
- Well-constructed or fabricated solid/hard foundations with provision of suitable rubber padding & good shunting

- Provision of mufflers & good silencer for vehicle
- Greenbelt around plant buildings & premises

Non-structural Measure:

- Static and dynamic balancing of rotating equipment/machineries
- Replacement of rubber paddings of foundation shall be done whenever required as preventive actions/maintenance
- Proper maintenance & lubrication of the plant, machineries & equipment on regular basis
- Provision of necessary PPEs like ear plug /ear muff to eliminate the impacts of noise in workplace.
- Regular noise monitoring as per environment monitoring plan shall be done in area of noise to track noise change above 10 dB(A) for timely action for noise reduction.
- The noise level in the plant area shall conform to the norms prescribed by GPCB/CPCB/MoEF as well as indicated in other GOI Rules/acts including factory act & rule.
- Shift planning shall be done with respect to the exposure level of noise at various plant areas in line with the statutory requirements & provisions.
- Dense & adequate greenbelt shall be maintained around the high noise area to provide barrier
- Proper maintenance & lubrication of the vehicles shall be done regularly
- Management shall be provided necessary PPEs to eliminate the impacts of noise in transportation activities.
- High noise horn, unfit vehicles, useless acceleration of vehicle shall be restricted. Necessary checking & inspection shall be done to ensure vehicle noise at normal desired/preferred level.
- Minimum transportation from residential & eco-sensitive area
- Avoidance of night transportation from residential & eco-sensitive area

Management Period

- The structural measures like Sturdy Foundation, Rubber Pads and Silencer/Acoustic Enclosure etc. shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.7. HAZARDOUS WASTE & INDUSTRIAL SOLID WASTE**Construction Phase****Structural Measure:**

- Water sprinkling system for stabilisation of stock pile of excavated soil and construction waste

- Dedicated oil change area.
- Designated construction waste storage area nearer to the construction site.
- Designated excavated soil storage area in the proposed greenbelt area
- Designated used oil storage area

Non-structural Measure:

- Provision for designated oil change area and used oil storage area shall be done.
- The used oil generated from construction machinery/equipment shall be stored in leak/spill proof container and shall be sold to authorised recycler.
- Construction waste shall be stored at one place nearer to the construction site.
- Storage of excavated top soil in designated area for greenbelt development.
- Water shall be sprinkled on the stock pile of construction waste and excavated soil to stabilise the sorted materials.
- The construction waste shall be reused for filling, PCC works, Road development etc.
- The excavated top soil shall be utilized for landscaping of greenbelt area.

Operation Phase**Structural Measure:**

- Designated Storage area for all solid & hazardous wastes as per regulatory/statutory requirements
- Adequate & proper facilities for handling & transfer of solid/hazardous wastes

Non-structural Measure:

- All solid & hazardous waste shall be stored in designated storage area.
- The solid & hazardous storage area shall be separated for each type of waste for easy management.
- Proper labelling shall be done on storage area for ready & easy identification of waste stored in that particular area.
- Proper labelling shall be done on storage containers/bags for ready & easy identification of waste stored in that storage container/bag.
- Proper & adequate handling & transfer facilities shall be provided & used to transfer the waste to prevent spill/leak during handling & transfer as well as to prevent exposure of employee engaged in handling & transfer.
- All waste shall be stored in their respective storage area only and shall be disposed off as per Hazardous waste management rule-2008.
 - The used oil shall be stored in leak proof closed container and shall be sold to registered recycler or reused.
 - ETP waste shall be stored in hazardous waste storage area and shall be disposed off to TSDF Site.
 - Discarded containers/barrels/liners shall be stored in the designated hazardous waste storage area near production/RM storage area. This waste shall be decontaminated and then sold to GPCB authorised scrap dealers.
 - Saturated carbon and process waste shall be stored in the designated hazardous waste storage area and shall be sent to common incinerator/ co-processing.
 - The non-hazardous solid baggase from manufacturing process shall be composted for greenbelt manuring.

- The hazardous waste generated from clean-up procedure during the incident of accidental spillage or leakage of chemicals shall be stored along with the ETP waste and shall be sent to TSDF site.
- Used of only registered vehicles for transportation of the hazardous wastes.
- Following Methodology for Decontamination and disposal of containers shall be followed.
 - All empty drums or bags must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them.
 - Empty as much material out of the drum or bags as possible, including easily removable residues.
 - Wash/rinse the drum/bags three times with a suitable solvent. If the material is soluble in water, use water to wash/rinse. If the material is not soluble in water, use a suitable organic solvent such as acetone for the first two washes and water for the final rinse.
 - Remove the top of the drum, using a drum de-header if necessary. If the drum contains a flammable material, it should be evaluated for potential explosive hazards.
 - Wear safety goggles during the washing/rinsing process. Wear heavy gloves to prevent crushed fingers and protect against sharp edges. When washing the drum, wear gloves that are impervious to the solvent.
 - Label the drum(s)/bags: "these drum/bags have been triple washed/ rinsed." Paint over or cross through any other markings on the drum.
 - After Neutralization & decontamination of all empty drums & bags selling to authorised recyclers
 - Keep record properly of all empty bags and drums which are decontaminated Before selling to authorised recyclers.

Management Period

- The structural measures as mentioned above shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in charge, safety & environment Officer & engineers, Contractors & operators.

10.4.8. RISK & HAZARD MANAGEMENT**Construction Phase****Structural Measure:**

- Adequate system for material handling of and transfer of material handling & transfer to prevent emissions from construction site
- Set proper handling for mercury, bromine, ethanol, HCl and other hazardous chemical of company.
- Enclosed storage area for Construction materials to reduce particulate emission

Non-Structural Measure:

- Proper & efficient implementation of Procedures for storage, handling & transfer of hazardous materials
- Implementation of safe work procedures to prevent major hazards from happening.

Operation PhaseStructural Measure:

- Inherent safer designed hazardous materials storage facilities/area as recommended in Risk Assessment Report
- Mercury and mercury waste shall be managed as per the protocol attached as **Annexure-XIII**.
- Provision of all necessary safety equipment, facilities & safety gears & PPEs for control & prevention risk associated with major hazards
- Provision of Firefighting equipment & fire hydrant system as per TAC/NFPA Norms
- Automated Fire detection system in storage area as well as plant area. Where automated system is not feasible to install, manual call points for fire location identification
- Emergency management equipment & facilities as recommended as given in Risk Assessment Report
- Adequate & efficient handling & transfer facilities/arrangements for prevention of major hazards during transfer & handling operations as recommended in Risk Assessment Report
- Provision of Local exhaust in storage area/warehouse & process area to prevent toxic chemical vapour exposure and maintained area below PEL/TLV limits.
- Static grounding points at storage, handling and process area as well as for all tanks proposed for storage of chemicals
- Fix piping with supports and clamping needs to be provided for raw material charging and minimum flexible hose should be connected for charging chemicals in day tank or reactor
- Safety valve provision to be made on reactors.
- In general, to prevent amputation of any person's body part, all machines Nip (like rollers, saw blade, cutter blade, chain, v-belt, etc.) shall be protected with appropriate fix safe guard.

Non-Structural Measure:

- Storage tanks & facilities must be made up of suitable MOC
- Proper ventilation with adequate air change ration in godown.
- Proper label and identification board /stickers in the storage area
- Materials storage should be done as per the chemical compatibility.
- Smoking and other spark, flame generating item shall be banned within the premises.
- Identification label and NFPA diamond code sticker on all chemicals drums & bags and tank area.
- MSDS to be displayed at storage as well as process and chemical handling area.
- Storage of empty drums & bags in separate dedicated empty drum & bag storage area.
- Neutralization & decontamination of all empty drums & bags before selling to recyclers
- Tank farm area should be well maintained and must be situated away from process area and safe distances to be maintain as per statutory requirements.

- Company should meet provisions of the Manufacture, storage & Import of Hazardous Chemicals Rules- 1986, the factories Act- 1948, Gujarat Factory Rules and The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules- 1996 (As amended timely).
- All environmental regulations shall be complied all the time without failure
- Static grounding provision needs to be provided to all process vessels and equipment.
- Caution note board for all hazardous chemicals shall be displayed.
- Periodic On Site Emergency, Mock Drills should be conducted, in order to train the staff and make them mentally prepared to tackle any emergency.
- Emergency management equipment & facilities including fire extinguishers/hydrant system should be maintained in a tip top condition round the clock.
- Safety devices and control instruments should be calibrated once in a year.
- Proper colouring as per IS 2379 should be done in plant to pipeline network, tank and equipment to protect it from corrosion.
- Preventive maintenance schedule should be prepared for all the equipment and colour code or tagging should be provided.
- Permit to work system should be implemented on 100 % basis for hazardous work to be carried out in the plant.
- Training should be made compulsory to all new employees about safety measures before starting duties in plant.

Management Period

- The structural measures like properly designed greenbelt areas, structural measures for water & wastewater management, hazardous & non-hazardous waste management and emission control and hazard prevention/control etc. shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in-charge, safety & environment Officer & engineers, Contractors & operators

10.4.9. OCCUPATIONAL HEALTH AND SAFETY**Construction Phase****Structural Measure:**

- All necessary PPEs, Safety Gear & facilities for construction works
- Provision of Safe scaffolding
- Enclosed storage area for Construction materials to reduce particulate emission
- Proper arrangement of material handling & transfer to prevent emissions from construction site
- Medical Facilities to cope up with hazards associated with construction works

Non-Structural Measure:

- Adequate & efficient implementation of Procedures for storage, handling & transfer of construction materials
- Adequate & efficient implementation of Procedures for working on height
- Prevention of water spillage on ground to prevent chances of slip & trip
- Safe work procedures should be implemented to prevent major hazards

Operation PhaseStructural Measure:

- Provision of all necessary structural measures for control & prevention risk associated with major hazards as suggested in section of hazardous materials management and Risk assessment reports
- Occupational Diseases are recognized and regular medical check-up of employee must be done by management.
- Mercury and mercury waste shall be managed as per the protocol attached as **Annexure-XIII** to prevent exposure of employee to mercury.
- Strictly follow the standard procedure for Mercury handling and transfer.
- Provision of in-house medical facilities including medical centre, first aid box and other medical facilities
- Mechanical handling system & arrangement wherever possible to avoid manual handling & so to avoid issues of MSD. Wherever, automatic system is not possible, adequate manual handling facilities like trolley & Crain to reduce the stress of pulling -pushing and lifting to prevent or minimize the chances of issues related with MSDs.
- Provision of In-house Occupational Health Centre (OHC) should be made.
- Artificial Respiration system/devices
- Provision of ergonomic design of all facilities wherever possible (e.g. chairs, tables, working platforms, self and position & height of display screens & panel etc.) to prevent or minimize the chances of issues related with MSDs

Non-Structural Measure:

- Safety of employee during operation of production units / equipment shall be ensured in line with the provisions of the Factory Act & MSIHC Rules.
- The company should meet provisions of the Manufacture, storage & Import of Hazardous Chemicals Rules- 1986, the factories Act- 1948, Gujarat Factory Rules and The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules- 1996 (As amended timely) throughout the life of proposed project.
- To avoid any adverse effect on the health of workers due to chemicals, dust, heat, noise and other operational hazards; sufficient measures shall be provided in the unit.
- Isolation of drinking water & refreshment area including canteen etc. from the area of hazardous materials storage & handling
- Edibles & potables should be strict prohibition in the area of hazardous materials storage & handling.
- Match box, lighters, clothes having potential of static charges as well as smoking in plant & storage area should be strict prohibition.
- Provision of aprons & other suitable work-apparels, gloves, goggles, safety shoes and other required PPEs for the employees engaged in hazardous areas & operations as well as working with hazardous materials.

- Provision of decontamination facilities including bath area with adequate resources like soap, shampoo & showers.
- Proper shift planning of workers exposed to hazard prone areas to manage the total exposure level as per stipulated standards & / or statutory norms
- Company shall train a group of employee for comprehensive first-aid and basic first-aid training to all employees shall be imparted at regular intervals.
- Occupational Health Centre (OHC) shall be headed by qualified EHS officer and an appointed doctor. Immediate medical treatment by OHC shall be ensured in case of any emergency.
- Life-saving medicines shall be available within OHC which includes antidote kits (as required) containing necessary antidote drugs/medicine for severe poisoning of any hazardous chemicals.
- The medical histories of all employees shall be maintained in the prescribed format. Thereafter, the employees shall be subjected to medical examination on annual basis.
- The health status of workers in the unit shall be regularly monitored under an occupational surveillance program as practice of OHS program.
- Medical checkup shall be done considering the requirement for all chemicals of the proposed project and suggestion in RA for such checkup programs shall be followed.
- When necessary, well-equipped ambulance with all emergency medical facilities shall be called by dialling 108 or other number mentioned in DMP for Ambulance facility.
- Management shall ensure to provide all necessary PPEs, safety equipment/materials to ensure healthy & safe work conditions.
- Regular inspection for the safety procedures and use of PPEs & Safety equipment/material shall be done by the management/safety officer.
- Workplace monitoring shall be carried out on regular basis. Necessary records & documents for such monitoring shall be maintained by the proponent on regular basis.
- Necessary safety documents, protocol/SOPs, guidelines along with MSDS (if & where required) shall be provided to the associated/concerned personnel engaged in respective operational activities.
- Necessary training programs & audit shall be done on regular basis to prevent impacts of the operational activities on human health as well as to improve workplace condition & safe work system.
- The proponent shall ensure implementation of emergency management system with provision of firefighting equipment/facilities, first aid & medical facilities, evacuation procedures etc. Proponent shall ensure proper implementation & functioning as well as assess effectiveness of this system on regular basis even after the proposed project.
- Risk assessment study shall be carried out and recommended safety measures/safety & disaster management plan shall be implemented to ensure safe work condition as well as healthy workplace condition in all project operation areas/units.
- Regular audit for EHS System shall be done.

Management Period

- The structural measures like properly lined storage areas with necessary firefighting system wherever required, pollution control & prevention technologies etc. shall be provided in construction phase prior to commissioning of plant operation and their necessary structural maintenance shall be done throughout the extent of operation phase.

- The non-structural actions shall be initiated with inception of commissioning stage and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in-charge, safety & environment Officer & engineers, Contractors & operators.

10.4.10. ECOLOGY AND BIODIVERSITY**Construction Phase**Structural Measure:

- Enclosed storage area for Construction materials to reduce particulate emission
- Proper arrangement of material handling & transfer to prevent emissions from construction site
- Water sprinkling system.
- All necessary structural measures suggested/planned for control of air & water pollution, reduction of noise and waste management

Non-structural Measure:

- Proper & efficient implementation of mitigation measures & EMP suggested for control of Air pollution, Water & wastewater management, reduction of Noise and construction waste management
- Water sprinkling in construction area, unpaved area & earthen road.
- Greenbelt development & maintenance within premises & around periphery as per greenbelt development plan given.

Operation PhaseStructural Measure:

- Enclosed storage area for raw materials & products for reduction of emission from storage operations
- Proper arrangement materials handling & transfer to prevent emissions from storage & production area
- All necessary structural mitigation measures suggested/planned for control of air pollution, water & wastewater management, reduction of noise as well as waste management.
- Provision of all structural measures as suggested for reduction & prevention of major hazards in storage of hazardous materials and production area

Non-structural Measure:

- Regular monitoring of stack for Emission & Ambient air quality, Noise and water & wastewater as per monitoring plan.
- Proper & efficient implementation of mitigation measures & EMP suggested for Air, Water & Noise environment and waste management.

- Proper & efficient implementation of non-structural preventive/precautionary/control measures as well as procedures suggested for prevention/control of major hazards in the proposed unit
- Greenbelt Development Plan & maintenance of density @ 1200 trees/Ha. (In around 30% of total land area of project) within premises & around periphery of the project are will be maintained throughout the life cycle of the manufacturing unit.
- Disaster management and emergency action plan shall be prepared carefully and implemented to eliminate / minimize the chances of impact on ecology.

10.4.11. GREENBELT DEVELOPMENT PLAN:

The greenbelt will be created in open land to develop greenbelt in around 2000.00 m² (about 30 % area of total land) area of total land of project. The plantation for proposed greenbelt will be started in the Monsoon season.

Greenbelt is the selection and plantation of a species or groups of species of trees and shrubs to reduce the effect of a source of pollutant. The most efficient greenbelt development not only abates pollution, but also helps:

- ✓ Control rainwater runoff
- ✓ Increase underground water levels
- ✓ Prevent soil erosion
- ✓ Reduce pollution cost-effectively
- ✓ Helps in increasing biodiversity index

Right from conducting a meticulous survey of the site environment, selecting the best-suited native plant species, to the actual plantation based on the appropriate green cover width while making the campus biologically diverse, safe and sustainable.

Guidelines for Greenbelt Development

- Design and development of greenbelt should be in adherence to industry-specific requirements and prevalent climatic conditions.
- Company shall ensure healthy & dens greenbelt throughout the project life.
- Company shall ensure greenbelt development & maintenance in minimum 2000.00 Sq. m. at any time.
- Company shall follow CPCB guidelines for development & maintenance of greenbelt area
- Company shall ensure regular irrigation & fertilization of greenbelt area as required timely
- Company shall ensure re-plantation in greenbelt area depending upon the survival rate of planted vegetation to maintain greenbelt in about 30% (2000.00 sq. m. area) of the total area of proposed premises
- Company shall plant trees with density of about 1200 trees per hectare in the greenbelt area (i.e., around 240 trees).
- Indigenous species with fast growth are only selected or form the base of selection as Green Belt can come in view as fast as possible.
- Company shall plant local species of trees & shrub for greenbelt development

- The tress shall be planted in three tiers pattern so as to ensure that the entire area gets covered and ensure effective pollution abatement. For this, management shall ensure that plantation of trees shall include mixture of lower, higher and middle canopy structure, which shall be mixed appropriately / proportionately / uniformly.
- The plantation shall also include fruit bearing trees/ species which shall be uniformly distributed which shall act as dwelling place for Varsity of birds and other fauna and form a breeding ground for them.
- The geographical, environmental, morphological, anatomical & physiological aspects of plants species have been found influencing the dust capture by plant species, therefore following criteria should be adopted for selection of plant species for green belt development in urban areas:
 - a. The species should be adapt to site and should be able to produce optimum harvest on a sustained basis.
 - b. The leaf litter should decompose quickly thus adding organic matter to the soil tree.
 - c. The species should preferably be capable of enriching soil, through nitrogen fixation or any other mechanism tree.
 - d. The morphological characters of the species must suit the objectives of plantation and the cultivation practice; e.g. a wide crown may be preferred for dust capturing and fuel wood plantation but small-narrow crown with minimum effect on agriculture crop and providing valuable wood.
 - e. Multi-purpose tree plant species have a special significance in fulfilling the objectives of environment as well as needs of the people. The combination of species to address the local needs is more beneficial.
 - f. The tree products should have acceptable characteristics to suit local customs and traditions flowering Herbs & shrubs species.

Company can select species as per the following list suggested:

Table 10.2 Recommended Species for Greenbelt

Sr. No.	Scientific Name	Common Name	Family	No. of Plants
Trees				
1	<i>Azadirachta indica</i>	Neem	<u>Meliaceae</u>	35
2	<i>Mangifera indica</i>	Mango	Anacardiaceae	25
3	<i>Saraca indica</i>	Ashoka	Fabaceae	50
4	<i>Delonix regia</i>	Gulmohar	Fabaceae	10
5	<i>Dalbergia latifolia</i>	Shisham	Fabaceae	10
6	<i>Syzygium cumini</i>	Jambu	<i>Myrtaceae</i>	10
7	<i>Ficus bengalensis</i>	Banayan tree	<i>Moraceae</i>	5
8	<i>Pongamia Pinnata</i>	Karanja	Fabaceae	15
9	<i>Polyalthia longifolia</i>	Mast Tree/Asopalav	Annonaceae	90
10	<i>Achrassapota</i>	Chiku	<i>Sapotaceae</i>	25
Shrubs				
1	<i>Acalyphagodseffiana</i>	Acalypha	Euphorbiaceae	15
2	<i>Duranta erecta</i>	Daranta Gold	Verbenaceae	10

Sr. No.	Scientific Name	Common Name	Family	No. of Plants
3	<i>Galphimiagracilis</i> <i>Sheena's Gold</i>	Galphinia	Malpighiaceae	10
4	<i>Ixorabrachiata</i>	Ixora	Rubiaceae	30
5	<i>Thujakoraiensis</i>	Thuja	Cupressaceae	30
6	<i>JasminumOfficinale</i>	Jasmine	Oleaceae	10
7	<i>Hibiscus rosasinensis</i>	Jasud	Malvaceae	30

- Apart from the plantation of trees in the earmarked areas, the space left over within the premises after construction of the plant shall be efficiently utilized by converting them into small gardens, vegetative belt etc., which shall again add to the aesthetic beauty of the place and also act as a source of recreation.
- Care shall be taken to plant ample trees along the road side, boundary wall as well as within the plant premises. It shall enable proper balance of atmosphere both outside the campus by absorbing noise and gaseous pollutants of the road side movement of vehicles and also absorption of noise and emissions within the premises of the plant.
- Company shall follow the following five year comprehensive greenbelt development program

1st YEAR PLAN

- Capital provision for irrigation facilities (water pipelines & taps/valves, flexible pipes) and shall be made in project capital cost
- Recurring Budget for First Year Activities: 1 Lakh
- Company shall start activities of greenbelt development along with inception of construction phase of the project
- Company shall provide all necessary facilities for irrigation of greenbelt
- Plantation in about 30% area (2000.00 Sq. m.) within premises and around boundary
- Company shall acquire saplings from local private/government (Forest & Other) nursery
- Plantation & maintenance of trees & shrubs as described in Guidelines for greenbelt development
- Company shall do fertilization as required for healthy & dense greenbelt development

2nd to 5th YEAR PLAN

- Recurring Budget for Second to Fifth Year Activities: 0.5 Lakh
- Company shall maintain all necessary facilities for irrigation of greenbelt in good condition and necessary maintenance of irrigation facilities shall be done regularly
- Company shall regularly assess survival rate of planted trees & shrub and if required necessary re-plantation shall be done to ensure healthy & dense greenbelt area in about 30% area (2000.00 Sq. m.) of the total area of proposed premises
- For re-plantation, if required, company shall acquire saplings from local private/government (Forest & Other) nursery

- Company shall do fertilization as required for healthy & dense greenbelt development

Management Period

- The structural measures like properly designed greenbelt areas, irrigation facilities, Sapling storage & maintenance area and storage for greenbelt development resources/tools etc. shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions as described in above sections of greenbelt development guidelines and five year program shall be initiated with inception of construction phase of project and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting head/manager, Plant in-charge, safety & environment Officer & engineers, Contractors & operators.

10.4.12. SOCIO-ECONOMICS**Construction Phase**Structural Measure:

- Adequate Closed Construction Material Storage for prevention of air borne particles
- Water Sprinkling system for suppression of dust

Non-structural Measure:

- Proper closed storage facilities shall be provided for storage of the construction materials.
- Bund/barrier around construction area shall be provided to prevent runoff.
- Prevention of dust from construction works by provision of water sprinkling on land and curtains around construction site
- Water shall not be sourced from groundwater or water resource of local area. All water requirements shall be met by water supplied by GIDC water supply Dept.
- Adequate management for transportation of construction material to reduce traffic on local road.
- Avoidance of night transportation from the residential area and ban on use of loud horns
- Minimum use of road passing through residential area
- Careful recruitment by employing unemployed person of the local area to maximum extent to ensure adequate availability of labour for local socioeconomic activities and to ensure high employment status of local area.
- Proper public relation & management activities to prevent conflicts between project and local people

Operation PhaseStructural Measure:

- All structural measures as suggested for Air & Water Pollution control, Noise Pollution Control and Solid/Hazardous waste management
- All structural measures as suggested in Risk Assessment Report for prevention/control of major hazards

Non-structural Measure:

- Statutory guidelines & requirements for handling and storage of Hazardous chemicals shall be followed in any condition/ situation.
- Pollution prevention measures as suggested for control & prevention of water pollution, air pollution, noise pollution and soil pollution shall be implemented and maintained for maximum efficiency.
- No use of ground as well as of surface water resources of the local area. All water requirements shall be met only through supply by GIDC water supply dept.
- HAZMAT guidelines shall be followed for transport of all hazardous materials. Safety & emergency equipment & materials and safety & emergency management guidelines shall be provided on the transport vehicles.
- Implementation of all hazards and risk prevention & control measures as suggested in Risk Assessment report to prevent/control hazards & risk as well as to ensure safe operation of the proposed project
- All safety measures for transportation, storage & handling of hazardous chemicals shall be implemented and followed for prevention of major chemicals & fire hazards.
- Efficient Emergency Action & Disaster Management Plan to ensure no/minimum effects on surround area during catastrophic accident
- Provision of efficient Fire fighting equipment and system in storage areas and production areas
- Any contaminated runoff from proposed project shall not go out of premises and such runoff shall be diverted to ETP for treatment and disposal or to emergency storage for prevention of toxic effects on surrounding areas and water resources of surrounding areas.
- Regular medical check-up shall be done of people likely to be affected by the toxic chemicals of the project
- Careful recruitment by employing unemployed person of the local area to maximum extent to ensure adequate availability of labour for local socioeconomic activities and to ensure high employment status of local area.
- Adequate management for transportation of raw material & Products to reduce traffic on local road as well as to prevent accidents.
- Avoidance of night transportation from residential area and ban on use of loud horns.
- Minimum use of road passing through residential area.
- Proper public relation & management activities to prevent conflicts with local people.
- Regular CSR activity as per CSR Plan (Annexure- IX) to keep harmony with local people and to avoid conflicts with local people.
- Budgetary provision for CSR Activities shall be made in accordance with the costs suggested in CSR Plan enclosed as Annexure-IX.

Management Period

- The structural measures like pollution control/prevention measures as suggested in EMP, hazardous & non-hazardous waste storage & handling facilities, Firefighting system, Adequately designed material storage area etc. shall be provided in construction phase prior to commissioning of plant operation. The necessary structural maintenance shall be done throughout the extent of operation phase.
- The non-structural actions as described above sections for prevention of impacts on socioeconomic layout of area shall be initiated with inception of construction phase of project and shall be implemented & practiced as routine throughout the project life.

Responsible Authority

- Structural: Proponent/directors/MD, Project manager, accounting head/manager, Site Officer & engineers, Contractors
- Non-Structural: Proponent/directors/MD, Production manager, accounting, head/manager, Plant in-charge, safety & environment Officer & engineers, Contractors & operators.

10.4.13. OTHER EMP**Energy Conservation**

The company is committed to continual improvement in its energy conservation programs. It will successfully implement following actions to realize efficient energy conservation in its proposed unit.

- Managing efficiently the utilization of energy resources, upgrade operational practice and employ more energy efficient technologies.
- Employee Training for energy conservation & Promoting awareness among all employees
- Interdepartmental sharing of experience on energy conservation
- Share and enrich experience on energy conservation with other Industries.
- Regular internal audits to identify areas for improvement & benchmark continuously performance against the best
- Formation of Energy Conservation cell headed by senior personnel with following duties for Energy Conservation:
 - Periodic monitoring of unit/plant/department wise energy consumption.
 - Planning of corrective actions for deviations.
 - Carry out internal energy audits & field study on need basis.
 - Preparing annual energy activity plan
 - Benchmarking for energy performance.
 - Arrange training program for energy efficiency.

Resource Recovery, Reuse/ Recycle & Conservation

At present the company has no plan to reuse/recycling of treated wastewater. However, company has planned to recover the Solvent (Alcohol) used in process to reuse/reflux in process. The details of the alcohol recovery for Resue/reflux are presented below.

Alcohol Recovery is done in process of three products. The alcohol recovery system is an integrated part of manufacturing facilities. A fractionator is provided to separate the water and alcohol from the vapour and the recover alcohol re reused/reflused in process. The details regarding probable quantity of the alcohol used in process, approximated quantity of the excess alcohol in reaction mass and the quantity recovered along with the recovery efficiency are presented below I tabulated form.

Table 10.3 Details of Probable Alcohol Recovery

Product	Charged Quantity	Excess Quantity	Recovered Quantity	% Efficiency of Recovery
Esters (Process 1)	320	≅ 265	260	≅ 98%
Esters (Process 2)	300	≅ 225	215	≅ 95%
Organics Intermediates	800	≅ 695	660	≅ 95%

Rainwater Harvesting

At present the company has no arrangement to harvest rainwater. However, company has planned to provide rainwater harvesting system after proposed project. Company will provide all necessary structure and facilities for roof top rainwater harvesting. The system will be provided for part of roof of Shed area, which is about 1000 sq.mt. The average rainfall in the region is about 2000mm. Based on these, it is noted that company will be able to harvest about 1600 KL per annum. The harvested rainwater will be stored in the raw water storage tank and then it will be utilised to meet the water requirement of the project. The harvested rain water will not be utilized for ground water recharge.

Documentation & Reporting

Environmental Management Cell shall prepare & maintain all necessary documents and records as required for implementation the environmental management plan framed in earlier section of this chapter. In addition to these, proponent shall also prepare & submit quarterly/half yearly reports on implementation of the environmental management program as described in conditions in various licenses/certificate of clearance like EC, NOC, CC&A etc. as well as in the present EMP Such report shall be submitted to:

- ✓ Board of director through MD & General/Production manager
- ✓ Gujarat pollution control boards & other authority as required by regulatory provisions
- ✓ Other organizations/firms as directed timely by board of directors or General/production Manager or Govt. authority like MoEF, GPCB, CPCB etc.

CHAPTER: 11

SUMMARY & CONCLUSION

11.1. PROJECT DESCRIPTION

M/s. Heni Drugs Pvt. Ltd. is an existing Company having its unit located at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal.- Umargam, Dist.-Valsad, Gujarat-396155 performing Continuous distillation of crude Ethyl Oleate and production of inorganic Metal salts @ 1200 MT/Year". M/s. Heni Drugs Pvt. Ltd. has obtained NOC and CC&A (CC&A no. AWH-65133 dated 22-09-2014 valid up to 10-06-2019) of existing manufacturing unit.

Now M/s. Heni Drugs Pvt. Ltd. proposes the expansion of their production by addition of new products of "**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year**". For the proposed expansion project, the company intends to procure the available latest technology for manufacturing the proposed products.

As per the EIA notification- 2006 as amended the proposed products are covered under any activity- 5(f) category B1 requiring Prior Environmental Clearance.

Since the unit is situated within the notified industrial estate (GIDC Sarigam) developed before 2006 and falling in B category, Public Hearing is exempted for this project.

The proposed products & byproducts along with production capacity are presented below in tabulated form.

Table 11.1: List of Products & Byproducts with Capacity

Sr. No.	Products Name	Existing (MT/Year)	Proposed (MT/Year)	Total (MT/Year)
1	Continuous distillation	300.00	00.00	300.00
2	Metal salt	900.00	00.00	900.00
3	Esters	00.00	250.00	250.00
4	Organics Intermediates	00.00	45.00	45.00
5	Aromatic Metal Compounds	00.00	100.00	100.00
6	Extracts and Oils	00.00	20.00	20.00
Total		1200.00	415.00	1615.00

The capital of proposed project has been estimated & budgeted with costs of Rs. 400.00 Lakhs. The company has made provision of Rs. 25.00 Lakhs for the environment management system.

The proposed expansion project will be within the plot of the existing unit with Plot No. 1901/1901A admeasuring 6700.00 Sq. m. located at Phansa char Rasta, GIDC Sarigam. The other resources required for the proposed project is as follows:

- Land - 6700 Sq. m.
- Water- 33.00 KLD will be fulfilled by GIDC water supply.
- Power- (Existing- 99 KVA and Proposed- 160 KVA) 259 KVA which will be met by supply from GEB.

- Utility- In existing unit, the heat requirement met from Thermopack of capacity 1 Lac Kcal/Hr. And in the proposed unit steam requirement will be met from two Steam boilers of capacity 1Ton/hr each. One DG set of 160 KVA capacity.
- Fuel- Piped Natural Gas (Primary Fuel) 30 Nm³/hr, HSD: 30 Ltrs./Hr.
- Human Resource- Proposed 45 Nos.

The probable pollution load/sources of impacts are identified during the present EIA study. The details of the major pollution potential/identified sources of impacts are presented below.

- **Wastewater:** Industrial Effluent – 7.20 KLD, Domestic- 3.50 KLD.

The industrial effluent will be treated in full-fledged proposed in-house ETP (of capacity 10 KLD Max.) equipped with all required Primary, Secondary & Tertiary Treatment units. And the domestic waste water (Sewage) will be disposed off through septic tanks & soak pit

- **Emissions:** PM <150 mg/Nm³, SO_x <100 ppm & NO_x <50 ppm

Proposed Sack as utility emission control measures:

- Stack-I: TFH (Ht.-30 m., Dia-300 mm)
- Stack-II: Steam boilers (2 Nos.) (Ht.-30 m., Dia-300 mm)
- Stack-III: DG Set (Ht.-9 m., Dia-100 mm)

- **Solid/Hazardous wastes:**

- Used Oil: 112.50 Lit. /Month. (Sold to registered recycler /Reused)
- ETP Waste: 6.25 MT/Month (sent to TSDF Site)
- Discarded Containers: 28200 Nos/Yr (Sell to GPCB authorized scrape dealers as a scrap)
- Saturated Carbon: 5.5 MT/Month (To common Incinerator/ co-processing)
- Process Waste : 12.13 MT/Month (To common Incinerator/ co-processing)
- Solid Baggase: 0.10 Mt/Month (Composting)

- **Hazardous Material:**

The major hazards are noticed to be associated with only 6 chemicals of the project (Ethanol, 2-Ethyl hexane, Isopropanol, Monoethylene glycol, Bromine and Acetic acid) out of about 24 raw materials are hazardous in nature as per MSIHC rules (as amended), 2000. These hazardous materials will be received in drums by road truck and stored in designated areas of drum storage. All safety measures will be provided at design level with all required safety system for the specific chemicals to prevent the associated hazards & risks.

11.2. DESCRIPTION OF THE ENVIRONMENT & BASELINE ENVIRONMENT STATUS

PROJECT AREA

The proposed expansion unit - M/s. Heni Drugs Pvt. Ltd. will be setup at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155. The GIDC Industrial estate has all required infrastructure like electricity, roads, transportation etc.

The project area is situated in the southern part of Gujarat State and shares some area of UT of Daman and UT of Dadra & Nagar Haveli. The area has global identity for its industrial development since many decades especially in Vapi GIDC, adjoining UTs and Sarigam GIDC. The area has contributed significantly in the development of our Nation's economy through the excellent industrial growth. The area has considerably developed in last few decades by sharing vital input through industrial development and implementation of government actions/plan of development. The area has been selected as the production hub by many large banner industries of chemicals, pharmaceutical, pesticides, textile & plastic sectors. The Damanganga river flows west into the Arabian Sea. The river flows through Maharashtra and Gujarat states, as well as the Union territories of Daman and Diu and Dadra and Nagar Haveli. The industrial towns of Vapi, Dadra and Silvassa lie on the north bank of the river, and the town of Daman occupies both banks of the river's estuary.

BASELINE STATUS

The baseline environmental studies have been done for three months of winter season of 2015-16 (November 2015 to January 2016) for the EIA of expansion project of M/s. Heni Drugs Pvt. Ltd. The study has been conducted initially considering the draft TORs proposed for approval and then continued & finalized according to the conditions of awarded TORs. The study has been conducted by following the guidelines & the EIA Manual issued by MoEF. The study has been conducted & finalized by conducting studies during the season of winter (post-monsoon) 2015 covering study area of 5 km radius from project site area for environmental sampling & monitoring and 10 km radial area for mappings to comply with the TOR awarded by the State level Expert Environmental Appraisal Committee (SEAC), Gandhinagar, Gujarat.

The frequency of various environmental sampling & analysis was determined following the guidelines provided by MoEF in online EIA Manual. The details of frequency of environmental sampling considered for the study are illustrated in the following table.

Table 11.2: Details of Environmental sampling frequency.

Attributes	Sampling Monitoring Frequency
A. Air Environment	
Meteorological Data	Hourly continuous during Study Period
Ambient Air Quality	24 hourly twice a week during study period
B. Noise	
	Hourly for one day during Study Period
C. Water	
Ground Water	Once in Study Period
Surface Water	Once in Study Period
D. Soil Quality	
	Once in Study Period
E. Land Use -Land Cover & Topography	
	Once in Study Period

Attributes	Sampling Monitoring Frequency
F. Ecological Data	Once in Study Period
G. Socio-economic Data	Once in Study Period
H. Other Maps	Once in Study Period

One seasonal ambient air monitoring data was collected during the study period of November 2015 to January 2016.

The data of wind pattern collected during the study period indicates that the wind was blowing dominantly from 44Degree (NE) and the average wind speed was noticed to be around 2.70 m/sec. Maximum wind speed has been noticed to be 6.05 m/s.

Ambient Air Quality assessments for the selected locations are carried out as per the above schedule and it has been noticed that the ambient air quality status is well below the limits prescribed in NAAQS, 2009 for all studied parameter. No indication of ambient air pollution is observed.

Similar to ambient air quality no issue of critical pollution of soil and water is observed during the study. However, some natural issues like higher TDS and Hardness due to geological condition are observed in some cases.

Noise levels were also found well below the prescribed limits for residential as well as industrial area.

Further, critical issues related with ecological layout as well as socioeconomic factors have not been noticed in the studied area during the study period.

11.3 ANTICIPATED ENVIROMENTAL IMPACTS AND MITIGATION MEASURES

As studied during the present EIA study, no major significant impacts from proposed plant are anticipated except the cases of failure of APCD and catastrophic disaster in material storage area.

Proponent has planned to install well designed ETP, which will be efficient for adequate wastewater treatment to meet the norms for disposal through underground drainage of GIDC going to CETP, Sarigam. The ETP process adopted by the proponent is adequate to remove the pollutants from the waste water. Thus issue of water or land/soil pollution due to disposal of treated wastewater is also not envisaged. Besides, the water consumption will be met through the drawl of water from pipeline of GIDC water supply department. Groundwater will not be abstracted for water requirement of proposed project. Hence the impacts due to the water consumption are not envisaged. Risk assessment study has been conducted for the proposed project and the suggestions made in the report shall be implemented strictly to prevent any chances of environmental contamination and employee health & safety. By the efficient implementation of Hazard/Risk control/Prevention measures the negative impacts would be avoided.

Further, the fuel for TFH will be Natural Gas which is eco-friendly fuel and does not emit any considerable load pollutant. Hence, there would not be any considerable emission. Besides, the

hazardous waste generation includes almost all recyclable waste except ETP sludge and all these hazardous waste will be managed as per MoEF/CPCB/GPCB Guidelines. Hence issues of environmental contamination due to hazardous waste are not envisaged.

The proponent will plant varieties of trees & shrubs in the premises. The Greenbelt will be maintained in excellent condition giving visual of dense vegetation. The proponent will manage the greenbelt with all possible care & attention to improve environmental condition. Thus the beneficial impacts due to the dense greenbelt are envisaged. The greenbelt will be created in open land to develop greenbelt in around 2000.00 m² (around 30% area of total land) area of total land of project. The plantation for proposed greenbelt will be started in the Monsoon.

Other than these aspects, it is also found that the high noise generation sources will not be the part of proposed project. At any point of process plant the noise level at work place will remain below 75 dB (A) which will be further mitigated by provision of PPEs and shift management. The noise level out of the premises is envisaged to be below 60 dB(A) in day and below 50 dB(A) in night as maximum. Hence impacts of noise are not envisaged.

Company shall organize CSR activities in the surrounding area as well as other areas of state & country with necessary budgetary provision around 2% of capital cost in line with the time bound schedule for at least 5 years. Necessary timely revision of budgetary provision shall be done as required. All aspects of safety are adequately being managed and required safety material, equipments and facilities will be provided to all employees, contractor & visitors.

11.4 ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program has been prepared in five different sections covering all necessary guidelines & plan for effective & efficient monitoring of the environmental conditions to ensure that EMP is implemented efficiently to prevent/minimize the anticipated impacts. The details are of the programs are presented below in tabular form:

Table 11.3: Details of Environment Monitoring Program

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
1.	Ambient Air : At minimum 2 location within the plant premises having 1 location in downwind direction preferably at between 500 m. & 1 km distance from plant boundary.	Monthly - In-house lab. or External recognized lab MoEF&CC	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , VOCs*
	In case of accidental leak & spill of volatile hazardous chemical: At maximum spots likely to be affected.	When accidental spillage/ leakage occurs - In-house lab. or External recognized lab MoEF&CC	VOCs*
2.	Stationary Emission: All Stacks including stacks of Thermopack, Steam boilers, DG Set and process area stacks	Monthly - In-house lab. or External recognized lab MoEF&CC	PM, SO ₂ , NO _x , VOCs*

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
3.	Workplace areas: RM Storage and Production areas	Monthly - In-house lab. or External MoEF&CC recognized lab	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , Bromine, VOCs*, Temperature, Humidity, Light and Noise
4.	Ambient Noise: At all sources (DG set, Stem boiler, Thermopack, Production Utilities/machineries, Pumps, Compressors etc.) and at deferent areas (Production area, Storage area, transportation area, Administrative area, security area, utility house, ETP etc) within premises	Weekly – In House lab.	Equivalent Noise Level - dB (A) (At least 1 hr. continuous)
5.	Untreated waste water from high concentrated stream	External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Untreated waste water before inlet to ETP	Daily- In-house lab. External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD, BOD, Chlorides, Sulphate, Phosphate, Ammonia, Chromium, Manganese, Mercury
	Treated waste water for disposal to CETP	Daily- In-house lab. External MoEF&CC recognized lab	Parameters in CETP discharge norms.
	In case of accidental spillage/leak, water samples from the area likely to be affected.	When accidental spillage/leakage occurs.- External MoEF&CC recognized lab	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, , COD,

Sr. No.	Sampling regime and Location	Frequency & Responsibility	Parameter
			BOD, Chlorides, Sulphates, Phosphate, Ammonia, Chromium, Manganese, Mercury.
6.	Surface Soil: At Two locations from storage & greenbelt area in case of accidental spillage/leak, soil of the affected area from various spots & depth.	Quarterly or after accidental spillage/ leakage - External MoEF&CC recognized lab	pH, EC, Moisture, Organic matter, Hg, N, P, K, SO4-2, Cl-, Ca+2, Mg+2 & Na+
7.	Greenbelt/Vegetation Cover: Greenbelt Area at Boundary & Garden	Throughout Year at regular interval: In House by EHS Executive & other EMC members	Number of plantation (Units), Number of Survived Plants/Trees, Number of Poor Plant/Trees
8.	Annual Environmental Audit:	Yearly (In-house by MD, Environment Manager & other EMC members; External only if required by statutory provision through Approved Lab)	As per Direction of Honorary High Court, Gujarat (if applicable)
9.	Employee Medical/Health Checkup:	Yearly- Through Approved Medical Officer & Doctor as per OHS Plan	As per statutory provision & requirement
10.	Social Aspects:	Throughout year- by PRO or HR Manager or Designated person.	Employee social status and issues, Disbursement of fund for CSR, Socio-economic requirement of the area as informed by local people.

Note: *VOCs are to be monitored in terms of Chemicals of Proposed project.

11.5 ADITIONAL STUDY

In case of the present EIA study for proposed project Risk Assessment as additional studies has been given as condition in awarded TOR, which needed to be included in the EIA study & report. The Risk Assessment Study for the upcoming project has been conducted by functional area expert of EIA Team. The risk assessment has been carried out with consideration of some

probable worst case scenarios like Fire, explosion and flammable cloud & toxic dispersion. The major hazards are noticed to be associated with four chemicals of the project (Ethanol, 2-Ethyl Hexanol, Isopropanol, Mono ethylene glycol, Bromine and Acetic acid) which can have worst case scenarios of fire & explosion as well as dispersion of toxic vapour & flammable cloud. As, the proposed project is of manufacturing of synthetic organic products using some organic chemicals, impacts are likely to occur due to some other chemical hazards also. Thus with such probabilities & considerations of hazards & risk, "Risk Assessment Study" has been carried out by proponent as pre-project conceptual RA study. The Disaster & Onsite Emergency Management plan has also been prepared as a part of RA study assignment. The whole Risk Assessment Report is incorporated in the chapter-7 of the EIA report, and the onsite emergency plan has been enclosed as annexure of the EIA report.

11.6 PROJECT BENEFITS

The project does not require any land outside of a notified industrial estate of GIDC - Sarigam and the estate is years old with all required infrastructures. Hence no major benefits in terms of development of new infrastructures & direct improvement in infrastructure due to proposed project are anticipated.

The project benefits will be significant in terms of benefit to the local socio-economic status as well as economic conditions of state & country.

11.7 ENVIRONMENTAL MANAGEMENT PLAN

The proposed project will have some potential of impact in form of pollution sources mainly as the emission from utilities. Such sources of impacts and the significance of the impacts are already described in above sections with necessary mitigations. In line with the above description some important mitigation measures are cited as necessary requirement to prevent &/or control / minimize the probable impacts of proposed project on environment. The details of such mitigations are described below under respective heading with necessary details.

Air Pollution Control

- Sprinkling of water will be providing for suppression of dust generated from material handling & storage.
- By providing wet Curtain/ tarpaulin barrier around the construction site from prevention of particulate emission.
- To establish proper design method to reduce airborne particles from transportation, storage & handling of materials.
- Allowing only PUC certified vehicles who will be engaged in construction work.
- Maintenance of construction equipments, machineries & utilities to reduce emissions.
- Stack Monitoring shall be done during the commissioning phase on regular basis to prevent high emission from utility.
- Provision of necessary PPEs for employees engaged in activities of storage, transportation & handling of materials as well as construction & commissioning operations

- Adequate Stack height & internal diameter are provided for proper dispersion of emission from proposed Steam Boilers & D.G. Set.
- Proper sampling port & monitoring point shall be provided to all stacks.
- To reduce the loss of resources by ensuring proper operation of production & storage to get high production efficiency and to reduce PM & VOC emission
- Provision of FD/ ID fan with utilities/ stack if/as required to maintain desired velocity of exit gas
- Hazardous material storage tanks shall be designed adequate and manufactured by suitable material for reduction of Hazards.
- The storage area shall be adequately design with efficient air change ratio. The raw material, products & fuel handling and transport facilities shall be provided.
- Provision of Safety valve on reactors and to prevent accidental emissions shall be provided Safety arrangements, facilities.
- Internal roads shall be constructed from concrete/ asphalt for prevention of dust during vehicular movement
- Adequate greenbelt coverage, in & around the plant shall be developed as per the guideline.
- Low emission vehicles shall only be used for transportation
- Transportation, handling & storage of the hazardous materials shall be done as per statutory requirements, HAZMAT and guidelines issued by concerned authorities.
- The trucks/vehicles used for the transportation of hazardous materials shall be approved by concerned authority and the driver shall be well trained to overcome the safety issues occur during the transportation.
- NG Fired steam boiler shall be installed for the proposed project.
- HSD/Diesel fired DG sets shall be run only in emergency power requirement / power supply failure from electricity department.
- Stacks of adequate height & internal diameter at top should be provided for all utilities to control and manage the emission ensuring lowest possible pollutant levels in emission. All applicable standards of emission quality as timely issued/amended/corrected shall be strictly complied.
- Hazardous material storage area shall be provided with fire detection system (if possible) & firefighting facilities like hydrant & fire extinguishers.
- Proper & adequate handling facilities & procedures shall be provided to prevent fugitive emission from handling of all materials & wastes of the project.
- The hazardous materials storage tanks shall be provided with dyke wall to prevent spreading of materials during incident of leak, spill and other hazards.
- Regular monitoring of ambient air and emission of utility shall be conducted as per environment monitoring plan.
- To ensure that DMP & RA is prepared efficiently covering all necessary action plan to prevent all major probable threats associated with the hazardous materials of the project.

Water & Wastewater Management

- Connections for drawl of water from GIDC water supply line and raw water storage facilities
- Proper sanitation facilities with septic tank & soak pit for disposal of sewage

- Adequate structural facilities for prevention of any kind of contaminated runoff from construction area causing impacts outside premises
- Proper drinking water supply facilities construction personal
- Temporary short phase, hence no other major structural measures
- Ground water shall not be used to meet water requirement of the project. All water requirements shall be met only from GIDC water supply pipeline.
- Water consumption shall be optimized by reduction of wastage, unnecessary drawl and by preventive leakage from Taps/ Valves/ Pipeline.
- Runoff from construction site would be controlled by providing bund/barrier around construction area.
- The construction equipment will be washed properly only at designated washing area.
- Domestic effluent will be disposed of through adequate soak pit and septic tank.
- All construction materials having potential of being cause of soil contamination and hence water contamination shall be stored in closed storage area with concrete floor.
- Intake facilities from Source: GIDC Water Supply
- In-house fresh water storage facilities.
- Adequately ETP will be designed for treatment of High concentrated effluent containing inorganic mercury.
- Provision of effluent collection line in storage and production area for contaminated waste steam generated due to spill/ leak of hazardous chemicals mainly mercury as well as container/ vessel washing.
- Provision of Emergency storage tank/ Guard pond for temporary storage of effluent.
- Proper arrangement for effluent disposal line connected to GIDC Underground drainage to CETP-Sarigam.
- Efficiency of ETP for treatment of industrial effluent is mentioned in the EIA report as annexure and guard pond is suggested.
- Proper sanitation facilities with septic tank/ soak pit system for domestic wastewater discharge.
- Provision of properly lined storage area for hazardous materials (especially mercury) & wastes to prevent contamination of water.
- Provision of adequate storm water drainage lines.
- Ground water and surface water from nearby canal shall not be utilized for proposed project and the whole water requirement shall be met only from GIDC water supply pipeline.
- Reduce wastage in domestic activities by preventing leak/spill from pipes, taps/valves etc.
- Regular recording of water consumption using flow meter.
- Regular inspection ground water nearby /around the project site to check the quality of Ground water regarding presence of mercury.
- Reduction of wastewater generation rate by minimal use of water for various industrial activities and by prevention of leakage from tap/valve and pipeline.
- Continuous attempts to reduce pollutant load in effluent.
- Domestic effluent shall be disposed of only through adequate septic tank and soak pit.
- Effluent treatment plant having adequate capacity for efficient treatment of waste water generated from industrial operation shall be provided.

- The ETP for proposed project shall be provided as per the proposal made in Treatability report .
- Other Treated effluent shall be disposed off only through the common effluent disposal pipeline going to CETP of Sarigam GIDC.
- Emergency storage tank/ Guard pond shall be provided for temporary storage of wastewater to overcome issues related with treatment arising during failure of ETP and emergency/major disaster of chemical spill /leak.
- Contaminated waste stream generated due to spill/ leak of hazardous chemicals as well as container/ vessel washing shall be temporarily stored in guard pond and efficient treatment in ETP prior to discharge shall be ensured.
- In condition of inefficient operation/failure of ETP and emergency waste water generated from industrial activity shall be temporarily stored in guard pond.
- In any condition, poorly or untreated effluent shall not be disposed off.
- Hazardous waste storage area and disposal as per the regulatory guideline/ provisions shall be ensured prior to inception of industrial operations of proposed project.
- Impervious lining of floor of chemical storage and production area shall be provided to prevent /eliminate the issues of land and hence subsoil water contamination.
- No disposal of poorly or untreated effluent generated from clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Provision shall be made for alternative treatment option for effluent generated clean-up operation undertaken during emergency/major disaster of chemical spill /leak.
- Adequate operation & maintenance of ETP for efficient treatment of effluent.
- Regular quality assessment of treated effluent from ETP before disposal.
- Maintaining records of water consumption, effluent generation, effluent discharge, water characteristics, treated and untreated effluent characteristics.
- Maintenance of good housekeeping to avoid contamination of storm water.

Land Environment Management

- Proper handling & storage facilities shall be provided for the construction materials.
- Adequate management for transportation to ensure that materials in transport vehicles are covered to prevent spill & leak on ground as well as transportation is done in minimum frequency.
- Greenbelt development in about 30% Area of the plot as per Greenbelt Development Plan.
- All transportation of raw materials especially mercury and products shall be done in closed truck/tanker approved as per statutory requirement to prevent volatile and particulate emissions as well as leak/spill during transportation.
- Fire & explosion prevention /control measures shall be provided as per the suggestions made in RA report.
- Firefighting system shall be provided as per the suggestions made in RA report.
- Mitigation measures for prevention and control of particular emission shall be provided as suggested in RA report as well as in section of air pollution control.
- Adequate ETP for treatment of effluent & arrangement of disposal through underground drainage of GIDC going to CETP, Sarigam and for high concentrated effluent will send to MEE.

- Statutory guidelines & requirements for Hazardous waste management shall be followed in any condition/ situation.
- Effluent and solid /hazardous waste shall never be disposed off on land.
- Greenbelt development & management to ensure healthy & dens greenbelt/pasture throughout the life of the project.

Ecological Environment Management

- Proper & efficient implementation of mitigation measures & EMP suggested for control of Air pollution, Water & wastewater management, reduction of Noise and construction waste management.
- RA has to be conducted and all necessary control & prevention measures for all hazards associated with the project shall be implemented prior to inception of the project activities.
- Disaster/Emergency Management Plan shall be prepared & implemented
- Greenbelt development & maintenance within premises & around periphery as per greenbelt development plan.

Noise & Vibration Generation & Management

- Noise generating & vibrating equipment like motors, pumps etc. shall be mounted on sturdy concrete foundations with rubber padding to reduce vibrations.
- DG set shall be complying noise standard prescribed by CPCB and silencer as well as acoustic enclosure shall be provided.
- Barrier in form of Dens Greenbelt in and around premises and concrete wall wherever required & suitable.
- Further to cope up with the issue of occupational noise exposure, PPEs like earmuff & earplug will be provided to all concerned employees.
- The impacts of noise on occupational health would be mitigated by proper shift timing & regular annual checkup of concern employees.
- Periodic monitoring of noise levels as per post-project monitoring plan shall be done on regular basis.

Occupation Health & Safety

- All necessary implementation & actions for ensuring safe work condition
- All statutory guidelines related with occupational health & safety is/will be followed
- Implementation of all hazards & risk control & prevention measures
- Provision of all necessary PPEs, safety equipment/ materials
- Regular inspection for the safety procedures and use of PPEs & Safety equipment/material
- The medical histories of all employees shall be maintained in the prescribed format. Thereafter, the employees shall be subjected to medical examination on annual basis..

- Training programs & safety audit on regular basis to prevent impacts of the operational activities on occupational health as well as to improve workplace condition & safe work system.

Greenbelt Development

The greenbelt will be created in open land to develop greenbelt in around 2000.00 m² (about 30 % area of total land) area of total land of project. The plantation for proposed greenbelt will be started in the Monsoon season. The greenbelt will be maintained in healthy & dense condition throughout its operation period after the proposed project. Company shall plant trees with density of about 1200 trees per hectare in the greenbelt area. Only indigenous species with fast growth will be selected or form the base of selection as Green Belt can come in view as fast as possible. Company shall plant local species of trees & shrub for greenbelt development. All necessary actions like fertilization, irrigation, pest control, pruning & trimming as well as re-plantation as required shall be taken timely to ensure dense healthy greenbelt all the time.

Socioeconomic welfare & CSR Activities

- Socio economy development activities will be a part of CSR activities to be carried by the unit. We proposed following activities as a part of socio-economic development to considering local social need.
- A budget of Rs. 8 Lacs (2 % of the total cost) have been provided for the next 5 years to carry out various CSR activities in nearby area of Sarigam GIDC Area as detailed in EIA report. Attached as Annexure of EIA Report.
- M/s. Heni Drugs Pvt. Ltd. will be counted various CSR Activities education development, health care, women empowerment and sustainable livelihood, infrastructure development and various social issues through its CSR programme in the region. Various CSR activities will carry out by Propjet proponent.
- Maximum employment preferably 80% employment shall be done from local area by giving priority to local people/contractors under direct or indirect employment programs/plan.

11.8 CONCLUSION

The study for the proposed project of M/s. Heni Drugs Pvt. Ltd. at Sarigam GIDC has revealed that the upcoming activities of synthetic organic chemical manufacturing will have some considerable impacts which would mainly occur only upon accidental spill/leak of chemicals/materials and catastrophic disasters. All other impacts of the project will remain far below acceptable limits after necessary mitigation as described & suggested in EIA report. The major impacts of catastrophic disaster will also be brought under acceptable limits by implementing the required hazard prevention & control measures as suggested in RA report. Thus it has been concluded that there would not be any major impacts on environment due to the proposed project except the impacts of emissions and major accident scenarios which may extend out of the plant area.

CHAPTER: 12

DISCLOSURE OF CONSULTANT ENGAGED

12.1. ABOUT UNISTAR ENVIRONMENT & RESEARCH LABS PVT. LTD.

Unistar Environment And Research Labs Private Limited is a company registered under the companies Act in India (Vapi, Gujarat) to provide efficient and economical services in the areas of environmental pollution control/ monitoring and chemical analysis & research activities to various industries and institutions. Unistar Environment and Research Labs Private Limited is a service providing organization rendering a wide range of environment pollution control related services.

Unistar Environment And Research Labs Private Limited is a growing environmental pollution control service providing company having a team of qualified and experienced persons from various disciplines to handle complex assignments. In addition, we have a pool of highly qualified experts from related and specialized fields to draw upon should an assignment dictate so. The organization has a sufficing infrastructure along with a fully equipped laboratory and field staff.

The client list includes some of the foremost industry houses in India, mainly in the area of pharmaceuticals, Personal care products, Metal and Metal Processing, Textile processing, Paper manufacturing, Dyes and Intermediates, Specialty chemicals, Engineering (Fabrication, surface Treatment, coating and assembling), Plastics and Packaging, Hotels, various miscellaneous industrial units and government and semi-government departments.

The company aims to provide effective and optimum environment management systems for treatment & control of gaseous emissions, water, wastewater and hazardous waste.

Vision - to establish a strong technical foothold in the area of environmental pollution To establish a strong technical foothold in the area of environmental pollution control, Monitoring, Chemical testing and Research.

Mission - to provide reliable and economical solution in timely manner that best meets the individual concerns for each client.

Services-

The Unistar provides the following services

Consultancy Services:

- Environmental Impact Assessment (EIA) Study.
- Treatability/Feasibility study to establish Effluent Treatment Scheme.
- Study of pollution control system and its adequacy & efficacy.
- Environmental Audit of the industrial units.
- Environmental studies and reports.
- Legal and Technical assistance to comply with environmental legislations.

Environmental Monitoring Services:

- Post Environment Clearance monitoring programs.
- Potable water testing as per IS 10500: 2012 and WHO standard.
- Chemical & Microbial monitoring and analysis of Water & Waste Water.
- Hazardous and non-hazardous Solid Wastes and soil samples monitoring and analysis.
- Ambient Air quality, Work place, Flue gas stack, process gas stack emission, Ambient Noise level Monitoring.
- Analytical testing of all kind of chemicals, metals, etc.

Engineering Services:

- Designing, Erection and Commissioning of ETP and STP.
- Designing, Erection and Commissioning of APCD.
- Operation & Maintenance of ETP and STP.

Introducing Our Additional Services:

- Education and training in the area of Energy, Safety, Health, Various CSR activities and Environment.
- CSR Activity plan or Proposal and implementation, documentation and reporting.
- Carry out Social Need Assessment study.
- Conducting CSR Audits.

Recognition

- 1) MoEF&CC (Govt. Of India) Recognized Environmental Laboratory under The Environment (Protection) Act-1986.
- 2) GPCB (Govt. Of Gujarat) Recognized Environmental Auditor. (Schedule- II)
- 3) NABET Accreditation scheme for EIA Consultant: (Provisional Accreditation)
- 4) NABL (ISO/IEC 17025: 2005) Accredited Environmental Laboratory
- 5) OSHAS 18001:2007 certified Laboratory
- 6) ISO 9001: 2015 certified company.



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पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय
अधिसूचना

नई दिल्ली, 12 जनवरी, 2015

का.आ. 137(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 10 के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 12 की उपधारा (1) के खंड (ख) और धारा 13 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण और वन मंत्रालय, भारत सरकार की अधिसूचना संख्यांक का. आ.1174(अ) तारीख 18 जुलाई, 2007 में निम्नलिखित और संशोधन करती है, अर्थात् :-

उक्त अधिसूचना से संलग्न सूची में,-

(क) क्रम संख्यांक 8, और संख्यांक 74 और उससे संबंधित प्रविष्टियों के स्थान पर निम्नलिखित क्रम संख्यांक और प्रविष्टियां रखी जाएंगी, अर्थात् :-

(1)	(2)	(3)	(4)
“8	मैसर्स सेसा इन्वायरमेंट लैबोरेटरी, सेसा गोवा प्राइवेट लिमिटेड, खनन प्रभाग, कोडली माईसं, डाकघर कार्यालय, केरापाली, गोवा - 403727	(1) श्री० कृष्णा वी० कुलकर्णी (2) श्री० अरविंद जी० हांडीगोल (3) श्री० शायदरी एस० सीनारी	12.01.2015 से 11.01.2020
74	मैसर्स यूनिस्टार इन्वायरमेंट एण्ड रिसर्च लैब प्राइवेट लिमिटेड, प्लॉट न० सी / 5 -24, व्हाइट हाउस, पहली और दूसरी मंजिल, नीयर जीआईडीसी ऑफिस, चार रास्ता, वापी-396195, जिला- वलसाद (गुजरात)	(1) श्री० हरीश पी० जोशी (2) श्री० जैवीक एस० टंडेल (3) श्री० रंजन माहाराज	12.01.2015 से 11.01.2020

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डा० राशिद हसन, सलाहकार

टिप्पण : मूल अधिसूचना भारत के राजपत्र, असाधारण, में संख्यांक. का.आ. 1174(अ), तारीख 18 जुलाई, 2007 द्वारा प्रकाशित की गई थी और तत्पश्चात् अधिसूचना सं० का.आ. 1539(अ), तारीख 13 सितंबर, 2007, का.आ. 1811(अ), तारीख 24 अक्टूबर, 2007, का.आ. 55(अ), तारीख 9 जनवरी, 2008, का.आ. 428(अ), तारीख 4 मार्च, 2008, का.आ. 865(अ), तारीख 11 अप्रैल, 2008, का.आ. 1894(अ), तारीख 31 जुलाई, 2008, का.आ. 2728(अ), तारीख 25 नवंबर, 2008, का.आ. 1356(अ), तारीख 27 मई, 2009, का.आ.1802(अ) तारीख 22 जुलाई, 2009, का.आ.2399(अ) तारीख

18 सितंबर 2009, का.आ. 3122(अ), तारीख 7 दिसंबर, 2009, का.आ. 3123(अ), तारीख 7 दिसंबर, 2009, का.आ. 142(अ), तारीख 21 जनवरी, 2010, का.आ. 619(अ), तारीख 19 मार्च, 2010, का.आ. 1662(अ), तारीख 13 जुलाई, 2010, का.आ. 2390(अ), तारीख 30 सितंबर, 2010, का.आ. 2904 (अ), तारीख 8 दिसंबर, 2010, का.आ. 181(अ), तारीख 28 जनवरी, 2011, का.आ. 692(अ), तारीख 5 अप्रैल, 2011, का.आ. 1537(अ), तारीख 6 जुलाई, 2011, का.आ. 1754(अ), तारीख 28 जुलाई, 2011, का.आ. 2609(अ), तारीख 22 नवंबर, 2011, का.आ. 264(अ), तारीख 13 फरवरी, 2012, का.आ. 1150(अ), तारीख 22 मई, 2012, का.आ. 2039(अ), तारीख 5 सितंबर, 2012, का.आ. 2802(अ), तारीख 27 नवंबर, 2012 और का.आ. 2850(अ), तारीख 7 दिसंबर, 2012 तथा का.आ. 592(अ), तारीख 8 मार्च, 2013, का.आ. 945(अ), तारीख 8 अप्रैल, 2013, का.आ. 2287(अ), तारीख 27 जुलाई, 2013, का.आ. 2288(अ), तारीख 27 जुलाई, 2013 और का.आ. 3489(अ), तारीख 26 नवंबर, 2013, का.आ. 21(अ), तारीख 3 जनवरी, 2014, का.आ. 561(अ), तारीख 26 फरवरी, 2014, का.आ. 1205 (अ), तारीख 1 मई, 2014, का.आ. 1190 (अ), तारीख 2 मई, 2014, का.आ. 1190 (अ), तारीख 6 अगस्त, 2014, द्वारा उसका संशोधन किया गया था।

MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE**NOTIFICATION**

New Delhi, the 12th January, 2015

S.O. 137(E).— In exercise of the powers conferred by clause (b) of sub-section (1) of Section 12 and Section 13 of the Environment (Protection) Act, 1986 (29 of 1986) read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the erstwhile Ministry of Environment and Forests, number S.O. 1174(E), dated the 18th July, 2007, namely :-

In the said notification, in the Table, —

(a) for serial numbers 8 and 74 and the entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely :—

(1)	(2)	(3)	(4)
8	M/s Sesa Environment Laboratory, Sesa Goa Limited., Mining Division, Codli Mines, P.O. Kirlapale, Goa - 403727	(1) Mr. Krishna V. Kulkarni (2) Mr. Arvind. G. Handigol (3) Mr. Sahyadri. S. Sinari	12.01.2015 to 11.01.2020
74	M/s Unistar Environment and Research Labs Private Limited., Plot No. C/5-24, White House, 1 st and 2 nd Floor, Near GIDC Office, Char Rasta, Vapi- 396195, District - Valsad, (Gujarat)	(1) Mr. Haresh P. Joshi (2) Mr. Jaivik S. Tandel (3) Mr. Ranjan Maharaj	12.01.2015 to 11.01.2020

[F. No. Q. 15018/23/2013-CPW]

Dr. RASHID HASAN, Advisor

Note.— The principal notification was published in the Gazette of India, Extraordinary, vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O. 1811(E), dated the 24th October, 2007, S.O. 55(E), dated 9th January, 2008, S.O.428(E), dated the 4th March, 2008, S.O. 865(E), dated the 11th April, 2008, S.O.1894(E), dated the 31st July, 2008, S.O. 2728(E) dated the 25th November, 2008, S.O.1356(E), dated the 27th May, 2009, S.O. 1802(E) dated the 22nd July, 2009, S.O. 2399(E), dated the 18th September, 2009, S.O. 3122(E), dated the 7th December, 2009, S.O. 3123(E), dated the 7th December, 2009, S.O. No. 142(E), dated the 21st January, 2010, S.O. 619(E), 19th March, 2010, S.O. 1662(E), dated the 13th July, 2010, S.O. 2390(E), dated the 30th September, 2010, S.O. 2904(E), dated the 8th December, 2010, S.O.181(E), dated the 28th January, 2011, S.O. 692(E), dated the 5th April, 2011, S.O.1537(E), dated the 6th July, 2011, S.O. 1754(E), dated the 28th July, 2011 S.O. 2609(E), dated the 22nd November, 2011, S.O. 264 (E), dated the 13 February, 2012, S.O. 1150(E), dated the 22nd May, 2012, S.O. 2039(E), dated the 5th September, 2012, S.O. 2802(E), dated the 27th November, 2012, S.O. 2850(E), dated the 7th December, 2012, S.O. 592 (E), dated the 8th March, 2013, S.O. 945(E), dated the 8th April, 2013, S.O. 2287(E), dated the 27th July, 2013, S.O. 2288(E), dated the 27th July, 2013, S.O. 3489(E), dated the 26th November, 2013, S.O. 21(E), dated 3rd January, 2014, S.O. 561(E), the 26th February, 2014, S.O.1205(E), the 5th May, 2014, and S.O. 1190(E), the 2nd May, 2014, S.O. 2003(E), the 6th August, 2014.

Annexure- I

- Existing CC&A with compliance



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 021

Website . www.gpcb.gov.i

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution) Act-1981 and Authorization under rule 3(c) & 5(5) of the Hazardous Waste (Management Handling and Transboundary Movement) Rules'2008, framed under the EP Act-1986.

And whereas Board has received on line consolidated application Inward ID No: 53387 dated 11/07/2014 for the consolidated consent and authorization (CC & A) of this Board under the provisions / rules of the aforesaid Acts Consent & Authorization is hereby granted as under.

CONSENT AND AUTHORISATION:

(Under the provisions / rules of the afore said environmental acts)

To
M/s. Hani Chemical Industries,
Plot No: 1901, GIDC Estate,
Village: Sarigam,
Ta: Umbergaon,
Dist: Valsad-sarigam - 396 155.

1. Consent Order No: AWH-65133 Date of Issue: 22/09/2014.
2. The consents shall be valid up to 10/06/2018 for use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for manufacture of the following items / products

Sr. No.	Product	Capacity
1.	Continuous Distillation of Crude Ethyl Oleate	25 MT/Month
2.	Metal Salts of Copper, Cobalt, Nickel, Bismuth, Mercury & Aluminum Magnesium Mix Hydrocalcite Salt	75 MT/Month

SPECIFIC CONDITION:

Applicant shall not carry out any activities which required prior Environmental Clearance.

3.0 CONDITIONS UNDER THE WATER ACT:

- 3.1 The quantity of the industrial effluent from the manufacturing process and other ancillary industrial operations shall be NIL.
- 3.2 The quantity of domestic sewage effluent from the factory shall not exceed 1.800 KLPD.
- 3.2 Sewage shall be disposed of through septic tank/soak pit system.

4.0 CONDITIONS UNDER THE AIR ACT:

- 4.1 The following shall be used as fuel in boiler/ furnace /heater/Kiln/D G. Set respectively.

Sr. No.	Fuel	Quantity
1.	Natural Gas	50 SCm/hr

- 4.2 The applicant shall install & operate a comprehensive adequate air pollution in order to achieve prescribed norms control system so as to achieve standards.

4.3 The flue gas emission through stack attached to boiler /furnace/heater shall conform to the following standards.

Stack No.	Stack attached to	Stack Height in Meter	APCM	Parameter	Permissible Limit
1	Baby Boiler	11	---	Particulate matter SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm

4.4 There shall be no process emission from the manufacturing process and other ancillary industrial operations.

4.5 Ambient air quality within the premises of the industry shall conform to the following standards:-

PARAMETERS	PERMISSIBLE LIMIT	
	Annual	24 Hrs Average
Particulate Matter-10 (PM ₁₀)	60 Microgram/M ³	100 Microgram/M ³
Particulate Matter-2.5 (PM _{2.5})	40 Microgram/M ³	60 Microgram/M ³
SO ₂	50 Microgram/M ³	80 Microgram/M ³
NO _x	40 Microgram/M ³	80 Microgram/M ³

- Annual arithmetic mean of minimum 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 monitoring 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.

4.6 The applicant shall operate industrial plant / air pollution control equipment very efficiently and continuously so that the gaseous emission always conforms to the standards specified in condition no 4.3 and 4.6 as above

4.7 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 condition no. 4.3. and 4.6 as above

4.8 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.

4.9 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB(A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m and 10 p.m and nighttime is reckoned between 10 p.m and 6 a.m.

5. Authorization for the [Management, Handling & Transboundary Movement of Hazardous Waste] Rules - 2008, Form-2 (See rule 5 (4) for grant of Authorization for occupier under handling Hazardous Waste.

5.1 M/s. Hani Chemical Industries is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Plot No: 1901, GIDC Estate, Village: Sarigam, Ta: Umbergaon, Dist: Valsad - sarigam.

Sr. No.	Waste	Quantity	Schedule	Facility
1.	Discarded Containers/ Barrels/ Liners contaminated with Hazardous Wastes/Chemicals	05 MT/Year	I-333	Collection, storage, Transportation and disposal by selling to registered recyclers



GPCB

GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 021

Website : www.gpcb.gov.i

Sr. No.	Waste	Quantity	Schedule	Facility
2	Jsec Spent Oil	0.150 MT/Year	i-5.1	Collection, storage, Transportation and disposal by selling to registered recyclers
3	Chemicals Sludge From Waste Water Treatment	15 MT/Year	i-34.3	Collection, storage, Transportation and Disposal at TSDF.

5.2 The authorization is granted to operate a facility for collection, storage, within the factory premises and treatment, transportation and ultimate disposal of Hazardous wastes as per **Haz. Waste [Management, Handling & Transboundary Movement] Rules 2008.**

5.3 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

5.4 The authorization shall be in force for a period of five years (i.e. up to 30/06/2019).

5.5 **TERMS AND CONDITIONS OF AUTHORISATION:**

5.5.1 The applicant shall comply with the provisions of the Environment (Protection) Act - 1986 and the rules made there under

5.5.2 The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board

5.5.3 The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board

5.5.4 Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization

5.5.5 It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.

5.5.6 An application for the renewal of an authorization shall be made as laid down in rule 5 (7) (ii)

5.5.7 Industry shall submit annual report within 15 days and sub quarterly by 31st January every year

6. **GENERAL CONDITIONS:**

6.1 Any change in personnel, equipment or working conditions as mentioned in the consent's form/order should immediately be intimated to this Board.

6.2 The waste generator shall be totally responsible for collection, storage, transportation and ultimate disposal of the waste generated.

6.3 In case of any accident, details of the same shall be submitted in Form - 5 to Gujarat Pollution Control Board

6.4 As per "Public Liability Insurance Act - 91" company shall get insurance policy if applicable.

6.5 Empty drums and containers of toxic and hazardous material shall be treated as per the guidelines published for "Management & Handling of discarded containers". Record of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly

- 6.6 Unit shall take all concrete measures to show tangible results in waste generation reduction avoidance, reuse and recycle. Action taken in this regard shall be submitted within 03 months and also along with Form - 4
- 6.7 industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme Court's order in W.P. No. 657 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD


(Smt. U.K. Upadhyay)
ENVIRONMENTAL ENGINEER

NO: GPCB/NOC-VSD-38317D: 41800/

Date:

ISSUED TO:

M/s. Hani Chemical Industries,
Plot No: 1901, GIDC Estate,
Village: Sarigam,
Ta: Umbergaon,
Dist: Valsad - sarigam - 396 155.

Outward No: 301888, 22/01/2015

M/s. Heni Drugs Pvt. Ltd.

Plot No. 1901/1901A, Phansa Char Rasta,
GIDC, Sarigam – 396155
Tal. Umbergaon, Dist. Valsad. Gujarat (INDIA).
COMPLIANCE REPORT OF CCA

For Water (Prevention and control of pollution) ACT –1974, Air (Prevention And Control of Pollution) Act – 1981 and Authorization under Hazardous waste –Management Rules -2003:

1. Consent Order No. : AWH - 65133, dated of issue: 22/09/2014.
2. The consents shall be valid up to 11/06/2019 for use of outlet for the discharge of treated effluent & emission due to operation of industrial plant for:

Sr. No.	product	As per CCA MT/Month
1.	Continuous distillation of crude ethylOleate	25
2.	Metal salt of copper, cobalt, Nickel, Bismuth, Mercury and Aluminum Magnesium Mix Hydrotalcite salt	75
CONDITION UNDER THE WATER ACT:		
3.1.	The quantity of the industrial effluent from the manufacturing process and other ancillary industrial operations shall be nil.	We do comply with this condition
3.2	The quantity of domestic sewage effluent from the factory shall not exceed 1.800 KL/day.	We do comply with this condition
3.2.1	Sewage shall be dispose of through septic tank/ sock pit system.	We do comply with this condition
4. CONDITIONS UNDER THE AIR ACT:		
4.1	The following shall be used as fuel.	Natural Gas : 50SCm/Hr.
4.2	The applicant shall install & operate comprehensive adequate air pollution in order to achieve prescribed norms control system so as to achieve standard.	We do comply with the condition. And the stack Monitoring report is enclosed as Annexure-1.
4.3	The flue gas emission through stack attached to Boiler / Furnace / Heater shall conform to the following standards: (Mention in consent)	We do comply with the condition. The stack Monitoring report is enclosed as Annexure-1.
4.4	There shall be no process emission from the manufacturing process and other ancillary industrial operations.	We do comply with the condition.

M/s. Heni Drugs Pvt. Ltd.

Plot No. 1901/1901A, Phansa Char Rasta,

GIDC, Sarigam – 396155

Tal. Umbergaon, Dist. Valsad. Gujarat (INDIA).

4.5	<p>Ambient air quality within the premises of the industry shall conform to the following standards:-</p> <table border="1"> <thead> <tr> <th rowspan="2">PARAMETERS</th> <th colspan="2">PERMISSIBLE LIMIT</th> </tr> <tr> <th>Annual</th> <th>24 Hrs Average</th> </tr> </thead> <tbody> <tr> <td>Particulate Matter-10 (PM₁₀)</td> <td>60 Microgram/M³</td> <td>100 Microgram/M³</td> </tr> <tr> <td>Particulate Matter-2.5 (PM_{2.5})</td> <td>40 Microgram/M³</td> <td>60 Microgram/M³</td> </tr> <tr> <td>SO₂</td> <td>50 Microgram/M³</td> <td>80 Microgram/M³</td> </tr> <tr> <td>NO_x</td> <td>40 Microgram/M³</td> <td>80 Microgram/M³</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Annual arithmetic mean of minimum 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. 	PARAMETERS	PERMISSIBLE LIMIT		Annual	24 Hrs Average	Particulate Matter-10 (PM ₁₀)	60 Microgram/M ³	100 Microgram/M ³	Particulate Matter-2.5 (PM _{2.5})	40 Microgram/M ³	60 Microgram/M ³	SO ₂	50 Microgram/M ³	80 Microgram/M ³	NO _x	40 Microgram/M ³	80 Microgram/M ³	We do comply with the condition. the Existing Ambient air quality monitoring report is enclosed as Annexure-1.
PARAMETERS	PERMISSIBLE LIMIT																		
	Annual	24 Hrs Average																	
Particulate Matter-10 (PM ₁₀)	60 Microgram/M ³	100 Microgram/M ³																	
Particulate Matter-2.5 (PM _{2.5})	40 Microgram/M ³	60 Microgram/M ³																	
SO ₂	50 Microgram/M ³	80 Microgram/M ³																	
NO _x	40 Microgram/M ³	80 Microgram/M ³																	
4.6	The applicant shall operate industrial plant/air pollution control equipment very efficiently and continuously so that the gaseous emission always conforms to the standards specified in condition no. 4.3 and 4.6 as above.	We do comply with the condition.																	
4.7	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 condition no. 4.3, and 4.6 as above.	We do comply with the condition.																	
4.8	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.	We are complying with the condition.																	
4.9	The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB(a) during day time and 70 dB(A) during night time. Daytime is reckoned in between 6 a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 p.m.	We are complying with the condition and the Ambient noise monitoring report is enclosed as Annexure-1.																	
5	Authorization for the [Management, Handling & Transboundary Movement of Hazardous Waste] Rules-2008, Form-2 (See rules 5 (4) for grant of Authorization for occupier under handling Hazardous Waste.	We do comply with the condition.																	

M/s. Heni Drugs Pvt. Ltd.

Plot No. 1901/1901A, Phansa Char Rasta,

GIDC, Sarigam – 396155

Tal. Umbergaon, Dist. Valsad. Gujarat (INDIA).

5.1	M/s. Heni Chemical Industries is hereby granted an authorization to operate facility for following hazardous waste on the premises situated at plot No. 1901, GIDC Estate, Village: Sarigam, Ta: Umbergaon, Dist: Valsad- Sarigam. (Mention in consent)	
5.2	The authorization is granted a facility for collection, storage within the factory premises and treatment, transportation and ultimate disposal of Hazardous wastes as per Haz. Waste [Management, Handling & Transboundry Movement] Rules 2008.	We do comply with the condition.
5.3	The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.	We do comply with the condition.
5.4	The authorization shall be in force for period of five years (i.e. up to 10/06/2019).	We do comply with the directives issued by the competent authorities time to time.
5.5	TERMS AND CONDITIONS OF AUTHORIZATION	
5.5.1	The applicant shall comply with the provisions of the Environment (Protection) Act – 1986 and the rules made there under.	We do comply with the condition.
5.5.2	The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.	We do comply with the condition.
5.5.3	The persons authorized shall not rent, lend, sell and transfer of otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.	We do comply with the condition.
5.5.4	Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.	We do comply with the condition.
5.5.5	It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.	We do comply with the condition.
5.5.6	An application for the renewal of an authorization shall be made as laid down in rule - 5(7) (II).	We do comply with the condition.
5.5.7	Industry shall submit annual report within 15 days and sub squinty by 31 st January every year.	We do comply with the condition.
6. GENERAL CONDITIONS:		
6.1	Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.	We do comply with the condition.
6.2	The waste generator shall be totally responsible for	We do comply with the condition.

M/s. Heni Drugs Pvt. Ltd.

Plot No. 1901/1901A, Phansa Char Rasta,

GIDC, Sarigam – 396155

Tal. Umbergaon, Dist. Valsad. Gujarat (INDIA).

	collection, storage, transportation and ultimate disposal of the waste generated.	
6.3	In case of any accident, details of the same shall be submitted in form-5 to Gujarat Pollution control Board.	We do comply with the condition.
6.4	As per public Liability Insurance Act-91” company shall get insurance policy, if applicable.	We do comply with the condition
6.5	Empty drums and containers of toxic and hazardous material shall be treated as per the guidelines published for “Management & Handling of discarded containers” Record of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.	We do comply with the condition
6.6	Unit shall take all concrete measures to show tangible results in waste generation reduction avoidance, reuse and recycle. Action taken in this regard shall be submitted within 03 months and also along with form-4.	We do comply with the condition
6.7	Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme Court’s order in W.P. No: 657 dated 14 th October 2003.	We do comply with the condition

For **M/s. Heni Drugs Pvt. Ltd.**
(Authorized Signatory)

TEST REPORT
(AMBIENT AIR MONITORING)

Test Report No.	UERL/16/03/A-HD001	Report Issue Date:	30/03/2016
Service Request form No.	UERL/AIR/SRF/03/001	Service Request Date	26/03/2016
Sample ID No.	UERL/AIR/ID/A-16/03/001	Field Data Sheet No.:	UERL/AIR/FDS/A-16/03/001
Name & Add. of Customer	M/s. Henl Drugs Pvt. Ltd. Plot No. 1901/1901A, Phansa Char Rasta, GIDC - Sarigam.		
Dates of Sampling	26/03/2016	Date of Testing	28/03/2016
Sampling Procedure:	CPCB Guideline		
Location of Sampling / Monitoring	Within Company Premises		

➤ **Details of Master Instrument Used for Monitoring**

Instrument Id No.	Instrument Name	Serial Number	Cali. Date	Next Cali. Date
UERL/AIR/RDS/13	Respirable Dust Sampler	1716-DTE-2010 287-DTD-2010	01/11/2015	31/10/2016
UERL/AIR/FPS/06	Fine Particulate Sampler	280-DTE-2010	01/09/2015	31/08/2016

➤ **General Sampling / Monitoring Observation as per CPCB Guideline**

Sr. No.	Description	Unit of measurement	Observation
1.	Monitoring Duration	h	24
2.	Flow Rate of PM ₁₀	m ³ /min	1.32
3.	Volume of Air Sampled for PM ₁₀	m ³	1900
4.	Volume of Air Sampled for PM _{2.5}	m ³	24.10
5.	Flow Rate for Gas	L/min	1.5
6.	Volume of Air Sample for Gas	L	2160

➤ **Environmental Conditions during testing:** Temp.: 25 ± 5 °C, Relative Humidity: 40 to 50%

➤ **Test Parameter Results**

Sr. No.	Test Parameter	Unit	Result	Specific Value (As per NAAQMS)	Test Method
1.	Particulate Matter. (PM ₁₀)	µg/m ³	92	100	IS - 5182, Part - 23
2.	Particulate Matter. (PM _{2.5})	µg/m ³	30	60	CPCB Manual Volume - 1
3.	Sulphur Dioxide	µg/m ³	23.7	80	IS - 5182, Part - 2
4.	Nitrogen Dioxide	µg/m ³	31.5	80	IS - 5182, Part - 6

Sampling Done By:

Achal
(Chemist)
(A-2-1)

Page No.: 1 of 1

Tested By:

Manish
(Chemist) / (Sr. Chemist)
(A-13-7)

Authorized By:

Manish
(Sr. Chemist)
(A-2-7)

UERL/AIR/F-05/02

**TEST REPORT
(STACK MONITORING)**

Test Report No.	UERL/16/03/S-HD001	Report Issue Date	30/03/2016
Service Request form No.	UERL/AIR/SRF/03/001	Service Request Date	26/03/2016
Sample ID No.	UERL/AIR/ID/S-16/03/001	Field Data Sheet No.	UERL/AIR/FDS/S-16/03/001
Name & Add. of Customer	M/s. Henl Drugs Pvt. Ltd. Plot No. 1901/1901A, Phansa Char Rasta, GIDC - Sarigam.		
Date of Sampling	26/03/2016	Date of Testing	26/03/2016
Stack Sampling Attached to	Thermopac		
Air Pollution Control Device	--		
Fuel Used	Natural Gas		

➤ **Details of Instrument Used for Monitoring**

Instrument Id No.	UERL/AIR/SMK/16		
Instrument Name	Stack Monitoring Kit, VSS1	Serial Number	814 DTI 10
Calibration Date	01/09/2015	Next Calibration Due On	31/08/2016

➤ **General Stack Monitoring Observation**

Sr. No.	Description	Unit of measurement	Observation
1.	Stack Height	m	30
2.	Stack Dia	mm	300
3.	Stack Area	m ²	0.0706
4.	Ambient Temperature	°C	33
5.	Flue Gas Temperature	°C	130
6.	Exit Gas Velocity	m/s	9.26
7.	Exit Gas Flow	m ³ /h	2353

➤ **Test Parameter Results**

Sr. No.	Test Parameter	Unit of measurement	Result	Specific Value	Test Method
1.	Particulate Matter	mg/Nm ³	14	<150	IS 11255(Part 1)
2.	Sulphur Dioxide	mg/Nm ³	Not Detected	<40	IS 11255(Part 2)
3.	Oxide of Nitrogen	mg/Nm ³	12	<25	IS 11255(Part 7)

Sampling Done By:

A. Patel
(Chemist)
(A.N.T.)

Page No.: 1 of 1

Tested By:

[Signature]
(Chemist) / (Sr. Chemist)
(A.N.T.)

Authorized By:

[Signature]
(Sr. Chemist)
(A.N.T.)

UERL/AIR/F-04/00

NOISE LEVEL MONITORING REPORT

Test Report No.:	16/03/N-HD001	Date Of Report:	30/03/2016
Name & Add. Of Industries	M/s. Heni Drugs Pvt. Ltd. Plot No. 1901/1901A, Phansa Char Rasta, GIDC – Sarigam.		

➤ Details of Instrument Used for Monitoring.

Instrument Id No.	Instrument Name	Model Number	Cali. Date	Next Call. Date
UERL/AIR/SLM/09B	Sound Level Meter	SL 4010	01/04/2015	31/03/2016

Date and Time of Monitoring : 26-03-2016 at 14:15 Hrs.

Result

Sr. No.	Location	Direction	Noise Level dB(A)	Permissible Limit CPCB
1.	Within Company Premises	East	54	<75 dB(A)
		West	57	<75 dB(A)
		South	61	<75 dB(A)
		North	55	<75 dB(A)

Note:

Checked By

Acatil

Authorized By

Stanley

Annexure- II

- Awarded TOR & its compliance status



HARDIK SHAH, IAS
SECRETARY

State Level Expert Appraisal Committee

STATE LEVEL EXPERT APPRAISAL
COMMITTEE, GUJARAT.

Office : Gujarat Pollution Control Board,
"Paryavaran Bhavan", Sector 10-A,
Gandhinagar-382010, GUJARAT

Phone : 079 -23232152,

Fax : 079 -23222784.

Email : ms-gpcb@gujarat.gov.in

Ref. No.: EIA-10-2015-7132-E. 9236

17 NOV 2015

R.P.A.D

To,
Mr. Kapil Girotra
Hani Drugs Pvt Ltd.
1302, A Wing,
Maple leaf Building,
Raheja Vihar,
Chandi Velly,
Pavai, Mumbai.

Sub: Environment Clearance under the EIA Notification 2006 for your proposed project at Plot No.1901/1901A, GiDC Sarigam, Umargam, Valsad.

Dear Sir,

This refers to your application on the subject mentioned above and the meeting held with the State Level Expert Appraisal Committee, Gujarat, on 09th September 2015. The relevant information furnished in Form I, Prefeasibility report and presentation made before the SEAC was considered and the Terms of Reference prescribed was communicated to you by the SEAC immediately after the said presentation. However, a copy of the same is attached herewith for further necessary action at your end. You may please furnish the desired information / documents to enable us to process the application further.

With regards,

Yours sincerely,

(Hardik Shah)

Secretary, State Level Expert Appraisal Committee

Encl : As above.

010

Project / Activity No.: 5(f)

- M/s: Hani Drugs Pvt. Ltd. (herein after Project Proponent – PP) has submitted application vide their letter dated 02/07/2015.

Project status: Expansion

Project / Activity Details:

This unit is engaged in manufacturing of Continuous Distillation of crude ethyl Ole ate and Metallic Salts and now proposed for expansion by adding new products like "Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils as tabulated below:

Sr. No.	Name of Products	Production Capacity (MT/Annum)		
		Existing	Proposed	Total
1	Continuous distillation	300	00.00	300.00
2	Metal salt	900	00.00	900.00
3	Esters	00.00	250.00	250.00
4	Organics Intermediates	00.00	45.00	45.00
5	Aromatic Metal Compounds	00.00	100.00	100.00
6	Extracts and Oils	00.00	20.00	20.00
Total		1200.00	415.00	1615.00

The project falls under Category B of project activity 5(f) as per the schedule of EIA Notification 2006.

Total plot area is 6700 sq. m & unit has proposed 2000 sq. m. area for the green belt development/Tree plantation. Expected project cost for proposed expansion will be 4.10 Crores. Total water consumption for project will be 33 KL /day [Existing 7 KL (2 KL for Domestic, 1 KL for Gardening, 1 KL for Process & Washing, 1 KL for Boiler and 2 KL for Cooling) and Total proposed water requirement will be 26 KL/Day (2 KL for Domestic, 1 KL for Gardening, 6 KL for Process & Washing, 9 KL for boiler and 8 KL for Cooling)]. Fresh water will be sourced from GIDC water supply. Total Industrial waste water generation will be 7.20 KL/Day [(Existing 1 KL (0.90 KL for Process & Washing, 0.05 KL for boiler and 0.05 KL for Cooling) and Total proposed 6.20 KL/Day (6.10 KL for Process & Washing, 0.05 KL for boiler and 0.05 KL for Cooling)], Which will be treated using adequate ETP then will be used for the plantation within the premises or will be disposed off through underground drainage to CETP, Sarigam. Domestic waste water (3.50 KL/day) will be disposed off through soak pit and septic tank. It is proposed to install one Boiler (2 TPH), D.G. Set (40 KVA) and one Thermo pack (1000 U). Natural Gas (30 SCM/hr) will be used as fuel in boiler. HSD (100 Lit/Month) will be used as fuel in D.G. Set. Total Hazardous waste generated from the manufacturing activity will be used oil (Existing 0.012 MT/Month and Proposed 100 Lit/Month), ETP waste (Existing 1.25 MT/Month and Proposed 5 MT/Month), Discarded containers/barrels/liners (Existing 0.04 MT/Month and

Proposed 0.50 MT/Month)), Saturated Carbon (Existing NIL and Proposed 5.5 MT/Month).

Observations / Discussion:

Technical presentation made during the meeting by project proponent. Committee concern about the use of Mercury metal as a raw material. Committee noted that the mercury is the extremely toxic and care must be taken during its storage and handling. At this, committee suggested to explore the possibility of substitute products and processes containing or using mercury with non-mercury (Mercury free) alternatives. While discussing about performance of the CETP, PP informed that the CETP is performing well at present and they have obtained permission to discharge the effluent. Committee asked to submit compliance report of CETP with analysis reports of final treated effluent. Committee suggested reuse/recycle of treated waste water at maximum extent and minimize the effluent discharge to the CETP. After detailed discussion, the following additional Terms of Reference were prescribed for the EIA study to be done covering 5 Km radial distance from the project boundary.

1. Need for the proposed expansion should be justified in detail.
2. Explore the possibility of substitute products and processes containing or using mercury with non-mercury (Mercury free) alternatives.
3. Ensure that the various regulations for use, storage and transportation of Mercury metal/Compounds will be complied in letter and spirit. Give legal undertaking in this regard.
4. Demarcation of proposed expansion activities in lay out of the existing premises.
5. Exact aerial distance from the CEPI area of Vapi and Inter state boundary from the project premises.
6. Exact details about additional infrastructural facilities, plant machineries etc. required for the proposed expansion.
7. Technical details of all the plants along with details of manufacturing process / operations of each product. Details on strategy for the implementation of cleaner production activities.
8. Chemical name of each product and raw materials along with chemical reactions of unit processes. Detailed manufacturing process of each product along with chemical reactions and mass balance (including reuse-recycle, if any).
9. Assessment of source of the water supply with adequacy of the same to meet with the requirements for the project expansion. Permission obtained for supply of increased quantity of raw water. Undertaking stating that no bore well shall be dug within the premises.
10. Water consumption and consumption of each raw material per MT of each product.
11. Water balance diagram (including reuse-recycle, if any) alongwith qualitative and quantitative analysis of the each waste stream to be generated. A detailed treat ability study vis-à-vis the adequacy and efficacy of the treatment facilities proposed for the wastewater to be generated. The characteristic on which treatability is based shall also be stated. Characteristics of untreated and treated wastewater.
12. Quality and quantity of waste water to be generated from the manufacturing process of each product to be manufactured along with mass balance.
13. Stream wise qualitative & quantitative analysis of each waste stream (including process water, cooling tower blow down, boiler blow down, washing effluent etc.) to be generated.

Characteristics of untreated and treated wastewater. A detailed effluent treat ability study vis-à-vis the adequacy and efficacy of the treatment facilities proposed for the wastewater to be generated. The characteristic on which treatability is based shall also be stated.

14. Detailed effluent treatment scheme and disposal method. Technical details of the proposed ETP, including size of each unit, retention time etc. including modifications / up gradation to be done in existing ETP to take care of increased effluent quantity along with its adequacy report.
15. Technical details of specific treatment for Mercury in effluent.
16. Details of CETP- Sarigam including (1) Total capacity of the CETP (2) Total booked capacity and actual load received at present (Qualitative and Quantitative) (3) CETP Up gradation scheme, if any (4) Last 2 years analysis reports of GPCB for Inlet and outlet of CETP (5) Spare capacity of CETP with treatability and feasibility report. (6) Recommendations and suggestions of the last two Environment Audit reports of CETP- Sarigam and its compliance report.
17. Plan for management and disposal of waste streams to be generated from spillage, leakages, occasional reactor washing, and exhausted media from Scrubber etc.
18. Explore the possibility of reuse / recycle and other cleaner production options for reduction of wastes. Details of methods to be adopted for the water conservation.
19. Undertaking stating that a separate electric meter will be provided for the ETP.
20. One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall should be incorporated.
21. Anticipated environmental impacts due to the proposed project/production may be evaluated for significance and based on corresponding likely impacts VECs (Valued Environmental Components) may be identified. Baseline studies may be conducted within the study area of 5 km for all the concerned/identified VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures.
22. One complete season base line ambient air quality data (except monsoon) to be given along with the dates of monitoring. The parameters to be covered shall be in accordance with the revised National Ambient Air Quality Standards as well as project specific parameters. Locations of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors. There should be at least one monitoring station in the upwind direction. There should be at least one monitoring station in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur.
23. Modelling indicating the likely impact on ambient air quality due to proposed activities. The details of model used and input parameters used for modelling should be provided. The air quality contours may be shown on location map clearly indicating the location of sensitive receptors, if any, and the habitation. The wind rose showing pre-dominant wind direction should also be indicated on the map. Impact due to vehicular movement shall also be included into the prediction using suitable model. Results of Air dispersion modelling should be superimposed on google map / geographical area map.
24. Base line status of the noise environment, impact of noise on present environment due to the project and proposed measures for noise reduction including engineering controls.
25. Specific details of (i) Process gas emission from each unit process with its quantification, (ii) Air pollution Control Measures proposed for process gas emission, (iii) Adequacy of the air pollution control measures for process gas emission measures to achieve the GPCB

- norms (iv) Details of the utilities required (v) Type and quantity of fuel to be used for each utility (vi) Flue gas emission rate emission from each utility (vii) Air Pollution Control Measures proposed to each of the utility along with its adequacy (viii) List the sources of fugitive emission along with its quantification and proposed measures to control it.
26. Name and quantity of each type of solvents to be used for proposed production. Details of solvent recovery system including mass balance, solvent loss, recovery efficiency feasibility of reusing the recovered solvents etc. for each type of solvent.
 27. Details on management of the by-products and spent acid to be generated along with copies of MOU / agreements done with actual consumers regarding utilization of by-products & spent acids shall be incorporated.
 28. Details of management of the hazardous wastes to be generated from the project stating detail of storage area for each type of waste, its handling, its utilization and disposal etc. How the manual handling of the hazardous wastes will be minimized.
 29. Methodology of de-contamination and disposal of discarded containers and its record keeping.
 30. Membership of Common Environmental Infrastructure including the TSDF / Common Hazardous Waste Incineration facility along with an assessment to accommodate the additional quantity of wastes to be generated. Explore the possibilities for co-processing of the Hazardous waste prior to disposal into TSDF/CHWIF.
 31. Data on air emissions, wastewater generation and solid / hazardous waste generation and management for the existing plant should also be incorporated.
 32. Details of measures proposed for the noise pollution abatement and its monitoring.
 33. A detailed EMP including the protection and mitigation measures for impact on human health and environment as well as detailed monitoring plan and environmental management cell proposed for implementation and monitoring of EMP. The EMP should also include the concept of waste-minimisation, recycle/reuse/recover techniques, energy conservation, and natural resource conservation. Total capital cost and recurring cost/annum earmarked for environment pollution control measures.
 34. Occupational health impacts on the workers and mitigation measures proposed to avoid the human health hazards along with the personal protective equipment to be provided to the workers. Provision of industrial hygienist and monitoring of the occupational injury to workers as well as impact on the workers. Plan for periodic medical check up of the workers exposed. Details of work place ambient air quality monitoring plan as per Gujarat Factories Rules.
 35. Details of hazardous characteristics and toxicity of raw materials and products to be handled and the control measures proposed to ensure safety and avoid the human health impact.
 36. Details of quantity of each hazardous chemical to be stored, material of construction of major hazardous chemical storage tanks, threshold storage quantity as per schedules of Manufacture, Storage & Import of Hazardous Chemicals Rules of major hazardous chemicals.
 37. Risk assessment including prediction of the worst-case scenario and maximum credible accident scenarios should be carried out. The worst-case scenario should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the map clearly showing which of the facilities and surrounding units would be affected in case of an accident taking place. Based on the same, proposed

- safeguard measures including On-Site / Off-Site Emergency Plan should be provided.
38. Permission from PESO, Nagpur for storage of solvents, other toxic chemicals, if any.
 39. Details of fire fighting system including provision for flame detectors, temperature actuated heat detectors with alarms, automatic sprinkler system, location of fire water tanks & capacity, separate power system for fire fighting, details of qualified and trained fire personnel & their job specifications, nearest fire station & time required to reach the proposed site. Submit line diagram of the fire hydrant network.
 40. Detailed five year greenbelt development program including annual budget, types & number of trees to be planted, area under green belt development [with map], budgetary outlay; along with commitment of the management to carry out the tree plantation activities outside the premises at appropriate places in the nearby areas and elsewhere.
 41. Proposal for socio-economic development activities including community welfare program most useful in the project area for the overall improvement of the environment.
 42. Copies of Consent to Establish, Consent to Operate orders obtained in past along with point wise compliance status of all the conditions stipulated therein.
 43. Copy of Environmental Clearance obtained for the existing project and a certified report of the status of compliance of the conditions stipulated in the environmental clearance for the existing operation of the project by the Regional Office of the MoEF.
 44. Records of any legal breach of Environmental laws i.e. details of show- cause notices, closure notices etc. served by the GPCB to the existing unit in last five years and actions taken then after for prevention of pollution.
 45. Details of fatal / non-fatal accidents, loss of life or man hours, if any, occurred in the existing unit in last three years and measures proposed to be taken for avoiding reoccurrence of such accidents in future.
 46. (a) 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. (b) 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.
 47. What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions. Details of this system may be given.
 48. Submit checklist in the form of Do's & Don'ts of preventive maintenance, strengthening of HSE, manufacturing utility staff for safety related measures.
 49. Does the company have a 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 should be detailed in the EIA Report.
 50. Compliance of the MoEF's OM dated 04/08/2009 and 05/10/2011 regarding compliance of TOR prescribed & factual correctness of the data submitted in the EIA report, the names of experts associated with / involved in the preparation of the EIA report and the ownership of the EIA report by the Project proponent.
 51. Certificate of accreditation issued by the NABET, QCI to the environmental consultant should be incorporated in the EIA Report.

The above mentioned project specific TORs/additional TORs and the model TORs available in the MoEF's sector specific EIA Manual for **Synthetic Organic Chemical** industry shall be considered as generic TORs for preparation of the EIA report in addition to all the relevant information as per the generic structure of EIA given in Appendix III in the EIA Notification, 2006. The project shall be appraised on receipt of the final EIA report.

ANNEXURE-II: POINT WISE TABULAR COMPLIANCE OF AWARDED TOR

The project authorities 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 report. All Synthetic Organic Chemicals Industry located inside the notified industrial area/estate are listed at S.N. 5(f) under category 'B' and appraised by State Expert Appraisal Committee.

M/s. Heni Drugs Pvt. Ltd. has proposed to expand their existing manufacturing unit at Plot No. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam, Tal. Umargam, Dist.-Valsad, Gujarat-396155 by addition of new products "**Esters, organic intermediates, Aromatic metal compounds, Extracts and Oils @ 415 MT/Year**" which are Synthetic Organic Chemicals. Total plot area is 6700.00 m². Total cost of the project is Rs. 420 Lacks. Darotha River (a tributary of Damanganga river) is flowing at a distance of 6.00 Km. D&NH wildlife sanctuary is located at a distance of 14 Km.

Following are the particulars of Awarded TOR Points & point wise compliance status with compliance note:

TOR No.	TOR Condition	Compliance Status
1	Need for the proposed expansion should be justified in detail.	Need for the proposed expansion has been described in EIA report of Chap-1, Section-1.4.1, page 1-4.
2	Explore the possibility of substitute products and processes containing or using mercury With non-mercury (Mercury free) alternatives.	Instead of immediate phasing out we would like to continue our mercury based products in our product profile with implantation of safety and hazard prevention measures for mercury. Further, we would like to inform you that the production of mercury product will be on campaign basis to minimize the use of mercury and production of mercury product. It is also noteworthy that gradually we are switching to non-mercury product in our product profile and by doing so we will be able to make our product profile mercury free with development of mercury free product profile. Please refer Annexure-XIV for justification regarding this TOR condition.
3	Ensure that the various regulations for use, storage and transportation of Mercury metal/Compounds will be complied in letter and spirit. Give legal undertaking in this regard.	Complied. Please refer Annexure-XIII for document related to the actions to comply with various regulations for use, storage and transportation of Mercury metal/Compounds. Legal undertaking is enclosed as Annexure-XI.

4	Demarcation of proposed expansion activities in lay out of the existing premises.	Complied Layout plan of the factory premises with showing demarcation of proposed expansion activity has been given in EIA Report under Chapter 2, fig.-2.3, Page no 2-8. and Annexure-XII(A).
5	Exact aerial distance from the CEPI area of Vapi and Interstate boundary from the project Premises.	<ul style="list-style-type: none"> • The Aerial distance form CEPI - Vapi @9.03 Km NE • Interstate boundary from the project premises <ol style="list-style-type: none"> 1. Dadra & Nagar Haveli – 7.35 Km E 2. Daman – 9.25 km N
6	Exact details about additional infrastructural facilities, plant machineries etc. required for the proposed expansion.	Complied The Detail about additional infrastructural facilities, plant machineries has been given in EIA report under Chap.-2, section-2.2, Page- 2-7 to 2-19.
7	Technical details of all the plants along with details of manufacturing process/operations Of each product. Details on strategy for the implementation of cleaner production activities.	Complied <ul style="list-style-type: none"> • Technical details of all plants including machinery and equipments has been given in EIA Report under Chap.-2, Section- 2.2.4, Page- 2-10. • The details of manufacturing process / operations of each product have been given in EIA Report under Chap.-2, Section- 2.3.2, Page- 2-14 to 2-22.
8	Chemical name of each product and raw materials along with chemical reactions of unit Processes. Detailed manufacturing process of each product along with chemical reactions and mass balance (including reuse-recycle, if any).	Complied <ul style="list-style-type: none"> • Chemical name of each product has been given in Chap.-2, Section - 2.1.1, Table-2.2, Page- 2-3 and Chemical name of Raw materials has been given EIA report under Chap.-2, Section - 2.3.1, Page- 2-12. • Detailed manufacturing process of each product along with chemical reactions and mass balance has been given in EIA report under Chap.-2, Section - 2.3.2, Page- 2-14 to 2-22.
9	Assessment of source of the water supply with adequacy of the same to meet with the requirements for the project expansion. Permission obtained for supply of increased quantity of raw water. Undertaking stating that no bore well shall be dug within the premises.	Complied <ul style="list-style-type: none"> • Source of the water supply- GIDC Sarigam. • Adequacy of the water consumption to meet with the requirements for the project expansion has been given in EIA report under Chap.-2, section-2.2.2, Page-2-9. • Undertaking stating that no bore well shall be dug within the premises is enclosed as Annexure-XI.

10	Water consumption and consumption of each raw material per MT of each product.	Complied Water consumption and consumption of each raw material per MT of each product have been given in EIA report under chap.-2, Section 2.2.2, page- 2-9 & Section - 2.3.2., page- 2.14.
11	Water balance diagram (including reuse-recycle, if any) along with qualitative and quantitative analysis of the each waste stream to be generated. A detailed treat ability study vis-à-vis the adequacy and efficacy of the treatment facilities proposed for the wastewater to be generated. The characteristic on which treatability is based shall also be stated. Characteristics of untreated and treated wastewater.	Complied <ul style="list-style-type: none"> • Water balance diagram has been given in EIA report under chap.-2, Section -2.4.2, fig. - 2.4, page- 2-23. • Qualitative and quantitative analysis of the each waste stream to be generated have been given in Adequacy & treatability report as Annexure- VIII of EIA report. • A detailed treat ability study vis-à-vis the adequacy and efficacy of the treatment facilities proposed for the wastewater to be generated have been given in Adequacy & treatability report as Annexure- VIII of EIA report. • Characteristics of untreated and treated wastewater have been given in Adequacy & treatability report as Annexure- VIII of EIA report.
12	Quality and quantity of waste water to be generated from the manufacturing process of each product to be manufactured along with mass balance.	Complied The Quality and quantity of waste water to be generated from the manufacturing process of each product to be manufactured along with mass balance have been given in Adequacy and treatability report as Annexure-VIII of EIA report.
13	Stream wise qualitative & quantitative analysis of each waste stream (including process water, cooling tower blow down, boiler blow down, washing effluent etc.) to be generated. Characteristics of untreated and treated wastewater. A detailed effluent treat ability study vis-à-vis the adequacy and efficacy of the treatment facilities proposed for the wastewater to be generated. The characteristic on which treatability is based shall also be stated.	Complied The detail of Stream wise qualitative & quantitative analysis of each waste stream (including process water, cooling tower blow down, boiler blow down, washing effluent etc.) generation and Characteristics of untreated and treated wastewater have been given in treatability report as Annexure- VIII of EIA report.

14	Detailed effluent treatment scheme and disposal method. Technical details of the proposed ETP, including size of each unit, retention time etc. including modifications / upgradation to be done in existing ETP to take care of increased effluent quantity along with its adequacy report.	Complied The Detailed effluent treatment scheme and disposal method. Technical details of the proposed ETP, including size of each unit, retention time etc. including modifications / up gradation to be done in existing ETP to take care of increased effluent quantity along with its adequacy report have been given in Adequacy and treatability report as Annexure-VIII of EIA report.
15	Technical details of specific treatment for Mercury in effluent.	The Technical details of specific treatment for Mercury in effluent are given in Adequacy and treatability report as Annexure-VIII of EIA report.
16	Details of CETP- Sarigam including (1) Total capacity of the CETP (2) Total booked capacity and actual load received at present (Qualitative and Quantitative) (3) CETP Up gradation scheme, if any (4) Last 2 years analysis reports of GPCB for Inlet and outlet of CETP (5) Spare capacity of CETP with treatability and feasibility report. (6) Recommendations and suggestions of the last two Environment Audit reports of CETP Sarigam and its compliance report.	We have made an application to CETP, Sarigam regarding (1) Total capacity of the CETP (2) Total booked capacity and actual load received at present (Qualitative and Quantitative) (3) CETP Up gradation scheme, if any (4) Last 2 years analysis reports of GPCB for Inlet and outlet of CETP (5) Spare capacity of CETP with treatability and feasibility report. (6) Recommendations and suggestions of the last two Environment Audit reports of CETP Sarigam and its compliance report. Please refer Annexure-XII (F) for The acknowledged copy of the application made and details of CETP performance. The CETP membership letter received has been enclosed as Annexure-XII(C).
17	Plan for management and disposal of waste streams to be generated from spillage, leakages, occasional reactor washing, and exhausted media from Scrubber etc.	The plan for management and disposal of waste streams to be generated from spillage, leakages, occasional reactor washing has been described in EIA report under chap-10, section 10.4.2., page 10-10.
18	Explore the possibility of reuse/recycle and other cleaner production options for reduction of wastes. Details of methods to be adopted for the water conservation.	Compiled. The Detail of reuse/recycle for reduction of wastes has been described in EIA report under chap-10, section 10.4.13., page 10-30.
19	Undertaking stating that a separate electric meter will be provided for the ETP.	Undertaking stating that, a separate electric meter will be provided for the ETP is enclosed as Annexure-XI.
20	One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall should be incorporated.	One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall have been given in EIA report under chap.3 of Section 3.

21	Anticipated environmental impacts due to the proposed project/production may be evaluated for significance and based on corresponding likely impacts VECs (Valued Environmental Components) may be identified. Baseline studies may be conducted within the study area of 5 km for all the concerned/identified VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures.	Complied The details of Anticipated environmental impacts due to the proposed project/production within the study area of 5 km and its mitigations have been explained in EIA Report under Chapter 4 of EIA report. Baseline studies has been conducted within the study area of 5 km for all the concerned/identified VECs and details of the study has been described in chapter 3 of EIA report.
22	One complete season base line ambient air quality data (except monsoon) to be given along with the dates of monitoring. The parameters to be covered shall be in accordance with the revised National Ambient Air Quality Standards as well as project specific parameters. Locations of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors. There should be at least one monitoring station in the upwind direction. There should be at least one monitoring station in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur.	Complied The details of One season base line ambient air quality monitoring at 6 locations has been explained in EIA Report under Chapter 3, Section 3.2.4, Page no. 3- 25.
23	Modelling indicating the likely impact on ambient air quality due to proposed activities. The details of model used and input parameters used for modelling should be provided. The air quality contours may be shown on location map clearly indicating the location of sensitive receptors, if any, and the habitation. The wind rose showing pre dominant wind direction should also be indicated on the map. Impact due to vehicular movement shall also be included into the prediction using suitable model. Results of Air dispersion modelling should be superimposed on google map / geographical area map.	Complied Modeling indicating the impact on ambient air quality due to proposed activities and air quality contour map clearly indicating the location of sensitive have been described in EIA Report under Chapter 4, Section 4.3.1, Page no. 4-09.

24	Base line status of the noise environment, impact of noise on present environment due to the project and proposed measures for noise reduction including engineering controls.	Complied Baseline status of noise environment has been presented in EIA Report under Chapter 3, Section 3.2.5, Page no.3-26. and Impact of noise on present environment due to the project and proposed measures for noise reduction including engineering controls have been presented in EIA Report under Chapter 4, Section 4.3.6 Page no.4-26.
25	Specific details of (i) Process gas emission from each unit process with its quantification, (ii) Air pollution Control Measures proposed for process gas emission, (iii) Adequacy of the air pollution control measures for process gas emission measures to achieve the GPCB norms (iv) Details of the utilities required (v) Type and quantity of fuel to be used for each utility (vi) Flue gas emission rate emission from each utility (vii) Air Pollution Control Measures proposed to each of the utility along with its adequacy (viii) List the sources of fugitive emission along with its quantification and proposed measures to control it.	Details of process emission its control, Measures and efficiency of control measures is provided in EIA Report under Chapter 2, Section 2.4.1, Page no.2-22. Details of the utilities have been described in EIA Report under Chapter 2, Section 2.4.1, Page no.22-25. There is no considerable source of fugitive emission.
26	Name and quantity of each type of solvents to be used for proposed production. Details of solvent recovery system including mass balance, solvent loss, recovery efficiency feasibility of reusing the recovered solvents etc. for each type of solvent.	All solvents are utilized in the finished product preparation. Hence issue of solvent recovery is not anticipated.
27	Details on management of the by-products and spent acid to be generated along with copies of MOU/agreements done with actual consumers regarding utilization of byproducts & spent acids shall be incorporated.	There are no any kind of by-products and spent acid generation during manufacturing of existing and proposed product. Hence this condition is not applicable.

28	Details of management of the hazardous wastes to be generated from the project stating detail of storage area for each type of waste, its handling, its utilization and disposal etc. How the manual handling of the hazardous wastes will be minimized.	Details on management of the hazardous wastes to be generated from the project stating, storage area for each type of waste, its handling, its utilization and disposal have been described in EIA Report under Chapter 2, Section 2.4.3, Page no.2-24. and Environment management plan for handling of the hazardous wastes, minimization, Methodology of de-contamination and disposal of discarded containers and its record keeping have been described in EIA Report under Chapter 10, Section 10.4.7, Page no.10-17.
29	Methodology of de-contamination and disposal of discarded containers and its record keeping.	Complied The Methodology of de-contamination and disposal of discarded containers and its record keeping are given in EIA Report under Chapter 10, Section 10.4.7, Page no.10-17.
30	Membership of Common Environmental Infrastructure including the TSDF / Common Hazardous Waste Incineration facility along with an assessment to accommodate the additional quantity of wastes to be generated. Explore the possibilities for co-processing of the Hazardous waste prior to disposal into TSDF/CHWIF.	Complied The unit has got the provisional membership of CETP, Sarigam and TSDF (Saurashtra Enviro Projects Pvt. Ltd., Kutch for Integrated Common Hazardous Waste Management Facility). The copy of membership letter is enclosed as Annexure-XII (C) & (E).
31	Data on air emissions, wastewater generation and solid / hazardous waste generation and management for the existing plant should also be incorporated.	Complied The detail of The detail of air emissions, wastewater generation and solid / hazardous waste generation and management for the existing plant has been described in EIA report under Chap-2, section 2.4.1 to 2.4.3, page no.-2-22 to 24.
32	Details of measures proposed for the noise pollution abatement and its monitoring.	Complied The details of measures proposed for the noise pollution abatement and its monitoring has been described in EIA report under Chapter 10, Section 10.4.6, Page no.10-16.

33	A detailed EMP including the protection and mitigation measures for impact on human health and environment as well as detailed monitoring plan and environmental management cell proposed for implementation and monitoring of EMP. The EMP should also include the concept of waste-minimization, recycle/reuse/recover techniques, energy conservation, and natural resource conservation. Total capital cost and recurring cost/ annum earmarked for environment pollution control measures.	<p>Complied</p> <p>The detailed EMP has been described in EIA Report under Chapter 10.</p> <p>The details of energy conservation, waste minimization & reuse/recycle, resource recovery & reuse/recycling etc. have been described as Cleaner Production Measures in EIA Report under Chapter 10, Section 10.1, Page No.10-01</p> <p>Detailed monitoring plan and Total capital cost and recurring cost/Year earmarked for environment pollution control measures have been given in Chapter 10 Section 10.2, Page no 10-5.</p>
34	Occupational health impacts on the workers and mitigation measures proposed to avoid the human health hazards along with the personal protective equipment to be provided to the workers. Provision of industrial hygienist and monitoring of the occupational injury to workers as well as impact on the workers. Plan for periodic medical checkup of the workers exposed. Details of work place ambient air quality monitoring plan as per Gujarat Factories Rules.	<p>Complied</p> <p>Details of Occupational health impacts on the workers and mitigation measures proposed to avoid the human health hazards along with the personal protective equipment to be provided is described in EIA report, Chapter 4, Section 4.3.8, Page No. 4.29 and Chapter 10, Section 10.1, page no.10.1.</p> <p>Some employees working in the storage and production area are suspected to be exposed to some toxic/hazardous chemicals. Considering the probability of the exposure to the hazardous chemicals a separate document of "Safety measures for Hazardous Chemicals" is prepared as a part of RA report which has been Described in Annexure-VI of EIA report.</p>
35	Details of hazardous characteristics and toxicity of raw materials and products to be handled and the control measures proposed to ensure safety and avoid the human health impact.	<p>The Details of hazardous characteristics and toxicity of raw materials and products to be handled are given in EIA report under Chap. 2 of Table 2.10, page no.2-14. And</p> <p>The control measures proposed to ensure safety and avoid the human health impact has described in Chemical Safety plan report which has been present as Annexure-VII of RA report.</p>

36	Details of quantity of each hazardous chemical to be stored, material of construction of major hazardous chemical storage tanks, threshold storage quantity as per schedules of Manufacture, Storage & Import of Hazardous Chemicals Rules of major hazardous chemicals.	Complied The details of quantity of each hazardous chemical to be stored, material of construction of major hazardous chemical storage tanks, threshold storage quantity as per schedules of Manufacture, Storage & Import of Hazardous Chemicals Rules of major hazardous chemicals are given in Table 7.1, of chap.7 in EIA report, page no.-7-2.
37	Risk assessment including prediction of the worst-case scenario and maximum credible accident scenarios should be carried out. The worst-case scenario should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the map clearly showing which of the facilities and surrounding units would be affected in case of an accident taking place. Based on the same, proposed safeguard measures including On-Site/Off-Site Emergency Plan should be provided.	Complied. The Risk Assessment report which has been present EIA report, Chapter-7. And Proposed safeguard measures including On-Site/Off-Site Emergency Plan is given in DMP report which has been enclosed as Annexure- VI of EIA report.
38	Permission from PESO, Nagpur for storage of solvents, other toxic chemicals, if any.	PESO act and rules is not applicable to the materials of project, hence Permission from PESO is not required.
39	Details of fire fighting system including provision for flame detectors, temperature actuated heat detectors with alarms, automatic sprinkler system, location of fire water tanks & capacity, separate power system for fire fighting, details of qualified and trained fire personnel & their job specifications, nearest fire station & time required to reach the proposed site. Submit line diagram of the fire hydrant network.	Complied. The detail of firefighting system including provision for flame detectors, temperature actuated heat detectors with alarms, automatic sprinkler system, location of fire water tanks & capacity, separate power system for firefighting are given in Section 2(c), page no.3 of DMP report, which has been enclosed as Annexure- VI of EIA report. The details of qualified and trained fire personnel & their job specifications, nearest fire station & time required to reach the proposed site are given in Section 2(c), page no. 4 to 6 of DMP report, which has been enclosed as Annexure- VI of EIA report.

40	Detailed five year greenbelt development program including annual budget, types & number of trees to be planted, area under green belt development [with map], budgetary outlay; along with commitment of the management to carry out the tree plantation activities outside the premises at appropriate places in the nearby areas and elsewhere.	The details of greenbelt development have been described in EIA Report under Chapter 10, Section 10.4.11, Page no.10.25.
41	Proposal for socio-economic development activities including community welfare program most useful in the project area for the overall improvement of the environment.	Complied The details of socioeconomic development activities have been described in EIA Report under Chapter 11, Section 11.7, Page no 11-13. Details of CSR Activity year wise plan enclosed as Annexure- IX.
42	Copies of Consent to Establish, Consent to Operate orders obtained in past along with point wise compliance status of all the conditions stipulated therein.	Complied. The Copies of Consent to Establish, Consent to Operate of existing unit with its compliance are enclosed as Annexure-I of EIA report.
43	Copy of Environmental Clearance obtained for the existing project and a certified report of the status of compliance of the conditions stipulated in the environmental clearance for the existing operation of the project by the Regional Office of the MoEF.	The Existing product of proposed expansion project are inorganic products with only mixing and blending, As per EIA notification 2006, as amended Environmental Clearance was not obtained for existing product. Hence, this condition is not applicable
44	Records of any legal breach of Environmental laws i.e. details of show-cause notices, closure notices etc. served by the GPCB to the existing unit in last five years and actions taken then after for prevention of pollution.	Closure notice along with reply regarding violation of water Act under 1974 and Revocation letter is enclosed as Annexure-X
45	Details of fatal / non-fatal accidents, loss of life or man hours, if any, occurred in the existing unit in last three years and measures proposed to be taken for avoiding reoccurrence of such accidents in future.	There is no any kind of fatal / non-fatal accidents, loss of life or man hours occurs in existing unit last three years.

46	(a) 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. (b) 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.	The company has laid down "Environmental Policy" as described in EIA Report under Chapter 10, Section 10.3.1, Page no. 10-6.
47	What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions. Details of this system may be given.	Complied The details the hierarchical system have been described in EIA Report under Chapter 10, Section 10.3.2, Page no. 10-7
48	Submit checklist in the form of Do's & Don'ts of preventive maintenance, strengthening of HSE, manufacturing utility staff for safety related measures.	Complied checklist in the form of Do's & Don'ts of preventive maintenance, strengthening of HSE, manufacturing utility staff for safety related measures have been described in EIA Report under Chapter 7, Section 7.3.4.,Page No.7-22
49	Does the company have a 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 should be detailed in the EIA Report.	Yes,the company will developed 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.and This reporting mechanism has been documented in EIA Report under Chapter 10, Section 10.3.2, Page no. 10-7
50	Compliance of the MoEF's OM dated 04/08/2009 and 05/10/2011 regarding compliance of TOR prescribed & factual correctness of the data submitted in the EIA report, the names of experts associated with / involved in the preparation of the EIA report and the ownership of the EIA report by the Project proponent.	Complied. The compliance of the MoEF's OM dated 04/08/2009 and 05/10/2011 regarding compliance of TOR prescribed & factual correctness of the data submitted in the EIA report- regarding the under taking given by the EIA consultant and Project proponent with signed has been incorporate after cover page in EIA report .
51	Certificate of accreditation issued by the NABET, QCI to the environmental consultant should be incorporated in the EIA Report.	Complied. The copy of Certificate of accreditation issued by the NABET, QCI to the environmental consultant are incorporate in chap.12 of EIA report.

Annexure- III

➤ Micro meteorological Data

Micrometeorological Data

TEMPERATURE (°C)

Month	Maximum	Minimum	Average
November - 2015	37.10	23.00	28.51
December - 2015	30.50	24.60	
January- 2016	34.00	21.10	

RELATIVE HUMIDITY (%)

Month	Maximum	Minimum	Average
November - 2015	87.00	19.00	56.49
December - 2015	61.00	53.10	
January- 2016	85.00	16.90	

WIND SPEED (m/s)

Month	Maximum	Minimum	Average
November - 2015	6.05	0.35	2.92
December - 2015	4.25	3.05	
January- 2016	4.74	0.35	

URBAN MIXING HEIGHT (m)

Month	Maximum	Minimum	Average
November - 2015	2008.00	3.00	736.12
December - 2015	1115.00	42.00	
January- 2016	1115.00	48.00	

Micrometeorological Data

FREQUENCY COUNT

Date	1/03/2015	31/05/2015	Time	0.00	23.00		
Organization	M/s. Unistar Environment and Research Labs Pvt. Ltd.						
Location	G.I.D.C. Vapi.						
Calm	2.58%		Total Samples	2208			
Directions	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	Total
NNE	138	181	203	3	0	0	525
ENE	200	233	168	1	0	0	602
ESE	186	187	101	0	0	0	474
SSE	54	94	53	2	0	0	203
SSW	20	15	12	1	0	0	48
WSW	21	16	12	0	0	0	49
WNW	32	26	16	0	0	0	74
NNW	22	49	84	0	0	0	155

FREQUENCY DISTRIBUTION

Date	1/03/2015	31/05/2015	Time	0.00	23.00		
Organization	M/s. Unistar Environment and Research Labs Pvt. Ltd.						
Location	G.I.D.C. Vapi.						
Calm	2.58%		Total Samples	2208			

Directions	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	Total
NNE	0.06884	0.08469	0.09239	0.00136	0	0	0.24728
ENE	0.09058	0.10553	0.07609	0.00045	0	0	0.27264
ESE	0.08424	0.08469	0.04574	0	0	0	0.21467
SSE	0.02446	0.04257	0.024	0.00091	0	0	0.09194
SSW	0.00906	0.00679	0.00543	0.00045	0	0	0.02174
WSW	0.00951	0.00725	0.00543	0	0	0	0.02219
WNW	0.01449	0.01178	0.00725	0	0	0	0.03351
NNW	0.00996	0.02219	0.03804	0	0	0	0.0702

Annexure- IV

- Output of Dispersion Modeling Results

PM10- Dispersion Modeling Results

Discrete Receptor ID	X	Y	Concentration [ug/m ³]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Aver. Period (AVE)	Source Group (GRP)	Rank	Net ID	Date
	265607.68	2236479.86	0.00308	0	0	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	266607.68	2236479.86	0.00495	3.4	3.4	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	267607.68	2236479.86	0.00427	4.8	4.8	0	24-HR	ALL	1ST	UCART1	1/26/2016 24 hr
	268607.68	2236479.86	0.00771	7.3	7.3	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	269607.68	2236479.86	0.00474	10.6	10.6	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	270607.68	2236479.86	0.00559	15	15	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2236479.86	0.00591	18.1	18.1	0	24-HR	ALL	1ST	UCART1	12/26/2015 24 hr
	272607.68	2236479.86	0.00661	12	12	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	273607.68	2236479.86	0.00906	14.1	14.1	0	24-HR	ALL	1ST	UCART1	1/21/2016 24 hr
	274607.68	2236479.86	0.01298	25.4	25.4	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2236479.86	0.01595	29.2	29.2	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2236479.86	0.01147	50.1	50.1	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277607.68	2236479.86	0.01049	72.3	83	0	24-HR	ALL	1ST	UCART1	1/6/2016 24 hr
	278607.68	2236479.86	0.00506	60.6	60.6	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	279607.68	2236479.86	0.00317	43.4	43.4	0	24-HR	ALL	1ST	UCART1	12/8/2015 24 hr
	280607.68	2236479.86	0.00587	36.6	36.6	0	24-HR	ALL	1ST	UCART1	12/9/2015 24 hr
	281607.68	2236479.86	0.00131	27.8	27.8	0	24-HR	ALL	1ST	UCART1	11/5/2015 24 hr
	282607.68	2236479.86	0.0018	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/3/2015 24 hr
	283607.68	2236479.86	0.00202	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	284607.68	2236479.86	0.00327	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	285607.68	2236479.86	0.00124	38	38	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	265607.68	2237479.86	0.00519	3.6	3.6	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	266607.68	2237479.86	0.00353	3	3	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	267607.68	2237479.86	0.00617	5.1	5.1	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	268607.68	2237479.86	0.00515	9.2	9.2	0	24-HR	ALL	1ST	UCART1	12/28/2015 24 hr
	269607.68	2237479.86	0.00686	14.7	14.7	0	24-HR	ALL	1ST	UCART1	12/29/2015 24 hr
	270607.68	2237479.86	0.0064	14.1	14.1	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2237479.86	0.00445	16.4	16.4	0	24-HR	ALL	1ST	UCART1	12/31/2015 24 hr
	272607.68	2237479.86	0.00723	24	24	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	273607.68	2237479.86	0.00783	19.2	19.2	0	24-HR	ALL	1ST	UCART1	1/21/2016 24 hr
	274607.68	2237479.86	0.01404	21	21	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2237479.86	0.0166	23.2	23.2	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2237479.86	0.00868	34.6	34.6	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277607.68	2237479.86	0.00549	53.1	53.1	0	24-HR	ALL	1ST	UCART1	1/6/2016 24 hr
	278607.68	2237479.86	0.00336	48.1	48.1	0	24-HR	ALL	1ST	UCART1	12/13/2015 24 hr
	279607.68	2237479.86	0.00301	65.3	65.3	0	24-HR	ALL	1ST	UCART1	11/8/2015 24 hr
	280607.68	2237479.86	0.00398	39.8	39.8	0	24-HR	ALL	1ST	UCART1	12/8/2015 24 hr
	281607.68	2237479.86	0.00137	34	34	0	24-HR	ALL	1ST	UCART1	12/3/2015 24 hr
	282607.68	2237479.86	0.00219	29.8	29.8	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	283607.68	2237479.86	0.00359	29	29	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	284607.68	2237479.86	0.00147	32.2	32.2	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	285607.68	2237479.86	0.00406	38.2	38.2	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	265607.68	2238479.86	0.00807	3.8	3.8	0	24-HR	ALL	1ST	UCART1	1/15/2016 24 hr
	266607.68	2238479.86	0.00601	3.8	3.8	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	267607.68	2238479.86	0.00409	4.2	4.2	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	268607.68	2238479.86	0.00699	7	7	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	269607.68	2238479.86	0.00666	8.3	8.3	0	24-HR	ALL	1ST	UCART1	12/28/2015 24 hr
	270607.68	2238479.86	0.00589	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2238479.86	0.00645	24.7	24.7	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	272607.68	2238479.86	0.00745	28.2	28.2	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	273607.68	2238479.86	0.00914	17.6	17.6	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	274607.68	2238479.86	0.01452	22.3	22.3	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2238479.86	0.01711	24.5	24.5	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2238479.86	0.00668	35.7	35.7	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	277607.68	2238479.86	0.00591	54	54	0	24-HR	ALL	1ST	UCART1	12/17/2015 24 hr
	278607.68	2238479.86	0.00453	42.6	42.6	0	24-HR	ALL	1ST	UCART1	12/25/2015 24 hr

PM10- Dispersion Modeling Results

279607.68	2238479.86	0.00714	51	51	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
280607.68	2238479.86	0.00289	66.2	73	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
281607.68	2238479.86	0.00314	40.8	87	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
282607.68	2238479.86	0.00417	29.8	29.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283607.68	2238479.86	0.00192	29.7	29.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
284607.68	2238479.86	0.00329	34.1	34.1	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
285607.68	2238479.86	0.00434	36.4	36.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265607.68	2239479.86	0.00661	15	15	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
266607.68	2239479.86	0.00862	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
267607.68	2239479.86	0.00687	11.6	11.6	0	24-HR	ALL	1ST	UCART1	1/5/2016	24 hr
268607.68	2239479.86	0.00481	15.2	15.2	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
269607.68	2239479.86	0.00725	11	11	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
270607.68	2239479.86	0.01071	14.3	14.3	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
271607.68	2239479.86	0.0099	33.8	33.8	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
272607.68	2239479.86	0.00699	32.3	32.3	0	24-HR	ALL	1ST	UCART1	12/26/2015	24 hr
273607.68	2239479.86	0.00979	26.9	26.9	0	24-HR	ALL	1ST	UCART1	1/5/2016	24 hr
274607.68	2239479.86	0.01389	22.3	22.3	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
275607.68	2239479.86	0.01715	26.4	26.4	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2239479.86	0.00517	31.8	31.8	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
277607.68	2239479.86	0.00537	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
278607.68	2239479.86	0.00418	59.3	70	0	24-HR	ALL	1ST	UCART1	11/8/2015	24 hr
279607.68	2239479.86	0.00364	48.7	48.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2239479.86	0.00375	51.8	94	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
281607.68	2239479.86	0.00497	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2239479.86	0.00256	25.8	25.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
283607.68	2239479.86	0.00216	28.1	28.1	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
284607.68	2239479.86	0.0045	31.2	31.2	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
285607.68	2239479.86	0.00667	35.9	35.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265607.68	2240479.86	0.00894	13.9	13.9	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
266607.68	2240479.86	0.00691	16.3	16.3	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
267607.68	2240479.86	0.00927	16	16	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
268607.68	2240479.86	0.00868	31.2	31.2	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
269607.68	2240479.86	0.00612	17.4	17.4	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
270607.68	2240479.86	0.00712	12.2	12.2	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
271607.68	2240479.86	0.01299	38.3	38.3	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
272607.68	2240479.86	0.00775	32.7	32.7	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
273607.68	2240479.86	0.00856	25.7	25.7	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
274607.68	2240479.86	0.01164	21.2	21.2	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
275607.68	2240479.86	0.01633	23.8	23.8	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2240479.86	0.0054	28.9	28.9	0	24-HR	ALL	1ST	UCART1	12/10/2015	24 hr
277607.68	2240479.86	0.00484	43.5	69	0	24-HR	ALL	1ST	UCART1	12/18/2015	24 hr
278607.68	2240479.86	0.00634	47.9	47.9	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
279607.68	2240479.86	0.00296	55.9	55.9	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
280607.68	2240479.86	0.00677	38.1	38.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2240479.86	0.00382	29.7	29.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
282607.68	2240479.86	0.0038	33	33	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
283607.68	2240479.86	0.006	30.9	30.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
284607.68	2240479.86	0.0092	32.5	32.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285607.68	2240479.86	0.00633	36.1	36.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265607.68	2241479.86	0.00521	5.4	5.4	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
266607.68	2241479.86	0.01143	11.8	11.8	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267607.68	2241479.86	0.00972	16.6	16.6	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
268607.68	2241479.86	0.01156	26.4	93	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
269607.68	2241479.86	0.00924	26.3	93	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
270607.68	2241479.86	0.0082	24.7	24.7	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
271607.68	2241479.86	0.01085	24.3	24.3	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
272607.68	2241479.86	0.01341	65.9	105	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
273607.68	2241479.86	0.01134	33.8	33.8	0	24-HR	ALL	1ST	UCART1	12/22/2015	24 hr
274607.68	2241479.86	0.01643	25.4	25.4	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr

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275607.68	2241479.86	0.01425	27.1	27.1	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2241479.86	0.00679	26.6	26.6	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
277607.68	2241479.86	0.00591	33.3	33.3	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
278607.68	2241479.86	0.00157	44.2	44.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
279607.68	2241479.86	0.00744	41.9	41.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2241479.86	0.0061	34.6	34.6	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
281607.68	2241479.86	0.00542	28.4	28.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
282607.68	2241479.86	0.00744	28.7	28.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
283607.68	2241479.86	0.0107	32.5	32.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2241479.86	0.00721	38	38	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
285607.68	2241479.86	0.00831	32.9	32.9	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265607.68	2242479.86	0.00695	5.6	5.6	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
266607.68	2242479.86	0.00507	10.6	10.6	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
267607.68	2242479.86	0.00625	11.9	11.9	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
268607.68	2242479.86	0.01261	19.1	19.1	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
269607.68	2242479.86	0.00888	25.5	25.5	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
270607.68	2242479.86	0.0096	29.4	29.4	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
271607.68	2242479.86	0.0108	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
272607.68	2242479.86	0.01785	44.1	44.1	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
273607.68	2242479.86	0.0096	29.1	29.1	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
274607.68	2242479.86	0.0171	23.6	23.6	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
275607.68	2242479.86	0.01242	24.3	24.3	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
276607.68	2242479.86	0.00623	31.4	31.4	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
277607.68	2242479.86	0.0076	35.2	35.2	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
278607.68	2242479.86	0.00777	37.8	37.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279607.68	2242479.86	0.00977	41	41	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
280607.68	2242479.86	0.00744	28.8	28.8	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
281607.68	2242479.86	0.01351	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
282607.68	2242479.86	0.00665	31.3	31.3	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
283607.68	2242479.86	0.00856	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2242479.86	0.00138	32.9	32.9	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
285607.68	2242479.86	0.00171	39.2	39.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2243479.86	0.00903	7.4	7.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
266607.68	2243479.86	0.00861	12.6	12.6	0	24-HR	ALL	1ST	UCART1	1/25/2016	24 hr
267607.68	2243479.86	0.0076	18.1	18.1	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
268607.68	2243479.86	0.00608	16.4	16.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
269607.68	2243479.86	0.00964	22.7	22.7	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
270607.68	2243479.86	0.0117	30.3	30.3	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
271607.68	2243479.86	0.03557	50.3	160	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
272607.68	2243479.86	0.01573	46.1	160	0	24-HR	ALL	1ST	UCART1	1/16/2016	24 hr
273607.68	2243479.86	0.01758	32.3	32.3	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
274607.68	2243479.86	0.01379	33.4	33.4	0	24-HR	ALL	1ST	UCART1	11/18/2015	24 hr
275607.68	2243479.86	0.00877	23	23	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
276607.68	2243479.86	0.01021	39.7	39.7	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
277607.68	2243479.86	0.0083	45.4	72	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
278607.68	2243479.86	0.01173	44.6	145	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
279607.68	2243479.86	0.00994	29.6	29.6	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
280607.68	2243479.86	0.00978	31.8	31.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
281607.68	2243479.86	0.00966	29.4	29.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
282607.68	2243479.86	0.00152	30.1	30.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2243479.86	0.00388	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2243479.86	0.00323	35.1	35.1	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
285607.68	2243479.86	0.00495	37.6	37.6	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
265607.68	2244479.86	0.00747	9.4	9.4	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
266607.68	2244479.86	0.01111	13.9	13.9	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267607.68	2244479.86	0.0078	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
268607.68	2244479.86	0.00966	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
269607.68	2244479.86	0.01191	21.2	21.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
270607.68	2244479.86	0.01037	35.7	133	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr

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	271607.68	2244479.86	0.04997	56.1	160	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
	272607.68	2244479.86	0.08062	76.6	160	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
	273607.68	2244479.86	0.02125	36.5	36.5	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
	274607.68	2244479.86	0.02107	31.1	31.1	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
	275607.68	2244479.86	0.01385	33	33	0	24-HR	ALL	1ST	UCART1	11/17/2015	24 hr
	276607.68	2244479.86	0.00606	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
	277607.68	2244479.86	0.00736	46.1	145	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	278607.68	2244479.86	0.0014	121.9	139	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	279607.68	2244479.86	0.00951	32.1	32.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	280607.68	2244479.86	0.00436	23	23	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	281607.68	2244479.86	0.00403	21.5	21.5	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	282607.68	2244479.86	0.00479	28	28	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	283607.68	2244479.86	0.0073	30.5	30.5	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	284607.68	2244479.86	0.00628	31.7	31.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	285607.68	2244479.86	0.00405	33.5	33.5	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	265607.68	2245479.86	0.01525	0.4	0.4	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	266607.68	2245479.86	0.01802	12.5	12.5	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	267607.68	2245479.86	0.01866	9.4	9.4	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	268607.68	2245479.86	0.01665	10.2	10.2	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	269607.68	2245479.86	0.01217	19.2	19.2	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	270607.68	2245479.86	0.02178	47.1	133	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
	271607.68	2245479.86	0.01289	27.3	133	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
	272607.68	2245479.86	0.02876	49.1	49.1	0	24-HR	ALL	1ST	UCART1	1/25/2016	24 hr
	273607.68	2245479.86	0.0288	40.8	40.8	0	24-HR	ALL	1ST	UCART1	11/14/2015	24 hr
	274607.68	2245479.86	0.03522	34	34	0	24-HR	ALL	1ST	UCART1	11/13/2015	24 hr
	275607.68	2245479.86	0.02157	34.1	34.1	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
	276607.68	2245479.86	0.00978	35	35	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
	277607.68	2245479.86	0.00535	48.2	48.2	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
	278607.68	2245479.86	0.00786	31.5	145	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	279607.68	2245479.86	0.00989	24.9	24.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	280607.68	2245479.86	0.00559	20.8	20.8	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	281607.68	2245479.86	0.00418	22.4	22.4	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
	282607.68	2245479.86	0.0057	32.2	32.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	283607.68	2245479.86	0.00562	26.7	26.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	284607.68	2245479.86	0.00506	27.7	27.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	285607.68	2245479.86	0.00429	33.3	33.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	265607.68	2246479.86	0.00838	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	266607.68	2246479.86	0.00889	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	267607.68	2246479.86	0.00929	3.5	3.5	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	268607.68	2246479.86	0.01034	7.7	7.7	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	269607.68	2246479.86	0.01213	16.5	16.5	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	270607.68	2246479.86	0.01429	19	19	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	271607.68	2246479.86	0.0168	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	272607.68	2246479.86	0.0225	42.4	93	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	273607.68	2246479.86	0.07001	49.1	49.1	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	274607.68	2246479.86	0.07638	39.2	39.2	0	24-HR	ALL	1ST	UCART1	11/19/2015	24 hr
AQ (HENI)	275607.68	2246479.86	0.01986	35.6	35.6	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	276607.68	2246479.86	0.00356	42.1	42.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	277607.68	2246479.86	0.00291	32.7	32.7	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	278607.68	2246479.86	0.00421	27.4	27.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	279607.68	2246479.86	0.00443	21.8	21.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	280607.68	2246479.86	0.00423	25.2	25.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	281607.68	2246479.86	0.00392	25.1	25.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	282607.68	2246479.86	0.00362	28.6	28.6	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	283607.68	2246479.86	0.00338	31	31	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	284607.68	2246479.86	0.00305	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	285607.68	2246479.86	0.00276	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	265607.68	2247479.86	0.00677	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	266607.68	2247479.86	0.0074	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr

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267607.68	2247479.86	0.00741	4.4	4.4	0	24-HR	ALL	1ST	UCART1	1/18/2016	24 hr
268607.68	2247479.86	0.01123	10.3	10.3	0	24-HR	ALL	1ST	UCART1	1/18/2016	24 hr
269607.68	2247479.86	0.01431	9.4	9.4	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
270607.68	2247479.86	0.01403	17.5	17.5	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
271607.68	2247479.86	0.01115	30.1	30.1	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
272607.68	2247479.86	0.01408	31	31	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
273607.68	2247479.86	0.0565	53	132	0	24-HR	ALL	1ST	UCART1	1/31/2016	24 hr
274607.68	2247479.86	0.06773	57.1	146	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
275607.68	2247479.86	0.01476	45.4	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2247479.86	0.00253	33	219	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
277607.68	2247479.86	0.02482	34.8	34.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
278607.68	2247479.86	0.01746	26.5	26.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279607.68	2247479.86	0.00348	23.2	23.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280607.68	2247479.86	0.00126	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2247479.86	0.00073	29.1	29.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2247479.86	0.00048	31.7	31.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2247479.86	0.00035	25.7	25.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2247479.86	0.00027	24.9	24.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2247479.86	0.00023	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2248479.86	0.00781	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
266607.68	2248479.86	0.00747	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
267607.68	2248479.86	0.00594	0.9	0.9	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
268607.68	2248479.86	0.00556	12.9	12.9	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
269607.68	2248479.86	0.00748	15.4	15.4	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
270607.68	2248479.86	0.0126	16.3	16.3	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
271607.68	2248479.86	0.0309	26.2	26.2	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
272607.68	2248479.86	0.01095	26	26	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
273607.68	2248479.86	0.01288	30.8	219	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
274607.68	2248479.86	0.00528	89	219	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
275607.68	2248479.86	0.00485	102.8	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2248479.86	0.0026	34.5	219	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
277607.68	2248479.86	0.00072	25.5	25.5	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
278607.68	2248479.86	0.00159	19.1	19.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279607.68	2248479.86	0.0161	28.5	28.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280607.68	2248479.86	0.02257	30	30	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2248479.86	0.01612	31.7	31.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2248479.86	0.00701	32.3	32.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2248479.86	0.00284	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2248479.86	0.00082	25.6	25.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2248479.86	0.00051	31.4	31.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2249479.86	0.00357	0	0	0	24-HR	ALL	1ST	UCART1	11/19/2015	24 hr
266607.68	2249479.86	0.0056	0	0	0	24-HR	ALL	1ST	UCART1	1/30/2016	24 hr
267607.68	2249479.86	0.00761	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
268607.68	2249479.86	0.00918	9.2	9.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
269607.68	2249479.86	0.01776	14.4	14.4	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
270607.68	2249479.86	0.01487	18.8	18.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
271607.68	2249479.86	0.00675	25.3	25.3	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
272607.68	2249479.86	0.00958	15.6	15.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
273607.68	2249479.86	0.00909	24.2	219	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
274607.68	2249479.86	0.01138	33.4	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2249479.86	0.01027	84.2	219	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276607.68	2249479.86	0.01036	39.9	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
277607.68	2249479.86	0.00062	23.6	197	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
278607.68	2249479.86	0.00047	17.9	17.9	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
279607.68	2249479.86	0.00057	27.4	27.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280607.68	2249479.86	0.00116	19.6	19.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2249479.86	0.00834	21	21	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2249479.86	0.01882	14	14	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2249479.86	0.01388	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr

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284607.68	2249479.86	0.0126	33.6	33.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2249479.86	0.00815	35.2	35.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2250479.86	0.00619	0	0	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
266607.68	2250479.86	0.00703	0	0	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
267607.68	2250479.86	0.01184	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
268607.68	2250479.86	0.01124	9	9	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
269607.68	2250479.86	0.01108	22.3	22.3	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270607.68	2250479.86	0.00403	13.6	13.6	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
271607.68	2250479.86	0.00594	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2250479.86	0.00337	17	17	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
273607.68	2250479.86	0.0047	15.6	15.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
274607.68	2250479.86	0.00573	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2250479.86	0.00303	30	21.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2250479.86	0.001	90.9	135	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
277607.68	2250479.86	0.00723	18.1	123	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2250479.86	0.00046	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279607.68	2250479.86	0.00034	6.2	26	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
280607.68	2250479.86	0.00049	15.2	15.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
281607.68	2250479.86	0.00045	3.5	3.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2250479.86	0.00089	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2250479.86	0.005	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2250479.86	0.01381	30.2	30.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2250479.86	0.01433	34	34	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2251479.86	0.0092	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
266607.68	2251479.86	0.01195	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
267607.68	2251479.86	0.00997	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
268607.68	2251479.86	0.00381	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
269607.68	2251479.86	0.0035	6.4	6.4	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
270607.68	2251479.86	0.00373	10	10	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
271607.68	2251479.86	0.00352	7.8	7.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
272607.68	2251479.86	0.00594	8.7	8.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
273607.68	2251479.86	0.00347	11.3	11.3	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
274607.68	2251479.86	0.00561	20.1	20.1	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2251479.86	0.00157	22.6	22.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2251479.86	0.00516	21.1	21.1	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2251479.86	0.00639	30.2	57	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2251479.86	0.00105	23.6	23.6	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
279607.68	2251479.86	0.00036	20.8	20.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2251479.86	0.00027	19.9	19.9	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
281607.68	2251479.86	0.0004	24.5	24.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
282607.68	2251479.86	0.00063	21.8	21.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
283607.68	2251479.86	0.0004	26.5	26.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2251479.86	0.00074	32.9	32.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2251479.86	0.00308	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2252479.86	0.00622	0	0	0	24-HR	ALL	1ST	UCART1	1/31/2016	24 hr
266607.68	2252479.86	0.00895	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
267607.68	2252479.86	0.00325	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
268607.68	2252479.86	0.00331	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
269607.68	2252479.86	0.00336	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
270607.68	2252479.86	0.00326	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
271607.68	2252479.86	0.00401	0.4	0.4	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
272607.68	2252479.86	0.00301	4.8	4.8	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273607.68	2252479.86	0.00273	14	14	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
274607.68	2252479.86	0.00435	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2252479.86	0.00196	67.7	75	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276607.68	2252479.86	0.00552	18	18	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2252479.86	0.00041	22.6	22.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2252479.86	0.00877	21.6	21.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2252479.86	0.00039	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr

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280607.68	2252479.86	0.0003	19.4	19.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2252479.86	0.00023	22.3	22.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2252479.86	0.00031	24.9	24.9	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
283607.68	2252479.86	0.00076	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284607.68	2252479.86	0.00049	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285607.68	2252479.86	0.00033	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2253479.86	0.00481	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
266607.68	2253479.86	0.00271	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
267607.68	2253479.86	0.003	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
268607.68	2253479.86	0.00286	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
269607.68	2253479.86	0.00374	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
270607.68	2253479.86	0.0033	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
271607.68	2253479.86	0.00405	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2253479.86	0.003	9.7	9.7	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273607.68	2253479.86	0.0041	10	10	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
274607.68	2253479.86	0.00246	18.3	98	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2253479.86	0.00213	67.6	75	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276607.68	2253479.86	0.0064	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2253479.86	0.00042	18.2	18.2	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2253479.86	0.00481	19.3	19.3	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2253479.86	0.00252	20.4	20.4	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280607.68	2253479.86	0.00035	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2253479.86	0.00026	22.8	22.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2253479.86	0.0002	24.2	24.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2253479.86	0.00027	28.2	28.2	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
284607.68	2253479.86	0.00068	26.1	26.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285607.68	2253479.86	0.00077	29.9	29.9	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265607.68	2254479.86	0.00222	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
266607.68	2254479.86	0.00267	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
267607.68	2254479.86	0.00239	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
268607.68	2254479.86	0.00367	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
269607.68	2254479.86	0.00359	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270607.68	2254479.86	0.00302	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271607.68	2254479.86	0.00333	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2254479.86	0.00209	0	15	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
273607.68	2254479.86	0.00478	14	14	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
274607.68	2254479.86	0.00131	11.9	11.9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2254479.86	0.00102	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
276607.68	2254479.86	0.00614	20.4	20.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2254479.86	0.00212	6.2	6.2	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278607.68	2254479.86	0.00037	6.9	6.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2254479.86	0.00813	17	17	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280607.68	2254479.86	0.00059	21.5	21.5	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
281607.68	2254479.86	0.00032	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2254479.86	0.00023	26.7	26.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283607.68	2254479.86	0.00018	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2254479.86	0.00023	23.6	23.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
285607.68	2254479.86	0.00051	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265607.68	2255479.86	0.00235	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
266607.68	2255479.86	0.002	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
267607.68	2255479.86	0.00353	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
268607.68	2255479.86	0.00245	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
269607.68	2255479.86	0.00218	0	0	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
270607.68	2255479.86	0.00298	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271607.68	2255479.86	0.00171	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
272607.68	2255479.86	0.0016	0	0	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
273607.68	2255479.86	0.00329	9	9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
274607.68	2255479.86	0.00069	14.9	14.9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2255479.86	0.00089	17.4	17.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr

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	276607.68	2255479.86	0.00337	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	277607.68	2255479.86	0.0041	15.4	15.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278607.68	2255479.86	0.00024	18.6	18.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	279607.68	2255479.86	0.00401	23.7	23.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	280607.68	2255479.86	0.00406	21	21	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281607.68	2255479.86	0.0003	27.9	27.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	282607.68	2255479.86	0.00028	20.2	20.2	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283607.68	2255479.86	0.00021	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	284607.68	2255479.86	0.00017	21.3	21.3	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	285607.68	2255479.86	0.00021	25.6	25.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
	265607.68	2256479.86	0.00169	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	266607.68	2256479.86	0.00293	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	267607.68	2256479.86	0.00206	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
	268607.68	2256479.86	0.00308	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	269607.68	2256479.86	0.00206	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	270607.68	2256479.86	0.00338	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	271607.68	2256479.86	0.00231	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
	272607.68	2256479.86	0.00178	0	0	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	273607.68	2256479.86	0.00195	14.8	14.8	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	274607.68	2256479.86	0.00051	13.8	13.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	275607.68	2256479.86	0.00076	12.7	12.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	276607.68	2256479.86	0.00198	11.4	11.4	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	277607.68	2256479.86	0.00309	12.8	12.8	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278607.68	2256479.86	0.00028	18.8	18.8	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	279607.68	2256479.86	0.00042	18.4	18.4	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	280607.68	2256479.86	0.0072	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281607.68	2256479.86	0.0011	20.5	20.5	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	282607.68	2256479.86	0.00029	25.7	25.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283607.68	2256479.86	0.00026	24.6	24.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	284607.68	2256479.86	0.00018	21	21	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	285607.68	2256479.86	0.00017	21.3	21.3	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
AQ (HENI)	275607.68	2246479.86	0.01986	35.57	35.57	0	24-HR	ALL	1ST		12/5/2015	24 hr
AQ (BHILAD)	279916.74	2244872.28	0.00631	22.92	22.92	0	24-HR	ALL	1ST		12/20/2015	24 hr
AQ (PUNAT)	276752.3	2247598.21	0.0021	34.31	84	0	24-HR	ALL	1ST		12/21/2015	24 hr
AQ (KANADU)	273710.9	2248366.37	0.0129	31.04	219	0	24-HR	ALL	1ST		11/4/2015	24 hr
AQ (SARAI)	271823.72	2244130.7	0.04076	52.28	160	0	24-HR	ALL	1ST		1/2/2016	24 hr
AQ (DAHELI)	277578.1	2242240.09	0.00813	30.46	30.46	0	24-HR	ALL	1ST		12/9/2015	24 hr
DW (PDISCR)	275108.63	2246122.33	0.06653	35.92	35.92	0	24-HR	ALL	1ST		11/21/2015	24 hr
DW (PDISCR)	274761.3	2245762.66	0.05156	34.43	34.43	0	24-HR	ALL	1ST		11/13/2015	24 hr
DW (PDISCR)	274413.97	2245402.99	0.03727	35.65	35.65	0	24-HR	ALL	1ST		11/13/2015	24 hr
DW (PDISCR)	274066.64	2245043.32	0.02038	33.65	33.65	0	24-HR	ALL	1ST		11/13/2015	24 hr
DW (PDISCR)	273719.31	2244683.65	0.02284	35.15	35.15	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW (PDISCR)	273371.98	2244323.98	0.02549	39.02	160	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW (PDISCR)	273024.66	2243964.31	0.01865	41.83	160	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW (PDISCR)	272677.33	2243604.64	0.01927	48.97	160	0	24-HR	ALL	1ST		1/16/2016	24 hr
DW (PDISCR)	272330	2243244.97	0.01834	51.89	160	0	24-HR	ALL	1ST		1/6/2016	24 hr
DW (PDISCR)	271982.67	2242885.3	0.01367	41.47	160	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	271635.34	2242525.63	0.01096	30.68	30.68	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	271288.01	2242165.96	0.00976	22.15	22.15	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	270940.68	2241806.29	0.0089	18.65	18.65	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	270593.35	2241446.62	0.00825	24.64	24.64	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	270246.02	2241086.95	0.00748	20.36	20.36	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	269898.69	2240727.28	0.00687	20.69	20.69	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	269551.36	2240367.61	0.00628	17.64	17.64	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	269204.03	2240007.94	0.00579	17.16	17.16	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	268856.71	2239648.27	0.00533	14.69	14.69	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW (PDISCR)	268509.38	2239288.6	0.00496	15.92	15.92	0	24-HR	ALL	1ST		12/8/2015	24 hr

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Discrete Receptor ID	X	Y	Concentration [ug/m ³]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Aver. Period (AVE)	Source Group (GRP)	Rank	Net ID	Date
	265702.84	2234462.45	0.03439	3.6	3.6	0	24-HR	ALL	1ST	UCART1	1/26/2016 24 hr
	266702.84	2234462.45	0.03532	4	4	0	24-HR	ALL	1ST	UCART1	1/15/2016 24 hr
	267702.84	2234462.45	0.05334	13	13	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	268702.84	2234462.45	0.04228	13.5	13.5	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	269702.84	2234462.45	0.06249	7.6	7.6	0	24-HR	ALL	1ST	UCART1	12/29/2015 24 hr
	270702.84	2234462.45	0.0563	4.2	4.2	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271702.84	2234462.45	0.03391	15.2	15.2	0	24-HR	ALL	1ST	UCART1	1/22/2016 24 hr
	272702.84	2234462.45	0.06101	17	17	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	273702.84	2234462.45	0.07041	22.5	22.5	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	274702.84	2234462.45	0.08564	21.2	21.2	0	24-HR	ALL	1ST	UCART1	1/21/2016 24 hr
	275702.84	2234462.45	0.10843	49.1	158	0	24-HR	ALL	1ST	UCART1	1/19/2016 24 hr
	276702.84	2234462.45	0.05257	45.8	158	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277702.84	2234462.45	0.04539	36.7	36.7	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	278702.84	2234462.45	0.04129	40.2	40.2	0	24-HR	ALL	1ST	UCART1	12/17/2015 24 hr
	279702.84	2234462.45	0.02831	46.1	46.1	0	24-HR	ALL	1ST	UCART1	12/18/2015 24 hr
	280702.84	2234462.45	0.01209	56.5	56.5	0	24-HR	ALL	1ST	UCART1	11/8/2015 24 hr
	281702.84	2234462.45	0.02988	40.2	40.2	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	282702.84	2234462.45	0.00586	45	45	0	24-HR	ALL	1ST	UCART1	12/25/2015 24 hr
	283702.84	2234462.45	0.02269	37	37	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	284702.84	2234462.45	0.03233	33.3	33.3	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	285702.84	2234462.45	0.01509	50.5	50.5	0	24-HR	ALL	1ST	UCART1	11/30/2015 24 hr
	265702.84	2235462.45	0.05233	2.3	2.3	0	24-HR	ALL	1ST	UCART1	1/14/2016 24 hr
	266702.84	2235462.45	0.03891	4.3	4.3	0	24-HR	ALL	1ST	UCART1	1/26/2016 24 hr
	267702.84	2235462.45	0.04167	4	4	0	24-HR	ALL	1ST	UCART1	12/8/2015 24 hr
	268702.84	2235462.45	0.04354	4.2	4.2	0	24-HR	ALL	1ST	UCART1	1/3/2016 24 hr
	269702.84	2235462.45	0.08373	6	6	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	270702.84	2235462.45	0.05582	8	8	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271702.84	2235462.45	0.05621	14.3	14.3	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	272702.84	2235462.45	0.06944	25.9	25.9	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	273702.84	2235462.45	0.07698	19.8	19.8	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	274702.84	2235462.45	0.10936	24.3	24.3	0	24-HR	ALL	1ST	UCART1	1/4/2016 24 hr
	275702.84	2235462.45	0.07683	33.6	158	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276702.84	2235462.45	0.00808	93	158	0	24-HR	ALL	1ST	UCART1	1/12/2016 24 hr
	277702.84	2235462.45	0.00926	83.8	107	0	24-HR	ALL	1ST	UCART1	12/10/2015 24 hr
	278702.84	2235462.45	0.0439	53	53	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	279702.84	2235462.45	0.0299	43.1	100	0	24-HR	ALL	1ST	UCART1	12/25/2015 24 hr
	280702.84	2235462.45	0.06343	37.5	37.5	0	24-HR	ALL	1ST	UCART1	12/9/2015 24 hr
	281702.84	2235462.45	0.00557	35.5	35.5	0	24-HR	ALL	1ST	UCART1	11/5/2015 24 hr
	282702.84	2235462.45	0.02826	38.2	38.2	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	283702.84	2235462.45	0.03309	37	37	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	284702.84	2235462.45	0.02223	31.9	31.9	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	285702.84	2235462.45	0.04404	41.8	41.8	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	265702.84	2236462.45	0.07005	0.1	0.1	0	24-HR	ALL	1ST	UCART1	1/15/2016 24 hr
	266702.84	2236462.45	0.05902	2.7	2.7	0	24-HR	ALL	1ST	UCART1	1/15/2016 24 hr
	267702.84	2236462.45	0.04431	5.9	5.9	0	24-HR	ALL	1ST	UCART1	1/26/2016 24 hr
	268702.84	2236462.45	0.04974	5	5	0	24-HR	ALL	1ST	UCART1	12/8/2015 24 hr
	269702.84	2236462.45	0.0487	11.5	11.5	0	24-HR	ALL	1ST	UCART1	12/28/2015 24 hr
	270702.84	2236462.45	0.08037	14.4	14.4	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271702.84	2236462.45	0.07645	16.7	16.7	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	272702.84	2236462.45	0.04805	13.8	13.8	0	24-HR	ALL	1ST	UCART1	12/26/2015 24 hr
	273702.84	2236462.45	0.08216	15	15	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	274702.84	2236462.45	0.12614	23	23	0	24-HR	ALL	1ST	UCART1	1/4/2016 24 hr
	275702.84	2236462.45	0.07844	30.6	30.6	0	24-HR	ALL	1ST	UCART1	12/29/2015 24 hr
	276702.84	2236462.45	0.10421	49.4	49.4	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277702.84	2236462.45	0.06316	57.8	83	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	278702.84	2236462.45	0.01989	59.2	89	0	24-HR	ALL	1ST	UCART1	11/3/2015 24 hr

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279702.84	2236462.45	0.02741	41.1	41.1	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
280702.84	2236462.45	0.0256	35.1	35.1	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
281702.84	2236462.45	0.02018	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
282702.84	2236462.45	0.03401	33.7	33.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283702.84	2236462.45	0.02446	28.7	28.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
284702.84	2236462.45	0.05373	33.8	33.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
285702.84	2236462.45	0.04005	40.4	40.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265702.84	2237462.45	0.06775	4	4	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
266702.84	2237462.45	0.08345	3.3	3.3	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
267702.84	2237462.45	0.06864	4.8	4.8	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
268702.84	2237462.45	0.05081	9.6	9.6	0	24-HR	ALL	1ST	UCART1	1/26/2016	24 hr
269702.84	2237462.45	0.06594	15	15	0	24-HR	ALL	1ST	UCART1	1/16/2016	24 hr
270702.84	2237462.45	0.06291	12.8	12.8	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
271702.84	2237462.45	0.07106	17.1	17.1	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
272702.84	2237462.45	0.05535	23.9	23.9	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
273702.84	2237462.45	0.08606	21.4	21.4	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
274702.84	2237462.45	0.1341	20.3	20.3	0	24-HR	ALL	1ST	UCART1	1/21/2016	24 hr
275702.84	2237462.45	0.07304	23	23	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
276702.84	2237462.45	0.12961	37.8	37.8	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
277702.84	2237462.45	0.07253	57.1	61	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
278702.84	2237462.45	0.04501	50.3	50.3	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
279702.84	2237462.45	0.03373	68.2	68.2	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
280702.84	2237462.45	0.01282	39.3	39.3	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
281702.84	2237462.45	0.03463	34.5	34.5	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
282702.84	2237462.45	0.03026	30.6	30.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283702.84	2237462.45	0.05358	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
284702.84	2237462.45	0.05718	34.2	34.2	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
285702.84	2237462.45	0.07272	40.7	40.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265702.84	2238462.45	0.09985	3.5	3.5	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
266702.84	2238462.45	0.07814	2.1	2.1	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
267702.84	2238462.45	0.08815	4	4	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
268702.84	2238462.45	0.07775	6.3	6.3	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
269702.84	2238462.45	0.05856	9.5	9.5	0	24-HR	ALL	1ST	UCART1	1/26/2016	24 hr
270702.84	2238462.45	0.08931	14.9	14.9	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
271702.84	2238462.45	0.12173	25.6	25.6	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
272702.84	2238462.45	0.12559	29.2	29.2	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
273702.84	2238462.45	0.08127	20.2	20.2	0	24-HR	ALL	1ST	UCART1	12/26/2015	24 hr
274702.84	2238462.45	0.12755	19.8	19.8	0	24-HR	ALL	1ST	UCART1	1/21/2016	24 hr
275702.84	2238462.45	0.08533	25.5	25.5	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
276702.84	2238462.45	0.10751	37.9	37.9	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
277702.84	2238462.45	0.06728	50.3	50.3	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
278702.84	2238462.45	0.03811	44	44	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
279702.84	2238462.45	0.03341	51.1	51.1	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
280702.84	2238462.45	0.02036	58.2	73	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
281702.84	2238462.45	0.03174	42.9	87	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282702.84	2238462.45	0.05699	31	31	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
283702.84	2238462.45	0.06413	29	29	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
284702.84	2238462.45	0.08916	34.9	34.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
285702.84	2238462.45	0.11188	34.9	34.9	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265702.84	2239462.45	0.04172	15.3	15.3	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
266702.84	2239462.45	0.08909	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267702.84	2239462.45	0.09929	11.9	11.9	0	24-HR	ALL	1ST	UCART1	1/17/2016	24 hr
268702.84	2239462.45	0.07046	15.7	15.7	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
269702.84	2239462.45	0.08474	12.1	12.1	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
270702.84	2239462.45	0.06759	14	14	0	24-HR	ALL	1ST	UCART1	1/26/2016	24 hr
271702.84	2239462.45	0.13578	39.5	39.5	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
272702.84	2239462.45	0.15912	35	35	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
273702.84	2239462.45	0.06794	23.2	23.2	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
274702.84	2239462.45	0.11191	23.5	23.5	0	24-HR	ALL	1ST	UCART1	1/5/2016	24 hr

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275702.84	2239462.45	0.09825	26.7	26.7	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
276702.84	2239462.45	0.08564	32.4	32.4	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
277702.84	2239462.45	0.05776	32.3	32.3	0	24-HR	ALL	1ST	UCART1	12/18/2015	24 hr
278702.84	2239462.45	0.03304	69	70	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
279702.84	2239462.45	0.03809	51.5	51.5	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
280702.84	2239462.45	0.03939	42.1	94	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281702.84	2239462.45	0.04249	30	30	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
282702.84	2239462.45	0.07842	25.9	25.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
283702.84	2239462.45	0.12891	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284702.84	2239462.45	0.06589	34	34	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
285702.84	2239462.45	0.10915	37.7	37.7	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265702.84	2240462.45	0.06245	16.4	16.4	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
266702.84	2240462.45	0.0489	14.8	14.8	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
267702.84	2240462.45	0.05235	16.5	16.5	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
268702.84	2240462.45	0.14608	32.9	32.9	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
269702.84	2240462.45	0.08832	16.6	16.6	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
270702.84	2240462.45	0.11249	15.5	15.5	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
271702.84	2240462.45	0.09513	39	39	0	24-HR	ALL	1ST	UCART1	1/26/2016	24 hr
272702.84	2240462.45	0.13338	34	34	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
273702.84	2240462.45	0.15152	23.2	23.2	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
274702.84	2240462.45	0.11749	17.3	17.3	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
275702.84	2240462.45	0.10588	24.1	24.1	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
276702.84	2240462.45	0.07076	29.4	29.4	0	24-HR	ALL	1ST	UCART1	12/10/2015	24 hr
277702.84	2240462.45	0.06662	43.8	69	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
278702.84	2240462.45	0.03737	48.4	48.4	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
279702.84	2240462.45	0.02466	59.3	59.3	0	24-HR	ALL	1ST	UCART1	11/30/2015	24 hr
280702.84	2240462.45	0.06849	38.1	38.1	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
281702.84	2240462.45	0.10235	28.5	28.5	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
282702.84	2240462.45	0.10032	29.9	29.9	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
283702.84	2240462.45	0.12797	28.5	28.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284702.84	2240462.45	0.03363	32.7	32.7	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285702.84	2240462.45	0.01331	38.4	38.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265702.84	2241462.45	0.07961	7.5	7.5	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
266702.84	2241462.45	0.08123	14.4	14.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
267702.84	2241462.45	0.08153	16.4	16.4	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
268702.84	2241462.45	0.10698	35.7	93	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
269702.84	2241462.45	0.06824	23.8	93	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
270702.84	2241462.45	0.14415	21.2	21.2	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
271702.84	2241462.45	0.14982	25.8	25.8	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
272702.84	2241462.45	0.0283	71.5	105	0	24-HR	ALL	1ST	UCART1	12/10/2015	24 hr
273702.84	2241462.45	0.18401	31.8	31.8	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
274702.84	2241462.45	0.11768	24.7	24.7	0	24-HR	ALL	1ST	UCART1	12/22/2015	24 hr
275702.84	2241462.45	0.12188	28.8	28.8	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
276702.84	2241462.45	0.07561	26	26	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
277702.84	2241462.45	0.03688	31.9	31.9	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
278702.84	2241462.45	0.06478	43.8	43.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279702.84	2241462.45	0.10458	37.7	37.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
280702.84	2241462.45	0.21231	37.1	37.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
281702.84	2241462.45	0.14918	23.6	23.6	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
282702.84	2241462.45	0.0199	27.7	27.7	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
283702.84	2241462.45	0.0307	32.1	32.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284702.84	2241462.45	0.0444	36.8	36.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285702.84	2241462.45	0.04535	31.6	31.6	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
265702.84	2242462.45	0.07287	9.8	9.8	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
266702.84	2242462.45	0.09719	10.1	10.1	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267702.84	2242462.45	0.09321	11.3	11.3	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
268702.84	2242462.45	0.0758	21.4	21.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
269702.84	2242462.45	0.08328	24.2	24.2	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
270702.84	2242462.45	0.12663	29.4	29.4	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr

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	271702.84	2242462.45	0.09547	29.2	29.2	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
	272702.84	2242462.45	0.25474	41.5	41.5	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
	273702.84	2242462.45	0.12392	30.1	30.1	0	24-HR	ALL	1ST	UCART1	11/2/2015	24 hr
	274702.84	2242462.45	0.19615	23	23	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
	275702.84	2242462.45	0.10502	26	26	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
	276702.84	2242462.45	0.13998	29.3	29.3	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
	277702.84	2242462.45	0.08612	35	35	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	278702.84	2242462.45	0.14356	37.9	37.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	279702.84	2242462.45	0.24536	37.4	37.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	280702.84	2242462.45	0.02233	28.3	28.3	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	281702.84	2242462.45	0.05817	28	28	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	282702.84	2242462.45	0.06069	32.4	32.4	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	283702.84	2242462.45	0.08354	29.7	29.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	284702.84	2242462.45	0.08877	36.1	36.1	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	285702.84	2242462.45	0.05462	40.2	40.2	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	265702.84	2243462.45	0.12747	7.9	7.9	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	266702.84	2243462.45	0.15507	13.2	13.2	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	267702.84	2243462.45	0.16973	16.7	16.7	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	268702.84	2243462.45	0.15968	17	17	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	269702.84	2243462.45	0.12616	23.8	23.8	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	270702.84	2243462.45	0.16562	29.6	29.6	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	271702.84	2243462.45	0.04874	65.7	160	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
	272702.84	2243462.45	0.46545	43.5	160	0	24-HR	ALL	1ST	UCART1	1/25/2016	24 hr
	273702.84	2243462.45	0.15155	29.8	29.8	0	24-HR	ALL	1ST	UCART1	11/23/2015	24 hr
	274702.84	2243462.45	0.20809	31.9	31.9	0	24-HR	ALL	1ST	UCART1	11/12/2015	24 hr
	275702.84	2243462.45	0.14905	28.3	28.3	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
	276702.84	2243462.45	0.14826	39.9	39.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	277702.84	2243462.45	0.57136	52.8	72	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
	278702.84	2243462.45	0.10708	42	42	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	279702.84	2243462.45	0.09457	28.7	28.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	280702.84	2243462.45	0.09165	31	31	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	281702.84	2243462.45	0.05089	27.4	27.4	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
	282702.84	2243462.45	0.0503	29.9	29.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	283702.84	2243462.45	0.06027	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	284702.84	2243462.45	0.05686	35.9	35.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	285702.84	2243462.45	0.04269	38	38	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	265702.84	2244462.45	0.07955	10.3	10.3	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	266702.84	2244462.45	0.08397	14.4	14.4	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	267702.84	2244462.45	0.08817	14.9	14.9	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	268702.84	2244462.45	0.09375	16.4	16.4	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	269702.84	2244462.45	0.10936	21	21	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	270702.84	2244462.45	0.31041	44.9	133	0	24-HR	ALL	1ST	UCART1	1/13/2016	24 hr
	271702.84	2244462.45	0.10401	57.2	160	0	24-HR	ALL	1ST	UCART1	1/29/2016	24 hr
	272702.84	2244462.45	0.11289	57.6	160	0	24-HR	ALL	1ST	UCART1	1/29/2016	24 hr
	273702.84	2244462.45	0.19323	34.2	34.2	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	274702.84	2244462.45	0.42945	31.4	31.4	0	24-HR	ALL	1ST	UCART1	11/19/2015	24 hr
AQ (Project)	275702.84	2244462.45	0.12079	32.2	32.2	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
	276702.84	2244462.45	0.02016	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	277702.84	2244462.45	0.16111	46.7	145	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	278702.84	2244462.45	0.00246	94	145	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	279702.84	2244462.45	0.04399	29.8	29.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	280702.84	2244462.45	0.04066	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	281702.84	2244462.45	0.03877	23	23	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	282702.84	2244462.45	0.03979	28.6	28.6	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	283702.84	2244462.45	0.04113	31	31	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	284702.84	2244462.45	0.03791	31	31	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	285702.84	2244462.45	0.03659	32.7	32.7	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	265702.84	2245462.45	0.06873	7.7	12	0	24-HR	ALL	1ST	UCART1	1/29/2016	24 hr
	266702.84	2245462.45	0.07152	13.5	13.5	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr

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267702.84	2245462.45	0.0692	11	11	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
268702.84	2245462.45	0.09606	12.7	12.7	0	24-HR	ALL	1ST	UCART1	1/18/2016	24 hr
269702.84	2245462.45	0.11868	20.7	20.7	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
270702.84	2245462.45	0.17068	52.4	133	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
271702.84	2245462.45	0.10206	27.9	133	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
272702.84	2245462.45	0.16518	52.4	65	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
273702.84	2245462.45	0.45994	43.2	43.2	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
274702.84	2245462.45	0.11793	32.6	32.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
275702.84	2245462.45	0.02023	31.8	31.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
276702.84	2245462.45	0.00603	35.5	35.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
277702.84	2245462.45	0.16752	48.1	59	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
278702.84	2245462.45	0.29896	32.7	145	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279702.84	2245462.45	0.05654	23.7	23.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280702.84	2245462.45	0.00924	22.5	22.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
281702.84	2245462.45	0.00387	25	25	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282702.84	2245462.45	0.00249	30.3	30.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283702.84	2245462.45	0.00175	27.4	27.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284702.84	2245462.45	0.0014	26.9	26.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285702.84	2245462.45	0.00123	34.4	34.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265702.84	2246462.45	0.07241	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
266702.84	2246462.45	0.0706	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
267702.84	2246462.45	0.06197	1.4	1.4	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
268702.84	2246462.45	0.05124	9.5	9.5	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
269702.84	2246462.45	0.04936	15.5	15.5	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
270702.84	2246462.45	0.09805	20.8	20.8	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
271702.84	2246462.45	0.16181	24.5	24.5	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
272702.84	2246462.45	0.31023	44	93	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
273702.84	2246462.45	0.09243	47.7	47.7	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
274702.84	2246462.45	0.18687	39.7	39.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
275702.84	2246462.45	0.00864	35.4	35.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
276702.84	2246462.45	0.27849	42.2	42.2	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
277702.84	2246462.45	0.00299	35.1	35.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
278702.84	2246462.45	0.00475	25.3	25.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279702.84	2246462.45	0.0427	24.3	24.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280702.84	2246462.45	0.24425	24.8	24.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281702.84	2246462.45	0.18795	27	27	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282702.84	2246462.45	0.10175	26.8	26.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283702.84	2246462.45	0.05181	30.2	30.2	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284702.84	2246462.45	0.01603	28.9	28.9	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285702.84	2246462.45	0.00337	30	30	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265702.84	2247462.45	0.03835	0	0	0	24-HR	ALL	1ST	UCART1	1/26/2016	24 hr
266702.84	2247462.45	0.03329	0	0	0	24-HR	ALL	1ST	UCART1	11/17/2015	24 hr
267702.84	2247462.45	0.06181	11.3	11.3	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
268702.84	2247462.45	0.08684	10.8	10.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
269702.84	2247462.45	0.09253	11	11	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
270702.84	2247462.45	0.17388	19.6	19.6	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
271702.84	2247462.45	0.09721	30	30	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
272702.84	2247462.45	0.04567	29.6	29.6	0	24-HR	ALL	1ST	UCART1	11/17/2015	24 hr
273702.84	2247462.45	0.02392	75.8	132	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
274702.84	2247462.45	0.05298	53.9	219	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
275702.84	2247462.45	0.01958	41.2	219	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276702.84	2247462.45	0.01616	35.6	84	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277702.84	2247462.45	0.02523	33.1	33.1	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278702.84	2247462.45	0.00212	26.8	26.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279702.84	2247462.45	0.00269	23.8	23.8	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
280702.84	2247462.45	0.00394	29.7	29.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281702.84	2247462.45	0.03125	30.5	30.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282702.84	2247462.45	0.20019	31.3	31.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283702.84	2247462.45	0.16357	25.5	25.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr

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284702.84	2247462.45	0.12987	26.4	26.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285702.84	2247462.45	0.09967	28.6	28.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265702.84	2248462.45	0.05439	0	0	0	24-HR	ALL	1ST	UCART1	1/30/2016	24 hr
266702.84	2248462.45	0.07297	0	0	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
267702.84	2248462.45	0.06778	7	7	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
268702.84	2248462.45	0.14706	11.8	11.8	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
269702.84	2248462.45	0.133	14.7	14.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270702.84	2248462.45	0.05518	16.7	16.7	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
271702.84	2248462.45	0.03245	26.6	26.6	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
272702.84	2248462.45	0.04731	22.6	22.6	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
273702.84	2248462.45	0.12022	31.4	219	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
274702.84	2248462.45	0.0145	86.6	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2248462.45	0.00329	114.2	219	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
276702.84	2248462.45	0.0979	33	219	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277702.84	2248462.45	0.09873	25.5	25.5	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278702.84	2248462.45	0.00257	22.6	22.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279702.84	2248462.45	0.00172	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280702.84	2248462.45	0.00215	29.3	29.3	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
281702.84	2248462.45	0.0039	25.1	25.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
282702.84	2248462.45	0.00323	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283702.84	2248462.45	0.01724	14.6	14.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284702.84	2248462.45	0.10009	25.6	25.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285702.84	2248462.45	0.17447	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265702.84	2249462.45	0.05614	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
266702.84	2249462.45	0.11206	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
267702.84	2249462.45	0.06912	4	4	0	24-HR	ALL	1ST	UCART1	1/31/2016	24 hr
268702.84	2249462.45	0.09485	7.5	7.5	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
269702.84	2249462.45	0.03974	13.1	13.1	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
270702.84	2249462.45	0.02632	20.5	20.5	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
271702.84	2249462.45	0.05617	21.5	21.5	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
272702.84	2249462.45	0.04881	14.5	14.5	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
273702.84	2249462.45	0.03891	24.3	219	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
274702.84	2249462.45	0.07168	34.9	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2249462.45	0.0027	83.1	219	0	24-HR	ALL	1ST	UCART1	12/18/2015	24 hr
276702.84	2249462.45	0.11856	36.8	219	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277702.84	2249462.45	0.00241	23.1	197	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278702.84	2249462.45	0.06504	19.6	19.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279702.84	2249462.45	0.00217	27.1	27.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280702.84	2249462.45	0.0014	22.1	22.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281702.84	2249462.45	0.00167	20.5	20.5	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
282702.84	2249462.45	0.00519	14	14	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
283702.84	2249462.45	0.00318	29	29	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284702.84	2249462.45	0.00377	30.5	30.5	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
285702.84	2249462.45	0.01338	34.2	34.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265702.84	2250462.45	0.07039	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
266702.84	2250462.45	0.09013	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
267702.84	2250462.45	0.03947	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
268702.84	2250462.45	0.02741	8.7	8.7	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
269702.84	2250462.45	0.02284	23	23	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
270702.84	2250462.45	0.04684	13.1	13.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271702.84	2250462.45	0.0279	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
272702.84	2250462.45	0.06131	16.1	16.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
273702.84	2250462.45	0.02418	16.9	16.9	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
274702.84	2250462.45	0.03133	24.3	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2250462.45	0.0034	30.8	219	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276702.84	2250462.45	0.01133	100.4	123	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
277702.84	2250462.45	0.00753	18.3	18.3	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278702.84	2250462.45	0.06317	19	19	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279702.84	2250462.45	0.00758	8.3	26	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr

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280702.84	2250462.45	0.00177	16.7	16.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281702.84	2250462.45	0.00116	4	4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282702.84	2250462.45	0.00142	24.2	24.2	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
283702.84	2250462.45	0.00491	28.8	28.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284702.84	2250462.45	0.0075	32.4	32.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285702.84	2250462.45	0.00253	32.4	32.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265702.84	2251462.45	0.07624	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
266702.84	2251462.45	0.02397	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
267702.84	2251462.45	0.0219	0	0	0	24-HR	ALL	1ST	UCART1	1/8/2016	24 hr
268702.84	2251462.45	0.01863	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
269702.84	2251462.45	0.0373	7	7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
270702.84	2251462.45	0.02609	9.8	9.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
271702.84	2251462.45	0.03583	9.5	9.5	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272702.84	2251462.45	0.02511	9.6	9.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273702.84	2251462.45	0.00994	12.4	12.4	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
274702.84	2251462.45	0.02088	19	19	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2251462.45	0.00383	22.8	22.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276702.84	2251462.45	0.0259	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277702.84	2251462.45	0.04226	16.5	57	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278702.84	2251462.45	0.00308	21.6	21.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279702.84	2251462.45	0.06855	19.2	19.2	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280702.84	2251462.45	0.00182	20.2	20.2	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281702.84	2251462.45	0.00154	23.9	23.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282702.84	2251462.45	0.00109	22.5	22.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283702.84	2251462.45	0.00126	28.2	28.2	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
284702.84	2251462.45	0.00455	33.7	33.7	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285702.84	2251462.45	0.00745	27.1	27.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265702.84	2252462.45	0.02261	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
266702.84	2252462.45	0.02044	0	0	0	24-HR	ALL	1ST	UCART1	1/8/2016	24 hr
267702.84	2252462.45	0.01589	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
268702.84	2252462.45	0.02527	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
269702.84	2252462.45	0.01615	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
270702.84	2252462.45	0.02189	0	0	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
271702.84	2252462.45	0.0424	4	4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272702.84	2252462.45	0.02227	5.1	5.1	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273702.84	2252462.45	0.02873	12.7	12.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
274702.84	2252462.45	0.03236	37.1	92	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2252462.45	0.07578	51.1	75	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276702.84	2252462.45	0.01469	16.7	16.7	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
277702.84	2252462.45	0.0441	21.2	21.2	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278702.84	2252462.45	0.0012	19.8	19.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279702.84	2252462.45	0.04546	15.1	15.1	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280702.84	2252462.45	0.0259	19.9	19.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
281702.84	2252462.45	0.00175	23.5	23.5	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282702.84	2252462.45	0.00137	26	26	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283702.84	2252462.45	0.00119	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
284702.84	2252462.45	0.00122	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
285702.84	2252462.45	0.00254	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265702.84	2253462.45	0.02016	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
266702.84	2253462.45	0.01366	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
267702.84	2253462.45	0.01646	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
268702.84	2253462.45	0.02054	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
269702.84	2253462.45	0.02903	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270702.84	2253462.45	0.02318	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271702.84	2253462.45	0.02655	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272702.84	2253462.45	0.01368	10.2	10.2	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273702.84	2253462.45	0.0303	11.7	11.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
274702.84	2253462.45	0.03083	20.5	99	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275702.84	2253462.45	0.04306	46.3	98	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr

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	276702.84	2253462.45	0.00884	13.2	13.2	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	277702.84	2253462.45	0.03571	18.6	18.6	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278702.84	2253462.45	0.00355	15.8	15.8	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	279702.84	2253462.45	0.00365	17.9	17.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	280702.84	2253462.45	0.06335	20.3	20.3	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281702.84	2253462.45	0.00394	24.1	24.1	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	282702.84	2253462.45	0.00164	24.1	24.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283702.84	2253462.45	0.00128	29.9	29.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	284702.84	2253462.45	0.00112	25.9	25.9	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	285702.84	2253462.45	0.00119	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	265702.84	2254462.45	0.01184	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
	266702.84	2254462.45	0.01364	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	267702.84	2254462.45	0.02034	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
	268702.84	2254462.45	0.0268	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	269702.84	2254462.45	0.02254	0	0	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	270702.84	2254462.45	0.03125	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	271702.84	2254462.45	0.01187	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
	272702.84	2254462.45	0.00696	5.5	17	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
	273702.84	2254462.45	0.02459	14.7	14.7	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	274702.84	2254462.45	0.02572	8.4	8.4	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	275702.84	2254462.45	0.00562	13.3	13.3	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	276702.84	2254462.45	0.00522	19.4	19.4	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	277702.84	2254462.45	0.04442	7.5	7.5	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278702.84	2254462.45	0.01927	10.9	10.9	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	279702.84	2254462.45	0.00107	23.4	23.4	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	280702.84	2254462.45	0.03645	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281702.84	2254462.45	0.04101	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	282702.84	2254462.45	0.00155	27.7	27.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283702.84	2254462.45	0.00153	26.1	26.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	284702.84	2254462.45	0.00112	24.1	24.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	285702.84	2254462.45	0.00114	26.9	26.9	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
AQ (Project)	275702.84	2244462.45	0.1198	32.16	32.16	0	24-HR	ALL	1ST		11/5/2015	24 hr
AQ (Bhilad)	279916.74	2244872.28	0.0033	22.92	22.92	0	24-HR	ALL	1ST		12/21/2015	24 hr
AQ (Punat)	276752.3	2247598.21	0.01619	34.31	84	0	24-HR	ALL	1ST		12/19/2015	24 hr
AQ (Kanadu)	273710.9	2248366.37	0.107	31.04	219	0	24-HR	ALL	1ST		12/7/2015	24 hr
AQ (Sarai)	271823.72	2244130.7	0.22281	52.28	160	0	24-HR	ALL	1ST		1/11/2016	24 hr
AQ (Dehali)	277578.1	2242240.09	0.11024	30.46	30.46	0	24-HR	ALL	1ST		12/7/2015	24 hr
DW1 (PDISCR)	275346.45	2244108.45	0.38008	27.56	27.56	0	24-HR	ALL	1ST		11/12/2015	24 hr
DW2 (PDISCR)	274992.89	2243754.89	0.23054	26.02	26.02	0	24-HR	ALL	1ST		11/12/2015	24 hr
DW3 (PDISCR)	274639.34	2243401.34	0.19762	33.21	33.21	0	24-HR	ALL	1ST		11/12/2015	24 hr
DW4 (PDISCR)	274285.79	2243047.79	0.13223	28.3	28.3	0	24-HR	ALL	1ST		11/2/2015	24 hr
DW5 (PDISCR)	273932.23	2242694.23	0.11972	27.15	27.15	0	24-HR	ALL	1ST		11/2/2015	24 hr
DW6 (PDISCR)	273578.68	2242340.68	0.12253	30.51	30.51	0	24-HR	ALL	1ST		11/2/2015	24 hr
DW7 (PDISCR)	273225.13	2241987.13	0.16361	55.68	91	0	24-HR	ALL	1ST		1/22/2016	24 hr
DW8 (PDISCR)	272871.57	2241633.57	0.02344	90.42	105	0	24-HR	ALL	1ST		12/10/2015	24 hr
DW9 (PDISCR)	272518.02	2241280.02	0.16513	54.48	105	0	24-HR	ALL	1ST		1/22/2016	24 hr
DW10 (PDISCR)	272164.47	2240926.47	0.10901	40.5	64	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW11 (PDISCR)	271810.91	2240572.91	0.10413	32.37	32.37	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW12 (PDISCR)	271457.36	2240219.36	0.07632	24.49	24.49	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW13 (PDISCR)	271103.81	2239865.81	0.07147	15.89	15.89	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW14 (PDISCR)	270750.25	2239512.25	0.06805	15.3	15.3	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW15 (PDISCR)	270396.7	2239158.7	0.06471	11.37	11.37	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW16 (PDISCR)	270043.15	2238805.15	0.06151	11.3	11.3	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW17 (PDISCR)	269689.59	2238451.59	0.05846	9.37	9.37	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW18 (PDISCR)	269336.04	2238098.04	0.05558	11.79	11.79	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW19 (PDISCR)	268982.49	2237744.49	0.05287	11.37	11.37	0	24-HR	ALL	1ST		1/26/2016	24 hr
DW20 (PDISCR)	268628.93	2237390.93	0.0503	9.37	9.37	0	24-HR	ALL	1ST		1/26/2016	24 hr

NOx - Dispersion Modeling Results

Discrete Receptor ID	X	Y	Concentration [ug/m ³]	Elevation (ZELEV)	Hill Heights (ZHILL)	Flagpole (ZFLAG)	Aver. Period (AVE)	Source Group (GRP)	Rank	Net ID	Date
	265607.68	2236479.86	0.08913	0	0	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	266607.68	2236479.86	0.14648	3.4	3.4	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	267607.68	2236479.86	0.1307	4.8	4.8	0	24-HR	ALL	1ST	UCART1	1/26/2016 24 hr
	268607.68	2236479.86	0.23463	7.3	7.3	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	269607.68	2236479.86	0.14285	10.6	10.6	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	270607.68	2236479.86	0.16703	15	15	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2236479.86	0.17683	18.1	18.1	0	24-HR	ALL	1ST	UCART1	12/26/2015 24 hr
	272607.68	2236479.86	0.19737	12	12	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	273607.68	2236479.86	0.26291	14.1	14.1	0	24-HR	ALL	1ST	UCART1	1/21/2016 24 hr
	274607.68	2236479.86	0.3766	25.4	25.4	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2236479.86	0.45776	29.2	29.2	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2236479.86	0.34237	50.1	50.1	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277607.68	2236479.86	0.05227	72.3	83	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	278607.68	2236479.86	0.10627	60.6	60.6	0	24-HR	ALL	1ST	UCART1	1/1/2016 24 hr
	279607.68	2236479.86	0.08653	43.4	43.4	0	24-HR	ALL	1ST	UCART1	12/25/2015 24 hr
	280607.68	2236479.86	0.17689	36.6	36.6	0	24-HR	ALL	1ST	UCART1	12/9/2015 24 hr
	281607.68	2236479.86	0.03062	27.8	27.8	0	24-HR	ALL	1ST	UCART1	11/5/2015 24 hr
	282607.68	2236479.86	0.03411	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	283607.68	2236479.86	0.05392	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	284607.68	2236479.86	0.09115	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	285607.68	2236479.86	0.03575	38	38	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	265607.68	2237479.86	0.15621	3.6	3.6	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	266607.68	2237479.86	0.10215	3	3	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	267607.68	2237479.86	0.18394	5.1	5.1	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	268607.68	2237479.86	0.12925	9.2	9.2	0	24-HR	ALL	1ST	UCART1	12/28/2015 24 hr
	269607.68	2237479.86	0.20524	14.7	14.7	0	24-HR	ALL	1ST	UCART1	12/29/2015 24 hr
	270607.68	2237479.86	0.19289	14.1	14.1	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2237479.86	0.10672	16.4	16.4	0	24-HR	ALL	1ST	UCART1	12/24/2015 24 hr
	272607.68	2237479.86	0.19897	24	24	0	24-HR	ALL	1ST	UCART1	12/27/2015 24 hr
	273607.68	2237479.86	0.22748	19.2	19.2	0	24-HR	ALL	1ST	UCART1	1/21/2016 24 hr
	274607.68	2237479.86	0.40911	21	21	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2237479.86	0.47654	23.2	23.2	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2237479.86	0.2636	34.6	34.6	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277607.68	2237479.86	0.16674	53.1	53.1	0	24-HR	ALL	1ST	UCART1	1/6/2016 24 hr
	278607.68	2237479.86	0.09499	48.1	48.1	0	24-HR	ALL	1ST	UCART1	12/13/2015 24 hr
	279607.68	2237479.86	0.04707	65.3	65.3	0	24-HR	ALL	1ST	UCART1	11/8/2015 24 hr
	280607.68	2237479.86	0.09631	39.8	39.8	0	24-HR	ALL	1ST	UCART1	12/8/2015 24 hr
	281607.68	2237479.86	0.02562	34	34	0	24-HR	ALL	1ST	UCART1	12/3/2015 24 hr
	282607.68	2237479.86	0.06174	29.8	29.8	0	24-HR	ALL	1ST	UCART1	12/1/2015 24 hr
	283607.68	2237479.86	0.10225	29	29	0	24-HR	ALL	1ST	UCART1	12/7/2015 24 hr
	284607.68	2237479.86	0.0432	32.2	32.2	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	285607.68	2237479.86	0.11375	38.2	38.2	0	24-HR	ALL	1ST	UCART1	12/6/2015 24 hr
	265607.68	2238479.86	0.24025	3.8	3.8	0	24-HR	ALL	1ST	UCART1	1/15/2016 24 hr
	266607.68	2238479.86	0.18151	3.8	3.8	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	267607.68	2238479.86	0.1185	4.2	4.2	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	268607.68	2238479.86	0.20899	7	7	0	24-HR	ALL	1ST	UCART1	1/16/2016 24 hr
	269607.68	2238479.86	0.18437	8.3	8.3	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	270607.68	2238479.86	0.17859	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	271607.68	2238479.86	0.19439	24.7	24.7	0	24-HR	ALL	1ST	UCART1	1/10/2016 24 hr
	272607.68	2238479.86	0.22343	28.2	28.2	0	24-HR	ALL	1ST	UCART1	1/7/2016 24 hr
	273607.68	2238479.86	0.25228	17.6	17.6	0	24-HR	ALL	1ST	UCART1	1/5/2016 24 hr
	274607.68	2238479.86	0.42355	22.3	22.3	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	275607.68	2238479.86	0.48981	24.5	24.5	0	24-HR	ALL	1ST	UCART1	1/20/2016 24 hr
	276607.68	2238479.86	0.19011	35.7	35.7	0	24-HR	ALL	1ST	UCART1	1/2/2016 24 hr
	277607.68	2238479.86	0.13896	54	54	0	24-HR	ALL	1ST	UCART1	12/17/2015 24 hr
	278607.68	2238479.86	0.13459	42.6	42.6	0	24-HR	ALL	1ST	UCART1	12/25/2015 24 hr

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279607.68	2238479.86	0.2014	51	51	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
280607.68	2238479.86	0.06546	66.2	73	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
281607.68	2238479.86	0.09115	40.8	87	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
282607.68	2238479.86	0.12018	29.8	29.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
283607.68	2238479.86	0.05688	29.7	29.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
284607.68	2238479.86	0.09399	34.1	34.1	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
285607.68	2238479.86	0.13199	36.4	36.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265607.68	2239479.86	0.19422	15	15	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
266607.68	2239479.86	0.25412	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
267607.68	2239479.86	0.20818	11.6	11.6	0	24-HR	ALL	1ST	UCART1	1/5/2016	24 hr
268607.68	2239479.86	0.13943	15.2	15.2	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
269607.68	2239479.86	0.20053	11	11	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
270607.68	2239479.86	0.32708	14.3	14.3	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
271607.68	2239479.86	0.301	33.8	33.8	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
272607.68	2239479.86	0.20758	32.3	32.3	0	24-HR	ALL	1ST	UCART1	12/26/2015	24 hr
273607.68	2239479.86	0.27675	26.9	26.9	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
274607.68	2239479.86	0.40402	22.3	22.3	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
275607.68	2239479.86	0.48821	26.4	26.4	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2239479.86	0.15155	31.8	31.8	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
277607.68	2239479.86	0.13905	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
278607.68	2239479.86	0.07952	59.3	70	0	24-HR	ALL	1ST	UCART1	11/8/2015	24 hr
279607.68	2239479.86	0.11148	48.7	48.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2239479.86	0.10356	51.8	94	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
281607.68	2239479.86	0.143	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2239479.86	0.07651	25.8	25.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
283607.68	2239479.86	0.06201	28.1	28.1	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
284607.68	2239479.86	0.13697	31.2	31.2	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
285607.68	2239479.86	0.20294	35.9	35.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
265607.68	2240479.86	0.25819	13.9	13.9	0	24-HR	ALL	1ST	UCART1	1/17/2016	24 hr
266607.68	2240479.86	0.21017	16.3	16.3	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
267607.68	2240479.86	0.26235	16	16	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
268607.68	2240479.86	0.26461	31.2	31.2	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
269607.68	2240479.86	0.16623	17.4	17.4	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
270607.68	2240479.86	0.19358	12.2	12.2	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
271607.68	2240479.86	0.39473	38.3	38.3	0	24-HR	ALL	1ST	UCART1	12/29/2015	24 hr
272607.68	2240479.86	0.1928	32.7	32.7	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
273607.68	2240479.86	0.25423	25.7	25.7	0	24-HR	ALL	1ST	UCART1	1/7/2016	24 hr
274607.68	2240479.86	0.34884	21.2	21.2	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
275607.68	2240479.86	0.46043	23.8	23.8	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2240479.86	0.14584	28.9	28.9	0	24-HR	ALL	1ST	UCART1	12/10/2015	24 hr
277607.68	2240479.86	0.14368	43.5	69	0	24-HR	ALL	1ST	UCART1	12/18/2015	24 hr
278607.68	2240479.86	0.18982	47.9	47.9	0	24-HR	ALL	1ST	UCART1	12/9/2015	24 hr
279607.68	2240479.86	0.06374	55.9	55.9	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
280607.68	2240479.86	0.19262	38.1	38.1	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2240479.86	0.11491	29.7	29.7	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
282607.68	2240479.86	0.1155	33	33	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
283607.68	2240479.86	0.1829	30.9	30.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
284607.68	2240479.86	0.27838	32.5	32.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285607.68	2240479.86	0.18372	36.1	36.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265607.68	2241479.86	0.14685	5.4	5.4	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
266607.68	2241479.86	0.3498	11.8	11.8	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267607.68	2241479.86	0.27558	16.6	16.6	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
268607.68	2241479.86	0.33985	26.4	93	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
269607.68	2241479.86	0.28201	26.3	93	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
270607.68	2241479.86	0.21759	24.7	24.7	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
271607.68	2241479.86	0.28073	24.3	24.3	0	24-HR	ALL	1ST	UCART1	12/28/2015	24 hr
272607.68	2241479.86	0.19868	65.9	105	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
273607.68	2241479.86	0.30736	33.8	33.8	0	24-HR	ALL	1ST	UCART1	12/22/2015	24 hr
274607.68	2241479.86	0.49771	25.4	25.4	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr

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275607.68	2241479.86	0.39287	27.1	27.1	0	24-HR	ALL	1ST	UCART1	1/20/2016	24 hr
276607.68	2241479.86	0.20351	26.6	26.6	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
277607.68	2241479.86	0.13999	33.3	33.3	0	24-HR	ALL	1ST	UCART1	11/8/2015	24 hr
278607.68	2241479.86	0.03522	44.2	44.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
279607.68	2241479.86	0.20636	41.9	41.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2241479.86	0.18464	34.6	34.6	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
281607.68	2241479.86	0.16493	28.4	28.4	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
282607.68	2241479.86	0.22672	28.7	28.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
283607.68	2241479.86	0.32321	32.5	32.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2241479.86	0.21598	38	38	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
285607.68	2241479.86	0.2453	32.9	32.9	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265607.68	2242479.86	0.21167	5.6	5.6	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
266607.68	2242479.86	0.14265	10.6	10.6	0	24-HR	ALL	1ST	UCART1	1/9/2016	24 hr
267607.68	2242479.86	0.18175	11.9	11.9	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
268607.68	2242479.86	0.36154	19.1	19.1	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
269607.68	2242479.86	0.26713	25.5	25.5	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
270607.68	2242479.86	0.29258	29.4	29.4	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
271607.68	2242479.86	0.28837	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
272607.68	2242479.86	0.54032	44.1	44.1	0	24-HR	ALL	1ST	UCART1	1/10/2016	24 hr
273607.68	2242479.86	0.25433	29.1	29.1	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
274607.68	2242479.86	0.51575	23.6	23.6	0	24-HR	ALL	1ST	UCART1	1/4/2016	24 hr
275607.68	2242479.86	0.35489	24.3	24.3	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
276607.68	2242479.86	0.17141	31.4	31.4	0	24-HR	ALL	1ST	UCART1	12/27/2015	24 hr
277607.68	2242479.86	0.20589	35.2	35.2	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
278607.68	2242479.86	0.2095	37.8	37.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279607.68	2242479.86	0.29659	41	41	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
280607.68	2242479.86	0.22625	28.8	28.8	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
281607.68	2242479.86	0.41242	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
282607.68	2242479.86	0.20128	31.3	31.3	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
283607.68	2242479.86	0.25846	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2242479.86	0.02925	32.9	32.9	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
285607.68	2242479.86	0.04061	39.2	39.2	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
265607.68	2243479.86	0.26899	7.4	7.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
266607.68	2243479.86	0.26215	12.6	12.6	0	24-HR	ALL	1ST	UCART1	1/25/2016	24 hr
267607.68	2243479.86	0.23295	18.1	18.1	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
268607.68	2243479.86	0.16648	16.4	16.4	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
269607.68	2243479.86	0.27941	22.7	22.7	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
270607.68	2243479.86	0.32312	30.3	30.3	0	24-HR	ALL	1ST	UCART1	1/3/2016	24 hr
271607.68	2243479.86	1.05918	50.3	160	0	24-HR	ALL	1ST	UCART1	1/15/2016	24 hr
272607.68	2243479.86	0.46546	46.1	160	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
273607.68	2243479.86	0.53527	32.3	32.3	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
274607.68	2243479.86	0.40768	33.4	33.4	0	24-HR	ALL	1ST	UCART1	11/18/2015	24 hr
275607.68	2243479.86	0.24329	23	23	0	24-HR	ALL	1ST	UCART1	1/2/2016	24 hr
276607.68	2243479.86	0.28951	39.7	39.7	0	24-HR	ALL	1ST	UCART1	11/8/2015	24 hr
277607.68	2243479.86	0.25273	45.4	72	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
278607.68	2243479.86	0.3556	44.6	145	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
279607.68	2243479.86	0.30236	29.6	29.6	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
280607.68	2243479.86	0.29798	31.8	31.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
281607.68	2243479.86	0.29399	29.4	29.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
282607.68	2243479.86	0.02716	30.1	30.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2243479.86	0.11663	30.8	30.8	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2243479.86	0.09691	35.1	35.1	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
285607.68	2243479.86	0.14802	37.6	37.6	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
265607.68	2244479.86	0.21325	9.4	9.4	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
266607.68	2244479.86	0.3179	13.9	13.9	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
267607.68	2244479.86	0.23903	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
268607.68	2244479.86	0.28531	14.5	14.5	0	24-HR	ALL	1ST	UCART1	1/14/2016	24 hr
269607.68	2244479.86	0.34965	21.2	21.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
270607.68	2244479.86	0.31827	35.7	133	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr

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	271607.68	2244479.86	1.51549	56.1	160	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
	272607.68	2244479.86	0.1267	76.6	160	0	24-HR	ALL	1ST	UCART1	1/24/2016	24 hr
	273607.68	2244479.86	0.62319	36.5	36.5	0	24-HR	ALL	1ST	UCART1	12/23/2015	24 hr
	274607.68	2244479.86	0.62053	31.1	31.1	0	24-HR	ALL	1ST	UCART1	12/31/2015	24 hr
	275607.68	2244479.86	0.34105	33	33	0	24-HR	ALL	1ST	UCART1	11/17/2015	24 hr
	276607.68	2244479.86	0.18483	31.2	31.2	0	24-HR	ALL	1ST	UCART1	12/3/2015	24 hr
	277607.68	2244479.86	0.22164	46.1	145	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	278607.68	2244479.86	0.03284	121.9	139	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	279607.68	2244479.86	0.28914	32.1	32.1	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	280607.68	2244479.86	0.1315	23	23	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	281607.68	2244479.86	0.12129	21.5	21.5	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	282607.68	2244479.86	0.13976	28	28	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	283607.68	2244479.86	0.21508	30.5	30.5	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	284607.68	2244479.86	0.18189	31.7	31.7	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	285607.68	2244479.86	0.11143	33.5	33.5	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	265607.68	2245479.86	0.42877	0.4	0.4	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	266607.68	2245479.86	0.50392	12.5	12.5	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	267607.68	2245479.86	0.51661	9.4	9.4	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	268607.68	2245479.86	0.45214	10.2	10.2	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	269607.68	2245479.86	0.31703	19.2	19.2	0	24-HR	ALL	1ST	UCART1	1/11/2016	24 hr
	270607.68	2245479.86	0.62337	47.1	133	0	24-HR	ALL	1ST	UCART1	1/23/2016	24 hr
	271607.68	2245479.86	0.39581	27.3	133	0	24-HR	ALL	1ST	UCART1	1/19/2016	24 hr
	272607.68	2245479.86	0.87314	49.1	49.1	0	24-HR	ALL	1ST	UCART1	1/25/2016	24 hr
	273607.68	2245479.86	0.78306	40.8	40.8	0	24-HR	ALL	1ST	UCART1	11/12/2015	24 hr
	274607.68	2245479.86	0.88838	34	34	0	24-HR	ALL	1ST	UCART1	11/13/2015	24 hr
	275607.68	2245479.86	0.62551	34.1	34.1	0	24-HR	ALL	1ST	UCART1	12/8/2015	24 hr
	276607.68	2245479.86	0.28909	35	35	0	24-HR	ALL	1ST	UCART1	12/17/2015	24 hr
	277607.68	2245479.86	0.13393	48.2	48.2	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
	278607.68	2245479.86	0.2369	31.5	145	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
	279607.68	2245479.86	0.28372	24.9	24.9	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	280607.68	2245479.86	0.14638	20.8	20.8	0	24-HR	ALL	1ST	UCART1	1/1/2016	24 hr
	281607.68	2245479.86	0.12116	22.4	22.4	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
	282607.68	2245479.86	0.15221	32.2	32.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	283607.68	2245479.86	0.1483	26.7	26.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	284607.68	2245479.86	0.12776	27.7	27.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	285607.68	2245479.86	0.10113	33.3	33.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
	265607.68	2246479.86	0.25286	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	266607.68	2246479.86	0.26803	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	267607.68	2246479.86	0.27974	3.5	3.5	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	268607.68	2246479.86	0.29883	7.7	7.7	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	269607.68	2246479.86	0.34821	16.5	16.5	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	270607.68	2246479.86	0.40765	19	19	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	271607.68	2246479.86	0.47393	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	272607.68	2246479.86	0.62665	42.4	93	0	24-HR	ALL	1ST	UCART1	12/4/2015	24 hr
	273607.68	2246479.86	2.09834	49.1	49.1	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	274607.68	2246479.86	2.26083	39.2	39.2	0	24-HR	ALL	1ST	UCART1	11/19/2015	24 hr
AQ (HENI)	275607.68	2246479.86	0.25029	35.6	35.6	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	276607.68	2246479.86	0.06433	42.1	42.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	277607.68	2246479.86	0.07137	32.7	32.7	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	278607.68	2246479.86	0.11857	27.4	27.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	279607.68	2246479.86	0.12814	21.8	21.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	280607.68	2246479.86	0.12377	25.2	25.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	281607.68	2246479.86	0.11539	25.1	25.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	282607.68	2246479.86	0.10662	28.6	28.6	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	283607.68	2246479.86	0.09983	31	31	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	284607.68	2246479.86	0.09027	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	285607.68	2246479.86	0.0816	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
	265607.68	2247479.86	0.20149	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr
	266607.68	2247479.86	0.22013	0	0	0	24-HR	ALL	1ST	UCART1	1/27/2016	24 hr

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267607.68	2247479.86	0.22428	4.4	4.4	0	24-HR	ALL	1ST	UCART1	1/18/2016	24 hr
268607.68	2247479.86	0.34117	10.3	10.3	0	24-HR	ALL	1ST	UCART1	1/18/2016	24 hr
269607.68	2247479.86	0.39248	9.4	9.4	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
270607.68	2247479.86	0.3817	17.5	17.5	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
271607.68	2247479.86	0.31016	30.1	30.1	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
272607.68	2247479.86	0.41628	31	31	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
273607.68	2247479.86	1.65916	53	132	0	24-HR	ALL	1ST	UCART1	1/31/2016	24 hr
274607.68	2247479.86	1.93546	57.1	146	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
275607.68	2247479.86	0.33621	45.4	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2247479.86	0.03522	33	219	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
277607.68	2247479.86	0.67669	34.8	34.8	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
278607.68	2247479.86	0.47409	26.5	26.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279607.68	2247479.86	0.09371	23.2	23.2	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
280607.68	2247479.86	0.01716	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2247479.86	0.00905	29.1	29.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2247479.86	0.00609	31.7	31.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2247479.86	0.0045	25.7	25.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2247479.86	0.00374	24.9	24.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2247479.86	0.0034	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
265607.68	2248479.86	0.21517	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
266607.68	2248479.86	0.20687	0	0	0	24-HR	ALL	1ST	UCART1	1/28/2016	24 hr
267607.68	2248479.86	0.17619	0.9	0.9	0	24-HR	ALL	1ST	UCART1	1/8/2016	24 hr
268607.68	2248479.86	0.13832	12.9	12.9	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
269607.68	2248479.86	0.19623	15.4	15.4	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
270607.68	2248479.86	0.35354	16.3	16.3	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
271607.68	2248479.86	0.90744	26.2	26.2	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
272607.68	2248479.86	0.32581	26	26	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
273607.68	2248479.86	0.38841	30.8	219	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
274607.68	2248479.86	0.09847	89	219	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
275607.68	2248479.86	0.05688	102.8	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2248479.86	0.03799	34.5	219	0	24-HR	ALL	1ST	UCART1	11/7/2015	24 hr
277607.68	2248479.86	0.00997	25.5	25.5	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
278607.68	2248479.86	0.02314	19.1	19.1	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
279607.68	2248479.86	0.45373	28.5	28.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
280607.68	2248479.86	0.65151	30	30	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2248479.86	0.46113	31.7	31.7	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2248479.86	0.19056	32.3	32.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2248479.86	0.08576	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
284607.68	2248479.86	0.02085	25.6	25.6	0	24-HR	ALL	1ST	UCART1	12/20/2015	24 hr
285607.68	2248479.86	0.00698	31.4	31.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2249479.86	0.08324	0	0	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
266607.68	2249479.86	0.14585	0	0	0	24-HR	ALL	1ST	UCART1	1/30/2016	24 hr
267607.68	2249479.86	0.21494	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
268607.68	2249479.86	0.26021	9.2	9.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
269607.68	2249479.86	0.51446	14.4	14.4	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
270607.68	2249479.86	0.45317	18.8	18.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
271607.68	2249479.86	0.20408	25.3	25.3	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
272607.68	2249479.86	0.25543	15.6	15.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
273607.68	2249479.86	0.27829	24.2	219	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
274607.68	2249479.86	0.32701	33.4	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2249479.86	0.09979	84.2	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
276607.68	2249479.86	0.30237	39.9	219	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
277607.68	2249479.86	0.00863	23.6	197	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
278607.68	2249479.86	0.00651	17.9	17.9	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
279607.68	2249479.86	0.00956	27.4	27.4	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
280607.68	2249479.86	0.01826	19.6	19.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2249479.86	0.23173	21	21	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2249479.86	0.55101	14	14	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2249479.86	0.39915	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr

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284607.68	2249479.86	0.36287	33.6	33.6	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2249479.86	0.23128	35.2	35.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2250479.86	0.17337	0	0	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
266607.68	2250479.86	0.19999	0	0	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
267607.68	2250479.86	0.33677	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
268607.68	2250479.86	0.3099	9	9	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
269607.68	2250479.86	0.33738	22.3	22.3	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270607.68	2250479.86	0.11991	13.6	13.6	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
271607.68	2250479.86	0.14561	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2250479.86	0.09918	17	17	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
273607.68	2250479.86	0.1427	15.6	15.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
274607.68	2250479.86	0.1449	21.9	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2250479.86	0.0825	30	219	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
276607.68	2250479.86	0.00672	90.9	135	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
277607.68	2250479.86	0.20095	18.1	123	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2250479.86	0.00638	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
279607.68	2250479.86	0.00474	6.2	26	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
280607.68	2250479.86	0.01209	15.2	15.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
281607.68	2250479.86	0.00839	3.5	3.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
282607.68	2250479.86	0.01492	23.3	23.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
283607.68	2250479.86	0.13642	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
284607.68	2250479.86	0.40393	30.2	30.2	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
285607.68	2250479.86	0.41747	34	34	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2251479.86	0.25657	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
266607.68	2251479.86	0.31777	0	0	0	24-HR	ALL	1ST	UCART1	11/5/2015	24 hr
267607.68	2251479.86	0.30339	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
268607.68	2251479.86	0.11453	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
269607.68	2251479.86	0.1059	6.4	6.4	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
270607.68	2251479.86	0.1135	10	10	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
271607.68	2251479.86	0.07873	7.8	7.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
272607.68	2251479.86	0.18181	8.7	8.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
273607.68	2251479.86	0.05842	11.3	11.3	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
274607.68	2251479.86	0.15664	20.1	20.1	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2251479.86	0.02794	22.6	22.6	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
276607.68	2251479.86	0.15774	21.1	21.1	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2251479.86	0.17478	30.2	57	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2251479.86	0.01318	23.6	23.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2251479.86	0.00503	20.8	20.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
280607.68	2251479.86	0.00401	19.9	19.9	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
281607.68	2251479.86	0.00989	24.5	24.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
282607.68	2251479.86	0.01716	21.8	21.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
283607.68	2251479.86	0.0056	26.5	26.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284607.68	2251479.86	0.0177	32.9	32.9	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
285607.68	2251479.86	0.08226	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
265607.68	2252479.86	0.18104	0	0	0	24-HR	ALL	1ST	UCART1	1/31/2016	24 hr
266607.68	2252479.86	0.27086	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
267607.68	2252479.86	0.09258	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
268607.68	2252479.86	0.10044	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
269607.68	2252479.86	0.10154	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
270607.68	2252479.86	0.08727	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
271607.68	2252479.86	0.11877	0.4	0.4	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
272607.68	2252479.86	0.09087	4.8	4.8	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273607.68	2252479.86	0.08345	14	14	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
274607.68	2252479.86	0.12662	29.5	29.5	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2252479.86	0.03632	67.7	75	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276607.68	2252479.86	0.1678	18	18	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2252479.86	0.00555	22.6	22.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
278607.68	2252479.86	0.22959	21.6	21.6	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2252479.86	0.0059	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr

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280607.68	2252479.86	0.00418	19.4	19.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2252479.86	0.00352	22.3	22.3	0	24-HR	ALL	1ST	UCART1	12/21/2015	24 hr
282607.68	2252479.86	0.00682	24.9	24.9	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
283607.68	2252479.86	0.02145	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284607.68	2252479.86	0.01313	27.8	27.8	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285607.68	2252479.86	0.00823	27.5	27.5	0	24-HR	ALL	1ST	UCART1	11/10/2015	24 hr
265607.68	2253479.86	0.14344	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
266607.68	2253479.86	0.07908	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
267607.68	2253479.86	0.09109	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
268607.68	2253479.86	0.0854	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
269607.68	2253479.86	0.09507	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
270607.68	2253479.86	0.0818	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
271607.68	2253479.86	0.12337	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2253479.86	0.07946	9.7	9.7	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273607.68	2253479.86	0.11469	10	10	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
274607.68	2253479.86	0.07159	18.3	98	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2253479.86	0.04078	67.6	75	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
276607.68	2253479.86	0.19098	14.4	14.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2253479.86	0.00695	18.2	18.2	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278607.68	2253479.86	0.12203	19.3	19.3	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2253479.86	0.06818	20.4	20.4	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280607.68	2253479.86	0.00545	21.9	21.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
281607.68	2253479.86	0.00366	22.8	22.8	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2253479.86	0.00335	24.2	24.2	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
283607.68	2253479.86	0.00478	28.2	28.2	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
284607.68	2253479.86	0.01923	26.1	26.1	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
285607.68	2253479.86	0.02191	29.9	29.9	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265607.68	2254479.86	0.06206	0	0	0	24-HR	ALL	1ST	UCART1	11/1/2015	24 hr
266607.68	2254479.86	0.08095	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
267607.68	2254479.86	0.07016	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
268607.68	2254479.86	0.09047	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
269607.68	2254479.86	0.09226	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
270607.68	2254479.86	0.09182	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271607.68	2254479.86	0.09756	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
272607.68	2254479.86	0.03177	0	15	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
273607.68	2254479.86	0.08779	14	14	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
274607.68	2254479.86	0.03686	11.9	11.9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2254479.86	0.01554	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
276607.68	2254479.86	0.18118	20.4	20.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
277607.68	2254479.86	0.06451	6.2	6.2	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
278607.68	2254479.86	0.00622	6.9	6.9	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
279607.68	2254479.86	0.20617	17	17	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
280607.68	2254479.86	0.00776	21.5	21.5	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
281607.68	2254479.86	0.00503	30.7	30.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
282607.68	2254479.86	0.00342	26.7	26.7	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
283607.68	2254479.86	0.00349	28.4	28.4	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
284607.68	2254479.86	0.00371	23.6	23.6	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
285607.68	2254479.86	0.01424	27.5	27.5	0	24-HR	ALL	1ST	UCART1	12/5/2015	24 hr
265607.68	2255479.86	0.0713	0	0	0	24-HR	ALL	1ST	UCART1	11/6/2015	24 hr
266607.68	2255479.86	0.05725	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
267607.68	2255479.86	0.08715	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
268607.68	2255479.86	0.05976	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
269607.68	2255479.86	0.06321	0	0	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
270607.68	2255479.86	0.08948	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
271607.68	2255479.86	0.04326	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
272607.68	2255479.86	0.01818	0	0	0	24-HR	ALL	1ST	UCART1	12/14/2015	24 hr
273607.68	2255479.86	0.04885	9	9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
274607.68	2255479.86	0.01821	14.9	14.9	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
275607.68	2255479.86	0.01359	17.4	17.4	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr

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	276607.68	2255479.86	0.09776	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	277607.68	2255479.86	0.1249	15.4	15.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278607.68	2255479.86	0.00329	18.6	18.6	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	279607.68	2255479.86	0.09628	23.7	23.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	280607.68	2255479.86	0.1086	21	21	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281607.68	2255479.86	0.00493	27.9	27.9	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	282607.68	2255479.86	0.00448	20.2	20.2	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283607.68	2255479.86	0.00355	30.9	30.9	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	284607.68	2255479.86	0.00349	21.3	21.3	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	285607.68	2255479.86	0.00353	25.6	25.6	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	265607.68	2256479.86	0.04679	0	0	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	266607.68	2256479.86	0.07052	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	267607.68	2256479.86	0.03895	0	0	0	24-HR	ALL	1ST	UCART1	11/4/2015	24 hr
	268607.68	2256479.86	0.08139	0	0	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	269607.68	2256479.86	0.06078	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	270607.68	2256479.86	0.09663	0	0	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	271607.68	2256479.86	0.04974	0	0	0	24-HR	ALL	1ST	UCART1	12/1/2015	24 hr
	272607.68	2256479.86	0.05426	0	0	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	273607.68	2256479.86	0.02717	14.8	14.8	0	24-HR	ALL	1ST	UCART1	12/16/2015	24 hr
	274607.68	2256479.86	0.01393	13.8	13.8	0	24-HR	ALL	1ST	UCART1	12/6/2015	24 hr
	275607.68	2256479.86	0.01166	12.7	12.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	276607.68	2256479.86	0.03754	11.4	11.4	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	277607.68	2256479.86	0.09208	12.8	12.8	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	278607.68	2256479.86	0.00434	18.8	18.8	0	24-HR	ALL	1ST	UCART1	12/19/2015	24 hr
	279607.68	2256479.86	0.00776	18.4	18.4	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	280607.68	2256479.86	0.17796	15.7	15.7	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	281607.68	2256479.86	0.02749	20.5	20.5	0	24-HR	ALL	1ST	UCART1	12/30/2015	24 hr
	282607.68	2256479.86	0.00481	25.7	25.7	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	283607.68	2256479.86	0.00412	24.6	24.6	0	24-HR	ALL	1ST	UCART1	12/7/2015	24 hr
	284607.68	2256479.86	0.0035	21	21	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
	285607.68	2256479.86	0.00352	21.3	21.3	0	24-HR	ALL	1ST	UCART1	12/25/2015	24 hr
AQ (HENI)	275607.68	2246479.86	0.25024	35.57	35.57	0	24-HR	ALL	1ST		12/5/2015	24 hr
AQ (BHILAD)	279916.74	2244872.28	0.19118	22.92	22.92	0	24-HR	ALL	1ST		12/20/2015	24 hr
AQ (PUNAT)	276752.3	2247598.21	0.02859	34.31	84	0	24-HR	ALL	1ST		12/21/2015	24 hr
AQ (KANADU)	273710.9	2248366.37	0.38875	31.04	219	0	24-HR	ALL	1ST		11/4/2015	24 hr
AQ (SARAI)	271823.72	2244130.7	1.24617	52.28	160	0	24-HR	ALL	1ST		1/2/2016	24 hr
AQ (DAHILI)	277578.1	2242240.09	0.24912	30.46	30.46	0	24-HR	ALL	1ST		12/9/2015	24 hr
DW1 (PDISCR)	275108.63	2246122.33	1.70501	35.92	35.92	0	24-HR	ALL	1ST		11/21/2015	24 hr
DW2 (PDISCR)	274761.3	2245762.66	1.40082	34.43	34.43	0	24-HR	ALL	1ST		11/13/2015	24 hr
DW3 (PDISCR)	274413.97	2245402.99	0.99106	35.65	35.65	0	24-HR	ALL	1ST		11/13/2015	24 hr
DW4 (PDISCR)	274066.64	2245043.32	0.55155	33.65	33.65	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW5 (PDISCR)	273719.31	2244683.65	0.68319	35.15	35.15	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW6 (PDISCR)	273371.98	2244323.98	0.76803	39.02	160	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW7 (PDISCR)	273024.66	2243964.31	0.56238	41.83	160	0	24-HR	ALL	1ST		12/23/2015	24 hr
DW8 (PDISCR)	272677.33	2243604.64	0.5713	48.97	160	0	24-HR	ALL	1ST		1/16/2016	24 hr
DW9 (PDISCR)	272330	2243244.97	0.56254	51.89	160	0	24-HR	ALL	1ST		1/6/2016	24 hr
DW10 (PDISCR)	271982.67	2242885.3	0.37041	41.47	160	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW11 (PDISCR)	271635.34	2242525.63	0.29263	30.68	30.68	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW12 (PDISCR)	271288.01	2242165.96	0.26093	22.15	22.15	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW13 (PDISCR)	270940.68	2241806.29	0.23763	18.65	18.65	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW14 (PDISCR)	270593.35	2241446.62	0.21931	24.64	24.64	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW15 (PDISCR)	270246.02	2241086.95	0.19817	20.36	20.36	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW16 (PDISCR)	269898.69	2240727.28	0.18111	20.69	20.69	0	24-HR	ALL	1ST		12/8/2015	24 hr
DW17 (PDISCR)	269551.36	2240367.61	0.1657	17.64	17.64	0	24-HR	ALL	1ST		1/7/2016	24 hr
DW18 (PDISCR)	269204.03	2240007.94	0.15586	17.16	17.16	0	24-HR	ALL	1ST		1/7/2016	24 hr
DW19 (PDISCR)	268856.71	2239648.27	0.14672	14.69	14.69	0	24-HR	ALL	1ST		1/7/2016	24 hr
DW20 (PDISCR)	268509.38	2239288.6	0.1383	15.92	15.92	0	24-HR	ALL	1ST		1/7/2016	24 hr

Annexure- V

➤ Environmental Testing Method

ANNEXURE-V: ENVIRONMENTAL TESTING METHOD

Sr. No.	Parameters	Test Method / Standard against which tests are performed		Range of testing/ Limits of detection	Uncertainty of Measurement (\pm)
		As per NABL	As per MoEF		
• Ambient Air Quality Monitoring					
1.	Particulate Matter PM ₁₀	Gravimetric Method. IS-5182 Part-23:2006	Gravimetric Method. IS-5182 Part-23:2006	10 - 1000 $\mu\text{g}/\text{m}^3$	42.0 \pm 5.1
2.	Particulate Matter PM _{2.5}	Gravimetric Method. CPCB Manual Volume – 1, May 2011	Gravimetric Method. CPCB Manual Volume – 1, May 2011	4 - 100 $\mu\text{g}/\text{m}^3$	12.0 \pm 7.0
3.	Sulphur Dioxide	IS-5182(Part-2):2001 Reaffirmed 2006	IS-5182(Part-2):2001 Reaffirmed 2006	4 – 1050 $\mu\text{g}/\text{m}^3$	33.4 \pm 8.0
4.	Oxides of Nitrogen	Jacob & Hochheiser IS-5182 Part-6:2006	Jacob & Hochheiser IS-5182 Part-6:2006	6 - 420 $\mu\text{g}/\text{m}^3$	21.6 \pm 5.0
5.	Carbon Monoxide (Co)	--	By Using Gas Analyzer	--	--
6.	Voc	--	Adopted from OSHA & NIOSH (By GLC)	--	--
7.	Noise Level	--	SLM-100 (Instrument)	--	--
• Stack Emission Monitoring					
8.	Particulate Matter	IS 11255(Part 1):1985, Reaffirmed 2003	IS 11255(Part 1):1985, Reaffirmed 2003	10 - 500 mg/Nm^3	50.0 \pm 10.8
9.	Sulphur Dioxide	IS 11255(Part 2): 1985, Reaffirmed 2003	IS 11255(Part 2): 1985, Reaffirmed 2003	4 - 1000 mg/Nm^3	16.8 \pm 0.70
10.	Oxides of Nitrogen	IS 11255(Part 7):2005	IS 11255(Part 7):2005	5 - 400 mg/Nm^3	6.4 \pm 2.2

Sr. No.	Parameters	Test Method / Standard against which tests are performed		Range of testing/ Limits of detection	Uncertainty of Measurement (\pm)
		As per NABL	As per MoEF		
• Potable and domestic water, Ground water , Surface water (Rivers, lakes) Specification: IS 10500:2012					
1.	Colour (Pt-Co Scale)	IS 3025(Part 4): 1983, Reaff. 2006 Visible Comparison Method	IS 3025(Part 4): 1983, Reaff. 2006 Visible Comparison Method	1 – 50 Hazen	10 \pm 2
2.	Odour	IS 3025 (Part 5): 1983, Reaff. 2006 Qualitative Method	IS 3025 (Part 5): 1983, Reaff. 2006 Qualitative Method	Agreeable/ Not Agreeable	N.A.
3.	Turbidity	IS 3025 (Part10):1984, Reaffirmed 2006 Nephelometer Method	IS 3025 (Part10):1984, Reaffirmed 2006 Nephelometer Method	1.0-100 NTU	99.60 \pm 0.67
4.	pH	APHA,22 nd Ed., 2012, 4500-H ⁺ B,4-92 IS 3025(Part 11):1983, Reaff. 2006 By pH Meter	APHA,22 nd Ed., 2012, 4500-H ⁺ B,4-92 IS 3025(Part 11):1983, Reaff. 2006 By pH Meter	5 - 12	4.01 \pm 0.06
5.	Temperature	---	IS 3025(Part 9) 1984	--	--
6.	Total Hardness as CaCO ₃	APHA, 22 nd Ed., 2012, 3500 - B, 3-67 EDTA Titrimetric Method	APHA, 22 nd Ed., 2012, 3500 - B, 3-67 EDTA Titrimetric Method	1 - 500 mg/L	20.80 \pm 2.31
7.	Total Dissolved Solid	APHA, 22 nd Ed., 2012, 2540 C, 2-65 Gravimetric Method	APHA, 22 nd Ed., 2012, 2540 C, 2-65 Gravimetric Method	5 - 1000mg/L	150.80 \pm 3.30
8.	Calcium as Ca	---	APHA, 22 nd Ed.,2012, 3500 Ca.B	--	--
9.	Magnesium as Mg	APHA, 22 nd Ed.,2012, 3500-Mg, B,3-84 By calculation	APHA, 22 nd Ed.,2012, 3500 Mg, B,3-84 By calculation	5 - 500 mg/L	N.A.
10.	Total Alkalinity	IS 3025(Part 23): 1986, Reaff. 2009, Amds.2 Titration Method	IS 3025(Part 23): 1986, Reaff. 2009, Amds.2 Titration Method	0.5 -500 mg /L	51.50 \pm 5.40
11.	Chloride as Cl ⁻	APHA, 22 nd Ed.,2012,, 4500-Cl, B,4-72 IS 3025(Part 32):1988, Reaff. 2009 Argentometric	APHA, 22 nd Ed.,2012,, 4500-Cl, B,4-72 IS 3025(Part 32):1988, Reaff. 2009 Argentometric	0.15 - 250 mg/L	9.65 \pm 0.82

		Method	Method		
12.	Sulphate as SO ₄ ⁻²	IS 3025(Part 24): 1986, Reaff. 2009	IS 3025(Part 24): 1986, Reaff. 2009	1 - 40 mg/L	19.66 ± 0.33
13.	Nitrate as NO ₃	APHA, 22 nd Ed.,2012 4500 NO ₃ -B, 4- 122 UV Spectrophotometric Screening Method.	APHA, 22 nd Ed.,2012 4500 NO ₃ -B, 4- 122 UV Spectrophotometric Screening Method.	0.01– 10 mg/L	2.01 ± 0.59
14.	Fluoride as F	APHA, 22 nd Ed., 2012, 4500-F , D, 4 – 87 (SPADNS Spectrometer Method)	APHA, 22 nd Ed., 2012, 4500-F , D, 4 – 87 (SPADNS Spectrometer Method)	0.15 – 1.4 mg/L	0.75 ± 0.27
15.	Sodium	APHA,22 nd Ed.,2012, 3500-Na, B, 3-97 Flame Photometric In emission mode Method	APHA,22 nd Ed.,2012, 3500-Na, B, 3-97 Flame Photometric In emission mode Method	1.0 - 100 mg/L	30.04 ± 0.36
16.	Potassium	—	APHA 22 ⁿ Ed.,2012,3500 K,B	--	--
17.	Total Nitrogen	—	APHA 22 nd Ed.,2012, 4500 NH ₃ - B	--	--
18.	Total Phosphorous	—	APHA 22 nd Ed.,2012, 4500 – P , D	--	--
19.	Dissolved Oxygen	—	IS 3025(Part 38)1989, (APHA 22 nd Ed.,2012,4500 – O, B)	--	--
20.	Bio-Chemical Oxygen	—	IS 3025(Part 44)1993 Amd .01	--	--
21.	Chemical Oxygen Demand	—	IS 3025(Part 58)2006, (APHA 22 nd Ed.,2012,5220 –B)	--	--
22.	Phenolic Compound	—	APHA 22 nd Ed.,2012, 5530 - C	0.001	--
23.	Lead as Pb	—	IS 3025(Part 47)1994 Amd.02, (APHA 22 nd Ed.,2012 3111 –B)	0.01	--
24.	Arsenic	—	APHA 22 nd Ed.,2012, 3114 - C	0.01	--
25.	Cadmium	—	IS 3025(Part41)1992, (APHA 22 nd	0.003	--

			Ed.,2012,3111 –B)		
26.	Total Coliform	—	APHA 22 nd Ed.,2012,9222 - B	Absent	--
27.	E. Coli	—	IS : 15185 : 2002	Absent	--

Sr. No.	Parameters	Unit	Test Method / Standard against which tests are performed
• Soil Quality Testing			
1.	Bulk Density	gm/ml	Soil Chemical Analysis -By M.L. Jackson and Soil & Solid Waste Analysis -A Laboratory Manual -By Dr. P.K. Behera
2.	Salinity	ppt	
3.	Porosity	%	
4.	Texture Class		
	Silt	%	
	Clay	%	
	Sand	%	
5.	Ph(5% Solution)	--	
6.	Electrical Conductivity	μs	
7.	Cation Exchange Capacity	meq/100gm Clay	
8.	Sodium	mg/kg	
9.	Potassium	mg/kg	
10.	Nitrogen	mg/kg	
11.	Magnesium	mg/100 gm	
12.	Phosphorous	mg/100 gm	
13.	SAR	--	
14.	Water Holding Capacity	ml/100 gm	
15.	Iron as Fe	mg/lit.	
16.	Copper as Cu	mg/lit.	
17.	Zinc as Zn	mg/lit.	
18.	Manganese as Mn	mg/lit.	
19.	Nickel as Ni	mg/lit.	

Annexure- VI

➤ Disaster Management Plan

DISASTER MANAGEMENT PLAN

ON

MANUFACTURING OF SYNTHETIC ORGANICS CHEMICALS

(Category: 5(f) "B")

FOR

PROPOSED PROJECT

Of

M/s. HENI DRUGS PRIVATE LIMITED

Located At,
**Plot No. 1901/1901A, GIDC Estate,
Sarigam – 396155, Dist. - Valsad. (Gujarat) India.**

Prepared by,

**EIA CONSULTANT ORGANIZATION
UNISTAR ENVIRONMENT AND RESEARCH LABS PVT. LTD.VAPI – GUJARAT**

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Annexure I:Evacuation Plan

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1. INTRODUCTION

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and, as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups:

(a) Man Made Disasters

Malafide intentions such as sabotage, riots, industrial unrest, air attack etc. resulting into industrial accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, other structural collapses, air, sea, rail and road transport accidents, aircraft crashes, collisions of vehicles carrying inflammable liquids, oil spills at sea etc. will required State/National level resources to combat it.

(b) Natural Calamities

Disasters resulting from natural phenomena like earthquakes, volcanic eruption, storm, surges, cyclones, tropical storms, floods, landslides, forest fires and massive insect infestation. Also in this group, violent draught which will cause a creeping disaster leading to famine, disease and death must be included. These types of disasters are not under the purview of this plan.

Any kind of disaster can result in emergency situation in plant area. Depending on the type & place of the emergency, it can be classified in two categories:

(a) On Site Emergency

Emergency due to conditions (uncontrolled reaction, small fire, small gas leak, spill, failure of power, water, air, steam, cooling media, scrubbing media etc.) and which can be locally handled by plant personnel alone (without outside help) is not considered as major emergency. Line of actions to tackle such emergencies should be as per the onsite plan.

(b) Off Site Emergency

A major emergency occurring at work is one that may affect several departments within and / or may cause serious injuries, loss of life, extensive damage to property or serious disruption outside the works. It will require the use of outside resources to handle it effectively.

Usually the result of a malfunction or the normal operating procedures, it may also be precipitated by the intervention of an outside agency or natural calamity such as a severe storm, flooding, crashed aircraft or deliberate acts of person or sabotage.

2. MAJOR ON-SITE EMERGENCY

The identification of maximum onsite credible accidents due to Toxic and flammable material may arise from:

- (1) A slow intermittent release through a leaking relief valve.
- (2) A fire or mechanical damage is threatened on installation containing toxic and flammable material, over pressurization or plant failure.
- (3) Due to spillage of toxic chemicals.

(4) A major accident may occur due to sudden release of large quantity of toxic and flammable substances, as it would form large toxic cloud or vapor cloud. Although the probability of such an event occurring is extremely low.

a. TRANSPORTATION EMERGENCY FOR HAZARDOUS CHEMICALS

- The rapid growth of industries in India has boosted the transportation of hazardous chemical by road. This has in turn given birth to transportation emergency. When the carriers of the hazardous substances gets involved in accident it leads to disastrous consequences, maybe due to fire, explosion or toxic spillage resulting in damage of property, environment pollution and sometimes even loss of human life on both the sides of the transportation route. For handling and minimizing such emergency following survey is undertaken.
- The routes of transportation by road for hazardous chemicals are identified and restricted, so that the least populated area is affected during emergency.
- Population survey on both sides of the proposed transportation routes up to 500mm is undertaken so that the approximate number of people likely to be affected can be identified beforehand. Accordingly necessary evacuation and medical preparedness can be planned during the time of emergency.

b. FACTORS TO BE CONSIDERED DURING EVACUATION REQUIRED DUE TO CHEMICAL HAZARDS SPILLAGE

(i) The Dangerous Goods

- Degree of health hazard
- Amount involved.
- Containment /control of release.
- Rate of vapor movement.

(ii) The Population Threatened

- Location
- Number of people
- Time to evacuate or protect in place
- Ability to control evacuation or protection in place
- Building types and availability
- Special institutions or populations e.g. nursing homes, hospitals, etc.

(iii) Weather conditions

- Effect on vapor and cloud movement
- Potential for change
- Effect on evacuation or protection in-place.

c. ON SITE EMERGENCY MANAGEMENT PLAN

This emergency management plan specially deals with “On-site emergency” i.e. with respect to accidents that may take place in the industry and their effects are confined to the factory premises, involving only the people working in the factory.

i. Fire – Emergency Control Management

- Any person who notices fire will immediately inform through phone or messenger to:
 - Main gate
 - Concerned supervisor/shift incharge
 - HOD (Security and firefighting)
- Concerned supervisor will switch off electricity near the place of fire.
- Use suitable firefighting equipment placed at various locations. Fire extinguishers will be provided in all area; information of the fire extinguishers will be shown on plant layout drawing and provided to all department & concern personal. Following are the details of the fire extinguishers provided within premises.

Table 1: List of Safety &Emergency Facilities

Sr.no.	Particular of Equipment	Requirement
1	DCP powder (50% of fire extinguishers)	17
2	CO ₂ Cartridges (50% of fire extinguishers)	7
3	Sand scoops	8
4	Safety helmets	20
5	Stretchers	1
6	First aid box with anti-snake serum& Antidotes	3
7	Rubber hand gloves	20
8	Explosive meter	0
9	Fire entry suit w/o breathing apparatus	0
10	Resuscitator	0
11	Electric siren with 3 km range	0
12	Water gel blandest	0
13	Red/green flags for fire drill	0
14	Safety Goggles	20
15	Ambulance	0
16	Safety Shoes	20
17	Mention if any other	

Table 2: List of Fire Extinguisher

Sr. No.	Area	Type of Extinguisher	Nos	Capacity
1	Manufacturing & Utility Areas	For ex. CO ₂ , DCP/Foam	12	2 to 4 kgs
2	Laboratory	DCP	1	2 to 4 kgs
3	R.M. Storage & Tank Area	DCP/Foam	4	2 to 4 kgs
4	Finish Goods Area	DCP	4	2 to 4 kgs
5	Office	CO ₂	2	1 to 2 kgs

6	Security Office	CO2/DCP	4	2 to 4 kgs
7	Spare	Foam/DCP	4	2 to 4 kgs
8	Mention if any other	-	-	-

Table 3: Location of fire hydrant point with hose box

Sr. No.	Area / Plant	Nos. Of Hydrant point with hose box
1	Plant Areas	6
2	Ware house	1
3	R.M. Storage and Tank area	1
4	Utility area	0
5	Administrative Building	0
6	Security Area	1
7	Laboratory Area	0
	Mention if any other	

- Use fire hydrant provided in the plant properly as per suitability under guidance & supervision of site in charge. Following are the details of the fire hydrant points with Hose Box provided within premises.
- Main gate will send ambulance to the accident site and inform Chief Medical Officer.
- Security and firefighting personnel will rush to the site along with necessary equipment and cordon off the area. They will not allow unauthorized persons to enter in the area of fire.
- Security and firefighting personnel and other personnel will start using suitable firefighting equipment to extinguish fire.
- HOD Utility will ensure smooth supply of water.
- HOD will arrange to remove any stored material that is likely to come in contact with fire and may catch fire.
- HOD will arrange to dispose burnt material as waste as per waste disposal of that department and take appropriate action for mitigation of environmental impacts.

Emergency Control Procedure for Hazardous Chemicals

- In case of any major incident in chemical storage &/or transfer/handling system, immediately inform through phone or messenger to:
 - Main gate
 - Concerned supervisor / shift in charge
 - HOD (Security & Fire Fighting)
- Main gate will inform ambulance to send at the accident site and inform to Medical Officer.
- Security and firefighting personnel will rush to the site along with necessary equipment and cordon off the area. They will not allow unauthorized persons too near to the accident site.

- The emergency management team will follow the methods established in line with the guidelines of “Chemical Emergency Response Guide” as prepared separately for all chemicals.
- If any person is injured or affected in incident, provide first aid or shift him to dispensary, if required.
- If there is fire following leak/spill, follow procedure for mitigation of fire.
- If there is spillage of hazardous chemical following fire &/or dispersion, HOD arrange to collect the material, clean the area and dispose it accordingly after treatment as per the methods established in line with the guidelines of “Chemical Emergency Response Guide” as prepared separately for all chemicals.
- HOD will arrange to transfer spilled material and take appropriate action for mitigation of environmental Impacts as per the waste disposal plan and regulatory guidelines.
- Effluent treatment plant will take necessary action to treat the effluent arising out of the emergency control /management activities effluent.

ii. Control Room

The security office, at main gate, will be the control room that is manned 24 hours. The control room will be headed by Manager- Security, assisted by HOD (Personnel) and Safety Officer. The following facilities are available in the control room:

- Layout of the plant
- Emergency Contact List
- Maximum number of people working at a time and assembly points
- Population around the plant
- Internal and external telephones with telephone directory
- Public address system
- Torch lights
- List of dispensaries and registered medical practitioners around the plant
- Area map of surrounding villages
- Nominal roll of employees
- Note pads and pencils to record message received and instruction to be passed through runners
- The methods established in line with the guidelines of “Chemical Emergency Response Guide”
- “Chemical Emergency Response Guide”
- A copy of Emergency Plan
- List of emergency control committee, emergency crew, medical staff, transportation staff, and security and firefighting staff
- First aid box, jiggery, and peppermint
- Sitting arrangement

iii. Emergency Contact List

- During emergency, any person facing incident or any person aware of incident or any person seeking information for emergency contact details will use the following list.

Table 4: Emergency responsibilities personals:

S. No.	Name / Designation	Contact	Nos.
1	Mr. Kapil Girotra Director	Direct Line	0260-2780432-25
		Intercom	
		Home	
		Mobile	
2	Mr. vithalbhai pawar (Unit Head)	Direct Line	0260-2780432-24
		Intercom	
		Home	
		Mobile	
3	Mr. Vithal pawar (Manager – Production)	Direct Line	0260-2780432-23
		Intercom	
		Home	
		Mobile	
4	Mr. prasatbhai (Manager-Maintenance)	Direct Line	0260-2780432-24
		Intercom	
		Home	
		Mobile	
5	Mr. Prasantbhai (EHS-Manager)	Direct Line	0260-2780432-23
		Intercom	
		Home	
		Mobile	
6	Mr. (EXECUTIVE-Adm./P&A/HR)	Direct Line	
		Intercom	
		Home	
		Mobile	
7	Mr. (Incharge QC)	Direct Line	
		Intercom	
		Home	
		Mobile	
8	Mr. (Incharge Safety & Security)	Direct Line	
		Intercom	
		Home	
		Mobile	
10	Mr. (Security In-charge)	Direct Line	0260-2780432-21
		Intercom	
		Home	
		Mobile	
11	Local Crisis Control Room, GIDCSarigam	0260- 278139	

DISASTER MANAGEMENT REPORT: M/s. HENI DRUGS PVT. LTD.,
Proposed Expansion of Synthetic Organic Chemical Manufacturing Unit

S. No.	Name / Designation	Contact	Nos.
12	Fire Services,	0260-2780222	
	Common Fire Service Contact, Hot Dial	101	
13	Police Stations/control room: Sarigam Umargaon Bhilad Daman Silvassa Valsad	0260 - 2780933 0260 - 2562333/2561255 0260 – 2784033 0260-2254100/2254999 0260- 2642130/2642002 02632-242900/253333	
	Police Control Room, Hot Dial	100	
14	Collector Office Mamlatdar, Umargam Mamlatdar, Disaster, Valsad	02632 - 243417/253613 0260 – 2562089 02632- 243238/244274/244279	
15	GPCB–VAPI	2432089/2426207	
16	GSPC Local Emergency Contact	0260-6452000	
17	Primary Health Centre, Sarigam	0260-2562445	
18	Haria Hospital, Vapi	0260-2400053/2430206	
19	CHC And Government Referral Hospital, Bhilad	0260-2374329, 2375519	
20	Ambulance & Emergency, Hot Dial	108	
21	Blood Bank Nukem Blood Bank (Haria) Lions Blood Bank	0260 - 2430654,2400053 0260- 2434600,2434601	

iv. Assembling Point

During emergency, one emergency assembling point is provided near main gate area. Main gate will be the assembly points depending upon the wind direction and location of the person with respect to incident area. The person will move opposite to wind direction (facing direction from which wind is blowing) and away from the source of chemical leakage. When possible and space is available, person will move into left & right direction of the wind direction and finally will reach to the assembly point. Wind direction may be known by seeing direction of windsocks located at different points in the company and direction of stack smoke.

Name of neighbor industries:

1. HIGH PURITY LABORATORY CHEMICALS PVT LTD
2. HARDCASTLE PETROFER PVT LTD
3. SUPERSEAL CHEMICALS (I) PVT LTD
4. MERIT ORGANICS PVT LTD.
5. COROMANDEL INTERNATIONAL LTD.

v. Warning Signal

In case of emergency, people will be informed by raising siren. Manager Security/Manager P&A are authorized to raise siren. Siren will be blown intermittently for 5 minutes and will be treated as declaration of major emergency. Siren will be located at turbine house of power block.

vi. Emergency Ending

The emergency will be declared ended when the source of gas emission has been effectively isolated and gas clouds dispersed. This will be done by on – site incident controller. Siren will be blown intermittently for 2 minutes to declare emergency end.

vii. Emergency Control Committee (ECC)

The emergency control committee will be comprising of the following members.

- Managing Director/Units Head - Main Controller
- General Manager – On-site Incident Controller(Leader)
- Production Manager – Dy. On-site Incident (Jn. Leader)
- Manager (EHS)- On-Site Instructor
- Maintenance Manager
- Manager (P&A, Admin)
- HOD (Laboratory)
- In-charge/Manager (Godown)
- Manager (Commercial)
- In-charge/Manager (Security)
- Safety Officer

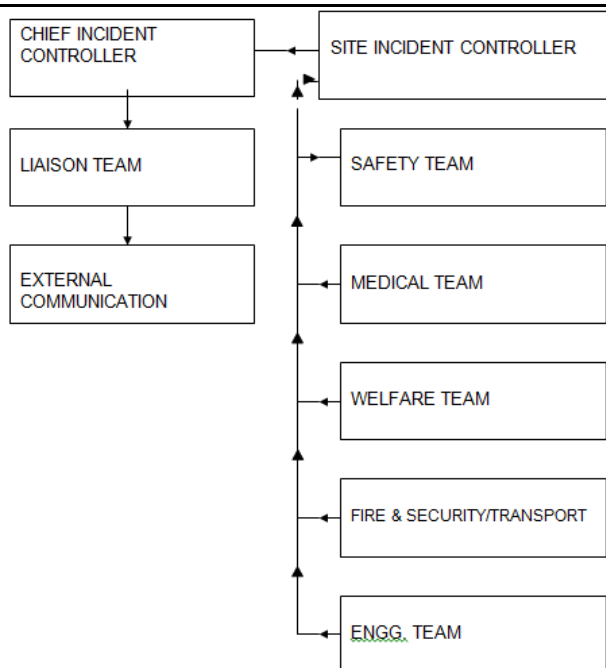


Figure 1.1: Schematic representation of EMC

viii. Responsibilities of Persons Involved

A. Works Main Controller

Either or Both of Managing Director & Unit Head will be works main controller. He/they will take care of on – site emergency plan. As soon as he/they is/are informed of emergency, he / they will:

- Assume responsibilities for overall main control.
- Ensure that members mentioned called in.
- Maintain a speculative continuous review of possible development and assess these to determine most probable cause of events.
- Arrange to maintain chronological record of emergency.
- Issue authorized statements to news media and inform head office.
- Inform outside emergency services including fire, police, hospitals, District Magistrate.

B. On-Site Incident Controller & Dy. On-Site Incident Controller

Either of General Manager or Manager Production will the on –site incident controller. When General Manager is assigned duty of On-site Incident Controller the Manager Production will be acting as Dy. On-site Incident controller to as per direction of General Manager. In other case, when General Manager is not available, Dy. On-Site Incident controller will act as On-site Incident Controller. As soon as he/they is/are informed of emergency he/they will proceed to the site. On arrival he/they will:

- Assess the scale of emergency and decide if a major emergency exists or likely to exist and declare it
- Direct all operation for controlling and stopping chemical leakage with the following priorities:
 - Secure safety of personnel

- Minimum damage to plant and machinery
- Direct rescue operation
- Ensure that affected area is searched for casualties
- Ensure that all non-essential workers in affected area leave the place (direct them to go to the assembly point as per wind direction)
- Report developments to works main controller
- Keep record to preserve evidences to facilitate any subsequent enquiry

C. Communication and Advisory Team

This team will consist of manager/head of various departments of the company.

D. Emergency Security Controller

He will be the senior most security person located at main gate office. He will take care of security of the plant and also guide outside government agencies.

E. Medical Officer

Medical officer will be a doctor / trained compounder at occupational health center / dispensary of plant / first aid center.

F. Worker

- Workers /employee of A/B/C shift having duty in following area/department will not leave their place of work without instruction by On-site Incident Controller &/or Dy. On-site Incident Controller &/or HOD of respective area/department:
 - Boiler operation
 - Tank Farm Area
 - Water supply
 - Electrical Dept.
 - Logistic/transportation
- Persons of any department instructed specifically not to leave the plant by shift in-charge/ shift supervisor
- Shift workers will see that leakage in any tank is contained and eliminated under guidance of their supervisor/shift in-charge
- Shift workers are strictly subjected to follow the manual of Chemicals while working in the area having hazardous chemicals. All workers will work with hazardous chemicals only under guidance /supervision of their supervisor / shift in-charge
- Shift workers (Water Supply) will ensure water supply to colony and plant. In no case water supply to the colony will be cut off.
- Shift workers (Electrical) will ensure power to water supply, colony, and plant. In no case power is to be switched off. They will also ensure cut-off of power in the area where power supply required to be stopped.
- Boiler attendants and operators will ensure that their plants are stopped in orderly manner without any damage.
- In-charge of transportation will ensure that their vehicles are parked in proper area to avoid

blockage on road and all vehicles are in ready condition for evacuation operations in case of evacuation is required.

- Other shift workers specifically instructed not to leave the plant, will perform the following function:
 - Act as extra first aiders to deal with casualties
 - Transport equipment, if any, to the incident
 - Remove vehicles away from the risk areas
 - Act as runners in case of communication difficulties
 - Any other work directed by senior person present at that location
- All other workers, except those mentioned above, will leave their work place after stopping their plant properly to avoid damage.
- After completing the above-mentioned/assigned works, all workers will leave their place immediately.

G. Communication System

Following communication system will be followed:

- Control room and place of incidence: Telephone/Mobile/Messenger/Internal Network/Internet
- Between two control teams: Telephone/Messenger/Walky-talky/Mobile/Internal Network
- For general communication is all area: Mike/Speaker equipped with microphone further, public address system is provided at control room.

H. Safety Appliances

All safety appliances as required to combat the emergency as suggested in “Chemical Safety measures/MSDS” will be made available in plant. All plant area will have suitable safety equipment like; fire extinguisher, self-contained breather, mask, goggles, safety suit, hydrant etc. as required.

I. Check – Up Schedule

For handling of hazardous materials, standard procedures shall be followed. Further, regular check-up shall be done to ensure safety. Guidelines for such check-up are given below:

Table 5: Details of Inspection Schedule

Particular	Frequency	Responsibility
Leakage in Hazardous Chemicals Tanks/Drum/Container/Pipelines	Daily	Manager (Production)
Temperature, Pressure & Groundings	Daily	Manager (Production)
Storage & handling of materials as per standard procedure	Daily	Manager (Production & EHS)
Pump, Motors & Valves for operation	Weekly	Manager (Maintenance)
Availability & Conditions and use of Safety appliances	Weekly	Manager (EHS&/or HR)
First aid box, peppermint, antidotes, vaccines and medicines	Weekly	Manager (Production&/or HR)
Fitting and fixtures	Monthly	Manager (Maintenance)

Recalibration of pressure gauge & flow meters	Monthly	HOD (Instrumentation)
Siren	Daily	HOD (Electrical)
Mock drill for Chemical leakage & Fire	Half yearly	Manager (Production)
Medical check – up	Half yearly	Manager (HR/P&A)
Testing of hoist, ropes, and sling	Yearly	Manager (Maintenance)
Pipeline and fitting replacement	Once in 4 yrs.	Manager (Maintenance)

J. Training

To educate employees, their families, and inhabitants in surrounding villages regarding precautions to be adopted and information system in case of hazardous chemical leak and also to train a group of employees in methods and procedures to prevent and/or to contain such leak is highly essential and is provided as under:

- Training and holding regular mock drills in dealing with hazardous chemical leak to employees working in hazardous chemical handling area, production plant & other areas.
- Training and holding mock drill in dealing with hazardous chemical leak and familiarization with terrain to fire and security staff.
- General safety instructions to protect individual from effects of chemicals are also propagated through safety exhibitions. Further, these instructions are displayed and distributed in English, Hindi, and Gujarati.

K. Medical Facility

The company shall have occupational health center/ dispensary for medical treatment. A full time/contracted MBBS, MD doctor shall be in charge of the center. Further, many hospitals are located nearby area / villages. To provide first aid to the affected person first aid box will be provided in the company. First aid box will be regularly checked.

L. Mutual Aid

While necessary facilities shall be made available and shall be updated from time to time, sometimes, it may be necessary to seek external assistance; it may be from the neighboring factories or from the State Government as the case may be. Upon inception of operation of the company following company of GIDC sarigam will be contacted to establish the mutual facilities for emergency management.

1. HIGH PURITY LABORATORY CHEMICALS PVT LTD
2. HARDCASTLE PETROFER PVT LTD
3. SUPERSEAL CHEMICALS (I) PVT LTD
4. MERIT ORGANICS PVT LTD.
5. COROMANDEL INTERNATIONAL LTD.

M. Mock Drill

In spite of detailed training, it may be necessary to try out whether, the Onsite Emergency Plan work out and will there be any difficulties in execution of such plan. In order to evaluate the plan and see whether the plan meets the objectives of the Onsite Emergency Plan, occasional mock drills are contemplated. Before undertaking the drill, it would be very much necessary to give

adequate training to all staff members and also information about possible mock drill. After few pre-informed mock drills, few UN-informed mock drills would be taken. All this is to familiarize the employees with the concept and procedures and to see their response. These scheduled and unscheduled mock drills would be conducted during shift change, public holidays, in night shift etc. To improve preparedness once in 6 months and performance is evaluated.

d. OFF – SITE EMERGENCY MANAGEMENT PLAN

The off-site emergency plan prepared herein will deal with those incidents, identified in the on-site plan, which have the potential to affect adversely the persons or the environment outside the boundary of the premises. Whenever such an emergency occurs, there is a great need to control and isolate the danger, and to minimize the adverse effect to the greatest extent possible. This plan has been drawn up with a view to mobilize resources and integrate with State Contingency Plan for an effective system of command and control in combating the emergency.

The off-site plan is the tool for co-ordination of existing services and their readiness, as far as possible, for the hazards and problems, which may arise in an incident. The information for the off-site emergency plan such as site Data, Toxic Cloud Dispersion distances, Role of Factory Management, External Support Services, Transportation Emergencies etc. is furnished.

Thus in brief the two main purposes of the off-site emergency plan are:

- To provide the local/district authorities, Police, Fire Brigade, Doctors, surrounding industries and public, the basic information of risk assessment and to appraise them of the consequences and the protection/prevention measures and control plans and to seek their help to communicate with the public in case of a major emergency.
- To assist the State Authorities (GSDMA, Collectors etc.) for preparing the off-site emergency (Contingent) plan for the district or particular area and to organize rehearsal from time to time and initiate corrective actions based on the lessons learnt.

A. Central Control Room (CCR)

The central control room is the place under the control of chairman of local crisis plan (LCP) committee, where the operations to handle the emergency are directed and co-ordinated. It is the Centre of Resources Mobilisation, Information & Media Communication.

B. Fire & Rescue Wing

The control of fire is normally the role of the fire commandant, till the controller of team of local disaster management authority come on site. He may also have a similar role for other type of incident like explosions, toxic release and collapse of structure where rescue work is to be carried out in scientific and systematic way. He has to ensure mobilization of all the fire services, and other requirements to achieve the target. He will liaise with other coordinator and feed the information regarding incident to the scene of fire or to the site.

PHASE 1: During Normal Circumstances Fire & Rescue Wing Should Carry Out and Get Prepared During Normal Period

1. Identify hazard potential areas.
2. Knowledge of approach roads & escape routes.

3. Provision adequate water supply and knowledge of other sources of water supply.
4. Arrangement of adequate type of firefighting equipment.
5. Provision of well-trained manpower.
6. Arrangement for pulling out manpower and resources from various units, without loss of time.
7. Provisions of required quantity of fire extinguishing chemicals & their easy procurements, also with mutual aid system.
8. Proper & efficient communication system, preferably wireless, on single channel.
9. Adequacy of specialized rescue team, with specific equipment.
10. Maintaining the standard firefighting equipment and store in working condition to meet call at any time.
11. Operational uniformity- fire response plan.
12. Knowledge of chemicals and their properties and types of fire extinguishing media to be used.
13. To arrange the training for fire crews and rescue team for evacuating purpose.
14. Incident involving chemical emergency/ toxic gas release, situation shall be handled by wearing self-contained breathing apparatus, along with protective clothing.
15. Fire commander shall keep ready a special jacket, to wear during emergency for identification. Proper co-ordination is required with police for the quick movement of fire fighting vehicles.
16. To know about the arrangement to keep open railway level crossing for quick movement of fire fighting vehicles I required with railway authority.

PHASE 2: During Emergency

1. For identification of fire-commander shall wear a special jackets or identification.
2. Immediately after receiving the message from Local Control Room (LCR), the Fire Commandant shall activate/mobilize the crew to order from nearby Fire Station & rush to the site under intimation to LCR.
3. The fire commandant, before ordering, will ensure the type of fire-extinguishing media required and approximate quality on getting information about the scene of fire or the units.
4. At the site of incident, the Fife Commandant will thoroughly observe and inspect and survey the site for the use of fire media, and will start functioning accordingly, till the emergency is controlled in all respect, with constant touch with LCR, giving the details and adopted controlling procedures.
5. Fire commandant will act as Incident controller at site. All the agencies shall report to him at site.
6. Further, in case of more help required, he will report to LCR accordingly with specific and clear instructions for such help.
7. For the suspect trapped personnel, in case of toxic gas leakage and major fire, rescue operation will be carried out as instructed by LCR on the advice of experts using necessary respiratory protection system.

PHASE 3: After Emergency

1. Incident controller will give the details about the incident to LCR also, for further actions, if required.
2. After "ALL OK SIREN" the necessary precautionary measures will be put in practice.
3. Work of removal of debris, removal of trapped persons or removal of dead bodies or other work as per scenarios & instructions will be carried out.
4. Incident Controller will assess the total damage and will give clear report about the scene to the chairman of LCG.
5. Incident controller will assess the adequacy of the work carried out and lacuna in the actions and find out the improvement to be required.

C. Warning, Evacuation & Traffic Control Wing

Role:

Formal duties of the Police Authority during emergency include protecting life and property and controlling traffic movement. Further, police have to control and evacuate unnecessary public, to cordon off area of incident and ensure free movement of vehicles involved in relief operations.

Functions:

1. Control and regulations of traffic within the area of incident.
2. Assist the fire-fighting wing by cordoning off the affected area and help the fire-fighting wing by supplementing fire-fighting personnel to the extent possible.
3. Assist the medical & evacuation personnel to work without any hindrance and help the medical department in evacuating casualties.
4. Prevent unauthorized entry into the affected area.
5. To control general law & order situation.

During Normal Circumstances:

1. To develop control point and communication system.
2. To plan clear chain of command and control for controlling traffic at accident site.
3. To decide assembly point, shelter points etc. keeping in view the wind direction.
4. To arrange necessary equipment for warning the population.
5. To prepare procedure to regular traffic and diversion of traffic on approach road to accident prone industrial pockets.
6. To keep co-operation with all emergency services and Control Room.
7. To arrange training for police staff.
8. To gain knowledge of risk hazards and identify accident-prone areas.
9. To decide strategy to pull out resources.
10. To issue passes to persons expected on duty, transport services and others.
11. To communicate about transfer of officer, charge in address with telephone number to the LCG for updating the information.
12. To decide procedure to maintain records.

13. To lay down the scheme of wireless network for smooth flow of information to various agencies for containing the emergency.

During Emergency:

1. On getting information about the emergency, from incident place or from the chairman of LCG and DySP, start functioning of control room at the incident place.
2. Arrangement should be made to maintain law and order in strict manner at the incident place and nearby.
3. Arrangement to control unwanted traffic and to divert unwanted traffic via safe route.
4. To post senior police officers near the mishap site.
5. Immediate and continuous announcement to make awareness about emergency among surrounding population.
6. Cordon the area so that area will not be crowded or blocked by unwanted people.
7. To keep the road clear and to see smooth flow of traffic.
8. To work in consultation with CCR and report the details of real position of each place.
9. To keep and carry out evacuation and remove trapped persons. Moreover, to ensure protection of property in evacuated areas.
10. To divert the person to first air post, casualty reception center and base hospital according to the situation.
11. To ensure that there is no interruption in the performance of tasks allotted to other emergency services.
12. Communicate the surrounding public instructing them to leave the area and move to the shelters and other safe place as decided, in case of release of toxic gas, the clear instruction should be communicated by wireless set/walkie-talkie through mobile vehicles, who should also wear the protective equipment like self-breathing apparatus.

After Emergency:

1. The evacuated areas (industrial and residential) should be securely protected till the rehabilitation is completed.
2. The place of incident should be preserved from evidence and theft point of view.
3. After getting clearance from LCR, traffic should be resorted in the control way.

The report of activities carried out during and after the emergency should be submitted to the Chairman of LCG.

D. Actions For Emergencies Involving Road Tankers Carrying Hazardous Chemicals

In recent years, India has witnessed rapid growth in transportation of hazardous chemicals by road. Major road accidents have clearly demonstrated that hazardous chemical carries, when involved in accidents, can cause disastrous consequences like fire, explosion & spillage resulting in loss of life and property besides environmental pollution. Such accidents demand immediate availability of essential information to take appropriate counter measures.

The products of chemical industry vary enormously in their types, property and degree of hazard, ranging from explosives to plaster board. These are transported as solids, liquids in a wide range of temperatures and pressures.

Realizing the dangers, the new Motor vehicles Act 1988 has been introduced in India by imposing permit conditions for vehicles carrying hazardous substances. Under this new act, every motor vehicle carrying hazardous substances should comply with certain regulations.

(i) Role of Transport Crew

1. Motor vehicle carrying hazardous substance should have the emergency information panel which provides details in the event of emergency. It indicates the Correct technical name of the substance being transported, it's UN – Number, Hazchem Code and UN Hazard class label. The panel also provides for contact telephone number in an emergency, as also specialist advice.
2. The driver of the vehicles should possess related Tremcard from the respective suppliers and to be kept on the vehicles.
3. To maintain the vehicles, accessories, protective clothing and other equipment in good conditions
4. In case of mishap, the driver should be reported, immediately, to the nearest police station.
5. At the time of mishap, the helper/ cleaner/ driver who-so-ever remain present should handover 'Tremcard' or written information about the contained chemicals to the emergency services.

(ii) Role of CCR

On the receipt of an incident/mishap report, the Central Control Room will ensure that the emergency services have been summoned through Fire Officer of the company, till the fire controller of LCG comes at site and will obtain the specialist advice & inform the expert to remain on telephone, if any assistance is needed.

A manufacturer's/ trader's/ supplier's specialist advice should normally be sought if deemed necessary after the situation has been assessed by the Emergency Services. This procedure may, however, be varied according to the situation and advice by experts.

(iii) Methodology

Policy based on the knowledge of immediate danger area does the action for initial cordoning.

(iv) Evacuation

1. Determination the extent of evacuation required in consultation with the emergency commander.
2. Residents should be advised to travel slowly and cautiously and not to burden themselves with unnecessary baggage.
3. Ensure that buses/trucks/vehicles are properly lined up at various picks up points. Responsible officer should be posted at these points to supervise loading and dispatch of buses/vehicles.
4. Ensure that drivers of buses/vehicles/trucks are given clear instruction about route and their destination.
5. Make proper security arrangement to look after houses and property in their absence, in other words, chances of theft etc. should be minimized during the period when the residents are away.
6. Get in touch with Div. Manager (Railway) & / or Local State Transport Manager to arrange the evacuation by railway or bus if required.

7. Ensure that battery/diesel operated floodlights are ready to be made functional in case there should be need for the same.

8. Decide in consultation with emergency commander for return of residents.

Register should be maintained giving evacuation and other details with time.

If evacuation is required, it is carried out as guided in the “Chemical Emergency Response Guidelines” table of isolation and protective action distances.

Before Evacuation the following factors are also to be considered.

The Dangerous Goods

- Degree of health hazard
- Amount involved
- Containment /control of release
- Rate of vapor movement

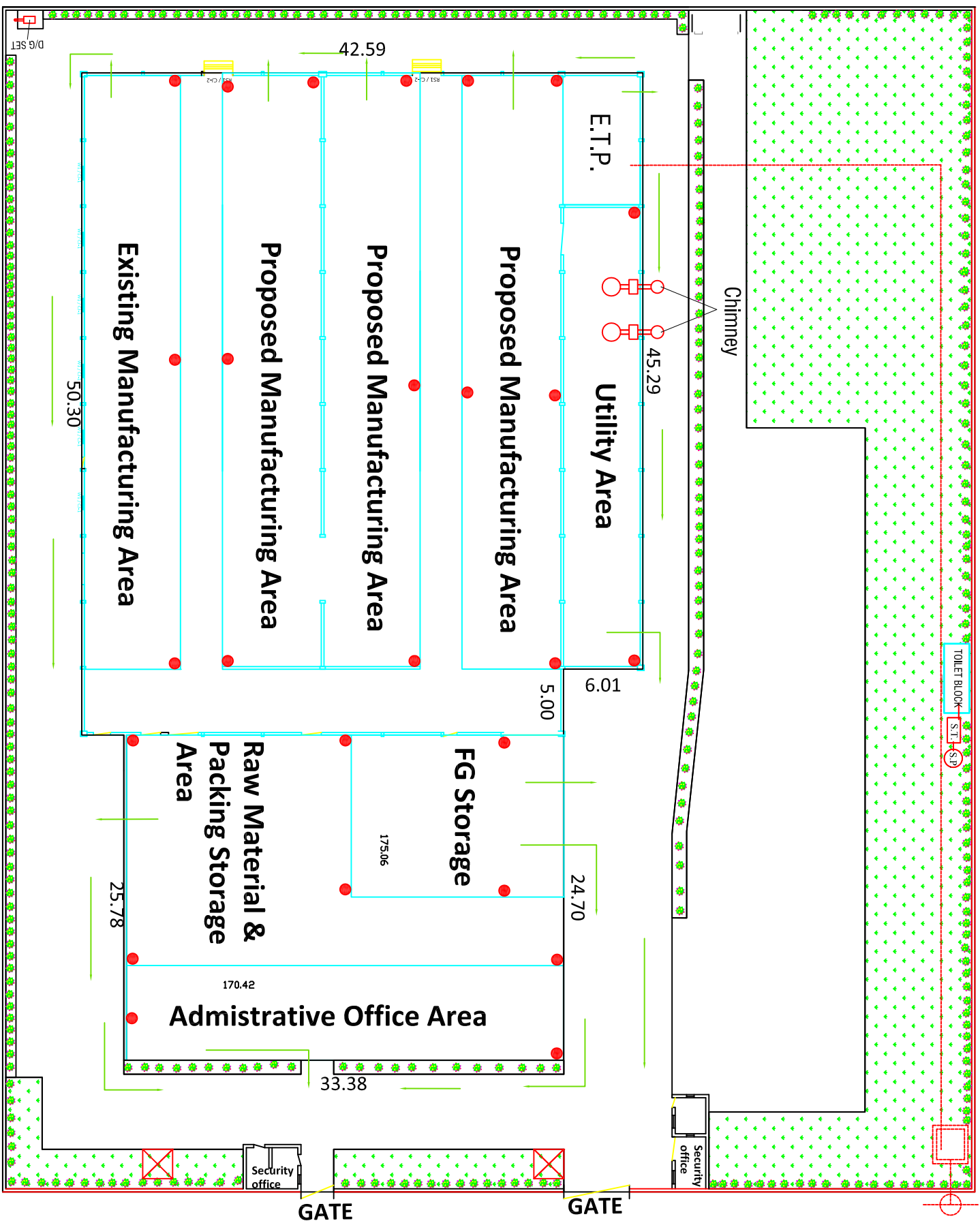
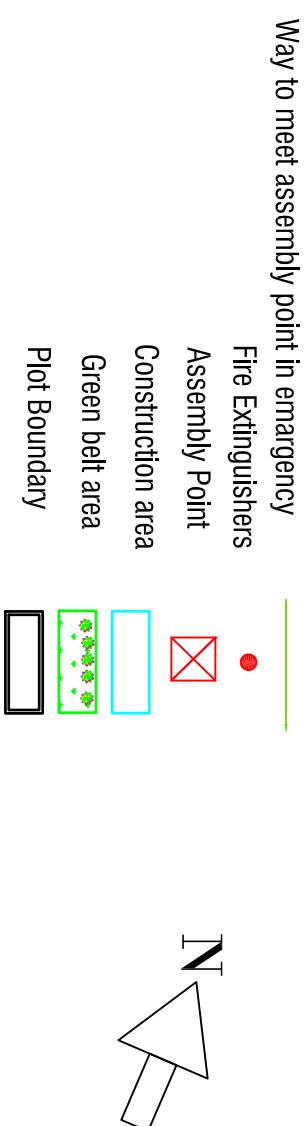
The Population Threatened

- Location
- Number of people
- Time to evacuate or protect in place
- Ability to control evacuation or protection in place
- Building types and availability
- Special institutions or populations e.g. nursing homes, hospitals, etc.

Weather conditions

- Effect on vapor and cloud movement
- Potential for change
- Effect on evacuation or protection in-place.

Annexure I: Evacuation Plan



Evacuation Plan

STAMP OF APPROVAL.

AREA STATEMENT :

PLOT AREA = 6700.00 SQ. MTS.
 TOTAL CONSTRUCTION AREA= 3000.00 SQ. MTS.
 TOTAL GREENBELT AREA= 2000.00 SQ. MTS.
 OPEN LEND AREA= 1700.00 SQ. MTS.

NAME OF OWNER / TITLE:

PLAN SHOWING DETAIL OF
OF FACTORY BUILDING
 ON
 PLOT NO: 1901 & 1901A
 AT G.I.D.C. SARIGAM, Dist: Valsad (Gujarat)
 FOR
"HENI DRUGS PVT. LTD."

SIGN. OF OWNER.

Annexure- VII

- A) ERPG GUIDE
- B) Chemical Safety plans

1. ACETIC ACID

GUIDE 132

FLAMMABLE LIQUIDS - CORROSIVE

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Flammable/combustible material.
- May be ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or ingested/swallowed.
- Contact with substance may cause severe burns to skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations **ONLY**; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, **ISOLATE** for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

- **Some of these materials may react violently with water.**

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.
- Do not get water inside containers.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.

- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb with earth, sand or other non-combustible material and transfer to containers (except for Hydrazine).
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

[Go to top](#)

ERG2012

GUIDE 153

SUBSTANCES - TOXIC and/or CORROSIVE (Combustible)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Combustible material: may burn but does not ignite readily.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- Runoff may pollute waterways.
- Substance may be transported in a molten form.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for

liquids and at least 25 meters (75 feet) for solids.

- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

- Dry chemical, CO2 or water spray.

Large Fire

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Do not get water inside containers.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

2. Bromine

GUIDE 154

SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- For UN3171, if Lithium ion batteries are involved, also consult GUIDE 147.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations **ONLY**; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, **ISOLATE** for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

- Dry chemical, CO₂ or water spray.

Large Fire

- Dry chemical, CO₂, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- **ALWAYS** stay away from tanks engulfed in fire.

SPILL OR LEAK

- **ELIMINATE** all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Do not get water inside containers.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves

3. Ethanol

GUIDE 127

FLAMMABLE LIQUIDS (Polar / Water-Miscible)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

4. Isopropanol

GUIDE 129

FLAMMABLE LIQUIDS (Polar / Water-Miscible / Noxious)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.
- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

1. Ethanol:

A. General Details

- **Synonyms:** Absolute Ethanol, alcohol, alcohol anhydrous, alcohol dehydrated, alcohol ethyl, algrain, anhydrol, cologne spirit, ethyl hydrate
- **Molecular Formula:** C₂H₆O
- **Molecular Weight:** 46.07

B. NFPA Classification

Health: 2 (Moderate)

Materials that, on intense or continued (but not chronic) exposure, could cause temporary incapacitation or possible residual injury, including those requiring the use of respiratory protective equipment that has an independent air supply. These materials are hazardous to health, but areas may be entered freely if personnel are provided with full-face mask self-contained breathing apparatus that provides complete eye protection.

Flammability: 3 (Serious)

This degree includes Class IB and IC flammable liquids and materials that can be easily ignited under almost all normal temperature conditions. Water may be ineffective in controlling or extinguishing fires in such materials.

Instability: 0 (Minimal)

This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.

C. Hazardous Property

- FLAMMABLE LIQUIDS (Polar / Water-Miscible)
 - HIGHLY FLAMMABLE: Easily ignited by heat, sparks or flames
 - CAUTION: Very low flash point; use of water spray when fighting fire may be inefficient

D. Storage Condition

- Keep tightly closed, cool and away from flame.
- Storage temp: ambient Venting: open (flame arrester) or pressure vacuum.
- Protect containers against physical damage Underground storage tanks outside the building is preferred for use of large quantities Small amt may be stored outside the building in the original shipping containers Should not be stored with perchlorates, peroxides, chromic acid and nitric acid.

E. Exposure Limits

- **IDLH:** 300 ppm
- **TLV:** 8 hr Time Weighted Avg (TWA): 1000 ppm.
- **OSHA Standard:** Permissible Exposure Limit: 8-hr Time Weighted Avg: 1000 ppm (1900 mg/cu m).

F. Health Effects

0.1.1 SUMMARY OF EXPOSURE

- 0.1.1.1 ACUTE EXPOSURE

- A) USES: Found primarily in alcoholic beverages. Also found in a variety of over-the-counter products including some cough/cold medicines, perfumes, colognes, mouthwashes, food flavorings (vanilla extract) and hand sanitizers. Also used clinically as a treatment of ethylene glycol or methanol poisonings.
- B) PHARMACOLOGY: When used therapeutically, ethanol's high affinity for alcohol dehydrogenase inhibits the metabolism of methanol and ethylene glycol.
- C) TOXICOLOGY: Ethanol enhances the inhibitory effects of GABA at the GABA-A receptor. It also competitively inhibits the binding of glycine at the NMDA receptor, disrupting excitatory glutaminergic neurotransmission. The net result is CNS depression. Chronic ethanol use causes desensitization and down-regulation of GABA-A receptors and NMDA up-regulation. Abrupt cessation of ethanol use then causes a hyperexcitable state, producing the ethanol withdrawal syndrome. Please refer to the ALCOHOL WITHDRAWAL SYNDROMES management for further information.
- D) EPIDEMIOLOGY: Extremely common exposure, which rarely results in morbidity or death. However, ethanol is a frequent precipitant of traumatic injury.
- E) WITH POISONING/EXPOSURE
 - 1) MILD TO MODERATE TOXICITY: Intoxication, euphoria, ataxia, nystagmus, disinhibition, aggressive behavior, nausea, vomiting, flushing, supraventricular tachydysrhythmias (primarily atrial fibrillation) can develop.
 - 2) SEVERE TOXICITY: Coma, respiratory depression, pulmonary aspiration, hypoglycemia and hypothermia can occur. Abrupt cessation of chronic ethanol use causes withdrawal, manifested by hypertension, tachycardia, tremors, seizures, and in severe cases delirium.

0.1.3 VITAL SIGNS

- 0.1.3.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE
 - 1) Hypothermia is common. Hypotension and tachycardia may be present. Bradypnea may occur early, and tachypnea may develop in cases of metabolic acidosis. Elevated body temperature and labored breathing (possibly from aspiration) have been reported in infants.

0.1.5 CARDIOVASCULAR

- 0.1.5.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE
 - 1) Atrial fibrillation and atrioventricular block have been reported with acute overdose. Cardiac arrest has been reported in a pediatric case. Cardiac output may be decreased in persons with pre-existing cardiac disease.
 - 2) After consuming recreational amounts of alcohol, persons suffering from variant angina may experience chest pain due to coronary artery spasm or myocardial ischemia.

- 3) Sudden cardiac failure, arrhythmias, subclinical left ventricular dysfunction, and other morphologic abnormalities of the heart can occur with chronic heavy abuse.

0.1.6 RESPIRATORY

- 0.1.6.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Respiratory depression may occur. Respiratory failure may follow severe intoxication. Aspiration of vomitus may result in pneumonitis and pulmonary edema.

0.1.7 NEUROLOGIC

- 0.1.7.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) ACUTE: Intoxication is characterized by confusion, ataxia, emotional lability, perceptual and sensation disturbances, possible blackout spells, and incoordination with impaired objective performance in standardized tests. CNS depression may progress to coma. Seizures due to hypoglycemia have been reported in children.
 - 2) CHRONIC: Wernicke's encephalopathy, Korsakoff's psychosis, dependence and withdrawal, as well as chronic cerebellar syndrome can occur.

0.1.8 GASTROINTESTINAL

- 0.1.8.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Nausea, vomiting, gastrointestinal bleeding and abdominal pain are common. Diarrhea may occur.

0.1.9 HEPATIC

- 0.1.9.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Acute hepatitis can occur. Acute ethanol ingestion has been associated with a significant increase in the rate of acetylation.
 - 2) Chronic use of ethanol has been associated with steatosis, necrosis, cirrhosis, depletion of vitamin A, and inhibition of glycogen storage, and may increase the risk of hepatotoxicity following exposure to some chemicals.

0.1.11 ACID-BASE

- 0.1.11.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Lactic or ketoacidosis may occur. Acidosis may occur due to metabolic disturbances, such as NADH overproduction, oxidation of ethanol, decreased lactate utilization, and inhibition of hepatic gluconeogenesis.

0.1.13 HEMATOLOGIC

- 0.1.13.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Anemia and thrombocytopenia can occur in alcoholics. An unusual case of pancytopenia has been reported in an alcoholic.

0.1.14 DERMATOLOGIC

- 0.1.14.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE
 - 1) Ethanol can cause facial flushing, skin dryness and irritation. Allergic contact urticaria, possibly from impurities, may occur. Toxicity from dermal absorption through intact or damaged skin has occurred in pediatric cases.

0.1.15 MUSCULOSKELETAL

- 0.1.15.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Acute and chronic skeletal myopathies have been recorded in ethanol abusers. Myoglobinuria, muscle weakness and brachial plexopathy have occurred following large ethanol ingestions.
 - 2) Chronic ethanol abusers have been found to have lower bone density, higher serum calcium levels and may develop rhabdomyolysis.

0.1.16 ENDOCRINE

- 0.1.16.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Hypoglycemia leading to seizures or coma can be a complication of ethanol intoxication. Hyperglycemia has also been seen, especially in alcoholics found to be acidotic.
 - 2) Some chronic alcohol abusers show characteristics of pseudo-Cushing's syndrome which disappear with ethanol discontinuation. Increases in plasma prolactin, decreases in plasma testosterone, cortisol and adrenocorticotrophic hormone levels have been seen following acute ethanol ingestion.

0.1.19 IMMUNOLOGIC

- 01.19.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Anaphylaxis following the ingestion of ethanol has been rarely reported. Sensitization has also been occasionally reported. Contaminants, metabolites or additives may be the cause of these responses.

0.1.20 REPRODUCTIVE HAZARDS

- A) Women who consume ethanol during pregnancy may give birth to a child with Fetal Alcohol Syndrome. No safe consumption level is known.

0.1.21 CARCINOGENICITY

- 0.2.21.1 IARC CATEGORY
 - A) IARC Carcinogenicity Ratings for CAS64-17-5 (IARC, 2004):
 - 1) Not Listed
- 0.2.21.2 HUMAN OVERVIEW
 - A) Alcohol consumption has been associated with various cancers, including liver cancer, esophageal cancer, breast and prostate cancer, and colorectal cancer.

0.1.22 GENOTOXICITY

- A) Ethanol caused DNA damage in a rat model and *S cerevisiae*, DNA repair in *E coli*, and DNA inhibition in human lymphocytes. It caused mutations in *E coli*, *S typhimurium*, *A nidulans*, and *S cerevisiae*. It has been positive on cytogenetic analysis in human fibroblasts, leukocytes, and lymphocytes; in rats and mice; and in hamster embryo and ovary cells.
- B) A positive micronucleus test was observed in mice and in dog lymphocytes. The dominant lethal test was positive in mice, sperm morphology was observed in mice, and ethanol was positive for gene conversion/mitotic recombination in *A nidulans*.

- C) Ethanol has caused sister chromatid exchange in human lymphocytes, hamster ovary cells, and in mice. It also caused sex chromosome loss/nondisjunction in A nidulans, D melanogaster, and in mice.

G. Laboratory Test

- Obtain an ethanol concentration (either blood or breath).
- A bedside dextrose is indicated for patients with an altered mental status.
- Consider a head CT for comatose patients or those with evidence of trauma. Monitor serum chemistries.
- Obtain arterial or venous blood gases, and serum and urine ketones for alcoholic ketoacidosis.

H. Treatment Overview

0.1.2 ORAL EXPOSURE

- **A) MANAGEMENT OF MILD TO MODERATE TOXICITY**
 - 1) Patients who appear mildly intoxicated may be simply managed with supportive care only. An ethanol concentration is generally not needed for management. Patients can be discharged when they are not clinically intoxicated (no ataxia, nystagmus or slurred speech). Significant CNS depression indicates a more severe poisoning.
- **B) MANAGEMENT OF SEVERE TOXICITY**
 - 1) Measure a serum ethanol level if ethanol is believed to be the cause of altered mental status and consider and rule-out other reversible causes of altered mental status such as hypoglycemia, hypoxia, and opiate intoxication. Patients who are comatose may require airway protection. Other causes of altered mental status should be considered as ethanol is often a coingestant with other drugs and intoxicated patients are predisposed to traumatic injuries. Children may be susceptible to hypoglycemia following an ethanol ingestion. Alcoholic ketoacidosis is a condition that typically develops in chronic drinkers that results in impaired gluconeogenesis. It often develops after binge drinking combined with malnutrition. Vomiting, abdominal pain, and an anion gap metabolic acidosis develop. Treatment is with fluid replacement and dextrose supplementation. Thiamine, folate, and other vitamins should also be provided intravenously. Ethanol withdrawal is a potentially life-threatening condition that may result in chronic drinkers following a period of abstinence. It usually begins with autonomic hyperactivity, tachycardia, tremor, hypertension, agitation leading to hallucinations and seizures. Treatment is generally with benzodiazepines for sedation. In patients with resistant symptoms, consider the use of propofol or a barbiturate such as phenobarbital.
- **C) DECONTAMINATION**
 - 1) **PREHOSPITAL:** There is no role for prehospital decontamination.
 - 2) **HOSPITAL:** Activated charcoal is not indicated because it poorly adsorbs to ethanol, but may be used in the appropriate conditions if there are coingestants. Consider the use of nasogastric suction for patients that present with massive ingestions within 30 minutes, which is rarely indicated.

- D) AIRWAY MANAGEMENT
 - 1) Patients who are comatose or with an altered mental status may need orotracheal intubation and mechanical ventilation.
- E) ANTIDOTE
 - 1) There is no specific antidote.
- F) ENHANCED ELIMINATION
 - 1) Hemodialysis can eliminate ethanol, but is rarely indicated. Consider in patients with severe intoxication (eg, hypotension) not responding to supportive care.
- G) PATIENT DISPOSITION
 - 1) HOME CRITERIA: Patients who are minimally intoxicated with no use of coingestants can be observed at home if there is another responsible nonintoxicated adult. Symptomatic children or children with ingestions that are expected to cause more than minimal symptoms should be referred to a health care facility.
 - 2) OBSERVATION CRITERIA: Patients should be observed until they are not clinically intoxicated. If they are minimally intoxicated and there is a responsible nonintoxicated adult that can provide care, and there is no evidence of trauma or other medical problems, they can potentially be discharged depending on the circumstances. Refer patients with chronic alcoholism or high risk drinking for detoxification and rehabilitation.
 - 3) ADMISSION CRITERIA: Admit patients with unstable vital signs, altered mental status that does not improve, concerning coingestants, associated serious trauma or medical conditions, or signs and symptoms of withdrawal.
 - 4) CONSULT CRITERIA: Consult a poison center or medical toxicologist for assistance in managing severe poisonings.
- H) PITFALLS
 - 1) Ethanol is often a coingestant with other drugs. Intoxicated patients are predisposed to traumatic injuries, which may be more difficult to diagnose in an intoxicated patient. Ethanol can account for an elevated osmolar gap. Small amounts of concentrated ethanol solutions may result in significant toxicity in children.
- I) PHARMACOKINETICS
 - 1) Well absorbed (80% to 90%). Peak concentrations are achieved within 0.5 to 1.5 hours after a single ingestion. Volume of distribution is approximately 0.6 L/kg. Hepatically metabolized, primarily by alcohol dehydrogenase (which is saturable at low ethanol concentrations), and to a lesser extent by cytochrome P2E1 (which is inducible with chronic consumption) and by the peroxidase-catalase system.
- J) TOXICOKINETICS
 - 1) Elimination changes from first order to zero order kinetics at low blood ethanol concentrations. Nontolerant drinkers typically eliminate ethanol at a rate of approximately 15 to 20 mg/dL/hr, while chronic drinkers have an elimination rate of approximately 20 to 30 mg/dL/hr. Patients also develop tolerance to some effects.
- K) DIFFERENTIAL DIAGNOSIS
 - 1) The differential diagnosis includes other xenobiotics that present with intoxication including ingestions of isopropanol and methanol, benzodiazepines,

barbiturates, and GHB. The differential diagnosis of altered mental status is extremely broad and includes toxicologic and nontoxicologic causes.

- L) DRUG INTERACTIONS
 - 1) Coingestions with other CNS and respiratory depressants (eg, benzodiazepines, barbiturates, opioids) increases toxicity.

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**

- The most appropriate extinguishers are carbon dioxide and dust; Water may be used, provided it is /used/ in large amounts.
- Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical.

- **Protective Equipment & Clothing:**

- All-purpose canister; safety goggles.
- Personal protective equipment should be provided where there is prolonged skin contact.
- Protective clothing should be worn by persons who are exposed to ethanol and should be composed of natural rubber, neoprene, nitrile, or vitron as these compounds have breakthrough times (ie the time it takes for a compound to move from the outer surface of protective clothing to the inner surface) of at least an hour or more.
- Breakthrough times greater than one hour reported by (normally, two or more testers for butyl rubber (butyl), natural rubber (nat.rub) neoprene (neop), nitrile rubber (nitrile) and viton. Breakthrough times less (usually significantly less) than one hour reported by (normally) two or more testers for polyvinyl alcohol (PVA) and polyvinyl chloride (PVC). No data for neoprene/styrene-butadiene rubber (neop/SBR), nitrile rubber/polyvinyl chloride (nitrile/PVC), polyethylene (PE), polyurethane (PU), and styrene-butadiene rubber (SBR).
- Wear appropriate personal protective clothing to prevent skin contact.
- Wear appropriate eye protection to prevent eye contact.
- Respirator Recommendations: Up to 3300 ppm: (Assigned Protection Factor = 10) Any supplied-air respirator/(Assigned Protection Factor = 50) Any self-contained breathing apparatus with a full facepiece.
- Respirator Recommendations: Emergency or planned entry into unknown concentrations or IDLH conditions: (Assigned Protection Factor = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(Assigned Protection Factor = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.
- Respirator Recommendations: Escape: Any appropriate escape-type, self-contained breathing apparatus.

- **Cleanup Method:**
 - Land spill: Apply appropriate foam to diminish vapor and fire hazard.
 - Water spill: Use natural barriers or oil spill control booms to limit spill travel. Allow to aerate.
 - Air spill: Apply water spray or mist to knock down vapors.

- **Disposal Method:**
 - SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.
 - The following wastewater treatment technologies have been investigated for ethanol: Biological Treatment.

- **ERPG GUIDE:** Please refer Emergency Response Guide No. 127 enclosed in Annexure-VII(A) for detailed Emergency Actions.

2. 2-Ethyl hexanol:

A. General Details

- **Synonyms:** 2-ETHYL HEXANOL, (.+-.)-2-ETHYL-1-HEXANOL, 2-ETHYL-1-HEXANOL, ETHYLHEXANOL, 2-ETHYLHEXANOL, 2-ETHYLHEXYL ALCOHOL, OCTYL ALCOHOL.
- **Molecular Formula:** C₈H₁₈O
- **Molecular Weight:** 130.23

B. NFPA Classification

Health: 2 (Moderate)

Materials that, on intense or continued (but not chronic) exposure, could cause temporary incapacitation or possible residual injury, including those requiring the use of respiratory protective equipment that has an independent air supply. These materials are hazardous to health, but areas may be entered freely if personnel are provided with full-face mask self-contained breathing apparatus that provides complete eye protection.

Flammability: 2 (Serious)

This degree includes materials that must be moderately heated before ignition will occur and includes Class II and IIIA combustible liquids and solids and semi-solids that readily give off ignitable vapors. Waterspray may be used to extinguish fires in these materials because the materials can be cooled below their flash points.

Instability: 0 (Minimal)

This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.

C. Hazardous Property

- COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

D. Storage Condition

- Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

E. Exposure Limits

- **IDLH:** Not listed
- **TLV:** Not listed
- **OSHA Standard:** Not listed

F. Health Effects

- Anesthesia, nausea, headache, dizziness; mildly irritating to skin and eyes

G. Laboratory Test

- measured VOC emissions /of 2-Ethyl-1-hexanol/ from the floors using double-cylinder chambers and the airborne concentrations of phthalate esters by filtration sampling, both by GC-MS.Abstract
- The diffusive sampling method is effective for the measurement of a low level of 2-ethyl-1-hexanol in indoor air Abstract.
- Determination of phthalate contaminants in iv solutions stored in pvc bags by gc-single-ion monitoring mass spectrometry.
- Capillary column GC with FID detection. Linear response over 0-50 ug/mL, the range of concentrations considered. Limit of determination 0.5 ug/L.

H. Treatment Overview

- Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Higher alcohols (>3 carbons) and related compounds.
- Basic Treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for shock and treat if necessary Monitor for pulmonary edema and treat if necessary Anticipate seizures and treat if necessary For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal Higher alcohols (>3 carbons) and related compounds.

- **Advanced Treatment:** Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques, with a bag-valve-mask device, may be beneficial. Consider drug therapy for pulmonary edema. Monitor cardiac rhythm and treat arrhythmias as necessary. Start IV administration of D5W /SRP: "To keep open", minimal flow rate. Use 0.9% saline (NS) or lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors if patient is hypotensive with a normal fluid volume. Watch for signs of fluid overload Monitor for signs of hypoglycemia (decreased LOC, tachycardia, pallor, dilated pupils, diaphoresis, and/or dextrose strip or glucometer readings below 50 mg) and administer 50% dextrose if necessary. Treat seizures with diazepam or lorazepam. Use proparacaine hydrochloride to assist eye irrigation. Higher alcohols (>3 carbons) and related compounds.

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**
 - Use water spray, alcohol-resistant foam, dry powder, carbon dioxide.
 - Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
 - Use water spray to cool unopened containers.
 - Wear self contained breathing apparatus for fire fighting if necessary.
 - To fight fire, use foam, carbon dioxide, dry chemical.
- **Protective Equipment & Clothing:**
 - Personnel protection: Wear appropriate chemical protective gloves, boots, and goggles.
 - Eye/face protection: Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
 - Body Protection: Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
 - Respiratory protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
 - Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulation. Keep in suitable, closed containers for disposal.
- **Cleanup Method:**
 - Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

- Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulation ... Keep in suitable, closed containers for disposal.
- Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

- **Disposal Method:**

- Product: This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
- Contaminated packaging: Dispose of as unused product.
- The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

- **ERPG GUIDE:** Please refer Emergency Response Guide No. 131 enclosed in Annexure-VII(B) for detailed Emergency Actions.

3. IPA (ISO PROPYL ALCOHOL):

A. General Details

- **Synonyms:** Avantine, Dimethylcarbinol, i-Propyl alcohol, Imsol A, IPA, Isohol, Isopropyl Alcohol, Lutosol, n-Propan-2-ol, Petrohol, PRO, Propan-2-ol, sec-Propyl Alcohol, Secondary Propyl Alcohol
- **Molecular Formula:** C₃H₈O
- **Molecular Weight:** 60.10

B. NFPA Classification

Health: 1 (Slight)

Materials that, on exposure, would cause significant irritation, but only minor residual injury, including those requiring the use of an approved air-purifying respirator. These materials are only slightly hazardous to health and only breathing protection is needed.

Flammability: 3 (Serious)

This degree includes Class IB and IC flammable liquids and materials that can be easily ignited under almost all normal temperature conditions. Water may be ineffective in controlling or extinguishing fires in such materials.

Instability: 0 (Minimal)

This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.

C. Hazardous Property

- FLAMMABLE LIQUIDS (Polar/Water-Miscible/Noxious)
 - HIGHLY FLAMMABLE: Easily ignited by heat, sparks, flames
 - CAUTION: Very low flash point; use of water spray when fighting fire may be inefficient
 - Do not use straight streams

D. Storage Condition

- Storage Temperature – Ambient in isolated storage of flammable liquids

E. Exposure Limits

- IDLH:2000 ppm
- TLV: 8 hr Time Weighted Avg (TWA): 200 ppm; Short Term Exposure Limit (STEL): 400 ppm
- OSHA Standard:
 - Permissible Exposure Limit: 8-hr Time Weighted Avg: 400 ppm (980 mg/cu m).
 - Vacated 1989 OSHA PEL TWA 400 ppm (980 mg/cu m); STEL 500 ppm (1225 mg/cu m) is still enforced in some states

F. Health Effects

0.1.1 SUMMARY OF EXPOSURE

- 0.1.1.1 ACUTE EXPOSURE
 - A) USES: Primarily used as a topical antiseptic. Typical household preparations contain 70% isopropanol. Also used as a solvent in many household, cosmetic, and topical pharmaceutical products. Isopropanol baths are occasionally used in some cultural practices to relieve fevers.
 - B) TOXICOLOGY: CNS depressant and gastrointestinal (GI) irritant; acetone (metabolite) likely contributes to CNS depression.
 - C) EPIDEMIOLOGY: The most common toxic alcohol exposure reported to poison centers in the United States. Cases occur in the thousands, but toxicity is rarely severe.
 - D) WITH POISONING/EXPOSURE
 - 1) MILD TO MODERATE TOXICITY: May include CNS depression, dysarthria, ataxia, nystagmus, similar to ethanol intoxication, nausea/vomiting, flushing, headache, tachycardia, mild hyperglycemia, ketonuria, and ketonemia WITHOUT metabolic acidosis.
 - 2) SEVERE TOXICITY: May include hemorrhagic gastritis, hypotension, respiratory depression, and coma. Death is rare and likely secondary to respiratory depression and aspiration.
 - 3) EYE EXPOSURE: Splash or vapor exposure causes irritation.
 - 4) DERMAL EXPOSURE: Repeated dermal application can cause systemic toxicity (primarily CNS depression), especially in infants and young children, because of more extensive dermal absorption and greater surface area-to-volume ratios.
 - 5) PARENTERAL EXPOSURE: CNS and respiratory depression are possible; hemolysis has developed in 1 patient.

0.1.2 VITAL SIGNS

- 0.1.2.1 ACUTE EXPOSURE
 - A) Ingestion, dermal absorption, or inhalation commonly cause tachycardia. Hypothermia, bradycardia, and hypotension may occur with severe poisoning.

0.1.3 HEENT

- 0.1.3.1 ACUTE EXPOSURE
 - A) Eye discomfort without significant injury occurs with brief vapor or splash exposure (70% solution).
 - B) Temporary changes in the corneal epithelium may develop after prolonged vapor exposure. Moderate irritation has been produced in animal eye tests.

0.1.4 CARDIOVASCULAR

- 0.1.4.1 ACUTE EXPOSURE
 - A) Tachycardia is common. Hypotension and bradycardia may occur in severe poisonings.

0.1.5 RESPIRATORY

- 0.1.5.1 ACUTE EXPOSURE
 - A) Respiratory depression and failure can occur in cases of severe poisoning from inhalation, ingestion, or parenteral exposure. Tracheobronchitis may occur.

0.1.6 NEUROLOGIC

- 0.1.6.1 ACUTE EXPOSURE
 - A) CNS depression is common, ranging from disorientation and lethargy to coma. Dysarthria, ataxia, and nystagmus may develop. Diminished or absent deep tendon reflexes are common. Seizures and increased CSF protein levels are rare effects.

0.1.7 GASTROINTESTINAL

- 0.1.7.1 ACUTE EXPOSURE
 - A) Vomiting and gastritis may occur. Hemorrhagic gastritis and associated anemia may be present.

0.1.8 GENITOURINARY

- 0.1.8.1 ACUTE EXPOSURE
 - A) Acute renal tubular necrosis has been reported in patients with hypotension or rhabdomyolysis. Myoglobinuria has been reported.

0.1.9 ACID-BASE

- 0.1.9.1 ACUTE EXPOSURE
 - A) Ketosis and ketonuria are common. Significant metabolic acidosis is rare.

0.1.10 HEMATOLOGIC

- 0.1.10.1 ACUTE EXPOSURE
 - A) Hemolysis may occur after exposure.

0.1.11 DERMATOLOGIC

- 0.1.11.1 ACUTE EXPOSURE
 - A) Dermal irritation and burns may develop from chronic use or prolonged contact. Systemic absorption may occur following dermal application, particularly in infants.

0.1.12 MUSCULOSKELETAL

- 0.1.12.1 ACUTE EXPOSURE
 - A) Rhabdomyolysis may occur following exposure.

0.1.13 ENDOCRINE

- 0.1.13.1 ACUTE EXPOSURE
 - A) Mild hyperglycemia is often reported in adults. Children may be at greater risk for developing hypoglycemia.

0.1.14 REPRODUCTIVE HAZARDS

- A) At the time of this review, no reproductive studies were found for isopropanol in humans.

0.1.15 CARCINOGENICITY

- 0.1.15.1 IARC CATEGORY
 - A) IARC Carcinogenicity Ratings for CAS67-63-0 (IARC, 2004):
 - 1) IARC Classification
 - a) Listed as: Isopropanol
 - b) Carcinogen Rating: 3
 - 1) The agent (mixture or exposure circumstance) is not classifiable as to its carcinogenicity to humans. This category is used most commonly for agents, mixtures and exposure circumstances for which the evidence of carcinogenicity is inadequate in humans and inadequate or limited in experimental animals. Exceptionally, agents (mixtures) for which the evidence of carcinogenicity is inadequate in humans but sufficient in experimental animals may be placed in this category when there is strong evidence that the mechanism of carcinogenicity in experimental animals does not operate in humans. Agents, mixtures and exposure circumstances that do not fall into any other group are also placed in this category.
 - 2) IARC Classification
 - a) Listed as: Isopropanol manufacture (strong-acid process)
 - b) Carcinogen Rating: 1
 - 1) The agent (mixture) is carcinogenic to humans. The exposure circumstance entails exposures that are carcinogenic to humans. This category is used when there is sufficient evidence of carcinogenicity in humans. Exceptionally, an agent (mixture) may be placed in this category when evidence of carcinogenicity in humans is less than sufficient but there is sufficient evidence of carcinogenicity in experimental animals and strong evidence in exposed humans that the agent (mixture) acts through a relevant mechanism of carcinogenicity.
- 0.1.15.2 HUMAN OVERVIEW
 - A) Isopropanol is not regarded as a human carcinogen at the present time.
 - B) Some studies reported an increased incidence of paranasal, laryngeal, and pharynx cancers, but this was felt to be related to other chemicals used in the manufacture of isopropanol using the strong acid method.

- 0.1.15.3 ANIMAL OVERVIEW

- A) Isopropyl alcohol has not been carcinogenic in experimental animals. A slight increase in interstitial testicular cell adenomas following inhalation exposure has been seen.

0.1.16 GENOTOXICITY

- A) Isopropanol has not been genotoxic in a variety of short-term tests.

G. Laboratory Test

- Monitor vital signs and mental status.
- Obtain a metabolic panel, serum isopropyl alcohol and acetone concentrations. Ketonemia and ketonuria may present within 1 to 3 hours of ingestion, but acidosis is NOT expected. Isopropanol elevates measured serum osmolality.
- Monitor for evidence of hemorrhagic gastritis (hemoccult stools, gastroccult emesis, hematocrit)

H. Treatment Overview

0.1.1 ORAL EXPOSURE

- A) MANAGEMENT OF MILD TO MODERATE TOXICITY
 - 1) Supportive care. There is no indication for activated charcoal or other GI decontamination.
- B) MANAGEMENT OF SEVERE TOXICITY
 - 1) Critically ill patients will need emergent management of airway, breathing, and circulation. CNS depression may require intubation, and alcohol-induced vasodilation and vomiting may lead to hypotension requiring fluid resuscitation, and rarely vasopressors.
- C) DECONTAMINATION
 - 1) PREHOSPITAL: Do not administer prehospital ipecac or activated charcoal, because of limited utility and the risk of aspiration if CNS depression develops. Irrigate exposed eyes with water. Wash exposed skin with soap and water and remove contaminated clothing.
 - 2) HOSPITAL: Activated charcoal and gastric lavage are not indicated. Consider simple nasogastric tube aspiration for large, recent ingestions if the airway is protected.
- D) AIRWAY MANAGEMENT
 - 1) May be necessary after large ingestions if the patient's mental status is so depressed they cannot protect their airway.
- E) ANTIDOTE
 - 1) No specific antidote is available.
- F) ENHANCED ELIMINATION
 - 1) Hemodialysis could be considered in extreme cases; however, most patients should improve with supportive care. Dialysis should be considered when levels

are extremely high (eg, greater than 500 to 600 mg/dL) or if hypotension does not respond to fluids and vasopressors.

- G) PATIENT DISPOSITION
 - 1) HOME CRITERIA: Asymptomatic children (other than mild drowsiness) with an acute inadvertent ingestion may be monitored at home. Children younger than 6 years old who have ingested 30 mL or greater are more likely to become symptomatic and should be referred for evaluation and treatment.
 - 2) OBSERVATION CRITERIA: Patients with deliberate ingestions or any patient who manifests symptoms should be sent to a health care facility for observation until symptoms resolve.
 - 3) ADMISSION CRITERIA: Patients with significant persistent CNS toxicity (somnia, intoxication, coma), hypotension or severe hemorrhagic gastritis should be admitted to an intensive care setting.
 - 4) CONSULT CRITERIA: Consult the poison center or medical toxicologist for assistance in managing patients with severe toxicity (eg, coma) or in whom the diagnosis is not clear.
- H) PITFALLS
 - 1) Missing an ingestion of another toxic alcohol (eg, ethylene glycol, methanol) or other possible etiologies for a patient's symptoms. In cases of hemorrhagic gastritis, it is imperative the patient's hemoglobin is stable.
- I) PHARMACOKINETICS
 - 1) Isopropanol is well absorbed by the body and quickly distributes into body fluids (volume of distribution 0.6 L/kg). It is metabolized by alcohol dehydrogenase to acetone (half-life of 2.5 to 3 hours).
- J) DIFFERENTIAL DIAGNOSIS
 - 1) CNS DEPRESSION: Other toxic alcohols, benzodiazepines, opiates/opioids, antipsychotic medications
 - 2) KETOSIS: Ethanol (alcoholic ketoacidosis), diabetic ketoacidosis, starvation ketosis
 - 3) GASTRITIS: Nonsteroidal anti-inflammatories, heavy metals

0.1.2 INHALATION EXPOSURE

- A) Supportive care.

0.1.3 EYE EXPOSURE

- A) Irrigate with water or normal saline, slit lamp examination if irritation persists.

0.1.4 DERMAL EXPOSURE

- A) OVERVIEW
 - 1) Wash exposed skin with soap and water and remove contaminated clothing. Supportive care

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**

- Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog.
- Solid streams of water may be ineffective.
- Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible.
- Use "alcohol" foam, dry chemical or carbon dioxide.

- **Protective Equipment & Clothing:**

- Wear safety glasses, rubber gloves, a face shield, coveralls
- The following materials are acceptable: neoprene, PVC, paracril/PVC, chlorinated polyethylene, butyl rubber, natural rubber, nitrile, vitron. Unacceptable: PVA. Conditionally acceptable: polyurethane. Note: This ... is ... a guide only. The user is advised to contact the protective clothing manufacturer regarding the specific applicability & limitations of a material under proposed conditions of use.
- Wear appropriate chemical protective ... boots and goggles.
- Breakthrough times greater than one hour reported by (normally) two or more testers for neoprene and nitrile rubber. Some data (usually from immersion tests) suggesting breakthrough times greater than one hour are not likely for natural rubber. No data for butyl rubber, neoprene/styrene-butadiene rubber, nitrile rubber/polyvinyl chloride, polyethylene, polyurethane, polyvinyl alcohol, and viton. Some data suggesting breakthrough times of approximated an hour or more for polyvinyl chloride.
- Wear appropriate personal protective clothing to prevent skin contact.
- Wear appropriate eye protection to prevent eye contact.
- Recommendations for respirator selection. Max concn for use: 2000 ppm. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. Eye protection needed. Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s). Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. Any powered, air-purifying respirator with organic vapor cartridge(s). Eye protection needed. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece.
- Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

- Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. Any appropriate escape-type, self-contained breathing apparatus.
- **Cleanup Method:**
 - If isopropyl alcohol is spilled or leaked ... 1. Remove all ignition sources. 2. Ventilate area of spill or leak. 3. For small quantities absorb on paper towels.
 - Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork.
 - Burn paper in suitable location away from combustible materials.
 - Large quantities can be collected & atomized in suitable combustion chamber.
- **Disposal Method:**
 - SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.
- **ERPG GUIDE.:** Please refer Emergency Response Guide No. 129 enclosed in Annexure-VII(B) for detailed Emergency Actions.

4. Monoethylene glycol:

A. General Details

- **Synonyms:** 1,2-Dihydroxyethane ,1,2-Ethandiol, 2-Hydroxyethanol , Ethane-1,2-diol ,Ethylene Alcohol ,Ethylene Dihydrate ,Fridex ,Glycol, Monoethylene Glycol.
- **Molecular Formula:** C₂H₆O₂
- **Molecular Weight:** 62.07

B. NFPA Classification

Health: 2 (Moderate)

Materials that, on intense or continued (but not chronic) exposure, could cause temporary incapacitation or possible residual injury, including those requiring the use of respiratory protective equipment that has an independent air supply. These materials are hazardous to health, but areas may be entered freely if personnel are provided with full-face mask self-contained breathing apparatus that provides complete eye protection.

Flammability: 1 (Slight)

This degree includes materials that must be preheated before ignition will occur, such as Class IIIB combustible liquids and solids and semi-solids whose flash point exceeds 200 deg F (93.4 deg C), as well as most ordinary combustible materials. Water may cause frothing if it sinks below the surface of the burning liquid and turns to steam. However, a water fog that is gently applied to the surface of the liquid will cause frothing that will extinguish the fire.

Instability: 0 (Minimal)

This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.

C. Hazardous Property

- SUBSTANCES - TOXIC (Non-combustible)
 - Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin

D. Storage Condition

- Temperature: Ambient

E. Exposure Limits

- **IDLH:**
- **TLV:** Ceiling Limit: 100 mg/cu m (Aerosol only).
- **OSHA Standard:** Vacated 1989 OSHA PEL Ceiling value 50 ppm (125 mg/cu m) is still enforced in some states.

F. Health Effects

0.1.1 SUMMARY OF EXPOSURE

- A) USES: Primarily used as an engine coolant (eg, antifreeze used in car radiators).
- B) PHARMACOLOGY: No medical use.
- C) TOXICOLOGY: Primary concern is the severe metabolic acidosis and nephrotoxicity from metabolites. Metabolized by alcohol dehydrogenase (ADH) to glycoaldehyde and then by aldehyde dehydrogenase to glycolic acid. Glycolic acid is metabolized by lactate dehydrogenase or glycolic acid oxidase to glyoxylic acid which can be metabolized to oxalic acid. Specifically, oxalic acid metabolite complexes with calcium to form calcium oxalate crystals in the renal tubules that can lead to acute renal failure. Other intermediate metabolites are believed to be nephrotoxic as well. May have CNS effects believed mediated through GABA receptors.
- D) EPIDEMIOLOGY: There are thousands of exposures and several deaths every year reported to poison centers. Inadvertent pediatric ingestions rarely develop severe toxicity.
- E) WITH POISONING/EXPOSURE
 - 1) MILD TO MODERATE TOXICITY: Initially, ethylene glycol ingestion may cause intoxication similar to ethanol with CNS depression, nystagmus, ataxia, and somnolence. Nausea and vomiting are also fairly common. If ethylene glycol metabolism is blocked early, there may be no other clinical manifestations.
 - 2) SEVERE TOXICITY: If ethylene glycol metabolism is not blocked early after a significant ingestion, patients develop increasing CNS depression (coma, hypotonia, hyporeflexia, eventually cerebral edema), anion gap metabolic acidosis (often severe, arterial pH < 7.0 is common with severe ingestion), and renal failure. Seizures are common with severe toxicity, but usually not prolonged. Mild to moderate tachycardia is common, Kussmaul respirations develop with increasing acidosis, hypotension is rare. Hypocalcemia may result from precipitation of calcium oxalate crystals, which can (rarely) lead to cardiac dysrhythmias. In addition, there are reports of cranial nerve abnormalities developing 1 to 2 weeks

post exposure in patients with severe intoxication, which may be secondary to calcium oxalate crystal formation in the brain.

0.1.3 VITAL SIGNS

- A) WITH POISONING/EXPOSURE
 - 1) Hypothermia has been reported.

0.1.4 HEENT

- A) WITH POISONING/EXPOSURE
 - 1) Facial paralysis, nystagmus, strabismus, ophthalmoplegias, papilledema, mydriasis, retinal injury, and eye and throat irritation may occur.

0.1.5 CARDIOVASCULAR

- A) WITH POISONING/EXPOSURE
 - 1) Cardiogenic pulmonary edema, cyanosis, cardiomegaly, myocarditis, and death may occur.

0.1.6 RESPIRATORY

- A) WITH POISONING/EXPOSURE
 - 1) Tachypnea, respiratory irritation, and adult respiratory distress syndrome have been reported following exposure to ethylene glycol.

0.1.7 NEUROLOGIC

- A) WITH POISONING/EXPOSURE
 - 1) CNS depression, seizures, coma, cerebral edema, cranial nerve deficits, and delayed neurologic sequelae may be seen following ethylene glycol exposures.

0.1.8 GASTROINTESTINAL

- A) WITH POISONING/EXPOSURE
 - 1) Nausea and vomiting are frequent early findings.

0.1.10 GENITOURINARY

- A) WITH POISONING/EXPOSURE
 - 1) Classic pathologic findings include acute tubular necrosis and presence of calcium oxalate crystals in the kidneys.
 - 2) The most uniform serious manifestation of poisoning is renal failure, with hematuria and proteinuria commonly seen.

0.1.11 ACID-BASE

- A) WITH POISONING/EXPOSURE
 - 1) Metabolic acidosis with an elevated anion gap is characteristic. However, a normal anion gap does not preclude a diagnosis of ethylene glycol toxicity.

0.1.12 FLUID-ELECTROLYTE

- A) WITH POISONING/EXPOSURE
 - 1) Hypocalcemia may occur.

0.1.13 HEMATOLOGIC

- A) WITH POISONING/EXPOSURE
 - 1) Pancytopenia, lymphocytosis, disseminated intravascular coagulation, and leukocytosis have been reported.

0.1.14 DERMATOLOGIC

- A) WITH POISONING/EXPOSURE
 - 1) Ethylene glycol does not significantly irritate the skin. Slight maceration of the skin may result from very severe, prolonged exposures. Cyanosis may occur 12 hours or longer post-ingestion.

0.1.15 MUSCULOSKELETAL

- A) WITH POISONING/EXPOSURE
 - 1) Myalgia and elevated CPK levels have been reported.

0.1.20 REPRODUCTIVE

- A) Exposures to glycols have resulted in teratogenicity, specifically craniofacial and neural tube closure defects and skeletal dysplasia in animal studies.

0.1.21 CARCINOGENICITY

- A) No data regarding carcinogenic effects in humans was found at the time of this review.

G. Laboratory Test

- Obtain metabolic panel (serum electrolytes, including calcium), BUN and creatinine on all patients with a history of ingestion.
- Obtain blood ethanol and ethylene glycol concentration, if available. Can consider a measured serum osmolality level if ethylene glycol concentration is not available.
- Patients with significant toxicity should have arterial blood gas.
- Obtain urinalysis with microscopy for calcium oxalate crystals. Hematuria and proteinuria are also common. Monitor urine output.

H. Treatment Overview

0.1.2 ORAL/PARENTERAL EXPOSURE

- A) MANAGEMENT OF MILD TO MODERATE TOXICITY
 - 1) Monitor serum electrolytes, renal function and ethylene glycol concentration. A peak ethylene glycol concentration < 20 mg/dL is commonly considered nontoxic. If the serum ethylene glycol concentration is >20 mg/dL, or there is a metabolic acidosis, or a history of a potentially toxic ingestion and ethylene glycol concentration is not rapidly available, administer an alcohol dehydrogenase inhibitor (either ethanol or fomepizole). In patients who present early after ingestion (before the development of metabolic acidosis), no further treatment may be required.
- B) MANAGEMENT OF SEVERE TOXICITY
 - 1) CNS depression may require intubation; adequate minute ventilation must be insured to prevent abrupt worsening of acidemia. Alcohol-induced vasodilation and vomiting may lead to hypotension requiring fluid resuscitation. Alcohol dehydrogenase (ADH) inhibition is the most specific treatment for patients with severe ethylene glycol toxicity. Blockade (using ethanol or fomepizole) allows for excretion of ethylene glycol without formation of toxic metabolites (ADH has a much higher affinity for ethanol or fomepizole than for ethylene glycol). In patients who present late with metabolic acidosis and for most patients with very high ethylene glycol concentrations, hemodialysis will be necessary after ADH inhibition. Hemodialysis is the most definitive therapy for ethylene glycol poisoning as it clears both ethylene glycol and its toxic metabolites from the blood and corrects any resulting metabolic acidosis. Indications for hemodialysis include metabolic acidosis (serum pH < 7.2), signs of end-organ toxicity (eg, seizures and coma), and renal failure. Thiamine and pyridoxine are also administered to encourage metabolism of ethylene glycol to less toxic metabolites.
- C) DECONTAMINATION

- 1) PREHOSPITAL: No ipecac or prehospital activated charcoal; no utility for therapy. If there is a dermal or eye exposure, it would be reasonable for simple decontamination with water at home.
- 2) HOSPITAL: Activated charcoal has no utility for ethylene glycol poisonings. Since ethylene glycol is a liquid, gastric lavage and whole bowel irrigation have no place in management. One could consider simple nasogastric tube aspiration for recent large ingestions, if the airway is protected.
- D) AIRWAY MANAGEMENT
 - 1) Intubation may be indicated if the patient's mental status is so depressed they cannot protect their airway. The ventilator should be adjusted to assure that the patient is able to maintain any respiratory compensation for the metabolic acidosis. Failure to maintain ventilation can result in a dramatic fall in pH and cardiovascular collapse.
- E) ANTIDOTE
 - 1) Treat patients with either ethanol or fomepizole to block production of the toxic metabolites of ethylene glycol. Indications include: a serum ethylene glycol concentration greater than 20 mg/dL; history of ethylene glycol ingestion with an osmolar gap greater than 10 mOsm/L (not accounted by ethanol or other alcohols); or a history or strong clinical suspicion of ethylene glycol ingestion and 2 of the following: serum bicarbonate less than 20 mEq/L, an arterial pH less than 7.3, or presence of oxalate crystals in the urine.
 - a) ETHANOL vs FOMEPIZOLE: Fomepizole is easier to use clinically, requires less monitoring, does not cause CNS depression or hypoglycemia, and may obviate the need for dialysis in some patients. Ethanol requires continuous administration and frequent monitoring of serum ethanol and glucose levels, and may cause CNS depression and hypoglycemia (especially in children). The drug cost associated with ethanol use is generally much lower than with fomepizole; however, other costs associated with ethanol use (continuous intravenous infusion, hourly blood draws and ethanol levels, possibly greater use of hemodialysis) may make the costs more comparable.
 - b) ETHANOL: Ethanol is given to maintain a serum ethanol concentration of 100 to 150 mg/dL. This can be accomplished by using a 5% to 10% ethanol solution administered intravenously through a central line. Intravenous therapy dosing, which is preferred, is 0.8 g/kg as a loading dose (8 mL/kg of 10% ethanol) administered over 20 to 60 minutes as tolerated, followed by an infusion rate of 80 to 150 mg/kg/hr (for 10% ethanol, 0.8 to 1.3 mL/kg/hr for a non-drinker; 1.5 mL/kg/hr for a chronic alcoholic). During hemodialysis, either add ethanol to the dialysate to achieve 100 mg/dL concentration or increase the rate of infusion during dialysis (for 10% ethanol, 2.5 to 3.5 mL/kg/hr). Oral ethanol may be used as a temporizing measure until intravenous ethanol or fomepizole can be obtained, but it is more difficult to achieve the desired stable ethanol concentration. The loading dose is 0.8 grams/kg (4 mL/kg of 20% {40 proof}) ethanol diluted in juice administered orally or via a nasogastric tube. Maintenance dose is 80 to 150 mg/kg/hour (of 20% {40 proof}) ethanol; 0.4 to 0.7 mL/kg/hour for a non-drinker; 0.8 mL/kg/hour for a chronic alcoholic). Concentrations

greater than 30% (60 proof) ethanol should be diluted. For both modalities, blood ethanol levels must be monitored hourly and adjusted accordingly, and both require patient monitoring in an ICU setting.

- c) FOMEPIZOLE: Fomepizole is administered as a 15 mg/kg loading dose, followed by four bolus doses of 10 mg/kg every 12 hours. If therapy is needed beyond this 48 hour period, the dose is then increased to 15 mg/kg every 12 hours for as long as necessary. Fomepizole is also effectively removed by hemodialysis; therefore, doses should be repeated following each round of hemodialysis. In selected patients (those who present early, without metabolic acidosis or renal failure) hemodialysis may be avoided by use of intravenous fomepizole. In patients with high ethylene glycol concentrations, who are treated with fomepizole alone, several days may be required before ethylene glycol is eliminated by the kidneys; hemodialysis may be indicated.
 - d) THIAMINE: Administer 100 mg intravenously daily to stimulate the conversion of glyoxylate to alpha-hydroxy-beta-ketoadipate, a nontoxic metabolite.
 - e) PYRIDOXINE: Administer 100 mg intravenously daily, to allow adequate stores of cofactor necessary for the conversion of glyoxylate to nontoxic glycine.
- F) SEIZURES
 - 1) Administer intravenous benzodiazepines, barbiturates.
 - G) ENHANCED ELIMINATION
 - 1) Hemodialysis is the definitive therapy for patients poisoned by toxic alcohols as it clears both the parent alcohol and the toxic metabolites from the blood. In addition, it corrects metabolic acidosis, electrolyte abnormalities, and maintains fluid balance. Indications for hemodialysis include: metabolic acidosis (pH <7).
 - 2) unresponsive to therapy; renal failure; ethylene glycol concentration of 50 mg/dL or more (unless patient is receiving fomepizole and is asymptomatic with normal arterial pH); deteriorating vital signs despite supportive care; electrolyte abnormalities not responding to conventional therapy. Many patients will require multiple courses of hemodialysis to clear ethylene glycol, and dosing of ethanol and fomepizole must be increased during hemodialysis.
 - H) PATIENT DISPOSITION
 - 1) HOME CRITERIA: A recent consensus guideline recommends that children with an observed lick, sip or taste ingestion or a known accidental ingestion of less than 10 mL in an adult can be monitored at home. All other exposures, including unwitnessed exposures, should be referred to a health care facility.
 - 2) OBSERVATION CRITERIA: Patient exposures that do not meet criteria for home management or any patient with symptoms should be sent to a health care facility. Patients who have no acidosis, normal renal function and a nontoxic ethylene glycol concentration may be discharged. If it is not possible to measure ethylene glycol concentrations, it is reasonable to observe patients who have undetectable serum ethanol concentrations for a minimum of 8 hours. During this period, the serum pH, bicarbonate and creatinine should be monitored every 2 hours. If the patient has no symptoms, no metabolic acidosis and normal renal function after 8 to 12 hours of observation, the risk of significant ethylene glycol toxicity is very low.

- 3) ADMIT CRITERIA: Any patient showing definitive signs of ethylene glycol poisoning (worsening renal function, metabolic acidosis, etc.) should be admitted to the hospital. Patients who have co-ingested ethanol will likely require admission if serum ethylene glycol concentrations cannot be measured, as these patients may not develop toxicity for more than 12 hours after presentation. Any patient receiving ethanol therapy requires an ICU admission. Any patient that is otherwise well and receiving fomepizole therapy should be safe in a less monitored setting (may require monitoring for suicide risk).
- 4) CONSULT CRITERIA: Consult your local poison center for any ethylene glycol exposure, especially those requiring antidote treatment, hemodialysis, or if the history is unclear.
- I) PITFALLS
 - 1) A normal osmolar gap does NOT rule out a significant ethylene glycol exposure. The Wood's lamp testing of urine for fluorescence to confirm or eliminate ethylene glycol exposure is NOT reliable. Laboratory and clinical findings change during the course of toxicity. Early in the course of severe poisonings, ethylene glycol concentration (and usually osmolar gap) are high, anion gap is low, and signs and symptoms are limited to inebriation and GI irritation. Late in the course of severe intoxication, severe anion gap acidosis is present along with severe CNS depression, renal insufficiency and calcium oxalate crystalluria, but ethylene glycol concentration and osmolar gap may be low.
- J) TOXICOKINETICS
 - 1) Ethylene glycol has a half-life of 3 to 5 hours via metabolism by ADH (zero-order kinetics). In the setting of ADH blockade, elimination is entirely renal with a half-life of approximately 17 hours. Ethylene is well absorbed orally and is not protein bound, with a volume of distribution of about 0.8 L/kg.
- K) DIFFERENTIAL DIAGNOSIS
 - 1) CNS depression: Other toxic alcohols, benzodiazepines, opiates/opioids, antipsychotic medications, etc.
 - 2) Elevated anion gap metabolic acidosis: Ketones, uremia, lactic acidosis, other toxins (iron, methanol, etc.), or alcoholic ketoacidosis.
 - 3) Renal injury: Other nephrotoxic drugs (eg, NSAIDs, aminoglycoside antibiotics), dehydration, etc.

0.1.3 INHALATION EXPOSURE

- A) INHALATION: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer oxygen and assist ventilation as required. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids.

0.1.4 EYE EXPOSURE

- A) DECONTAMINATION: Irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility.

0.1.5 DERMAL EXPOSURE

- A) OVERVIEW
 - 1) DECONTAMINATION: Remove contaminated clothing and wash exposed area thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists.

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**
 - If material on fire or involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use "alcohol" foam, dry chemical or carbon dioxide. Keep run-off water out of sewers and water sources.
- **Protective Equipment & Clothing:**
 - Breakthrough times greater than one hour reported by (normally) two or more testers for natural rubber (nat Rub), neoprene (neop), nitrile rubber (nitrile), polyethylene (PE), and polyvinyl chloride (PVC). Some data suggesting breakthrough times of approximately an hour or more for neoprene/natural rubber (Neop/Nat Rub) and polyvinyl alcohol (PVA). No data for butyl rubber (Butyl) Neoprene/styrene-butadiene (Neop/SBR), nitrile rubber/polyvinyl chloride (Nitrile/PVC), chlorinated polyethylene (CPE), polyurethane (PU), styrene-butadiene rubber (SBR), and viton.
 - Wear appropriate personal protective clothing to prevent skin contact.
 - Wear appropriate eye protection to prevent eye contact.
- **Cleanup Method:**
 - Environmental considerations: Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents.
 - Environmental considerations: Air spill: Apply water spray or mist to knock down vapors.
 - Environmental considerations: Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses.
- **Disposal Method:**
 - The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.
- **ERPG GUIDE:** Please refer Emergency Response Guide No. enclosed in Annexure-VII(B) for detailed Emergency Actions.

5. BROMINE:

A. General Details

- **Synonyms:** Bromine Solution
- **Molecular Formula:** Br₂
- **Molecular Weight:** 159.808

B. NFPA Classification

Health: 1 (Slight)

Can cause serious or permanent injury.

Flammability: 3 (Serious)

Will not burn under typical fire conditions.

Instability: 0 (Minimal)

Normally stable, even under fire conditions.

C. Hazardous Property

- SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible)
 - TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death

D. Storage Condition

- Store in cool, dry, well-ventilated location. Separate from oxidizing materials.
- Due to the fire and explosion hazard, bromine must not be stored, transported, or treated along with acetylene, butane, methane, benzene, turpentine, or metallic powders. Vessels containing bromine and its compd should be kept tightly closed. Large quantities should be stored out of doors, shielded from direct exposure to sunlight, and away from areas of acute fire hazard, high-temperature processes and, readily oxidizable materials.

E. Exposure Limits

- **IDLH:** 3 ppm
- **TLV:** 8 hr Time Weighted Avg (TWA): 0.1 ppm; 15 min Short Term Exposure Limit (STEL): 0.2 ppm.
- **OSHA Standard:** Permissible Exposure Limit: 8-hr Time Weighted Avg: 0.1 ppm (0.7 mg/cu m).

F. Health Effects

0.1.1 SUMMARY OF EXPOSURE

- 0.1.1.1 ACUTE EXPOSURE
 - A) USES: Bromine is used in gold extraction, manufacture of pharmaceuticals, ethylene bromide, and dyes, fire retardants, and as sanitation preparations for swimming pools and cooling towers.
 - B) PHARMACOLOGY: As an alkaline corrosive, bromine may cause liquefaction necrosis. It can saponify the fats in the cell membrane, destroying the cell and allowing deep penetration into mucosal tissue. In gastrointestinal tissue, an initial inflammatory phase may be followed by tissue necrosis (sometimes resulting in perforation), then granulation and finally stricture formation.
 - C) EPIDEMIOLOGY: Although bromine is found in shock treatments for swimming pools and spas and is available for consumer use, exposure has been infrequently reported.
 - D) WITH POISONING/EXPOSURE

- 1) Bromine exposure is unusual; limited data regarding specific human toxicity following bromine exposure is available. The following effects could be expected to occur, based on exposure data of other alkaline corrosives.
- 2) MILD TO MODERATE ORAL TOXICITY: Patients with mild ingestions may only develop irritation or grade I (superficial hyperemia and edema) burns of the oropharynx, esophagus or stomach; acute or chronic complications are unlikely. Patients with moderate toxicity may develop grade II burns (superficial blisters, erosions and ulcerations) and are at risk for subsequent stricture formation, particularly esophageal. Some patients (particularly young children) may develop upper airway edema.
 - a) Alkaline corrosive ingestion may produce burns to the oropharynx, upper airway, esophagus and occasionally stomach. Spontaneous vomiting may occur. The absence of visible oral burns does NOT reliably exclude the presence of esophageal burns. The presence of stridor, vomiting, drooling, and abdominal pain are associated with serious esophageal injury in most cases.
 - b) PREDICTIVE: The grade of mucosal injury at endoscopy is the strongest predictive factor for the occurrence of systemic and GI complications and mortality.
- 3) SEVERE ORAL TOXICITY: May develop deep burns and necrosis of the gastrointestinal mucosa. Complications often include perforation (esophageal, gastric, rarely duodenal), fistula formation (tracheoesophageal, aorto-esophageal), and gastrointestinal bleeding. Upper airway edema is common and often life threatening. Hypotension, tachycardia, tachypnea and, rarely, fever may develop. Stricture formation (esophageal, less often oral or gastric) is likely to develop long term. Esophageal carcinoma is another long term complication. Severe toxicity is generally limited to deliberate ingestions in adults in the US, because alkaline products available in the home are generally of low concentration.
- 4) INHALATION EXPOSURE: Mild exposure may cause cough and bronchospasm. Severe inhalation may cause upper airway edema and burns, stridor, and rarely acute lung injury.
- 5) OCULAR EXPOSURE: Ocular exposure can produce severe conjunctival irritation and chemosis, corneal epithelial defects, limbal ischemia, permanent visual loss and in severe cases perforation.
- 6) DERMAL EXPOSURE: Mild exposure causes irritation and partial thickness burns. Prolonged exposure or high concentration products can cause full thickness burns.

0.1.3 VITAL SIGNS

- 0.2.3.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Hypotension may occur after ingestion with corrosive injury and hemorrhage from the gastrointestinal tract.

0.1.4 HEENT

- 0.1.4.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE

- 1) Lacrimation, epistaxis, photophobia, blepharospasm, and brown discoloration of mucous membranes and the tongue may be noted.

0.1.5 CARDIOVASCULAR

- 0.1.5.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) HYPOTENSION - Oral ingestion may result in shock secondary to corrosive effects.

0.1.6 RESPIRATORY

- 0.1.6.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Inhalation may cause severe irritation of the respiratory tract, cough, delayed pulmonary edema, bronchospasm, chemical pneumonitis, ARDS, glottal spasm, and glottal edema. Bromine is reported to be a more potent respiratory irritant than chlorine.

0.1.7 NEUROLOGIC

- 0.1.7.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Headache and dizziness have been reported.

0.1.8 GASTROINTESTINAL

- 0.1.8.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Following ingestion mucosal burns, esophagitis, and gastroenteritis have occurred.
- 2) Diarrhea, nausea, vomiting, and abdominal pain have been reported following inhalation exposure.

0.1.10 GENITOURINARY

- 0.1.10.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Hemorrhagic nephritis, with oliguria or anuria, may develop within 1 to 2 days after oral ingestion of liquid bromine, as a sequelae to shock or hemolysis.

0.1.14 DERMATOLOGIC

- 0.1.14.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Dermatitis may occur following inhalation exposure.
- 2) Dermal burns may be noted.

0.1.21 CARCINOGENICITY

- 0.1.21.1 IARC CATEGORY

- A) IARC Carcinogenicity Ratings for CAS7726-95-6 (IARC, 2004):

- 1) Not Listed

- 0.1.21.2 HUMAN OVERVIEW

- A) No studies on the possible carcinogenic effects of bromine were found at the time of this review.

- 0.1.21.3 ANIMAL OVERVIEW

- A) No studies on the possible carcinogenic effects of bromine were found at the time of this review.

0.1.22 GENOTOXICITY

- A) No studies on the possible genetic effects of bromine were found at the time of this review.

G. Laboratory Test

- Obtain a complete blood count in symptomatic patients following bromine ingestion.
- In patients with signs and symptoms suggesting severe burns, perforation, or bleeding (or adults with deliberate, high volume or high concentration ingestions), obtain renal function tests, serum electrolytes, INR, PTT, type and crossmatch for blood, and monitor urine output. Serum lactate and base deficit may also be useful in these patients.
- Monitor pulse oximetry or arterial blood gases in patients with signs and symptoms suggestive of upper airway edema or burns.
- Obtain an upright chest x-ray in patients with signs and symptoms suggesting severe burns, perforation, or bleeding (or adults with deliberate, high volume or high concentration ingestions) to evaluate for pneumomediastinum or free air under the diaphragm. The absence of these findings DOES NOT rule out the possibility of necrosis or perforation of the esophagus or stomach. Obtain a chest radiograph in patients with pulmonary signs or symptoms.
- Several weeks after ingestion, barium contrast radiographs of the upper GI tract are useful in patients who sustained grade II or III burns, to evaluate for strictures.

H. Treatment Overview

0.1.2 ORAL EXPOSURE

- A) MANAGEMENT OF MILD TO MODERATE ORAL TOXICITY
 - 1) As there is little data on exposure to bromine, the following treatment information is based on experience with other alkaline corrosive agents. Perform early (within 12 hours) endoscopy in patients with stridor, drooling, vomiting, significant oral burns, difficulty swallowing or abdominal pain, and in all patients with deliberate ingestion. If burns are absent or grade I severity, patient may be discharged when able to tolerate liquids and soft foods by mouth. If mild grade II burns, admit for intravenous fluids, slowly advance diet as tolerated. Perform barium swallow or repeat endoscopy several weeks after ingestion (sooner if difficulty swallowing) to evaluate for stricture formation.
- B) SEVERE ORAL TOXICITY
 - 1) Resuscitate with 0.9% saline; blood products may be necessary. Early airway management in patients with upper airway edema or respiratory distress. Early (within 12 hours) gastrointestinal endoscopy to evaluate for burns. Early bronchoscopy in patients with respiratory distress or upper airway edema. Early surgical consultation for patients with severe grade II or grade III burns, large deliberate ingestions, or signs, symptoms or laboratory findings concerning for tissue necrosis or perforation.
- C) DILUTION
 - 1) Dilute with 4 to 8 ounces of water may be useful if it can be performed shortly after ingestion in patients who are able to swallow, with no vomiting or respiratory distress; then the patient should be NPO until assessed for the need for endoscopy. Neutralization, activated charcoal, ipecac and gastric lavage are all contraindicated.
- D) AIRWAY MANAGEMENT

- 1) Aggressive airway management in patients with deliberate ingestions or any indication of upper airway injury.
- E) ENDOSCOPY
 - 1) Should be performed as soon as possible (preferably within 12 hours, not more than 24 hours) in any patient with deliberate ingestion, adults with any signs or symptoms attributable to inadvertent ingestion, and in children with stridor, vomiting, or drooling after inadvertent ingestion. Endoscopy should also be considered in children with dysphagia or refusal to swallow, significant oral burns, or abdominal pain after unintentional ingestion. Children and adults who are asymptomatic after inadvertent ingestion do not require endoscopy. The grade of mucosal injury at endoscopy is the strongest predictive factor for the occurrence of systemic and GI complications and mortality. The absence of visible oral burns does NOT reliably exclude the presence of esophageal burns.
- F) CORTICOSTEROIDS
 - 1) The use of corticosteroids to prevent stricture formation is controversial. Corticosteroids should not be used in patients with grade I or grade III injury, as there is no evidence that it is effective. Evidence for grade II burns is conflicting, and the risk of perforation and infection is increased with steroid use.
- G) STRICTURE
 - 1) A barium swallow or repeat endoscopy should be performed several weeks after ingestion in any patient with grade II or III burns or with difficulty swallowing to evaluate for stricture formation. Recurrent dilation may be required. Some authors advocate early stent placement in these patients to prevent stricture formation.
- H) SURGICAL MANAGEMENT
 - 1) Immediate surgical consultation should be obtained on any patient with grade III or severe grade II burns on endoscopy, significant abdominal pain, metabolic acidosis, hypotension, coagulopathy, or a history of large ingestion. Early laparotomy can identify tissue necrosis and impending or unrecognized perforation, early resection and repair in these patients is associated with improved outcome.
- I) PATIENT DISPOSITION
 - 1) OBSERVATION CRITERIA: Patients with alkaline corrosive ingestion should be sent to a health care facility for evaluation. Patients who remain asymptomatic over 4 to 6 hours of observation, and those with endoscopic evaluation that demonstrates no burns or only minor grade I burns and who can tolerate oral intake can be discharged home.
 - 2) ADMISSION CRITERIA: Symptomatic patients, and those with endoscopically demonstrated grade II or higher burns should be admitted. Patients with respiratory distress, grade III burns, acidosis, hemodynamic instability, gastrointestinal bleeding, or large ingestions should be admitted to an intensive care setting.
- J) PITFALLS
 - 1) The absence of oral burns does NOT reliably exclude the possibility of significant esophageal burns.
 - 2) Patients may have severe tissue necrosis and impending perforation requiring early surgical intervention without having severe hypotension, rigid abdomen, or radiographic evidence of intraperitoneal air.
 - 3) Patients with any evidence of upper airway involvement require early airway management before airway edema progresses.

- 4) The extent of eye injury (degree of corneal opacification and perilimbal whitening) may not be apparent for 48 to 72 hours after the burn. All patients with corrosive eye injury should be evaluated by an ophthalmologist.
 - K) DIFFERENTIAL DIAGNOSIS
 - 1) Acid ingestion, gastrointestinal hemorrhage, or perforated viscus.
- 0.1.3 INHALATION EXPOSURE
- A) DECONTAMINATION
 - 1) Administer oxygen as necessary. Monitor for respiratory distress.
 - B) AIRWAY MANAGEMENT
 - 1) Manage airway aggressively in patients with significant respiratory distress, stridor or any evidence of upper airway edema. Monitor for hypoxia or respiratory distress.
 - C) BRONCHOSPASM
 - 1) Treat with oxygen, inhaled beta agonists and consider systemic corticosteroids.
- 0.1.4 EYE EXPOSURE
- A) DECONTAMINATION
 - 1) Exposed eyes should be irrigated with copious amounts of 0.9% saline for at least 30 minutes, until pH is neutral and the cul de sacs are free of particulate material.
 - 2) An eye examination should always be performed, including slit lamp examination. Ophthalmologic consultation should be obtained. Antibiotics and mydriatics may be indicated.
- 0.1.5 DERMAL EXPOSURE
- A) OVERVIEW
 - 1) DECONTAMINATION
 - a) Remove contaminated clothes and any particulate matter adherent to skin. Irrigate exposed skin with copious amounts of water for at least 15 minutes or longer, depending on concentration, amount and duration of exposure to the chemical. A physician may need to examine the area if irritation or pain persist.

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**
 - Use water spray to keep fire-exposed containers cool. Use appropriate extinguishing agents on nearly combustible fires.
 - If material involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty). Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use water spray to knock-down vapors.
- **Protective Equipment & Clothing:**
 - Wear appropriate personal protective clothing to prevent skin contact.
 - Wear appropriate eye protection to prevent eye contact.
 - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection.
 - Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. (Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly

remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.)

- Respirator Recommendations: Up to 2.5 ppm: (Assigned Protection Factor = 25) Any supplied-air respirator operated in a continuous-flow mode. Substance causes eye irritation or damage; eye protection needed./ (Assigned Protection Factor = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern. Only nonoxidizable sorbents allowed (not charcoal). Substance causes eye irritation or damage; eye protection needed.
- Respirator Recommendations: Up to 3 ppm: (Assigned Protection Factor = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern. Only nonoxidizable sorbents allowed (not charcoal). Only nonoxidizable sorbents allowed (not charcoal)/ (Assigned Protection Factor = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern. Only nonoxidizable sorbents allowed (not charcoal)./ (Assigned Protection Factor = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern. Only nonoxidizable sorbents allowed (not charcoal). Substance causes eye irritation or damage; eye protection needed./ (Assigned Protection Factor = 50) Any self-contained breathing apparatus with a full facepiece./ (Assigned Protection Factor = 50) Any supplied-air respirator with a full facepiece.
- Respirator Recommendations: Emergency or planned entry into unknown concentrations or IDLH conditions: (Assigned Protection Factor = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode./ (Assigned Protection Factor = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.
- Respirator Recommendations: Escape: (Assigned Protection Factor = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern. Only nonoxidizable sorbents allowed (not charcoal)/ Any appropriate escape-type, self-contained breathing apparatus.
- **Cleanup Method:**
 - SMALL SPILLS: absorb with sand or other noncombustible absorbent material and place in container Small spills (from a small package or a small leak from a large package): Isolate in all directions, 200 ft. Protect persons downwind, 0.2 miles /during the day/, 0.6 miles /at/ night. LARGE SPILLS: dike spill for later disposal Large spills (from a large package or from any small packages): Isolate in all directions, 700 ft. Protect persons downwind, 0.5 miles /during the/ day, 2.2 miles /at/ night.
 - 1) ventilate area of spill or leak. 2) collect for reclamation or absorb in vermiculite, dry sand, earth, or a similar material or pour sodium thiosulfate or lime water over small spills.

- Soln or slurries of 10-50% potassium carbonate, 10-13% sodium carbonate, & 5-10% sodium bicarbonate or saturated "hypo" soln (prepared by dissolving 4 kg of technical-grade sodium thiosulfate in 9.5 l of water & adding 113 g of soda ash) are preferred neutralizing agents for liquid bromine spills.
- A 5% lime slurry or 5% sodium hydroxide soln may be used, but heats of reaction are higher for these reagents. Ammonia soln should not be applied to liquid spills because of the high heat of reaction & nitrogen evolution. Anhydrous ammonia gas is useful for neutralization of bromine fumes.
- **Disposal Method:**
 - SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.
 - **ERPG GUIDE:** Please refer Emergency Response Guide No. 154 enclosed in Annexure-VII(B) for detailed Emergency Actions

6. ACETIC ACID:

A. General Details

- **Synonyms:** Acetic acid, glacial, Ethanoic Acid, Glacial Acetic Acid, Methanecarboxylic Acid, Pyroligneous acid, Vinegar acid, Vosol
- **Molecular Formula:** C₂H₄O₂
- **Molecular Weight:** 60.05

B. NFPA Classification

Health: 3 (Serious)

Materials that, on short exposure, could cause serious temporary or residual injury, including those requiring protection from all bodily contact. Fire fighters may enter the area only if they are protected from all contact with the material. Full protective clothing, including self-contained breathing apparatus, coat, pants, gloves, boots, and bands around legs, arms, and waist, should be provided. No skin surface should be exposed.

Flammability: 2 (Moderate)

This degree includes materials that must be moderately heated before ignition will occur and includes Class II and IIIA combustible liquids and solids and semi-solids that readily give off ignitable vapors. Water spray may be used to extinguish fires in these materials because the

materials can be cooled below their flash points.

Instability: 0 (Minimal)

This degree includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used.

C. Hazardous Property

- FLAMMABLE LIQUIDS – CORROSIVE
 - Flammable/combustible materials
- SUBSTANCES - TOXIC and/or CORROSIVE (Combustible)
 - TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death

D. Storage Condition

- Store in a dry, well ventilated place. Separate from oxidizing materials and alkaline substances.
- Fireproof. Separate from food and feedstuffs. Keep in a well-ventilated room.
- Quantities greater than 1 liter should be stored in tightly sealed metal containers in areas separate from oxidizers

E. Exposure Limits

- **IDLH:**50 ppm
- **TLV:** 8 hr Time Weighted Avg (TWA): 10 ppm; 15 min Short Term Exposure Limit (STEL): 15 ppm.
- **OSHA Standard:** Permissible Exposure Limit: 8-hr Time Weighted Avg: 10 ppm (25 mg/cu m).

F. Health Effects

0.1.1 SUMMARY OF EXPOSURE

- 0.1.1.1 ACUTE EXPOSURE
 - A) USES: Household uses include toilet, metal and drain cleaners, rust remover, in batteries, and as a primer for artificial nails. Used in clandestine methamphetamine labs (ie, hydrochloric and sulfuric acid). Industrial uses include: metal refining, plumbing, bleaching, engraving, plating, photography, disinfection, munitions, fertilizer manufacture, metal cleaning, and rust removal.
 - B) TOXICOLOGY: Acids cause coagulation necrosis. Hydrogen ions desiccate epithelial cells, causing edema, erythema, tissue sloughing and necrosis, with formation of ulcers and eschars.
 - C) EPIDEMIOLOGY: Inadvertent ingestions occur with moderate frequency in children, and are less common than alkaline exposures. Serious exposures are rare in the developed world (generally only seen with deliberate ingestions), largely because only low concentration acids are available in the home. Serious effects are more common in developing countries.
 - D) WITH POISONING/EXPOSURE

- 1) MILD TO MODERATE ORAL TOXICITY: Patients with mild ingestions may only develop irritation or Grade I (superficial hyperemia and edema) burns of the oropharynx, esophagus or stomach; acute or chronic complications are unlikely. Patients with moderate toxicity may develop Grade II burns (superficial blisters, erosions and ulcerations) are at risk for subsequent stricture formation, particularly gastric outlet and esophageal. Some patients (particularly young children) may develop upper airway edema.
- 2) SEVERE ORAL TOXICITY: May develop deep burns and necrosis of the gastrointestinal mucosa. Complications often include perforation (esophageal, gastric, rarely duodenal), fistula formation (tracheoesophageal, aortoesophageal), and gastrointestinal bleeding. Upper airway edema is common and often life threatening. Hypotension, tachycardia, tachypnea and, rarely, fever may develop. Other rare complications include metabolic acidosis, hemolysis, renal failure, disseminated intravascular coagulation, elevated liver enzymes, and cardiovascular collapse. Stricture formation (primarily gastric outlet and esophageal, less often oral) is likely to develop long term. Esophageal carcinoma is another long term complication. Severe toxicity is generally limited to deliberate ingestions in adults in the US, because acidic products available in the home are generally of low concentration.
 - a) PREDICTIVE: The grade of mucosal injury at endoscopy is the strongest predictive factor for the occurrence of systemic and GI complications and mortality. Initial signs and symptoms may not reliably predict the extent of GI burns.
- 3) INHALATION EXPOSURE: Mild exposure may cause dyspnea, pleuritic chest pain, cough and bronchospasm. Severe inhalation may cause upper airway edema and burns, hypoxia, stridor, pneumonitis, tracheobronchitis, and rarely acute lung injury or persistent pulmonary function abnormalities. Pulmonary dysfunction similar to asthma has been reported.
- 4) OCULAR EXPOSURE: Ocular exposure can produce severe conjunctival irritation and chemosis, corneal epithelial defects, limbal ischemia, permanent vision loss and in severe cases perforation.
- 5) DERMAL EXPOSURE: A minor exposure can cause irritation and partial thickness burns. More prolonged or a high concentration exposure can cause full thickness burns. Complications may include cellulitis, sepsis, contractures, osteomyelitis, and systemic toxicity.

0.1.3 VITAL SIGNS

- 0.1.3.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE

- 1) Shortness of breath may develop following inhalation of acid vapors, mists or aerosols.

0.1.4 HEENT

- 0.1.4.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Eye exposure may result in pain, swelling, corneal erosions and blindness.

0.1.5 CARDIOVASCULAR

- 0.1.5.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Cardiovascular collapse may develop soon after severe poisonings.

0.1.6 RESPIRATORY

- 0.1.6.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Inhalation may produce dyspnea, pleuritic chest pain, upper airway edema, pulmonary edema, hypoxemia, bronchospasm, pneumonitis, and persistent pulmonary function abnormalities. Airway hyperreactivity has also been reported.
 - a) The onset of respiratory symptoms may be delayed for several hours.
 - 2) Life threatening upper airway obstruction may develop after ingestion of concentrated acid.

0.1.7 NEUROLOGIC

- 0.1.7.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Abnormal neuropsychologic function has been reported following hydrochloric acid exposure from a leaking tanker truck.

0.1.8 GASTROINTESTINAL

- 0.1.8.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Ingestion of acids may result in burns, gastrointestinal bleeding, gastritis, perforations, dilation, edema, necrosis, vomiting, stenosis, fistula, and duodenal/jejunal injury.

0.1.9 HEPATIC

- 0.1.9.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Systemic toxicity may result in acute hepatic injury. Hepatic injury has been reported following chronic exposure to chromic acid.

0.1.10 GENITOURINARY

- 0.1.10.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Renal failure is a rare complication of severe poisonings. Hemoglobinuria may develop secondary to hemolysis. Nephritis may develop after hydrochloric acid ingestion.

0.1.11 ACID-BASE

- 0.1.11.1 ACUTE EXPOSURE

- A) WITH POISONING/EXPOSURE
 - 1) Metabolic acidosis may develop following significant acid ingestion.

0.1.12 FLUID-ELECTROLYTE

- 0.1.12.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Massive fluid and electrolyte shifts may occur with extensive dermal or gastrointestinal burns. Hyperkalemia may occur with hemolysis. Hyperphosphatemia, hypocalcemia and hyperchloremia have been reported.

0.1.13 HEMATOLOGIC

- 0.1.13.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Hemolysis may occur following significant acid ingestion. Disseminated intravascular coagulation has been reported.

0.1.14 DERMATOLOGIC

- 0.1.14.1 ACUTE EXPOSURE
 - A) WITH POISONING/EXPOSURE
 - 1) Chemical burns to the skin are often associated with concurrent thermal burns and trauma. Complications seen with thermal burns including cellulitis, sepsis, contractures, osteomyelitis, may occur as well as systemic toxicity from absorbed acid. Deep or extensive burns may require grafting.
 - 2) Alopecia was reported following application of an acidic formulation of a hair-relaxing product.
 - 3) Arterial injection of hydrochloric acid into the right inguinal area resulted in ischemia and ecchymosis of the right lower extremity as well as severe necrosis of the muscles.
- 0.1.14.2 CHRONIC EXPOSURE
 - A) Prolonged or repeated exposure to chromic acid mist can result in dermatitis. Ulcerations may also occur.

0.1.20 REPRODUCTIVE HAZARDS

- A) Single doses of dibromoacetic acid has resulted in reductions of sperm and serum testosterone in experimental animals. Repeated or single oral administration of monobromoacetic acid did not produce effects on male rat reproductive organs or sperm.

G. Laboratory Test

- Obtain a complete blood count and electrolytes in all patients with significant burns after acid ingestion.
- In patients with signs and symptoms suggesting severe burns, perforation, or bleeding (or adults with deliberate, high volume or high concentration ingestions), obtain renal function tests, liver enzymes, serial CBC, INR, PT, PTT, fibrinogen, fibrin degradation products, type and crossmatch for blood, and monitor urine output and urinalysis. Serum lactate and base deficit may also be useful in these patients.

- Monitor pulse oximetry or arterial blood gases in patients with signs and symptoms suggestive of upper airway edema or burns.
- Obtain an upright chest x-ray in patients with signs and symptoms suggesting severe burns, perforation, or bleeding (or adults with deliberate, high volume or high concentration ingestions) to evaluate for pneumomediastinum or free air under the diaphragm. The absence of these findings DOES NOT rule out the possibility of necrosis or perforation of the esophagus or stomach. Obtain a chest radiograph in patients with pulmonary signs or symptoms.
- Several weeks after ingestion, barium contrast radiographs of the upper GI tract are useful in patients who sustained grade 2 or 3 burns, to evaluate for strictures.

H. Treatment Overview

0.1.2 ORAL EXPOSURE

- **A) DILUTION**
 - 1) Dilute with 4 to 8 ounces of water may be useful if it can be performed shortly after ingestion in patients who are able to swallow, with no vomiting or respiratory distress; then the patient should be NPO until assessed for the need for endoscopy. Neutralization, activated charcoal, ipecac and gastric lavage are all contraindicated.
- **B) MILD TO MODERATE ORAL TOXICITY**
 - 1) Within the first 12 hours of exposure, if burns are absent or grade I severity, patient may be discharged when able to tolerate liquids and soft foods by mouth. If mild grade II burns, admit for intravenous fluids, slowly advance diet as tolerated. Perform barium swallow or repeat endoscopy several weeks after ingestion (sooner if difficulty swallowing) to evaluate for stricture formation.
- **C) SEVERE ORAL TOXICITY**
 - 1) Resuscitate with 0.9% saline; blood products may be necessary. Early airway management in patients with upper airway edema or respiratory distress. Early (within 12 hours) gastrointestinal endoscopy to evaluate for burns. Early bronchoscopy in patients with respiratory distress or upper airway edema. Early surgical consultation for patients with severe grade II or grade III burns, large deliberate ingestions, or signs, symptoms or laboratory findings concerning for tissue necrosis or perforation.
- **D) ENDOSCOPY**
 - 1) Should be performed as soon as possible (preferably within 12 hours, not more than 24 hours) in any patient with acid ingestion. The grade of mucosal injury at endoscopy is the strongest predictive factor for the occurrence of systemic and GI complications and mortality. The absence of visible oral burns does NOT reliably exclude the presence of esophageal burns.
- **E) AIRWAY MANAGEMENT**
 - 1) Aggressive airway management in patients with deliberate ingestions or any indication of upper airway injury. Severe edema may make intubation difficult; be

prepared for surgical airway management (cricothyroidotomy) in patients with severe upper airway edema.

- F) BRONCHOSPASM
 - 1) Treat with oxygen, inhaled beta agonists and consider systemic corticosteroids
- G) CORTICOSTEROIDS
 - 1) The use of corticosteroids to prevent stricture formation is controversial. Corticosteroids should not be used in patients with grade I or grade III injury, as there is no evidence that it is effective. Evidence for grade II burns is conflicting, and the risk of perforation and infection is increased with steroid use, so routine use is not recommended.
- H) STRICTURE
 - 1) A barium swallow or repeat endoscopy should be performed several weeks after ingestion in any patient with grade II or III burns or with difficulty swallowing to evaluate for stricture formation. Recurrent dilation may be required. Some authors advocate early stent placement in these patients to prevent stricture formation.
- I) SURGICAL MANAGEMENT
 - 1) Immediate surgical consultation should be obtained on any patient with grade III or severe grade II burns on endoscopy, significant abdominal pain, metabolic acidosis, hypotension, coagulopathy, or a history of large ingestion. Early laparotomy can identify tissue necrosis and impending or unrecognized perforation, early resection and repair in these patients is associated with improved outcome.
- J) PATIENT DISPOSITION
 - 1) OBSERVATION CRITERIA: Patients with an acid ingestion should be sent to a health care facility for evaluation. Patients with an endoscopic evaluation that demonstrates no burns or only minor grade I burns and who can tolerate oral intake can be discharged to home.
 - 2) ADMISSION CRITERIA: Symptomatic patients, and those with endoscopically demonstrated grade II or higher burns should be admitted. Patients with respiratory distress, grade III burns, or extensive grade II burns, acidosis, hemodynamic instability, gastrointestinal bleeding, or large ingestions should be admitted to an intensive care setting.
- K) PITFALLS
 - 1) The absence of oral burns does NOT reliably exclude the possibility of significant esophageal burns.
 - 2) Patients may have severe tissue necrosis and impending perforation requiring early surgical intervention without having severe hypotension, rigid abdomen, or radiographic evidence of intraperitoneal air.
 - 3) Patients with any evidence of upper airway involvement require early airway management before airway edema progresses.

- 4) The extent of eye injury (degree of corneal opacification and perilimbal whitening) may not be apparent for 48 to 72 hours after the burn. All patients with acidic eye injury should be evaluated by an ophthalmologist.
- L) DIFFERENTIAL DIAGNOSIS
 - 1) Alkaline corrosive ingestion, gastrointestinal hemorrhage, or perforated viscus.

0.1.3 INHALATION EXPOSURE

- A) INHALATION: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer oxygen and assist ventilation as required. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids.
- B) INHALATION: Administer oxygen. If respiratory symptoms develop obtain chest x-ray, monitor pulse oximetry and/or blood gases. Treat bronchospasm with inhaled beta agonists. If acute lung injury develops, consider PEEP. Evaluate for esophageal, dermal and eye burns as indicated.

0.1.4 EYE EXPOSURE

- A) DECONTAMINATION: Irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility.
- B) MEDICAL FACILITY: Irrigate with sterile 0.9% saline for at least an hour or until the cul-de-sacs are free of particulate matter and returned to neutrality (confirm with pH paper).
- C) EYE ASSESSMENT: The extent of eye injury (degree of corneal opacification and perilimbal whitening) may not be apparent for 48 to 72 hours after the burn.

0.1.5 DERMAL EXPOSURE

- A) OVERVIEW
 - 1) DECONTAMINATION: Remove contaminated clothing and jewelry; wash exposed area with copious amounts of water. A physician may need to examine the area if irritation or pain persists.

I. EMERGENCY ACTION GUIDELINES:

- **Fire Fighting Procedure:**
 - Use water spray, dry chemical, "alcohol" foam, or carbon dioxide. Use water to keep fire-exposed containers cool.
 - /When fighting fire/ use self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
 - If material on fire or involved in fire: Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. Use water spray to knock-down vapors.
 - Extinguish fire using agent suitable for type of surrounding fire. Material itself does not burn or burns with difficulty. Apply water from as far a distance as possible. Keep run-off water out of sewers and water sources. /Corrosive liquid/

- **Protective Equipment & Clothing:**

- Persons working with pure acid or concentrated solution should wear protective clothing, eye and face, ...hand and arm protection, and respiratory equipment.
- 500 ppm: Chemical cartridge respirator with an organic vapor cartridge(s) with a full facepiece or gas mask with an organic vapor canister (chin-style or front- or back-mounted canister) or supplied-air respirator with a full facepiece, helmet, or hood, or self-contained breathing apparatus with a full facepiece. 1000 ppm: Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. Escape: Gas mask with an organic vapor canister (chin-style or front- or back-mounted canister) self-contained breathing apparatus.
- Breakthrough times of greater than one hour were reported by (normally) two or more testers for neoprene, nitrile rubber, polyethylene, polyvinyl chloride, natural rubber and Vitron.
- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with solid or liquid acetic acid or solutions containing 50% or more of acetic acid by weight and to prevent repeated or prolonged skin contact with solutions containing 10% or more but less than 50% of acetic acid by weight.
- Employees should be provided with and required to use dust- and splash-proof safety goggles where there is any possibility of solid or liquid acetic acid or solutions containing acetic acid contacting the eyes.
- Wear appropriate personal protective clothing to prevent skin contact. />10%/
- Wear appropriate eye protection to prevent eye contact.
- Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. />5%/
- Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] />50%/
- Respirator Recommendations: Up to 50 ppm: (Assigned protection factor = 25) Any supplied-air respirator operated in a continuous-flow mode. Substance causes eye irritation or damage; eye protection needed./ (Assigned protection factor = 25) Any powered, air-purifying respirator with organic vapor cartridge(s). Substance causes eye irritation or damage; eye protection needed./ (Assigned protection factor = 50)

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(Assigned protection factor = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(Assigned protection factor = 50) Any self-contained breathing apparatus with a full facepiece/(Assigned protection factor = 50) Any supplied-air respirator with a full facepiece.

- Respirator Recommendations: Emergency or planned entry into unknown concentrations or IDLH conditions: (Assigned protection factor = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(Assigned protection factor = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.
- Respirator Recommendations: Escape: (Assigned protection factor = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus.

- **Cleanup Method:**

- Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Neutralize with caustic soda or soda ash.
- Environmental considerations: Water spill: Add dilute caustic soda
- Environmental considerations: Air spill: Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment.
- Collect leaking liquid in sealable containers. Cautiously neutralize spilled liquid with sodium carbonate only under the responsibility of an expert. Wash away remainder with plenty of water (extra personal protection: chemical protection suit including self-contained breathing apparatus).
- Remove all ignition sources, ventilate area of spill or leak. If in liquid form, for small quantities, absorb on paper towels ... large quantities can be collected & atomized in suitable combustion chamber, or diluted ... neutralized & flushed into a sewer. If in the solid form, collect in the most safe & convenient manner for reclamation or allow to melt & collect as above.
- Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures. Use soda ash to neutralize spills. Control runoff and isolate discharged material for proper disposal.

- **Disposal Method:**
 - SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.
 - Excess acetic acid and waste material containing this substance should be placed in a covered metal container, clearly labeled, and handled according to your institution's waste disposal guidelines.
 - The following wastewater treatment technologies have been investigated for acetic acid: Activated carbon.
 - The following wastewater treatment technologies have been investigated for acetic acid: Reverse osmosis.

- **ERPG GUIDE.:** Please refer Emergency Response Guide No. 132 & 153 enclosed in Annexure-VII(A) for detailed Emergency Actions.

1. Acetic Acid

GUIDE 132

FLAMMABLE LIQUIDS - CORROSIVE

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Flammable/combustible material.
- May be ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or ingested/swallowed.
- Contact with substance may cause severe burns to skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

- **Some of these materials may react violently with water.**

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.
- Do not get water inside containers.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb with earth, sand or other non-combustible material and transfer to containers (except for Hydrazine).
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

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ERG2012

GUIDE 153

SUBSTANCES - TOXIC and/or CORROSIVE (Combustible)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Combustible material: may burn but does not ignite readily.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- Runoff may pollute waterways.
- Substance may be transported in a molten form.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations **ONLY**; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

· See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

· If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

· Dry chemical, CO2 or water spray.

Large Fire

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Do not get water inside containers.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

2. BUTANOL:

GUIDE 129

FLAMMABLE LIQUIDS (Polar / Water-Miscible / Noxious)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.
- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

3. BUTYL ACETATE:

GUIDE 129

FLAMMABLE LIQUIDS (Polar / Water-Miscible / Noxious)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.
- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

4. Caustic Soda:

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GUIDE 154

SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- For UN3171, if Lithium ion batteries are involved, also consult GUIDE 147.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all

directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

- Dry chemical, CO2 or water spray.

Large Fire

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Do not get water inside containers.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. ETHYL ACETATE:

GUIDE 129

FLAMMABLE LIQUIDS (Polar / Water-Miscible / Noxious)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

6. HYDROCHLORIC ACID:

POTENTIAL HAZARDS

HEALTH

- **TOXIC; may be fatal if inhaled, ingested or absorbed through skin.**
- Vapors are extremely irritating and corrosive.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.

FIRE OR EXPLOSION

- Some may burn but none ignite readily.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Some of these materials may react violently with water.
- Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

- Dry chemical or CO2.

Large Fire

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Do not get water inside containers.
- Damaged cylinders should be handled only by specialists.

Fire involving Tanks

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Isolate area until gas has dispersed.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- **In case of contact with Hydrogen fluoride, anhydrous (UN1052),** flush skin and eyes with water for 5 minutes; then, for skin exposures rub on a calcium/gel combination; for eyes flush with a water/calcium solution for 15 minutes.
- Keep victim warm and quiet.
- Keep victim under observation.
- Effects of contact or inhalation may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

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GUIDE 157

SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible / Water-Sensitive)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Reaction with water or moist air may release toxic, corrosive or flammable gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- For UN1796, UN1826, UN2031 at high concentrations and for UN2032, these may act as oxidizers, also consult GUIDE 140.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Substance may react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

- Note: Some foams will react with the material and release corrosive/toxic gases.

Small Fire

- CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- Move containers from fire area if you can do it without risk.
- Use water spray or fog; do not use straight streams.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- A vapor suppressing foam may be used to reduce vapors.
- Do not get water inside containers.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.

Small Spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of contact with Hydrofluoric acid (UN1790), flush skin and eyes with water for 5 minutes; then, for skin exposures rub on a calcium/gel combination; for eyes flush with a water/calcium solution if available, otherwise continue with water for 15 minutes.

- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

7. IPA (ISO PROPYL ALCOHOL):

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GUIDE 129

FLAMMABLE LIQUIDS (Polar / Water-Miscible / Noxious)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.
- **Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.**

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

8. MEK (METHYL ETHYL KETON):

ERG2012

GUIDE 127

FLAMMABLE LIQUIDS (Polar / Water-Miscible)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to

protect themselves.

9. MIBK (METHYL ISO BUTYL KETON):

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GUIDE 127

FLAMMABLE LIQUIDS (Polar / Water-Miscible)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fire

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

10. MTO (MINERAL TERPENTINE OIL):

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GUIDE 128

FLAMMABLE LIQUIDS (Non-Polar / Water-Immiscible)

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- For UN3166, if Lithium ion batteries are involved, also consult GUIDE 147.
- **If molten aluminum is involved, refer to GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

CAUTION: For mixtures containing alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fire

- Dry chemical, CO₂, water spray or regular foam.

Large Fire

- Water spray, fog or regular foam.
- **Do not use straight streams.**
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

11. PHOSPHORIC ACID:

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GUIDE 154

SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Avoid any skin contact.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated.
- For UN3171, if Lithium ion batteries are involved, also consult GUIDE 147.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all

directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

Small Fire

- Dry chemical, CO2 or water spray.

Large Fire

- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Do not get water inside containers.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

12. SULFURIC ACID:

GUIDE 137

SUBSTANCES - WATER-REACTIVE - CORROSIVE

POTENTIAL HAZARDS

HEALTH

- CORROSIVE and/or TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating, corrosive and/or toxic gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Contact with molten substance may cause severe burns to skin and eyes.
- Runoff from fire control or dilution water may cause pollution.

FIRE OR EXPLOSION

- **EXCEPT FOR ACETIC ANHYDRIDE (UN1715), THAT IS FLAMMABLE**, some of these materials may burn, but none ignite readily.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Substance will react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Flammable/toxic gases may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.
- Substance may be transported in a molten form.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

- **When material is not involved in fire, do not use water on material itself.**

Small Fire

- Dry chemical or CO₂.
- Move containers from fire area if you can do it without risk.

Large Fire

- Flood fire area with large quantities of water, while knocking down vapors with water fog. If insufficient water supply: knock down vapors only.

Fire involving Tanks or Car/Trailer Loads

- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Small Spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Removal of solidified molten material from skin requires medical assistance.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

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GUIDE 157

SUBSTANCES - TOXIC and/or CORROSIVE (Non-Combustible / Water-Sensitive)

POTENTIAL HAZARDS

HEALTH

- **TOXIC**; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Reaction with water or moist air may release toxic, corrosive or flammable gases.
- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

FIRE OR EXPLOSION

- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- For UN1796, UN1826, UN2031 at high concentrations and for UN2032, these may act as oxidizers, also consult GUIDE 140.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Substance may react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "[PUBLIC SAFETY](#)".

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

Fire

- Note: Some foams will react with the material and release corrosive/toxic gases.

Small Fire

- CO₂ (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

Large Fire

- Water spray, fog or alcohol-resistant foam.
- Move containers from fire area if you can do it without risk.
- Use water spray or fog; do not use straight streams.
- Dike fire-control water for later disposal; do not scatter the material.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- A vapor suppressing foam may be used to reduce vapors.
- Do not get water inside containers.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.

Small Spill

- Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

FIRST AID

- Move victim to fresh air.
- Call 108 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of contact with Hydrofluoric acid (UN1790), flush skin and eyes with water for 5 minutes;

then, for skin exposures rub on a calcium/gel combination; for eyes flush with a water/calcium solution if available, otherwise continue with water for 15 minutes.

- For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Annexure- VIII

➤ Adequacy Report

Treatability / Feasibility Report
for
Proposed Waste Water Generation and its
Treatment Scheme
&
Adequacy of Existing Waste Water
Treatment Facilities
for

M/s. HENI DRUGS PVT. LTD.

**Unit Located at: Plot No. 1901/1901A, Phansa Char Rasta,
GIDC, Sarigam- 396155, Tal. Umbergaon,
Dist.: Valsad (Gujarat)**

Prepared By:

M/s. UniStar Environment and Research Labs Pvt. Ltd.

White House, Near G.I.D.C. office, Char Rasta,

Vapi-396195. Dist.-Valsad, Tel.: (0260) 2433966, 2435610

e-mail: response@uerl.in

❖ **INTRODUCTION:**

M/s. Heni Drugs Pvt. Ltd. has set up a manufacturing unit located at Plot no. 1901/1901A, Phansa Char Rasta, GIDC, Sarigam - 396155, Tal. Umbergaon, Dist.: Valsad. The unit is manufacturing Metal Salt and Ethyl Oleate by Continuous distillation of crude with having valid CCA of the Board.

Now as per the information provided to us the unit proposes to increase production quantity of existing products and also introduce new products. Detailed breakup of the existing, proposed and total after expansion production capacity are as under.

Sr. No.	Products Name	Production Capacity (MT/year)		
		Existing	Proposed	Total
1.	Ethyl Oleate by Continuous distillation of crude	300.00	00.00	300.00
2.	Metal salt of copper, cobalt, Nickel, Bismuth, Mercury and Aluminum Magnesium Mix Hydrotalcite salt	900.00	00.00	900.00
3.	Esters (Ethyl Oleate / Ethyl Lactate., Benzyl Cinnamate / Salicylate , Geranyl Acetate / Formate, Phenoxy Ethyl Isobutyrate / Isovalerate, Vetiveryl Acetate, Ethyl hexyl oleate, Cholesterol oleate Benzyl benzoate, Glycidyl Ester (E10), Dibasic esters, and similar ...)	00.00	250.00	250.00
4.	Organics Intermediates ((3H)-Isobenzofuranone,3,3-bis(4-hydroxyphenyl) (IBFH) , Tetra bromo -(3H)-Isobenzofuranone,3,3-bis (4hydroxyphenyl) , N,N dimethyl amino acrylate(1,3-epoxy-2-propanone , and similar ...)	00.00	45.00	45.00
5.	Aromatic Metal Compounds a. Phenyl mercuric acetate b. Phenyl mercuric nitrate c. Phenyl mercuric oleate d. Phenyl mercury dodecanyl succinate	00.00	100.00	100.00
6.	Extracts and Oils (Cardamom Oli, Spearmint Oil, Eucalyptus Oil Mentha Oil, Citronella Oil, Geranium Oil Pink Pepper Oil, Vetiveryl Oil, Rose Crystals, and similar ...)	00.00	20.00	20.00
TOTAL		1200.00	415.00	1615.00

As per the information obtained from the unit:

- Existing product Metal Salt is inorganic product, manufactured by simple inorganic chemical reaction.
- Existing Product Ethyl Oleate is manufacture by continuous distillation of crude Ethyl Oleate.
- Proposed product Esters will be manufacture by Esterification of Fatty Acid / Vegetable Oil with Alcohol.
- Proposed product Organics Intermediates will be manufactured by standard reactions like condensation, addition and purification.
- Proposed product Aromatic Metal Compounds will be manufactured by chemical reaction with Aromatic Compound with Mercury salt.
- Proposed product Extracts and Oils will be manufactured by only extraction and decantation unit operation. No chemical reaction involved.

❖ **Water Pollution Potential for manufacturing of proposed products :**

• **Water Requirement**

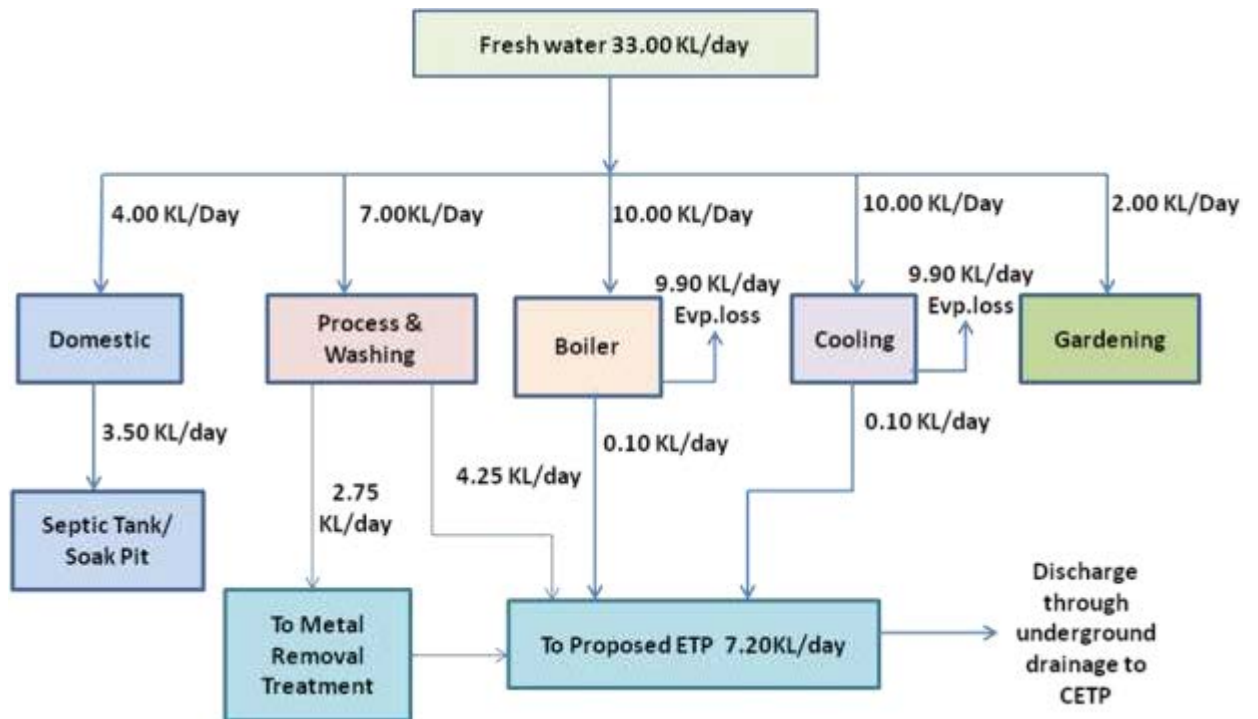
Sr. No.	Water Consumption	Quantity in KL/day		
		Exiting	Proposed	Total after expansion
1	Domestic	2.00	2.00	4.00
2	Industrial			
	Process & Washing	1.00	6.00	7.00
	Boiler	1.00	9.00	10.00
	Cooling	2.00	8.00	10.00
	Subtotal Industrial	4.00	23.00	27.00
3	Gardening	1.00	1.00	2.00
	Total	7.00	26.00	33.00

• **Wastewater Generation**

The category wise bifurcation of the wastewater generation after proposed product is given below in Table.

Sr. No.	Waste Water Generation	Quantity in KL/day		
		Exiting	Proposed	Total after expansion
1	Domestic	1.80	1.70	3.50
2	Industrial			
	Process & Washing	0.90	6.10	7.00
	Boiler	0.05	0.05	0.10
	Cooling	0.05	0.05	0.10
	Subtotal Industrial	1.00	6.20	7.20
	Total	2.80	7.90	10.70

- Existing waste water is generated from ancillary activities like process, washing of equipments, floor and utilities.
- Waste water generated during existing product is being treated in the adequately designed existing ETP and treated waste water is being evaporated in evaporator.
- Proposed waste water generated from ancillary activities like process, washing of equipments, floor and utilities will be treated in proposed effluent treatment plant.
- Details of existing and proposed waste water treatment are enclosed as **Annexure-I**.
- Detailed water balance diagram after proposed expansion is as under.



❖ Treatability for Waste water Treatment :

- Stream wise Waste Water Generation per day : based on the production capacity, water requirement and mass balance of product the per day waste water requirement is worked out as under :

Stream	Product Name	Waste water generation in kL/d
Stream - I	Ethyl Oleate by Continuous distillation of crude ethyl Oleate (Existing Product).	0.00
Stream - II	Metal salt of copper, cobalt, Nickel, Bismuth, Mercury and Aluminum Magnesium Mix Hydrotalcite salt (Existing Product)	0.90
Stream – III	Esters (Ethyl Oleate / Ethyl Lactate., Benzyl Cinnamte / Salicylate , Geranyl Acetate / Formate, Phenoxy Ethyl Isobutyrate / Isovalerate, Vetiveryl Acetate, Ethy hexyl oleate, Cholesterol oleate Benzyl benzoate, Glycidyl Ester (E10), Dibasic esters ,etc..)	1.10
Stream – IV	Organics Intermediates ((3H)-Isobenzofuranone,3,3-bis(4-hydroxyphenyl) (IBFH) , Tetra bromo –(3H)-Isobenzofuranone,3,3-bis (4hydroxyphenyl) , N, N dimethyl amino acrylate (1,3-epoxy-2-propanone ,etc..)	1.65
Stream – V	Aromatic Metal Compounds e. Phenyl mercuric acetate f. Phenyl mercuric nitrate g. Phenyl mercuric oleate h. Phenyl mercury dodecenyl succinate	1.85
Stream – VI	Extracts and Oils (Cardamom Oil, Spearmint Oil, Eucalyptus Oil Mentha Oil, Citronella Oil, Geranium Oil Pink Pepper Oil, Vetiveryl Oil, Rose Crystals, etc...)	1.5
Stream – VII	Boiler and Cooling activity	0.20
TOTAL		7.20

- Stream wise characteristics of waste water stream are given in below tables:
- **Characteristics of Waste water stream:**

1. Stream – II: (Existing Product)

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	3.2
2.	Colour (Pt- Co Scale unit)	--	200
3.	Total Suspended Solids	mg/lit	194
4.	COD Value	mg/lit	86
5.	BOD Value (3 days at 27 ^o c)	mg/lit	<5
6.	Oil & Grease	mg/lit	<1
7.	Mercury	mg/lit	0.81
8.	Other Heavy Metals	mg/lit	2.85

2. Stream – III :

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	5.4
2.	Colour (Pt- Co Scale unit)	--	100
3.	Total Suspended Solids	mg/lit	328
4.	COD Value	mg/lit	15358
5.	BOD Value (3 days at 27 ^o c)	mg/lit	6895
6.	Oil & Grease	mg/lit	35
7.	Phenolic compound	mg/lit	< 0.1
8.	Ammonical Nitrogen	mg/lit	< 5.0

3. Stream – IV:

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	7.8
2.	Colour (Pt- Co Scale unit)	--	150
3.	Total Suspended Solids	mg/lit	185
4.	COD Value	mg/lit	5942
5.	BOD Value (3 days at 27 ^o c)	mg/lit	2644
6.	Oil & Grease	mg/lit	12
7.	Phenolic compound	mg/lit	2.35
8.	Ammonical Nitrogen	mg/lit	< 5.0

4. Stream – V:

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	6.8
2.	Colour (Pt- Co Scale unit)	--	100
3.	Total Suspended Solids	mg/lit	85
4.	COD Value	mg/lit	856
5.	BOD Value (3 days at 27 ^o c)	mg/lit	187
6.	Oil & Grease	mg/lit	8
7.	Phenolic compound	mg/lit	0.85
8.	Ammonical Nitrogen	mg/lit	< 5.0
9.	Mercury	mg/lit	1.05

5. Stream – VI:

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	6.8
2.	Colour (Pt- Co Scale unit)	--	100
3.	Total Suspended Solids	mg/lit	318
4.	COD Value	mg/lit	3585
5.	BOD Value (3 days at 27 ^o c)	mg/lit	1847
6.	Oil & Grease	mg/lit	8
7.	Phenolic compound	mg/lit	< 0.1
8.	Ammonical Nitrogen	mg/lit	< 5.0

6. Stream – VII :

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	6.8
2.	Colour (Pt- Co Scale unit)	--	50
3.	Total Suspended Solids	mg/lit	184
4.	COD Value	mg/lit	35
5.	BOD Value (3 days at 27 ^o c)	mg/lit	9
6.	Oil & Grease	mg/lit	3

- **Stream no. II and Stream no. V (quantity : 2.75 kL/day) contains heavy metals which require separate metal removal treatment as under :**

- **Metal Removal treatment :**

The composite waste water was taken and pH of the same increased up to 12 by addition of lime solution and the generated Metal Hydroxides were filtered out. The clear alkaline solution was neutralized with Alum solution and again the coagulated mass was filtered out. Clear neutral waste water was passed through activated charcoal tube and taken for analysis. During this treatment all the heavy metal as well as Mercury are removed (Ref. International Journal of Chemical, Molecular, Nuclear, Materials and Metallurgical Engineering Vol:6, No:12, 2012).

The mercury containing effluent from the process is collected separately inside the plant. The mercury is eliminated from that stream by passing through an electrolyte batch and activated carbon. The mercury free waste stream is then sent to the ETP.

Analytical test results before Metal removal and after metal removal effluent are as under:

Sr. No.	Parameters	Unit	I	II
1.	pH	--	5.62	7.4
2.	Colour (Pt- Co Scale unit)	--	150	50
3.	Total Suspended Solids	mg/lit	126	54
4.	COD Value	mg/lit	604	385
5.	BOD Value (3 days at 27° c)	mg/lit	128	89
6.	Oil & Grease	mg/lit	6.0	< 4.00
7.	Mercury	mg/lit	0.97	< 0.01
8.	Phenolic compound	mg/lit	0.57	< 0.1
9.	Ammonical Nitrogen	mg/lit	3.36	< 5.0
10.	Heavy Metals	mg/lit	0.93	< 0.01

I : Untreated (composite of Stream II & V),

II : After Metal Removal Treatment Outlet

- As can be observed from the above analytical results that all the heavy metals and Phenolic compounds are remove from the effluent and are well within the prescribed norms in treated waste water. The other parameters like COD value, BOD value, and suspended solids need further treatment. Hence this treated waste water was mixed with the other steam as per required proportion waste water for further treatment as under. The generated solid waste and activated carbon waste shall be disposed through approved TSDF site with required treatment.

7. Composite stream: (Stream – III, IV, VI, VII and stream II & V after metal removal treatment)

Initially Untreated Composite Effluent sample was analyzed for relevant parameters and was taken for the treatability study.

Sr. No.	Test Parameters	Unit	Results
1.	pH	--	9.8
2.	Colour (Pt- Co Scale unit)	--	100
3.	Total Suspended Solids	mg/lit	160
4.	COD Value	mg/lit	4602
5.	BOD Value (3 days at 27° c)	mg/lit	2186
6.	Oil & Grease	mg/lit	17
7.	Mercury	mg/lit	< 0.01
8.	Phenolic compound	mg/lit	<0.1
9.	Ammonical Nitrogen	mg/lit	< 5.0
10.	Heavy Metal	mg/lit	<0.01

- So, in order to decide waste water treatment scheme for proposed products, untreated composite effluent sample was used to work out the Treatability Study.
- As can be observed from above analysis results that the sample needs treatment for some relevant parameters like Suspended Solids, COD, and BOD. Hence the study has been carried out as follows to achieve the treated waste water norms laid down by G.P.C.B.

1. PRIMARY TREATMENT:

The effluent was taken and neutralized by non ferric alum. Polyelectrolyte (coagulant) is added for proper settling of flocks to reduce the suspended solid concentration, color and COD in the effluent. Neutral effluent filtered through the filter paper and the clear effluent was analyzed and the results of the same are as bellow.

Analysis Report after primary treatment:

Sr. No.	Test Parameters	Unit	Results	% reduction
1.	pH	--	7.2	--
2.	Colour (Pt- Co Scale unit)	--	80	--
3.	Total Suspended Solids	mg/lit	45	72
4.	COD Value	mg/lit	3221	30
5.	BOD Value (3 days at 27° c)	mg/lit	1639	25
6.	Oil & Grease	mg/lit	8.0	--
7.	Mercury	mg/lit	< 0.01	--
8.	Phenolic compound	mg/lit	<0.1	--
9.	Ammonical Nitrogen	mg/lit	< 5.0	--
10.	Heavy Metal	mg/lit	<0.01	--

As can be observed from above results, almost all the parameters except COD & BOD are observed well within the treated effluent norms laid down by GPCB for disposal. For the removal of COD & BOD, the primary treated effluent was given the Secondary treatment (Biological treatment) as follows:

2. SECONDARY TREATMENT (Biological Treatment):

The bench scale experimentation was carried out with 750 ml. of Primary Treated Effluent which is treated with 250 ml. of biomass. It was initially analyzed for COD & BOD value and then two stage aeration was started through laboratory scale with Spurger type aerator. Required quantity of Nitrogen & Phosphorus (From Urea / DAP) as nutrient were added and COD values were checked after 48 hours.

Sr. No.	Test Parameters	Unit	Results	% reduction
1.	COD Value	mg/lit	128	96 %
2.	BOD Value (3 days at 27° c)	mg/lit	36	97 %

As can be observed from the above results, more than 90 % reduction in COD Value and more than 95 % reduction in BOD value could be achieved through biological treatment.

3. TERTIARY TREATMENT:

After secondary treatment clear effluent was passed through Sand column and Activated Carbon column. And outlet effluent was analyzed as follows.

Sr. No.	Test Parameters	Unit	Results	% reduction
1.	pH	--	7.1	--
2.	Colour (Pt- Co Scale unit)	--	50	--
3.	Total Suspended Solids	mg/lit	64	34
4.	COD Value	mg/lit	92	28
5.	BOD Value (3 days at 27° c)	mg/lit	28	20
6.	Oil & Grease	mg/lit	Nil	--
7.	Mercury	mg/lit	< 0.002	--
8.	Phenolic compound	mg/lit	< 0.1	--
9.	Ammonical Nitrogen	mg/lit	< 5.0	--
10.	Heavy Metal	mg/lit	<0.01	--

- As can be observed from above results, almost all the parameters are observed well within the treated effluent disposal norms laid down by G.P.C.B.

- Based on above results and capacity of installed ETP units the design criteria and Adequacy of ETP is as under:

Design Criteria of ETP and its Adequacy

- Source of Effluent: Process, Washing and utilities.
- Effluent treatment capacity: **10 kL/day Max.**

Sr. No.	Parameter	Untreated Effluent (Inlet)	Treated Effluent (Outlet)
1	pH	5 to 10	5.5 to 8.5
2.	Colour[Hazen Unit(APHA)]	200 (max)	<100
3.	Suspended Solids (mg/lit)	200 (max)	<100
4.	Chemical Oxygen Demand (mg/lit)	5500 (max)	<250
5.	Biochemical Oxygen Demand (mg/lit)	2500 (max)	<30
6.	Oil & Grease (mg/lit)	20 (max)	<10

- Based on the above criteria and effluent quantity, Effluent Treatment Plant having following units with mentioned required specifications and capacity is to be installed.

❖ List of the ETP units with MOC to be design, erected and commissioned :

Sr. No.	Unit	No. of Unit	Capacity	Retention Time	Remarks
1.	Oil & Grease Trap	02	0.5 KL each	--	Adequate
2.	Collection Tank	01	11.0 KL	1 day	Adequate
3.	Primary settling Tank	01	4.0 KL	8 hours	Adequate
4.	Aeration Tank	01	35.0 KL	3 days	F/M= 0.2, MLVSS= 3000 mg/Liter, required volume= 33.3 m ³ . So more than adequate
5.	Secondary Settling Tank	01	4.0 KL	8 hours	Adequate
6.	Holding Tank	01	6.0 KL	10 hours	Adequate
7.	Pressure Sand Filter	01	1.0 kL/hr	--	Adequate
8.	Activated Carbon Filter	01	1.0 kL/hr	--	Adequate
9.	Treated water Tank	01	6.0 kL	--	Adequate
10.	Sludge Drying Beds	03	2.0 m ² each	--	Adequate
11.	Sludge Storage Area	01	4.0 m ²	--	Adequate

7. Adequacy for Existing Effluent Treatment Plant:

Sr. No.	Unit	No. of Unit	Capacity	Retention Time	Remarks
1.	Collection Tank	01	3.0 KL	1 day	Adequate
2.	Primary settling Tank	01	0.5 KL	4 hours	Adequate
3.	Holding Tank	01	1.0 KL	7 hours	Adequate
4.	Pressure Sand Filter	01	0.15 kL/hr	--	Adequate
5.	Activated Carbon Filter	01	0.15 kL/hr	--	Adequate
6.	Treated water Tank	01	2.0 kL	--	Adequate
7.	Evaporator	01	0.5 kL/hr	--	Adequate
8.	Filter Neutch	03	1.5 m ² each	--	Adequate
9.	Sludge Storage Area	01	1.0 m ²	--	Adequate

- The effluent coming from stream – II and stream – V will be treated in adequate existing effluent treatment plant.

❖ CONCLUSIVE REMARKS :

It is concluded that the Environment Management System provided by M/s. Heni Drugs Pvt. Ltd. is adequate and efficient to comply the norms for the manufacturing of existing product as well as propose products within the existing infrastructure.

Recommendations:

- To maintain good housekeeping and environmental conditions by adopting good manufacturing process.
- To develop more greenbelt surrounding the unit to reduce probable minor impacts of industrial activities.

For
UNISTAR ENVIRONMENT AND
RESEARCH LABS PRIVATE LIMITED

Jaivik S. Tandel
(Environmental Auditor)

ANNAXTURE – I
PROPOSED EFFLUENT TREATMENT SCHEME

1. PRIMARY TREATMENT:

UNITS: Oil & Grease removal Tank
Collection cum Neutralization Tank
Primary settling and sludge removal

The effluent coming from the proposed plant and from the existing effluent treatment plant is initially passed through the Oil & Grease removal system. The oil free effluent is then collected into the collection cum reaction tank. In the collection cum reaction tank various chemicals like None Ferric Alum, Caustic soda/acid and polyelectrolyte (coagulant) are added to ensure proper settling which reduces the suspended solid concentration, color and COD in the effluent. The treated effluent is then fed into the primary clarifier. Clear effluent from primary settling tank is charged into the secondary treatment tank (Aeration tank) and settled sludge is discharged into the sludge drying beds and leached of the sludge drying beds is going back to collection tank.

2. SECONDARY TREATMENT (BIOLOGICAL TREATMENT):

UNITS: Aeration Tank
Secondary settling

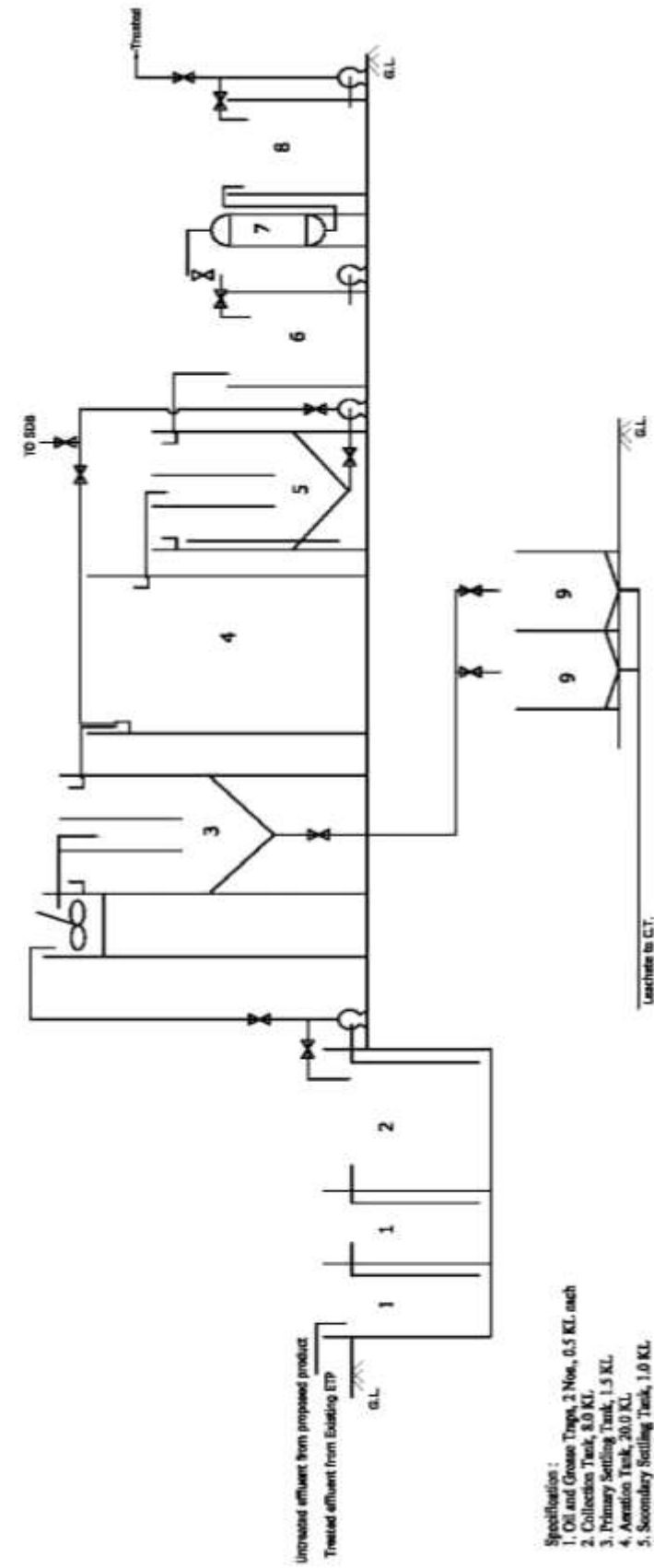
The primary treated clear effluent is passed through the aeration tank where the biodegradation of the organic matter is taken place in presence of active microorganism and required Dissolved Oxygen level. During the biological treatment BOD Value and COD Value are reduced. After the biological treatment (aeration tank) the effluent with the biomass is passed through secondary settling tank where biomass is settled and settled biomass is recycle back to aeration tank or if excess is discharged into the sludge drying beds. And clear effluent is collected into the holding tank.

3. TERTIARY TREATMENT:

UNIT: Sand and Carbon Filter (Mixed bed)

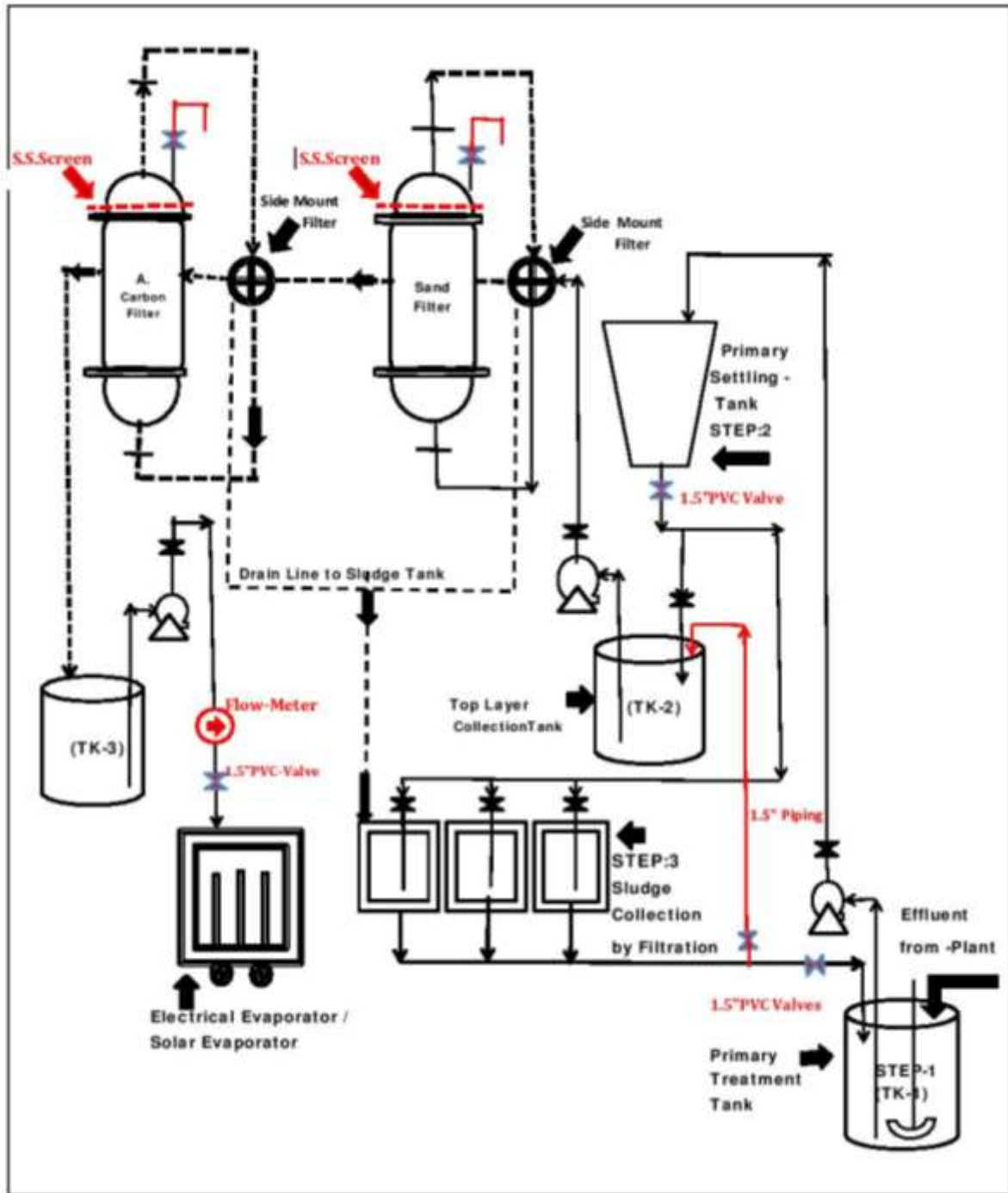
After secondary treatment the effluent is passed through the mixed bed filter for further reduction of COD Value, BOD Value and Color. Treated water is collected into the treated water tank above the roof. Finally the treated effluent confirming the treated water discharge norms laid down by board will be discharged for plantation or into the closed drainage line.

Hydraulic Flow diagram for M/s. Heni Drugs Pvt. Ltd., Sarigam.



- Specification :
- 1. Oil and Grease Traps, 2 Nos., 0.5 KL each
 - 2. Collection Tank, 8.0 KL.
 - 3. Primary Settling Tank, 1.5 KL.
 - 4. Aeration Tank, 20.0 KL.
 - 5. Secondary Settling Tank, 1.0 KL.
 - 6. Holding Tank, 2.5 KL.
 - 7. Mixed Bed Filter, 0.5 KL/Hr.
 - 8. Treated Water Tank, 6.0 KL.
 - 9. Sludge Drying Bed, 2 Nos., 1.0m² each

FLOW DIAGRAM OF EXISTING EFFLUENT TREATMENT PLANT



Annexure- IX

➤ CSR activity details

The proposed CSR programs are based on the needs felt and socioeconomic indicators of the study. The proposed CSR programs can be initially implemented in the five villages of the study area. Based on the outcome of the CSR programs, it will be expanded to the other villages apart from the study area.

According to our survey output and social need base we have recommended various CSR activities. A budget of Rs. 8 Lacs (2 % of the total cost) have been provided for the next 5 years to carry out various CSR activities in nearby area of Sarigam GIDC Area as detailed in EIA report. A budget of Rs. 1.60 lakhs have been allocated for every year to carry out various CSR activities.

The CSR Policy of M/s. Heni Drugs Pvt. Ltd aims at strengthening the bond between the project/ authorities and local population in the vicinity of proposed project. In Line with this CSR Policy. Project proponents will be carried out number of Community Welfare activities in following Areas.

CSR Project proposal

A. Education:

Unit will take part in some children development programs and contribute some funds by distributing school kits (school bags, books, note books, etc.) to nearby schools.

1. Improve the level of literacy at primary, secondary and advanced levels of education by providing scholarships to the meritorious students, enhancing school infrastructural facilities, industrial training, etc.
2. Residential Bridge Course for drop out students through free coaching classes for students belonging to economically weak background.
3. Scholarships/fellowships to deserving students to encourage education.
4. Provision of uniforms, books, and stationery, necessary equipments etc, to schools.
5. Promote computer literacy and technology assisted learning.
6. Skill Development for sustainable income generation & Livelihood for women.
7. Vocational training for Youth & Women.

B. Health :

1. Offering specialized support services to the physically handicapped and mentally challenged people.
2. Preventive health care by organizing health camps for immunization through vaccination
3. Curative health care by conducting specific health camps such as eye care for cataract, glaucoma, etc.

4. Support the health units/hospitals in the region by providing infrastructural facilities
5. Reproductive and child health through conducting awareness camps in the region

C. Water and Sanitation:

1. Safe drinking water provided by water tanker during water crisis circumstances.
2. Build water storage structures in cooperation with government.
3. Sanitation facility provided by building common toilets if needed possible extended to street wise.
4. Infrastructure development through providing drinking water facilities in the villages of the region.

D. Women Development activities

1. Unit may also organize some women development programs like stitching, cooking, knitting, handicraft, etc. to develop skill of women which will be helpful to them for self-sustainable and source of earning which finally help for healthy growth of family.
2. Training and awareness to the self-help groups for income generation.

E. Other Social Welfare Activities

1. Financial & infrastructure assistance during disaster & other crisis incidents
2. Sustainable livelihood and Farming Systems by providing awareness on various agricultural practices for better yield, pesticide and fertilizer management, etc.
3. Other social activities depending upon timely requirements & circumstances
4. Promoting sports and cultural activity.

Note: This CSR plan shall include systematic funding provisions for 5 years.

(In Rs Thousand)						
Sr. no.	Area of Work	2016 to 2017	2017 to 2018	2018 to 2019	2019 to 2020	2020 to 2021
1.	Promoting Education	28	28	28	28	28
2.	Promoting Health care	25	25	25	25	25
3.	Sanitation	20	20	20	20	20
4.	Water	22	22	22	22	22
5.	Women Development activities	35	35	35	35	35
6.	Other Social Welfare Activities	30	30	30	30	30
Total		1.60	1.60	1.60	1.60	1.60

Annexure- X

- Reply regarding violation of water Act under 1974.



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

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Phone : (079) 23226295

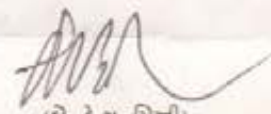
Fax : (079) 23232156

Website : www.gpcb.gov.in

જોખમી કચરાઓ (વ્યવસ્થાપન, જાળવણી અને સીમા પાર હેરફેર) નિયમો-૨૦૦૮ના ભંગ બદલ પર્યાવરણ (સુરક્ષા) અધિનિયમ-૧૯૮૬ની કલમ-૫ હેઠળ ઉદ્યોગ બંધ કરવાનો હુકમ.

- ૧) આપ મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ. પ્લોટ નં: ૧૯૦૧, જીઆઈડીસી-સરીગામ, તા. ઉમરગામ અને જિલ્લો: વલસાડ હેઠળે ઉદ્યોગ ચલાવો છો. અને કેમીકલ પ્રોડક્ટનું ઉત્પાદન કરો છો.
 - ૨) આપને જણાવવાનું કે આપના ઉદ્યોગની તા: ૨૯/૦૬/૨૦૧૫ના રોજ પર્યાવરણ સુરક્ષા અધિનિયમ-૧૯૮૬ની કલમ ૧૦ હેઠળ બોર્ડના અધિકારીઓએ મૂલાકાત લીધેલ ત્યારે નીચે મુજબની વિગતો જાણવા મળેલ હતી.
 - ૧) ઉદ્યોગ દ્વારા બીજા ઉદ્યોગોનું જોખમી કચરો સ્પેન્ટ સોલ્વેન્ટને રો-મટીરીયલ તરીકે વાપરવામાં આવે છે.
 - ૨) એકમે એક રાજ્યમાંથી બીજા રાજ્યમાં લાવવા માટે જોખમી કચરાઓ (વ્યવસ્થાપન, જાળવણી અને સીમા પાર હેરફેર) નિયમો-૨૦૦૮ અન્વયેની મંજૂરી મેળવેલ નથી.
 - ૩) આપના એકમ દ્વારા crude ethyl oleateનું ઉત્પાદન ન કરવા અંગે તા: ૨૫/૦૬/૨૦૧૩ના રોજ અન્ડર ટેકીંગ આપેલ છે જેનું પાલન કરેલ નથી.
- ઉપરોક્ત સંજોગોમાં હું ડો. કે.યુ.મિસ્ત્રી, અધ્યક્ષ, ગુજરાત પદ્મચણ નિયંત્રણ બોર્ડ, પર્યાવરણ (સુરક્ષા) અધિનિયમ-૧૯૮૬ની કલમ-૫ હેઠળ નીચે મુજબનો હુકમ કરું છું.

- ૧) દિન-૧૫ પછી તરત આપના ઉદ્યોગની ઉત્પાદન પ્રક્રિયા બંધ કરશો, ૧૫મા દિવસ સુધીમાં ચાલુ બેચ સલામત રીતે બંધ થાય તથા તે પછી તે ચાલુ ન રહે એવી તકેદારી રાખીને ઉત્પાદન પ્રક્રિયા બંધ કરશો.
 - ૨) જો આપની ઉત્પાદન પ્રક્રિયા આપના પોતાના (કેપ્ટીવ) પાવર પ્લાન્ટ કે ડી.જી. સેટથી ચાલતી હોય તો તે પણ બંધ કરશો.
 - ૩) જોખમી કચરાઓ (વ્યવસ્થાપન, જાળવણી અને સીમા પાર હેરફેર) નિયમો-૨૦૦૮ની કલમ-૧૧ હેઠળ મંજૂરી મેળવ્યા બાદ જ સ્પેન્ટ સોલવન્ટનો રો-મટીરીયલ તરીકે ઉપયોગ કરવો.
 - ૪) જોખમી કચરાઓ (વ્યવસ્થાપન, જાળવણી અને સીમા પાર હેરફેર) નિયમો-૨૦૦૮ હેઠળ અન્ય રાજ્યમાંથી લાવવા માટે ટ્રાન્સબાઉન્ડરી મુવમેન્ટની મંજૂરી મેળવવી.
- જો ઉપરના હુકમનું તાત્કાલિક પાલન નહીં કરવામાં આવે તો આપ અને આપના જવાબદાર અધિકારીઓ પર્યાવરણ સુરક્ષા અધિનિયમની કલમ: ૧૫ મુજબ કોર્ટમાં કરીયાદ કરવાને પાત્ર ઠરશે.


(ડો. કે.યુ. મિસ્ત્રી)
અધ્યક્ષ

નં. જીપીસીબી/સીસીએ-ચેસઆરજી-૯૬/આઈડી: ૪૧૮૦૦/૩૨૫૬૧૦ તા: ૨૦/૮/૨૦૧૬

રવાના:-
મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ,
પ્લોટ નં: ૧૯૦૧,
જીઆઈડીસી-સરીગામ,
તા. ઉમરગામ,
જિલ્લો: વલસાડ - ૩૯૬ ૧૫૫.



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

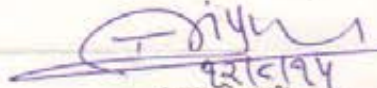
Website : www.gpcb.gov.in

BY R/PAD

પાણી પ્રદૂષણ(નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ-૩૩-અ હેઠળ ઉદ્યોગ બંધ કરવાનો હુકમ.

- ૧) આપ મે. હેની કેમીકલ ઇન્ડસ્ટ્રીઝ, પ્લોટ નં: ૧૯૦૧, જીઆઈડીસી-સરીગામ, તા. ઉમરગામ અને જિલ્લો: વલસાડ હેઠાણે ઉદ્યોગ ચલાવો છો અને કેમીકલ પ્રોડક્ટનું ઉત્પાદન કરો છો.
- ૨) આપના ઉદ્યોગની તા. ૨૯/૦૬/૨૦૧૫ના રોજ પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમની કલમ-૨૩ હેઠળ બોર્ડના અધિકારીઓએ મૂલાકાત લીધેલ ત્યારે નીચે મુજબની વિગતો જાણવા મળેલ હતી.
 - ૧) ઈટીપી પર ફ્લો મીટર લગાડેલ નથી.
 - ૨) આપના એકમ દ્વારા crude ethyl oleateનું ઉત્પાદન ન કરવા અંગે તા. ૨૫/૦૬/૨૦૧૩ના રોજ અન્ડર ટેકીંગ આપેલ છે જેનું પાલન કરેલ નથી.
 - ૩) એકમની મૂલાકાત દરમિયાન ઈટીપી અને ઈંવાપરેટર ચાલુ જોવા મળેલ ન હતા.
 - ૪) એકમની બાજુમાંથી પસાર થતી નેચરલ ડ્રેઈનમાં કલરવાળું પાણી જોવા મળેલ.
 - ૫) હાઉસકીપીંગ ખુબ જ નબળું જોવા મળેલ છે.
- ૩) મૂલાકાત સમયે લેવામાં આવેલ ગંદા પાણીના નમૂનાનું પૃથ્થકરણ અહેવાલ બોર્ડની નિયતમાત્રા કરતા વધારે જણાવેલ છે. ઉપરોક્ત સંજોગોમાં હું વાચ એ.તાઇ. પર્યાવરણ ઇજનેર, ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ, પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ -૩૩(અ) હેઠળ આજ્ઞાનુસાર નીચે મુજબનો હુકમ કરું છું.
 - ૧) દિન -૧૫ની અસરથી આપના ઉદ્યોગની ઉત્પાદન પ્રક્રિયા બંધ કરશો.
 - ૨) જો આપની ઉત્પાદન પ્રક્રિયા આપના પોતાના (કેપ્ટીવ) પાવર પ્લાન્ટ કે ડી.જી. સેટથી ચાલતી હોયતો તે પણ બંધ કરશો.
 - ૩) મૂલાકાત દરમિયાન આપવામાં આવેલ લેખિત સૂચનાઓનું પાલન કરશો.જો ઉપરના હુકમનું તાત્કાલિક પાલન નહીં કરવામાં આવે તો આપ અને આપના જવાબદાર અધિકારીઓ પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ- ૪૧(૨) મુજબ કોર્ટમાં ફરીયાદ કરવાને પાત્ર કરશો.

ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડના
નામે અને વતી


૧૨/૦૬/૧૫
(વાચ એ.તાઇ)
પર્યાવરણ ઇજનેર

નં. જીપીસીબી/સીસીએ-એસઆરજી-૯૬/આઇડી: ૪૧૮૦૦/૩૨૫/૨૬ તા.

12/06/2015

રવાના:-

મે. હેની કેમીકલ ઇન્ડસ્ટ્રીઝ,
પ્લોટ નં: ૧૯૦૧,
જીઆઈડીસી-સરીગામ,
તા. ઉમરગામ,
જિલ્લો: વલસાડ - ૩૯૬ ૧૫૫.

Clean Gujarat Green Gujarat

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation



HENI CHEMICAL INDUSTRIES

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.,
Sarigam, (Gujarat), Pin code - 396155
Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Emails : heni@henichem.net * www.henichem.net

Date: 22/08/2015

GPCB ID: 41800

To,
The Environmental Engineer
Gujarat Pollution Control Board
Paryavaran Bhavan, Sector 10A,
Gandhinagar - 382 010.

Kind Attn.: **Shri Y.A. Tai**

Subject: Revocation application against Direction issued under Section 33-A of the Water Act - 1974 and under Section 5 of the Hazardous Waste (M, H & T) Rules 1986 and as amended in 2008.

Reference: **Board's Letter No. GPCB/CCA/SRG-96/ ID-41800/ 324128 dated 12/08/2015 and Board's Letter No. GPCB/CCA/SRG-96/ ID-41800/ 324610 dated 20/08/2015**

Respected Sir,

We are in receipt of your above cited directions and have noted the contents therein. In this connection, we would like to submit the clarifications and compliances against above referred **Board's Letter No. GPCB/CCA/SRG-96/ ID-41800/ 324128 dated 12/08/2015**.

1. We have already purchased the flow meter and the same will be installed within 3 - 4 days time. We shall upload the photos of the same online after installation.
2. We would like to bring to the notice of the board that we are not manufacturing any Crude Ethyl Oleate but are only carrying out Continuous Distillation by purchasing the Crude Ethyl Oleate from our sister concern unit and the undertaking also states the same.
3. Kindly note that our industrial waste water generation is in the form of ~~boiler blow down~~ and wash water and the same is not generated on daily basis. So, we usually collect the waste water generated during week's time and then treat the same in our ETP. However, during the visit of the board officials, we had stored the volume in our collection tank and hence the ETP and Evaporator were not in function.
4. We would like to inform the board that we are having full fledged treatment facility at our unit for treatment of effluent and are not aware of any whereabouts of the coloured effluent found in the nearby natural drain passing besides our unit. We would also like to highlight the fact that the origination of the drain is far away from our unit and the water is found coloured before it passes our unit.

Reg. add.: "Vikram" 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai - 400 082



HENI CHEMICAL INDUSTRIES

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.,
Sarigam, (Gujarat), Pin code - 396155
Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Emails : heni@henichem.net * www.henichem.net

5. We assure the board that we shall improve the house-keeping in our unit premises and shall maintain the same.
6. As mentioned above in point no. 3, the ETP was not in operation and hence the sample collected by the board officials was of **Untreated effluent** due to which the parameters were found higher than the permissible limits. However, our treated effluent is meeting the permissible norms as specified by the board.

The clarifications and compliances against above referred **Board's Letter No. GPCB/CCA/SRG-96/ ID-41800/ 324610 dated 20/08/2015** are as under:

1. We would like to bring to the notice of the board that we are manufacturing "Inorganic Metal Salts" and "**Carrying out Continuous Distillation by purchasing the Crude Ethyl Oleate**" wherein there is no requirement of any Solvents. The board can also refer our CTE and CC&A application and verify our mfg. process wherein there is no use of Solvents in pure or spent form stated by us. We have also given Raw material list wherein there is no solvents mentioned by us. The process of **Continuous Distillation of Crude Ethyl Oleate** is enclosed herewith as **Annexure IV** for your kind reference.
2. Kindly note that we are not bringing any kind of Hazardous waste from any other state. We are only buying "**Crude Ethyl Oleate**" which is a form of **Vegetable Oil** from our sister concern unit and are further processing the same by carrying out **Continuous Distillation** at our unit at Sarigam and selling the distilled form.
3. We would once again like to confirm the fact that we are not manufacturing any **Crude Ethyl Oleate** but are only carrying out **Continuous Distillation by purchasing the Crude Ethyl Oleate** from our sister concern unit and thereafter selling the distilled form.

In view of the revocation procedure, we are herewith submitting all the necessary supportings such as Form No. 20, Form No. 21 & Revocation Form as **Annexure I** for your ready reference. As a part of the assurance, we are herewith submitting the notarized undertaking on Rs. 100/- stamp paper as **Annexure II** and Bank Guarantee of **Rs. 25,000/- (Rupees Twenty Five Thousand Only)** as **Annexure III** for your kind reference.

We hope that the above compliances/implemented measures will be in line with your requirements and request you to revoke the above said directions at your earliest. Kindly do the needful.

Yours faithfully,
For HENI CHEMICAL INDUSTRIES

Sutis

AUTHORISED SIGNATORY

CC- To: Regional Officer- GPCB, Sarigam

PK
24/8/15
Gujarat Pollution Control Board
Sector No. 10 A,
Gandhinagar - 382 010.

Reg. add.: "Vikram" 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai - 400 082

(6)

APPLICATION FOR REVOCATION OF CLOSURE ORDER

1. Full name and address of the unit : M/s. Heni Chemical Industries
Plot No. 1901, Opp. Merit Organics
GIDC, Sarigam - 396155
2. GPCB ID No. : **41800**
3. No. & date of closure order for : **GPCB/CCS-SRG-96/ID: 41800/324128**
Which the revocation is sought for **Dated: 12.08.2015**
GPCB/CCS-SRG-96/ID: 41800/324610
Dated: 20.08.2015
4. Date of disconnection of Electric Supply : Not Applicable
5. Date of disconnection of Water Supply : Not Applicable
6. Remedial measures taken to control the pollution (in the table mentioned below):

Sr. No.	Reasons of Closure	Remedial measures taken	Date of completion of the measures	Where compliance requires more than 07 days time, likely date of its completion
1.	With reference to the Board's Letter No. GPCB/CCA/SR G-96/ID-41800/324128 dated 12.08.2015.	<ol style="list-style-type: none"> 1. We have already purchased the flow meter and the same will be installed within 3 - 4 days time. We shall upload the photos of the same online after installation. 2. We would like to bring to the notice of the board that we are not manufacturing any Crude Ethyl Oleate but are only carrying out Continuous Distillation by purchasing the Crude Ethyl Oleate from our sister concern unit and the undertaking also states the same. 3. Kindly note that our industrial waste water generation is in the form of boiler blow down and wash water and the same is not generated on daily basis. So, we usually collect the waste water generated during week's time and then treat the same in our ETP. However, during the visit of the board officials, we had stored the volume in our collection tank and hence the ETP and Evaporator were not in function. 	<p style="text-align: center;">Complete</p> <p style="text-align: center;">Complete</p>	Will be complete in within 3-4 days time.

	<p>4. We would like to inform the board that we are having full fledged treatment facility at our unit for treatment of effluent and are not aware of any whereabouts of the coloured effluent found in the nearby natural drain passing besides our unit. We would also like to highlight the fact that the origination of the drain is far away from our unit and the water is found coloured before it passes our unit.</p> <p>5. We assure the board that we shall improve the house-keeping in our unit premises and shall maintain the same.</p> <p>6. As mentioned above in point no. 3, the ETP was not in operation and hence the sample collected by the board officials was of Untreated effluent due to which the parameters were found higher than the permissible limits. However, our treated effluent is meeting the permissible norms as specified by the board.</p>	<p>Complete</p> <p>Complete</p> <p>Complete</p>
<p>2. With reference to the Board's Letter No. GPCB/CCA/SR G-96/ ID-41800/ 324610 dated 20/08/2015</p>	<p>1. We would like to bring to the notice of the board that we are manufacturing "Inorganic Metal Salts" and "Carrying out Continuous Distillation by purchasing the Crude Ethyl Oleate" wherein there is no requirement of any Solvents. The board can also refer our CTE and CC&A application and verify our mfg. process wherein there is no use of Solvents in pure or spent form stated by us. We have also given Raw material list wherein there is no solvents mentioned by us. The process of Continuous Distillation of Crude Ethyl Oleate is enclosed herewith as Annexure IV for your kind reference.</p> <p>2. Kindly note that we are not bringing any kind of Hazardous waste from any other state. We are only buying "Crude Ethyl Oleate" which is a form of Vegetable Oil from our sister</p>	<p>Complete</p>

		<p>concern unit and are further processing the same by carrying out Continuous Distillation at our unit at Sarigam and selling the distilled form.</p>	
		<p>3. We would once again like to confirm the fact that we are not manufacturing any Crude Ethyl Oleate but are only carrying out Continuous Distillation by purchasing the Crude Ethyl Oleate from our sister concern unit and thereafter selling the distilled form.</p>	Complete

7. Where remedial measures to mitigate pollution are likely to last more than 07 days, an undertaking (on stamp paper of Rs.100-00 duly signed and sealed by the Notary) shall be submitted to GPCB stating the measures and likely date of their completion.

In addition to this, the company shall also undertake to comply with all provisions of the Water Act, 1974, and Air Act.1981 and the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and shall also comply with the conditions stipulated in the Consolidated Consents and Authorisation (CCA) by the Board.

Enclosed as Annx. II

8. Letter of Bank Guarantee, if required : **Attached as Annx. III**
9. Status of CCA along with date of expiry : **Valid CCA. Date of Expiry: 10.06.2019**
10. Up to which period the Water Cess is paid : **N.A**
11. Are Samples analysis charges paid : **No Yes**
12. If the Unit is in critically dark Zone area. What is the source of water? If bore-well is in Use, can it be sealed? Explain with reasons. : **No. GIDC Water.**
13. Closure order(s) issued to the unit by the GPCB in last two year : **None**
14. Status of Monthly Report from Industry (Form-20) : **Enclosed as Annx. I**
15. Status of Annual Report from industry (Form-21) : **Enclosed as Annx. I**
16. Env. Audit Report (If applicable):
- 16.1 Compliance of Last year Env. Audit Report:
- 16.2 For current year Env. Auditor's acknowledgment Letter: **Not Applicable.**

(2)

17. Status of Env. Statement (Form-V - EPA Act) : ---

Date : 22.08.2015

Place : Sarigam

For HENI CHEMICAL INDUSTRIES

Let

AUTHORISED SIGNATORY

Signature of Occupier / Manager

*This date should be after the date mentioned in item no.4 or 5.

Note of Unit Head: - Following items shall be attached and ensured by the Unit Head.

- 1) Data Collection Form.
- 2) Last visit report form Regional Office.
- 3) Industries profile fully filled up.

Above facts are verified and found correct

Signature of the Unit Head



HENI CHEMICAL INDUSTRIES

SITE : PLOT NO.1901/1901A, Phansa Char Rasta, GIDC, Sarigam, (Gujarat), 396 155, INDIA.
REG OFF : VIKRAM, 26 DREAMLAND, SHASTRI NAGAR, MUMBAI 400 082, INDIA
TEL: 0091 22 2583 6009, 2582 3357 FAX: 0091 22 2582 0719

24/09/2015

GPCB ID: 41800

To: The Environmental Engineer
Gujarat Pollution Control Board
Parayvaran Bhavan, Sector 10 A
Gandhinagar - 382 101

Sub: Declaration against revocation application submitted by us on 22/08/2015.

Ref: Boards Letter No: GPCB/CCA/SRG-96/ID-41800/324128 & GPCB/CCA/SRG-96/ID-41800/324610 dated 20/08/2015.

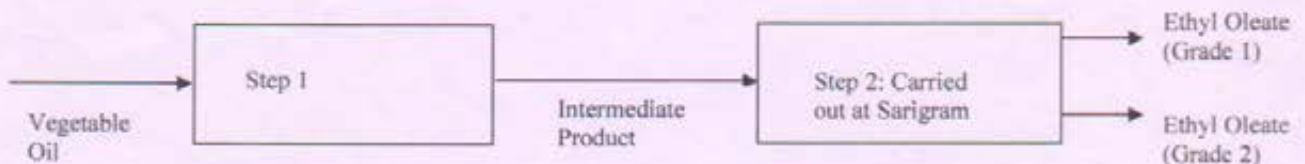
Respected Shri Y.A.Tai,

In continuation to our application and as per our meeting & discussion with your good self today at GPCB, Gandhinagar office we humbly submit further clarifications and decelerations on the said matter.

1. As per instructions we have had our water and electricity connection disconnected. The photocopies of the confirmation letter from GIDC and GEB are attached herewith.
2. The declaration given by us in 2013 was a misunderstanding from our side. We intended to explain that we will carry out only distillation crude ethyl oleate and not carry out the synthetic production of crude ethyl oleate. But due to our misunderstanding/mistake we put crude ethyl oleate distillation in our declaration. Since then we were granted the NOC. And after grant of the NOC we built the facility only to carry out the distillation of crude ethyl oleate. We regret that we did not bring this mistake to the notice of the pollution control board.
3. Following is the process description explaining that the present activity is only distillation and not any synthetic production:

Step 1: We carry out the reaction step which involves use of vegetable oils in our sister concern in Mumbai. This concern has its own EC from Maharashtra Pollution Control Board. The latest consent reference is 1.0/BO/AS(T)/TN-5780-15/R/GEN-07271 dated 01/07/2015. The output of the this step is an intermediate product which we call as crude ethyl oleate. This intermediate product does not fall in hazardous waste category as it is an intermediate product.

Step 2 (Carried out at Sarigam): Crude ethyl oleate is separated into two grades in a ration of approximately 80 % and 20 %. This is done in the installed distillation facility at Sarigam plant. Both the grades are sold as ethyl oleate finished product to different customers. There is no residue or hadarzous waste from this distillation.



We hope that the above clarifications/compliances are in line with your requirements and request you to revoke the above said directions at your earliest. We will not carry out the above mentioned distillation activity till board clarifies the matter. We will be more than willing to provide any further information and clarification required. We remain at your disposal.

Yours sincerely,

Kapil Girotra
Director

24/9/15
Gujarat Pollution Control Board
Sector No. 10 A,
Gandhinagar - 382 010.

Corrspondence Address: Plot A-161, Wagle Industrial Estate, Road No 27, Thane: 400604, India.
E-MAIL : heni@henichem.net * www.henichem.net



HENI CHEMICAL INDUSTRIES

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.,
Surigaur, (Gujarat), Pin code - 396155
Tel: +91 260 278 0432
Email: heni@henichem.net * www.henichem.net

GPCB ID: 41800

Date : 25/08/2015

To,
The Environmental Engineer
Gujarat Pollution Control Board
Pariyavaran Bhavan, Sector 10A
Gadhinar - 382 010

Kind Attn: Mr. Y.A.Tai

Sub: Original copy of Bank Guarantee as part of our revocation application submitted on 22/08/2014.

Reference: Board Letter No. GPCB/CCA/SRG-96/ID-41800/324128 dated 12/08/2015 and Boards Letter No. GPCB/CCA/SRG-96/ID-41800/324610 dated 20/08/2015, Revocation application dated 22/08/2015(copy attached).

Respected Sir,


Please find the original copy of BANK GUARANTEE enclosed herewith.

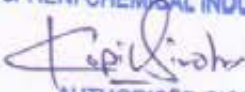
BANK GUARANTEE DETAILS:

BANK: STATE BANK OF INDIA
GUARANTEE NO: 0505015BG0002036
COVER FROM: 24/08/2015 TO 21/08/2016

Please consider this submission as part of the revocation letter submitted on 22/08/2015, a copy of the same with confirmed inward is attached herewith.

Yours faithfully,


Kapil Girotra
Director

For HENI CHEMICAL INDUSTRIES

AUTHORISED SIGNATORY


16/9/15
Gujarat Pollution Control Board
Sector No. 10 A,
Gandhinagar - 382 010.

Off Add: Plot A-161, Wagle Industrial Estate, Thane: 400 604, Maharashtra. Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Reg. add.: "Vikram" 26, Dreamland Society, Mulynd Colony, Shashtri Nagar, Mumbai - 400 082



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 RPAD

પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ-૩૩(અ) હેઠળ બંધ ઉદ્યોગને ચાલુ કરવાનો હુકમ.

- ૧) આપ મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ, પ્લોટ નં: ૧૯૦૧, જીઆઈડીસી-સરીગામ, તા. ઉમરગામ અને જિલ્લો: વલસાડ હેઠળ ઉદ્યોગ ચલાવો છો અને કેમીકલ પ્રોડક્ટનું ઉત્પાદન કરો છો.
- ૨) ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ દ્વારા આપને પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ-૩૩(અ) હેઠળ આપનું ઔદ્યોગિક એકમને બંધ કરવા માટે તા. ૧૨/૦૮/૨૦૧૫ના પત્ર નં. જીપીસીબી/સીસીએ-એસઆરજી-૯૬/આઈડી: ૪૧૮૦૦/૩૨૪૧૨૮થી હુકમ કરવામાં આવેલ હતો.
- ૩) આપને જણાવવામાં આવે છે કે, બોર્ડ હુકમ નં. AWM-૬૬૧૩૩, જે તા. ૨૨/૦૧/૨૦૧૫ થી તા. ૧૦/૦૬/૨૦૧૬ સુધી આપને ઉદ્યોગ ચલાવવા માટે મંજૂરી આપેલ છે.
- ૩) આપના દ્વારા રૂ. ૧૦૦/- ના સ્ટેમ્પ પેપર પર બાંહેધરી પત્રક આપવામાં આવેલ છે. એકમ રૂ. ૨૫,૦૦૦/- ની બેંક ગેરંટી રજૂ કરેલ છે, જેની મુદત તા. ૨૧/૦૮/૨૦૧૬ સુધીની માન્ય છે.
- ૪) આપના ઉદ્યોગની તા. ૦૮/૧૦/૨૦૧૫ના રોજ પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ-૨૩ હેઠળ બોર્ડના અધિકારીઓએ મૂલાકાત લીધેલ ત્યારે નીચે મુજબની વિગતો જાણવા મળેલ હતી.
 - ૧) એકમનો વીજ પૂરવઠો તથા પાણી પૂરવઠો કપાઈ ગયેલ જોવા મળેલ.
 - ૨) ઉત્પાદન બંધ જોવા મળેલ.
 - ૩) એકમ દ્વારા બંધના હુકમનું પાલન કરવામાં આવેલ છે.
- ૫) એકમ દ્વારા બોર્ડ જે નિર્ણય લે ત્યાં સુધી Distillationની Activity નહીં કરવાની બાંહેધરી આપેલ છે.

ઉપરોક્ત સંજોગોમાં હું વાચ. એ. તાઈ, પર્યાવરણ ઇન્જનેર, ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ આજ્ઞાનુસાર જણાવું છું કે, પાણી પ્રદૂષણ (નિવારણ અને નિયંત્રણ) અધિનિયમ-૧૯૭૪ની કલમ-૩૩(અ) હેઠળ બંધ કરવાનો હુકમ ૩ માસ માટે નીચેની શરતોને આધિન રહીને પરત ખેંચવામાં આવે છે.

 - ૧) આપના દ્વારા રજૂ કરવામાં આવેલ તા. ૨૨/૦૮/૨૦૧૫ના બાંહેધરીપત્રનું અભિપ્રાય પાલન કરવાનું રહેશે.
 - ૨) બોર્ડ દ્વારા વખતો-વખત આપવામાં આવતી સુચનાઓનું તથા પર્યાવરણીય કાયદાઓનું ચુસ્તપણે પાલન કરવાનું રહેશે.
 - ૩) Continuous Distillation of Crude Ethyl Olefinનું ઉત્પાદન કરવું નહીં.

નં. જીપીસીબી/સીસીએ-એસઆરજી-૯૬/આઈડી: ૪૧૮૦૦/

રવાના:-

મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ,
પ્લોટ નં: ૧૯૦૧,
જીઆઈડીસી-સરીગામ,
તા. ઉમરગામ,
જિલ્લો: વલસાડ, ૩૯૬ ૧૫૫.

ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ-૫

નામે અને વતી,

(વાચ. એ. તાઈ)

પર્યાવરણ ઇન્જનેર

તા. ૨૦/૧૦/૨૦૧૬

Clean Gujarat Green Gujarat

ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation

નકલ રવાના:-

૧) પ્રતિ,

ડેપ્યુટી ઇન્સ્પેક્ટરી, (ઓ એન્ડ એમ)

દક્ષિણ ગુજરાત વીજ કંપની લિ,

ભીલાડ-સરીગમ, જી. વલસાડ.....આથી તમોને વિનંતી કરવામાં આવે છે કે, મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ, પ્લોટ નં: ૧૯૦૧, જીઆઈડીસી-સરીગમ, તા. ઉમરગામ અને જિલ્લો: વલસાડ ઉદ્યોગનો વીજ પુરવઠો ૩ માસ માટે ચાલુ રાખશો અને તેની જાણ લેખિત પત્રથી બોર્ડને કરશો.

૨) પ્રતિ,

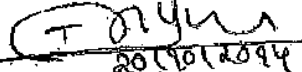
નાયબ ઇન્સ્પેક્ટરી,

જી.આઈડી.સી,

સરીગમ.....આથી તમોને વિનંતી કરવામાં આવે છે કે, મે. હેની કેમીકલ ઈન્ડસ્ટ્રીઝ, પ્લોટ નં: ૧૯૦૧, જીઆઈડીસી-સરીગમ, તા. ઉમરગામ અને જિલ્લો: વલસાડ ઉદ્યોગનો વીજ પુરવઠો ૩ માસ માટે ચાલુ રાખશો અને તેની જાણ લેખિત પત્રથી બોર્ડને કરશો.

ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડના

નામે અને વતી


20/10/2015

(વાચ.એ.તાઈ)

પર્યાવરણ ઇન્સ્પેક્ટર

૩) પ્રાદેશિક અધિકારીશ્રી,

ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડ,

સરીગમ...સદર એકમની દિન-૧૫માં મૂલાકાત લઈ ઉપરોક્ત બાબતોની ખાત્રી કરી શુક્રવાર મૂલાકાત અહેવાલ મોકલી આપવા વિનંતી છે.

૪) કાયદાશાખા, વડી કચેરી ગાંધીનગર.....જાણસાથે.

૫) સંબંધિત યુનિટ ફાઇલ.

Outward No: 330788, 20/10/2015

Annexure- XI

- Legal Undertaking for ToR compliance



गुजरात गुजरात GUJARAT 3100 ता. 22/7/16 इ. सं. 1/4/100
अति इ. पीस/परिस/सो/ _____ नां स्टैम्प ने सांघल मासे
अडे _____
श्री/श्रीमति Henri Drugs Pvt. Ltd.
रहे Sarigam ता. उमरगाव
Satish
लेवास्वी सही प्रशास अरिटर सरीगाम ला. वं. ३१/८८

AW 662618

UNDERTAKING

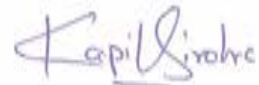
I, The undersigned Mr. KapilGirotra, adult Indian resident of 1302,A wing, Maple leaf building, RahejaVihar, Chandivelly, Powai- Mumbai-400 072, am the Director of the company M/s. Henri Drugs Pvt. Ltd., located at 1901/1901A, Phansa Char Rasta, GIDC Sarigam, Tal.: Umergaon, Dist.: Valsad, (Gujarat). Do hereby solemnly undertake that,

1. We ensure that, we will comply with the applicable regulations for handling, storage and transportation of Mercury metal/Compounds as mentioned below:
 - Occupational Health Guidelines for Inorganic Mercury &Organo (Alkyl) Mercury by NIOSH, USA
 - IS : 7812 - 1975

- The Environment (Protection) Act-1986
 - Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
 - Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended.
 - The Factories Act, 1948, [Act No. 63 of 1948] As amended in 1987
 - The Gujarat Factories Rules, 1963 (as amended timely)
2. We shall not dig any bore well within the premises of project site for water requirement purpose.
 3. We will provide a separate electric meter for the ETP.

Date: 22/07/2016
Place: Sarigam

For Heni Drugs Pvt. Ltd.



Mr. Kapil Girotra
(Director)

Annexure- XII

- A. Layout Plan
- B. Legal Documents (Lease Agreement/ Plot Transfer letter / (Name Change Letter) -Ackw.)
- C. CETP Membership
- D. TSDF Membership letter
- E. TSDF Saurashtra Enviro Provi. Membership
- F. Details of CETP, Sarigam



DETOX GROUP

Saurashtra Enviro Projects Pvt. Ltd.

Integrated Common Hazardous Waste Management Facility

REF No: SEPPL/1200002552/2016-17/689

Date of Issue: 19/07/2016

TO WHOMSOEVER CONCERN

PROVISIONAL MEMBERSHIP CERTIFICATE

This is to certify that **M/s. Heni Drugs Private Limited** having its Production Unit at **Plot No:1901, GIDC Estate, Village: Sarigam, Ta: Umbergaon, Dist: Valsad- Sarigam-396155** approached M/s. **Saurashtra Enviro Projects Pvt. Ltd.** for obtaining membership of its Integrated Common Hazardous Waste Management Facility (I.C.H.W.M.F) operative at **Survey No: 414 to 418, Vill: Juna Katariya, Tal: Bhachau, Dist: Kutch** for disposal of Industrial Hazardous Waste generated by the industry.

This Provisional Certificate been issued for meeting any immediate requirement of the Regulatory Authorities. Final Membership Certificate* shall be issued subject to successful completion of all membership formalities after which all waste disposal activities shall commence.

In event of any clarification, please feel free to contact us for further assistance.

Thanks & Regards,

For, Saurashtra Enviro Projects Pvt. Ltd


(Director)

SARIGAM WASTE & EFFLUENT MANAGEMENT COMPANY LIMITED

SHED NO. C-1/614, G.I.D.C., SARIGAM, TAL. UMBERGAON, DIST. VALSAD, PHONE : 2780335

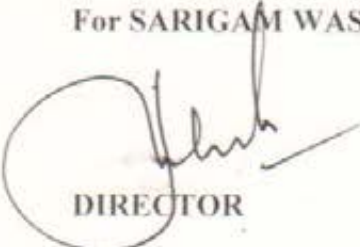
No. SWEMCL/2016-17/4

Date:05/07/2016

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s. Heni Drugs Pvt. Ltd. having their unit on Plot No.1901 & 1901/A,GIDC, Sarigam have become member of our SARIGAM WASTE & EFFLUENT MANAGEMENT COMPANY LIMITED (SOLID WASTE DISPOSITORY SCHEME) and have also agreed to hand over their solid waste for shifting to the disposal site of VAPI WASTE & EFFLUENT MANAGEMENT COMPANY LIMITED, VAPI.

For SARIGAM WASTE & EFFLUENT MANAGEMENT CO.LTD,



DIRECTOR

SARIGAM CLEAN INITIATIVE

Plot No.341/427/B, SARIGAM – MANDA ROAD, SARIGAM GIDC, SARIGAM, VALSAD.

REF: SCI/PROVISIONAL MEMBER/021 008

31/03/2016

To,

Heni Drugs Pvt Ltd,

Plot No. 1901, GIDC,

Sarigam.

Dear Sir,

Sub: Provisional membership of CETP

This is with reference to your letter dated 26/03/2016 where you have shown your intent to become member of CETP, we would like hereby confirming that your request of membership has been accepted by the management of CETP in principally subject to you should have valid consent of GPCB.

You are hereby directed to submit valid NOC and consent within six months form date of issue of this letter else your provisional membership will be revoked.

Further this letter is issued to you on your request for applying consent from GPCB.

For, Sarigam Clean Initiative


Chief Executive Officer





Phone No. 0260 244270-2442805
 Fax No. 0260 244270
**GUJARAT INDUSTRIAL
 DEVELOPMENT CORPORATION**
 (A Govt. of Gujarat Undertaking)
 Office of the Divisional Manager,
 Administrative office building
 Plot No. C-5 (01), GIDC, Chhatra Basha,
 GIDC VAPI, 396195.

BY ROAD

NO. GIDC/DM/VAPI/PLI/FTO/SRC/

1964

DC: 306/2011

15.03.2011

OFFICE ORDER

Subject: Transfer of Plot No. 1901 & 1901/A @ Narigan Industrial Estate.

A Plot of land (S.No 1901 & 1901/A) admin. about 33.13 sq. Mts. & 3260 Sq.Mtrs. (along with the plot there under) was allotted to M/s. Shivani Exteriors Pvt. Ltd. in Sarigan Industrial Estate. The Lease Deed has been executed on 24/09/85 and Deed Of Assignment on 30/11/2005. The Lessee had applied to the Corporation for transfer of the said plot in favour of **M/S H.K.THAKKAR & ASSOCIATES, consisting partners as under:**

- | | |
|----------------------------------|-------------|
| 1. MR. HEMENDRA KUMAR THAKKAR | 10% |
| 2. MRS. NISHIDA HEMENDRA THAKKAR | 10% |
| 3. MR. DEEPA HEMENDRA THAKKAR | 80% |
| 4. DIVYAKHIL HEMENDRA THAKKAR | 00% |
| TOTAL | 100% |


For sig. of PDS/CHARTER/STATE OF VAPI SURVEY SALES, DISMISSED SALES, DOWNSALES, GIDC/PLI/FTO/SRC/DM/315.

The permission with certain terms and conditions have been stipulated by the Divisional Manager Vapi, in per letter No. 933 dtd. 26/02/2011.

Transferor has paid all dues of the Corporation up to 2011-2012. He has also paid the Corporation's share in "Transfer Fee" in value of the land amounting to Rs.4,94,095/- to Rs. 120/- Per Sq. Mtrs. The Deed Of Assignment Cum Conveyance, has therefore been executed on 14/06/2011 between the Corporation/land owner and transferee. The Plot/land now therefore stands transferred in the name of **M/S H.K.THAKKAR & ASSOCIATES**, with effect from 14/06/2011.

The transfer permission shall not to be considered as valid under the hooding bye laws of the Corporation, if any unauthorized construction is carried out by Transferee. If any Un-authorized construction is carried out, the same shall not be considered that Corporation has regularized, the same. Transferee shall have to remove/regularize same violation, construction or shall have to be got approved from the Corporation. The water requirement is per transfer application for 175 Ltrs. per day /normal use only.

Transferee shall have contact to Chief Officer, Notified Area.(Water Supply) GIDC, Sarigan regarding change of name of Water supply connection.

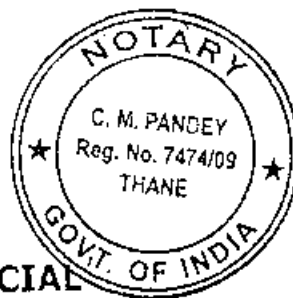

DIVISIONAL MANAGER
 GIDC, VAPI.

To:

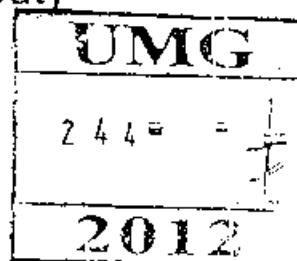
1. **M/S H.K.THAKKAR & ASSOCIATES,**
 "VIKRAM", 26, Dreamland,
 Nr. Mahatma Nagar, Midland Colony,
 ME/MIDAY-100 008.
2. M/s Shivani Exteriors Pvt Ltd,
 Plot No. 1901 & 1901/A, GIDC,
 Sarigan 396 155, Dist. Valsad.

Copy to:

1. The Ex.Engineer, GIDC, Vapi.
2. The Accounts Officer, GIDC, Vapi.O.O
3. The Dy.Ex.Engineer, GIDC, Sarigan.
4. The Chief Officer, Notified Area, GIDC, Sarigan.
5. S.I.A, GIDC, Sarigan.



INDIA NON JUDICIAL
Government of Gujarat
Certificate of Stamp Duty



Certificate No.	IN-GJ26428175668258K
Certificate Issued Date	23-Jan-2012 12:18 PM
Account Reference	NONACC (FI) / gjvdp/10/ UMARGAM/ GJ-VL
Unique Doc. Reference	SUBIN-GJGJEVL.FI.1034300922058584K
Purchased by	MS HENI CHEMICAL INDUSTRIES A PARTNERSHIP FIRM
Description of Document	Article 30(a) Lease - (immovable Property) - Rent
Property Description	PLOT NO.1901/1931 A ADMEAGRING 8587 SQM G I D G SARIGAM
Consideration Price (Rs.)	0 (Zero)
First Party	MS HENI CHEMICAL INDUSTRIES A PARTNERSHIP FIRM
Second Party	MS H K THAKRAR AND ASSOCIATES
Stamp Duty Paid By	MS HENI CHEMICAL INDUSTRIES A PARTNERSHIP FIRM
Stamp Duty Amount(Ps.)	1525 (One Thousand Five Hundred And Twenty Five only)



2012/2012

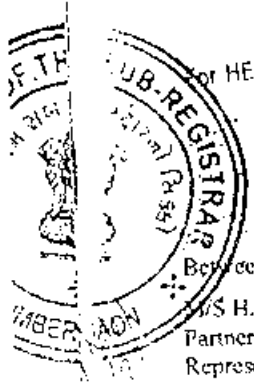
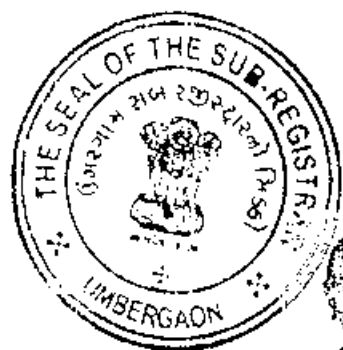
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दस्तावेज क्र. २
तारीख १/२/२०१२
महानगर उद्योगी उमरगाव

UMG
244 - 2
7
2012



M/S HENI CHEMICAL INDUSTRIES
N.H. Shakra
Partner

Lease Agreement

This Lease Agreement made at Thane this 1st Feb, 2012

Between
M/S H.K. Thakrar & Associates
Partnership Firm
Represented by
Shri Hemendra Kalidas Thakrar
Age 76 years.
Occupation - Industrialist
Residing at - 26, Dreamland
Near Shastri nagar
Mulund Colony
Mumbai - 400 082

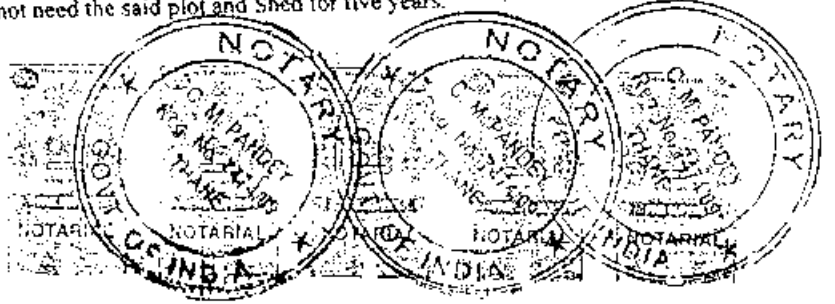
Lessor

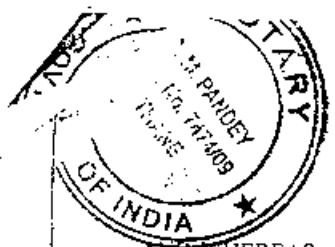
AND
M/S Heni Chemical Industries
Partnership Firm
Represented by
Mrs Nisha H. Thakrar
Age 71 years.
Occupation - Industrialist
Whereas the property bearing plot No. 1901/1901A, admeasuring 6587 sq.mter

Lessee

Sarigam GIDC, Umbragaon Taluka, Valsad District. Is owned and possessed by present lessor
AND WHEREAS the lessor is not need the said plot and Shed for five years.

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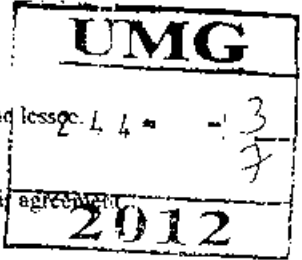




AND WHEREAS on account of non-using said plot, and the lessor has not been occupying the said premises.

AND WHEREAS the lessee approached the lessor and requested the former to lease out the said premises unto to lessee for the purpose of the manufacturing bulk of fine chemicals.

AND WHEREAS the lessor has agreed to consider the request made out to him by the lessee



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A/c
W/P
M/P

AND WHEREAS the parties hereto have worked out the terms and conditions of their agreement and also decided to reduce the same into writing.

NOW THIS DEED WITNESS, and it is hereby agreed by and between the parties as follows



1. That the lessor does hereby lease out the premises bearing plot No. 1901/1901A Sarigam CIDC, Umbargaon Taluka, Valsad District.
2. That the lessee shall pay unto the lessor by way of rent Rs.101 per month and such amount shall be payable by the lessee unto the lessor every month in advance by the tenth day of such month and also pay security Deposit Rs.25000 and security deposit will return to the lessee after the completion of the lease period .
That in addition to and over and above the said amount the lessee shall also pay every month an amount towards the water and electricity charges.
That the lessee shall have a right to use and enjoy the said premises for chemical purpose and he shall not allow any other person to stay with him except his guests on occasions.
3. That the lessee shall take all possible care of the premises and furniture fittings and fixtures provided for the said premises.
4. That the does hereby agree and undertake to vacate the said premises and hand over vacate and peaceful possession thereof unto the lessor. If the lessor were to required the same and in that event, the lessor shall give at least one month's intimation in writing to the lassee.
5. That if lessee wants to vacate the said premises, he shall be at liberty to do even without giving any such notice, but the lessee shall hand over vacant possession thereof unto the lessor only.
6. Lessee has to take the necessary permission from state govt Dept. And central govt. Dept. on his own before commencement of the production
7. The Lessee can be allowed to take term loan etc. From financial institutions and the same premises can be hypothecated to banks and financial institution as security
8. That the lessee company take any permission from any Government authority by its own risk and the lessor will not responsible for that.
9. That all the expenses of stamp duty and registration charges are to be borne by the lessee.

Handwritten notes:
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K/S
M/P

Handwritten notes:
W/P
M/P
2012



That the present lease shall be fixed for a period of five years from the date of handing over the possession of the said premises unto the lessees and the lessees shall be liable to vacate the said premises and hand over peaceful and vacant possession thereof unto the lessor immediately on the expiry of the lease.

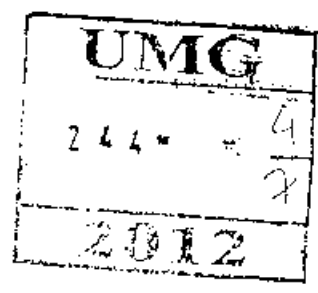
- 13. That the lessor shall refund unto the lessees the amount of the security deposit of Rs. 25000 at the handing over the possession of the premises and said amount shall not carry any interest.
- 14. That if the lessees or their officers were to cause any damages or loss to the premises or the said property. The lessor shall be entitle to deduct from the said amount of the security deposit of Rs.25000 such amount of damage or loss.
- 15. Tax shall be paid by Lessor. *H. H. Thakrar*

THE SCHEDULE OF THE PROPERTY ABOVE REFERRED TO :

All that piece and parcel bearing plot No. 1901/1901A Sarigam, GIDC, Umbargaon, Taluka & District Valsad admeasuring 6587 Sq. Meter or their abouts and bounded by as follows:

- On or towards the East ----- plot GIDC
- On or towards the West ----- Road
- On or towards the North ----- Road
- On or towards the South ----- Road.

H. H. Thakrar



Together with shed standing thereon.

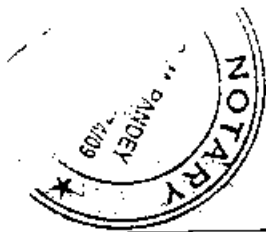
IN WITNESSES WHEREOF the parties hereto have signed hereunder at Umbargaon the date first abovementioned.



H. H. Thakrar
Shri Hemendra Kalidas Thakrar
LESSOR

N. H. Thakrar
Mrs. Nisha H. Thakrar
LESSEE

Witness :
I. S. Kumar *I. S. Kumar*



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Serial No. 244
 Presented of the office of the Sub-Registrar of
 S.R.O - UMBERGAON Between the hour of
 12 to 13 on Date 01/02/2012

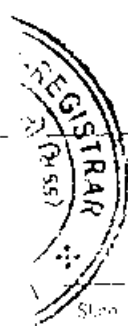
Receipt No - **2012235000362**

Received Fees as following	Rs.
Registration	270
Side Copy Fee (10)	100
Postage	80
Other Fees	0
TOTAL :-	450



Nisha Hemendra Thakrar

Ms Hem Chemical Industries through partner
 Nisha Hemendra Thakrar



(Signature)

(P G JADAV)
 Sub Registrar
 S.R.O - UMBERGAON

(Signature)

(P G JADAV)
 Sub Registrar
 S.R.O - UMBERGAON

Sl.no	Party Name and Address	Age	Photograph	Thumb Impression	Signature
-------	------------------------	-----	------------	------------------	-----------

Executing
 1.000
 Mrs H.K.Thakrar And Associates
 through its partner's Hemendra
 Kaldas Thakrar
 29,Dreamland Near Shastri Nagar
 Mulaund,Mumbai



Hemendra Kaldas

Claiming
 1.000
 Ms Hem Chemical Industries
 through partner Nisha Hemendra
 Thakrar
 Plot
 No 1991, 1991A G'DC Sargam



Nisha Hemendra

Executing Party
 admits execution

(Faint handwritten notes)

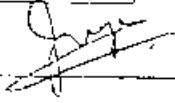
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2012		



Jayesh T. Patel
A-2/7, GIDC, UMBERGAM



Known to the under signed
Sub-Registrar state that the
personally known the above
executant and identifies him/them.

1. _____ 
2. _____

Date 1 Month February -2012



P. G. JADAV
Sub Registrar
S. R. O - UMBERGAON



Received Copies of Certified Evidence of Seller, Buyer and
Identifiers of Document

Date 01/02/2012



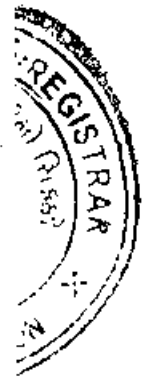
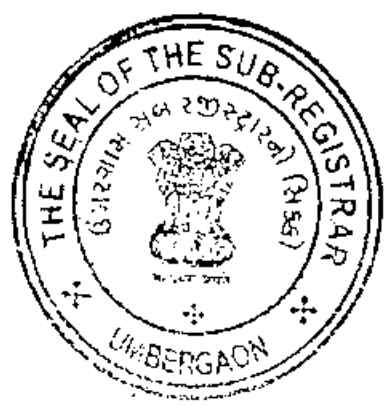
(P. G. JADAV)
Sub Registrar
S. R. O - UMBERGAON



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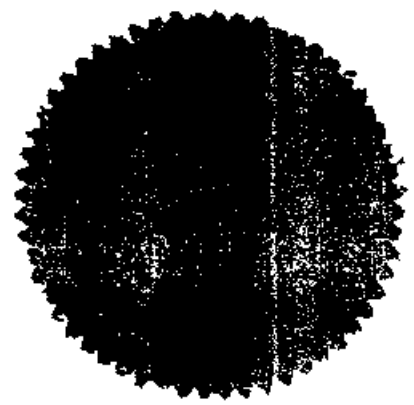
1	Book No.	244	Registered No.
Date:	01/02/2012		

P G JADAV
Sub Registrar
S.R.O - UMBERGAON



TRUE COPY

C. M. PANDEY
ADVOCATE & NOTARY
GOVT. OF INDIA



FEB 2012

FEB 2012



HENI DRUGS PVT. LTD.

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.
Sarigam, (Gujarat), Pin code - 396155
Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Emails : heni@henichem.net * www.henichem.net
CIN NO.: U24139MH1993PTC070091

Date: July 27, 2015

GPCB ID - 41800

To
Regional Officer
Gujarat Pollution Control Board,
Sarigam - 396155

Kind Attn.: Shri. G. V. Patel

Subject: Request for Change of name from M/s. Heni Chemical Industries to M/s. Heni Drugs Pvt. Ltd.

Respected Sir,

With reference to the above referred subject, we (M/s. Heni Chemical Industries) located at Plot No. 1901/1901A, Phansa Char Rashta, GIDC, Sarigam, Dist. Valsad have dissolved the existing management & have changed the constitution from "Partnership" to "Private Ltd" and have established the business by the name of "Heni Drugs Pvt. Ltd." The copy of the Certificate of Incorporation along with copy of Memorandum of Article of Association is enclosed herewith as Annexure - I for your kind reference. We have also obtained the SSI certificate from DIC - Valsad in the name of "Heni Drug Pvt. Ltd." & the copy of the same is enclosed as Annexure - II.

We are engaged in the manufacturing of "Inorganic Metal Salts of copper, Cobalt, Nickel, Bismuth, Mercury & Alum.- Magn.mix hyd." and are having valid consent bearing Order No. AWH - 65133 dated 22.09.2014 valid upto 10.06.2019. The copy of the said consent is enclosed herewith as Annexure III for your kind reference.

Kindly note that there is change in the management & the new list of Directors is enclosed herewith as Annexure IV for your kind reference. Kindly note that there is no change in Product or Production capacity, Industrial or Sewage effluent & No. of Employees due to change in name & constitution. As a part of our assurance to the board, we are herewith submitting the notarized undertaking on Rs. 100/- stamp paper in the name of both units (Old unit) "M/s. Heni Chemical Industries" and new unit "M/s. Heni Drugs Pvt. Ltd." as Annexure - V for your kind reference.

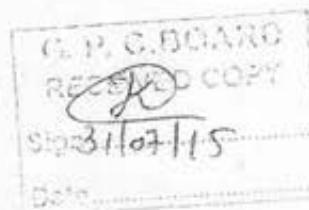
We would appreciate it if you would bring this announcement to your kind attention and request the board to amend the company's name from M/s. Heni Chemical Industries. to M/s. Heni Drugs Pvt. Ltd. in your online records and furnish us with an amendment letter for name change.

We would like to request the board to give due consideration to the above matter. Kindly do the needful.

Thanking you
Yours faithfully,

For HENI DRUG PVT. LTD.

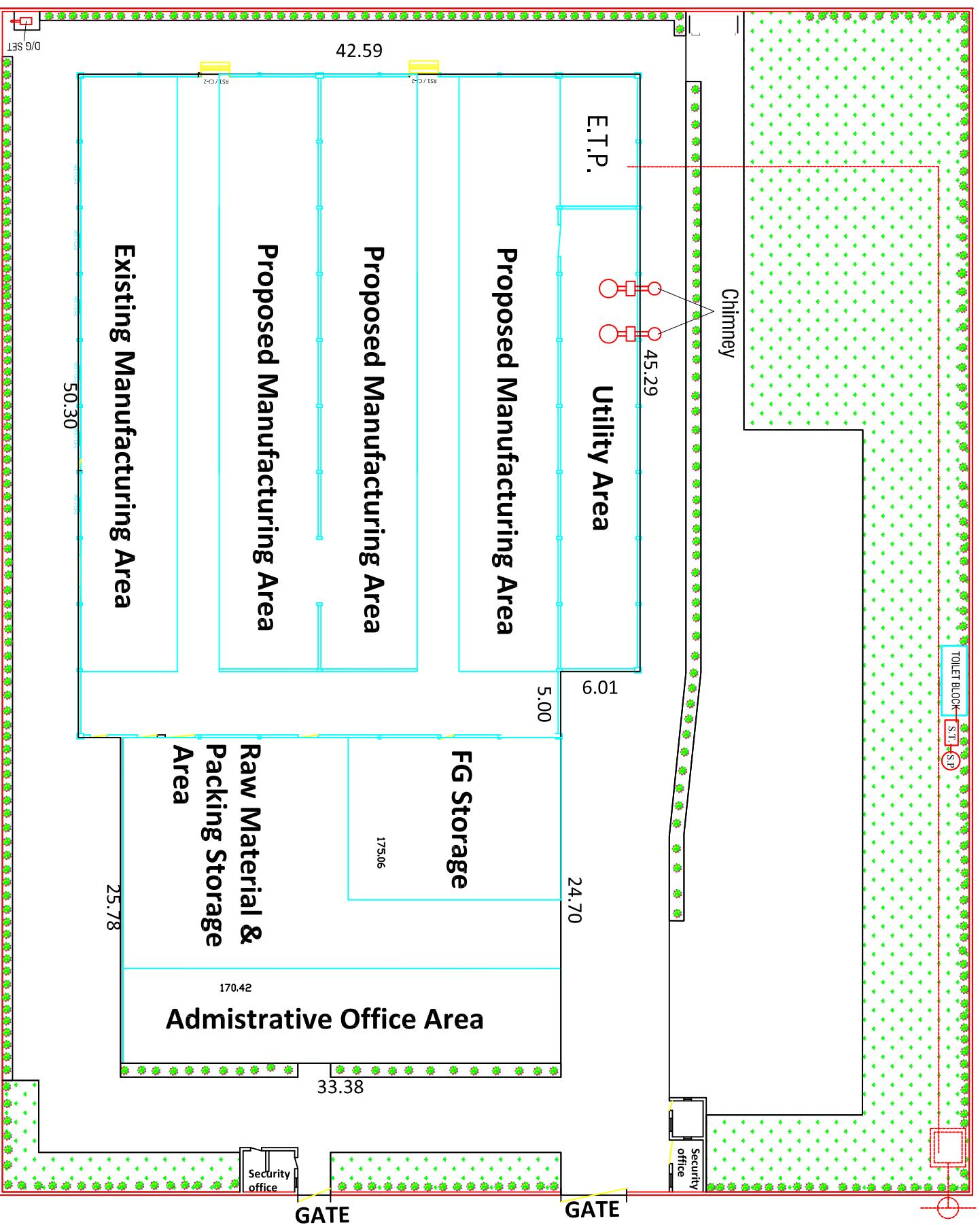
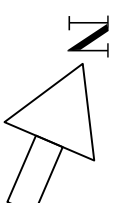
(Authorized Signatory)



CC: To, Env, Engg - GPCB, Gandhinagar (Shri. Y. A. Tai)

Reg. add.: "Vikram" 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai - 400 082

STAMP OF APPROVAL.



AREA STATEMENT :

PLOT AREA = 6700.00 SQ. MTS.
TOTAL CONSTRUCTION AREA= 3000.00 SQ. MTS.
TOTAL GREENBELT AREA= 2000.00 SQ. MTS.
OPEN LEND AREA= 1700.00 SQ. MTS.

NAME OF OWNER / TTILE:

***PLAN SHOWING DETAIL OF
OF FACTORY BUILDING
ON
PLOT NO: 1901 & 1901A
AT G.I.D.C. SARIGAM, Dist: Valsad (Gujarat)
FOR
"HENI DRUGS PVT. LTD."***
SIGN. OF OWNER.



HENI DRUGS PVT. LTD.

Works add.: Plot No. 1901/1901A, Phansa Char Rasta, G.I.D.C.,
Sarigam, (Gujarat), Pin code - 396155
Tel. : 91 22 2583 6009 / 2582 3357 / 25908236 * Fax: 91 22 2582 0719
Emails : heni@henichem.net * www.henichem.net
CIN NO.: U24139MH1993PTC070791

02/06/2016

To,
The Dy. Executive Engineer (O&M)
Gujarat Industrial Development Corporation
G.I.D.C., SARIGAM – 396 155 (Gujarat),

Sub : Request to issue a letter regarding CETP to submit to SEAC, Gujarat for obtaining Environmental Clearance for our unit Name "M/s. Heni Drugs Pvt. Ltd." Plot No. 1901/ 1901A, G.I.D.C. – Sarigam – 396 155.

REF: SCI/PROVISIONAL MEMBER/004 Dated :31-03-2016

Dear Sir,

With reference to our above referred Sarigam GIDC-CETP membership letter issued to us and subsequent presentation at State Level Expert Appraisal Committee, Gandhinagar, Gujarat for obtaining TORs in the process of getting Environment Clearance for our manufacturing product at Plot No. 1901/1901A, G.I.D.C. – Sarigam – 396 155; we have been awarded a TOR Letter with no. EIA-10-2015-712-E.236 dated 07-11-2015. And as per TOR No. 16 we are asked to submit details of CETP-Sarigam as under.

SEAC, Gujarat asked us to submit " Details of CETP- Sarigam including (1) Total capacity of the CETP (2) Total booked capacity and actual load received at present (Qualitative and Quantitative) (3) CETP Up gradation scheme, if any (4) Last 2 years analysis reports of GPCB for Inlet and outlet of CETP (5) Spare capacity of CETP with treatability and feasibility report. (6) Recommendations and suggestions of the last two Environment Audit reports of CETP Sarigam and its compliance report".

Copy of TOR letter received from SEAC, Gujarat is enclosed for your kind consideration with highlighted text of requirement from CETP Sarigam.

In view of our above requirement with enclosed letter, we most earnestly request your kind selves to consider our request to issue us a required letter which we can submit to SEAC for further appraisal of our proposed project for grant of Environmental Clearance at your earliest.

Thanking you.

Yours truly,

For Heni Drugs Pvt. Ltd.

(Authorized Signatory)

Encl: Copy of TOR Letter No. EIA-10-2015-712-E.236 dated 07-11-2015.

N.H. Kevkar
03/05/2016



Reg. add.: "Vikram" 26, Dreamland Society, Mulund Colony, Shashtri Nagar, Mumbai – 400 082

SARIGAM CLEAN INITIATIVE

Plot No.341/427/B, SARIGAM – MANDA ROAD, SARIGAM GIDC, SARIGAM, VALSAD.

REF: SCI/CETP DETAILS/020

10/05/2016

To,
Heni Drugs Pvt.Ltd,
Plot No 1901,
GIDC Sarigam.

Dear Sir,

Sub: DETAILS OF CETP SARIGAM

This is with reference to your letter date 02/05/2016 where you have requested to furnish the details of the CETP SARIGAM which is as under.

TOTAL CAPACITY OF THE CETP	:	15 MLD
ACTUAL LOAD AT PRESENT	:	7 TO 8 MLD
CETP UPGRADATION SCHEME	:	NO
LAST ENVIRONMENT AUDIT REPORT	:	NOT APPLICABLE DUE TO FIRST YEAR.

You are hereby directed to submit valid NOC and consent within six months form date of issue of this letter.

Further this letter is issued to you on your request for applying consent from GPCB only.

For, Sarigam Clean Initiative



Authorised Signatory



Annexure- XIII

➤ Details of Mercury Handling

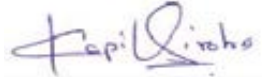
MERCURY HANDLING, STORAGE AND TRANSFER SYSTEM

Site: Heni Drugs Pvt. Ltd, Plot 1901/1091A,
Phansa Char Rasta, Sarigam, Gujarat

Contact: Kapil Girotra,

Email: Kapil.girotra@henichemicals.com

Phone: +91 22 25820529 ext: 109 / 122

				
09/06/2016	HDPL/14	00	Mercury Handling, Storage & Transfer System	KGI
Date	Doc No	Rev	Remark	Author

CONTENTS

1. INTRODUCTION

- 1.1. Background
- 1.2. Rationale
- 1.3. Scope
- 1.4. Principles
- 1.5. Compliance

2. THE SYSTEM

- 2.1. Hazards Of Mercury
- 2.2. Occupational Exposure Limits
- 2.3. Mercury Spillage Kits
- 2.4. Dealing With Spillage
- 2.5. Spillage on Hard Surface
- 2.6. Decontamination Of Hard Surface
- 2.7. Dealing with Mercury Waste
- 2.8. Training
- 2.9. Medical Examination

REVIEW

REFERENCE DOCUMENTATION DISTRIBUTION

1. INTRODUCTION

1.1. Background

Heni Drugs Pvt. Ltd. is in the business of making various fine, specialty and general chemicals. As part of the portfolio it proposes to produce small volumes of mercury compounds. The company has experience in handling these products for the last 20 years. The proposed site is located at 1901/1091A, Phansa Char Rasta, GIDC-Sarigam, Gujarat.

1.2. Rationale

The aim of this document is to enable the company to minimize the risk to staff, visitors and equipment from the hazards of mercury, by complying with the various Acts, Rules and codes as listed below.

- Occupational Health Guidelines for Inorganic Mercury & Organo (Alkyl) Mercury by NIOSH, USA
- IS : 7812 - 1975
- The Environment (Protection) Act-1986
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended.
- The Factories Act, 1948, [Act No. 63 of 1948] As amended in 1987
- The Gujarat Factories Rules, 1963 (as amended timely)

1.3. Scope

This system shall apply to all staff employed by HENI and encompasses any activity that affects directly and indirectly personnel related with the supply chain.

1.4. Principles

This system is based on the following principles: To define best practice when dealing with exposure to mercury. To ensure that the company fulfils its legal obligations in relation to the above mentioned Acts, Rules and codes.

1.5. Compliance

Managers are responsible for ensuring that their staffs are aware of this legal applicability & policy mentioned herein after, and that this information is given to all new staff on induction. In addition managers are responsible for keeping staff up to date about any changes in this document. Staff shall adhere strictly to this document and failure to do so may result in disciplinary action. The Director is responsible for the effective implementation of measures & system defined & mentioned in this document and the policy described herein after.

2. THE POLICY

2.1. Storage

Mercury is stored in special containers as defined below. The containers are always stored in lock and key. Only authorized personnel are allowed to access the storage and issue the material

to authorized personnel for use in production. Please refer Appendix I for details about containers. Appendix II has actual photos of flask in plant and the actual lock and key storage.

2.2. Hazards

Mercury is dense, silvery metal and used for some chemical processes. It is to be handled carefully in all its forms. The World Health Organization has set safe maximum working level of 0.05 mg per cubic meter the Time Limited Value (TLV) to which workers may be exposed for hours per day without risk.

If any person feels that they have been exposed to mercury, they shall immediately contact the Management. The main protection against mercury is the prompt use of mercury spillage procedures.

2.3. Mercury Spillage Kits

Mercury spillage kits shall be located in the premises and shall be kept by the Location Manager who shall be the person responsible for dealing with spillage's of mercury. Mercury spillage kits shall be made up as follows:

- a) Mask: To wear when handling mercury.
- b) Dust Mask: To wear for whole operation. While mixing powders.
- c) Absorbent Alloy Wool: For residual mercury removal.
- d) Pairs of vinyl gloves: To wear for whole operation.
- e) Calcium Hydroxide For residual mercury removal. Fine
- g) Mercury Waste Mercury Waste Container, for collection of mercury.
- h) Spatula For collection of Mercury Globules
- i) 25 mm brush For collection of Mercury Globules.
- j) Syringe For collection of Mercury Globules.

2.4. Dealing With Spillage

Spillage's must be cleared immediately. The person discovering the spillage shall secure the area from people and notify the Supervisor/senior staff responsible. Ventilate the area by opening all windows and doors (unless this compromises security of the area). Supervisor staff responsible shall obtain the Spillage Kit. The Supervisor/senior ward staff responsible shall put on the Personal Protective Equipment (Safety Mask, Safety Vinyl Gloves, Safety Goggle, Safety Apron) contained within the spillage kit. Vacate the area of non essential personnel. All jewelry shall be removed before performing spill cleanup & decontamination procedure. Please follow procedure as detailed in subsequent sections.

2.5. Spillage's On Hard Surface

Mercury is a heavy, liquid metal and a spillage usually results in the mercury spreading over a wide area, in many small globules. It is important to prevent people walking through the spillage area, spreading the mercury further.

Never use a vacuum cleaner or other suction device on a mercury spillage, since this will contaminate the cleaner or aspirator.

Using the scoop, move the globules of mercury together to form one large pool. Pick up as much of this as possible using the syringe and place in the mercury waste container. Return the syringe to the spillage kit. Make paste of equal amounts of Sulphur & Calcium Hydroxide with little water and spread onto the spillage area. Keep mixing the paste on the spillage area using the Brush Scoop for two or three minutes, it can be used wet and does not need to dry. Brush the paste onto the scoop and transfer it to the mercury waste container, wiping any residue paste from the brush and scoop on the lip of the mercury waste container. When the mercury waste has been placed in the container, it should be capped tightly and replaced in the spillage kit, along with all the other spillage kit items. Should any of the personal protective equipment become contaminated with mercury, these should be placed in dedicated container.

2.6. Decontamination Of Hard Surfaces

Mix, in third of bucket of warm water, a drop of washing up liquid and two heaped teaspoonful of Sulphur Calcium Hydroxide, stirring to make suspension. Use mop to apply this to hard floors, doing this every month for two months. After most of the suspension has been mopped off, clean the floor with preparatory cleaner

2.7. Dealing With Mercury Waste

The personal engaged in handling, storage & transfer of mercury waste shall use all necessary PPEs (Safety Mask, Safety Vinyl Gloves, Safety Goggle, and Safety Apron). The personal engaged in mercury waste management shall follow the following guidelines.

Mercury Containing Effluent:

All the streams from production of mercury bearing products are collected separately in a dedicated tank. The dissolved salts are then precipitated by coagulation & flocculation and then by evaporation. The estimated amount of salts to be collected has been minimized about 3-5 kg/month. These salts are then collected in dedicated container and de sensitized by sulphur calcium hydroxide.

Mercury Contaminated Materials Items shall be placed in designated containers and labeled (Danger Mercury Contamination). The Authorised Officer shall then be contacted who will arrange for its correct disposal via an authorized waste disposal site (TSDF Site).

Mercury Containing Solid Waste (Hazardous Waste):

The waste containing mercury must be desensitized by Sulphur & Calcium Hydroxide before packing. Then the de-sensitized waste shall be carefully transferred in designed containers. After properly sealing (Air Tight Sealing) the containers shall be labeled: "Mercury Waste" & "Danger-Mercury Contamination". Then the waste shall be transferred & stored in the designated "Mercury Waste Site" in the Hazardous waste storage area. When the storage reaches sufficient quantity to dispose off through TSDF, the authorized person shall contact the TSDF official for transport & final disposal of solid mercury waste through secured landfill at the TSDF site.

2.8. Training

The management through the authorized Officer Waste shall provide the necessary training to assist in the implementation of this policy. The record of the training programme shall be maintained and the training programme shall be reviewed annually.

2.9. Medical Examination

2.9.1. Pre-employment Medical Examination - In view of the effects of mercury exposure on kidney function, skin and central nervous system, persons showing abnormalities of the above functions as found during a pre-employment examination should be assigned to areas where they will not be exposed to mercury. Persons with poor teeth, infected gums, poor oral hygiene, and history of renal disease or with a generally nervous temperament should be preferably excluded.

2.9.2. Follow-Up /Periodic Medical Examination – Mercury levels in blood and urine of employees should be determined at suitable intervals and cases showing any deviation from the normal limits should be further investigated. Regular periodic medical examination should be carried out on employees working in areas where mercury exposure is possible. Records of such tests and examination should be properly maintained. In the periodic medical examination, inspection of mouth for signs of gingivitis, and of hands, and lips for signs of tremors should be included. Urine should be examined for presence of proteins.

REVIEW

The document and procedures will be reviewed once a year as a minimum or need basis.

REFERENCE DOCUMENTATION

<http://www.cdc.gov/niosh/topics/mercury/>

<http://www.atsdr.cdc.gov/mmg/mmg.asp?id=106&tid=24>

<http://www.atsdr.cdc.gov/toxfaqs/faq.asp?id=113&tid=24>

<http://www.osha.gov/SLTC/mercury/index.html>

<http://www.epa.gov/mercury/about.htm>

<http://www.inchem.org/documents/ehc/ehc/ehc001.htm>

IS : 7812 - 1975: Code Of Safety For Mercury (Amendment no. 1 December 2006)

Design of Mercury Storage Containers

Mercury Storage Container Design Standards

- **The ASME Boiler & Pressure Vessel Code does not apply**
 - Containing **pressures under 15 psig (100 kPa above atmosphere)**. None of these containers will reach that pressure under normal static circumstances. However, the containers still could be designed, manufactured, and tested to this standard.
- **All containers are designed for elemental mercury (99.5% by volume, or better)**
 - The impurities in the mercury should not be capable of corroding carbon or stainless steel (i.e., nitric acid solution, chloride salts solutions, or water).
- **Protective coating should be applied to the exterior surface of the containers**
 - Epoxy paint
 - Electro plating
 - No protective coating is required for the inner surface as long a mercury meets purity requirements and no water is present inside the container.

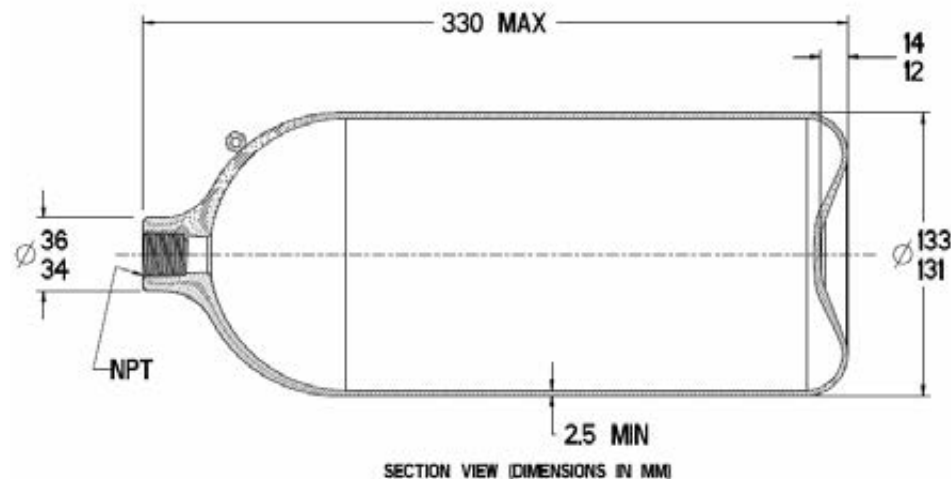
Mercury Storage Container Transport Standards

- **International Air Transport Association (IATA) Packing Instruction 803 allows transporting flasks containing less than 35 kg of mercury.**
 - **The flask must pass the 95 kPa pressure test for liquids by air (IATA 5.0.2.9).**
- **International Maritime Dangerous Goods (IMDG) Code (Amendment 33-06), Packing Instruction P800 allows transport via ocean vessels for flasks containing less than 3.0 L of mercury.**
- **Larger container must be transported by ground if code allows.**

3-Liter Flask

DOC NO: HDPL/14, Appendix I

- Allowable Metals
 - Carbon Steel (ASTM A36 minimum)
- Container Design
 - Seamless container (no welding, similar to gas cylinder)
 - Interior volume between 2.9 L to 3.5 L
 - Estimated empty mass, 9 kg
- No Welding
 - Welded seams are commonly weak locations on the flask
- Conclusions
 - Provides the highest cost per volume of mercury stored.
 - Good choice for small mercury generators. Easy to transport by ocean vessel, ground, or air
 - Would need to be stored in box pallet, typically 49 flask per pallet (pallet size 1.25 m x 1.25 m)



MERSADE (Europe)

U.S. Industry Produced

DLA Flask Examples



MECURY HANDLING SYSTEM

ACTUAL PLANT STORAGE PHOTOS







IS : 7812 - 1975

Indian Standard
CODE OF SAFETY FOR MERCURY

(First Reprint APRIL 1983)

UDC 661.849 : 614.878



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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

January 1976

AMENDMENT NO. 1 DECEMBER 2006
TO
IS 7812 : 1975 CODE OF SAFETY FOR MERCURY

[Page 4, clause 3.1(j)] — Insert the following at the end:

'k) Vapour pressure 0.3 Pa at 25°C'

(Page 4, clause 3.1) — Insert the following new clause at the end:

'3.2 Incompatibles — Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.'

(Page 5, clause 4.1.1.3) — Substitute the following for the existing:

'Equilibrium concentration of Hg at room temperature is 800 times the TL V for elemental and inorganic forms of mercury.'

(Page 6, clause 4.1.4) — Substitute the following for the existing:

The Threshold Limit Values (TLV) as recommended by ACGIH are given below:

Alkyl compounds:	TWA: 0.01 mg/m ³
	STEL: 0.03 mg/m ³
Aryl compounds:	0.1 mg/m ³
Elemental & inorganic forms:	0.025 mg/m ³

(Page 8, clause 7.6) — Substitute the following matter for the existing:

'Mercury levels in blood and urine of employees working in areas where risk of exposure is there should be determined at suitable intervals and cases showing any deviation from the normal limits should be further investigated. In addition to pre-placement medical examination, periodic medical examination as necessary should be carried out on employees working in areas where mercury exposure is possible. Record and test of such examinations should be properly maintained.'

(CHD 8)

Indian Standard

CODE OF SAFETY FOR MERCURY

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(Continued on page 2)

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(Continued from page 1)

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(Continued on page 9)

Indian Standard

CODE OF SAFETY FOR MERCURY

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 September 1975, after the draft finalized by the Chemical Hazards Sectional Committee had been approved by the Chemical Division Council.

0.2 Mercury is the only metal which is present in liquid state at ordinary temperatures. In its elemental form, it is used in a number of instruments and equipment, such as thermometers, barometers, manometers, blood pressure instruments, direct current meters, and mercury switches. Also since mercury readily forms alloys with many metals, it is used in the alkali manufacture, extraction metallurgy and in dentistry. Mercury vapour lamps and mercury arc rectifiers are some of its other important applications.

0.2.1 Mercury forms both inorganic and organic compounds. Inorganic compounds are used in various chemical reactions. Organic mercury compounds, such as fulminate, are used in explosives while alkyl mercury halides are used in seed treatment. Mercury and its compounds are toxic. A code of safety for mercury will be helpful in taking preventive measures for protection of health of persons exposed to this material in industry.

0.2.2 Metals with which mercury readily forms alloys include sodium, potassium, aluminium, copper, silver, gold and zinc. Mercury metal alloys are generally called amalgams.

0.3 This code of safety provides information on the important physical, chemical and toxic properties of the metal and recommends safety measures which should be followed while dealing with mercury.

0.3.1 This code does not cover aspects of safety with inorganic or organic mercury compounds.

0.4 In the preparation of this code, extensive assistance has been derived from the following publications:

KIRK OTHMER. Encyclopaedia of Chemical Technology. 1967.
Volume 13. Interscience Publishers, New York.

GENEVA. INTERNATIONAL LABOUR OFFICE. Occupational Safety and Health Encyclopaedia. 1972.

SAX, IRVING (N). Handbook of Dangerous Materials. 1951. Reinhold Publishing Co, New York.

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STRUP LESLEY BID (P). Toxicity of Mercury and Its Compounds. 1964. Elsevier Publishing Co, New York.

0.5 Legal Information — Mercury poisoning and its sequelae is included in the Schedule of Notifiable Diseases under the Factories Act, 1948. Mercury poisoning and its sequelae is a compensable disease under the Workmen's Compensation Act, 1923.

1. SCOPE

1.1 This standard describes the properties of mercury, the nature of hazards associated with it and essential information on its storage, handling, packing, labelling, disposal of waste, and personal preventive measures.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 4155-1966* and IS : 4167-1966† shall apply.

3. PROPERTIES OF MERCURY

3.1 The important properties of mercury are:

- | | |
|------------------------|--|
| a) Atomic number | 80 |
| b) Atomic mass | 200.61 |
| c) Melting point | -38.9°C |
| d) Boiling point | 356.9°C |
| e) Density | 13.546 g/cm ³ at 20°C |
| f) Vapour pressure | 1 mm at 126.2°C |
| g) Description | Silvery white liquid metal |
| h) Solubility: | |
| 1) in water | Practically insoluble |
| 2) in organic solvents | Insoluble |
| 3) in acids | Insoluble in dilute hydrochloric or sulphuric acids. Soluble in dilute nitric acid |
| j) Reactivity | Readily reacts with halogens, sulphur, concentrated hydrochloric acid, concentrated sulphuric acid, hydrogen sulphide, etc |

*Glossary of terms relating to chemical and radiation hazards and hazardous chemicals.

†Glossary of terms relating to air pollution.

4. HAZARDS ASSOCIATED WITH MERCURY

4.1 Health Hazards

4.1.1 General

4.1.1.1 Mercury fulminate, an organic compound, is shock sensitive. Alkyl mercury compounds are readily absorbed through skin.

4.1.1.2 Due to the high density of the metal mercury packages are heavy but they are very small in size. While handling such packages, therefore, care is necessary since a slight sudden shift in the centre of gravity may cause a tendency to destabilize the package containing the liquid metal.

4.1.1.3 Mercury gives off vapours even at room temperature. When at equilibrium at room temperature with the source of mercury, the vapour concentrates are 200 times the threshold limit value. The vapour pressure almost doubles for a temperature rise of about 10°C.

4.1.1.4 The principal route of entry of mercury vapour is through the respiratory tract by inhalation. Mercury, in extremely finely divided state, and many of its organic compounds may be absorbed through the skin upon direct contact. If mercury bearing compounds are accidentally ingested, mercury may be absorbed through the alimentary tract. Serious exposure may occur if there is a leak in the mercury boiler or distillation still.

4.1.1.5 Acute local effects may produce irritation, vesication and corrosion of the skin. This may lead to a dermatitis or eczematous rash.

4.1.2 Acute Toxicity — The acute toxicity may usually be due to ingestion of large amounts of inorganic mercury compound or from exposure to high dose of organic mercury compound. Acute systemic effects may be due to damage to kidneys. The possible symptoms of exposure may be metallic taste, salivation, burning, swelling, abdominal pain, diarrhoea, ulceration and intestinal haemorrhage. Many symptoms suddenly become acute leading to circulatory damage. In case acute exposure is suspected, immediate medical attention is recommended.

4.1.2.1 Local effects — Soluble mercury compounds are irritating to skin and mucous membranes.

4.1.3 Chronic Toxicity — Chronic exposure to mercury causes damage to the nervous system. Chronic effects of mercury poisoning include: psychic disturbances, erethism, stomatitis, tremor, salivation, gingivitis. Weakness, fatigue, weight loss are non-specific symptoms. The person with erythema becomes suddenly irritated, excited or depressed. Tremors of extremities is a peculiar sign of mercury exposure. The onset of symptoms of chronic mercury poisoning is insidious. The recovery is usually very slow. It is,

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therefore, necessary to take preventive measures on all operations involving exposure to mercury.

4.1.4 Threshold Limit Value (TLV*) in Air— Recommended threshold limit value (TLV) for mercury is 0.05 mg/m³ of air for repeated exposure for 8 hours work day and 40 hours work week.

5. STORAGE AND HANDLING

5.1 Storage— Mercury is stored in bottles and containers made of plastics and glass. While it should be stored away from contact with chemicals with which it easily reacts, the containers should be properly closed to reduce formation of vapours. The storage areas should be properly ventilated to avoid a build up of the vapour concentration. The flooring should be of an impervious smooth surface with adequate slope leading to drains via traps at several points and arrangement for washing away any spillage with water. The containers should be plainly labelled.

5.2 Handling— Mercury should be handled in enclosed systems as far as possible. If mercury is to be drained out of equipment such as pumps and meters, it should be immediately covered with a layer of water if permissible, otherwise the receiver should be covered.

5.2.1 Since spillage of mercury is practically unavoidable, the spilled material should be washed away to drains and collected in water sealed traps. Where it is suspected that small tiny droplets of mercury may remain over after adequate washing with water, such flooring/other areas may be sprinkled with lime sulphur spray and swept away after some time as an additional decontamination measure.

5.2.2 It should be explained to the personnel handling mercury that even a small package of mercury is very heavy and should be carefully handled avoiding a sudden shift in its centre of gravity. A sudden shift in the centre of gravity may cause it to fall.

5.2.3 Mercury is transported usually in bottles.

6. PACKING AND LABELLING

6.1 Packing— Mercury may be kept in glass or plastics bottles. The containers must be strong enough to withstand the heavy contents. The closure should be tight fitting to prevent spillage of contents or escape of vapours.

*As accepted by the American Conference of Governmental Industrial Hygienists, Ohio, USA.

6.2 Labelling — The following information may be incorporated and used in combination with other instructions or separately on the labels:

Mercury Metal Density: 13.5

Heavy liquid metal.

Handle carefully.

Avoid sudden jerks while handling.

Keep away from contact with metals like aluminium, copper, silver, gold, zinc, as it readily forms alloys/amalgams with them.

Avoid spillage.

Spilled material is difficult to retrieve. If spilled, wash down the spillage to the drain with water as soon as possible.

Gives off vapours at all temperatures.

Vapours are toxic on prolonged inhalation.

7. PREVENTIVE MEASURES

7.1 General — Simple protective measures against mercury splash may be used when necessary.

7.1.1 Overalls should have no pockets and cuffs. Hair should be covered with washable cap. Clothes for actual working should be stored separately from street clothes. Eating and smoking should be prohibited in workplaces. Good personal hygiene should be encouraged amongst the employees. Where a respirator has to be used for protection against mercury vapour it must have a suitable filter incorporated.

7.2 Training — Persons engaged in work involving handling, of mercury should be instructed on safety measures while handling mercury and steps to be taken to minimize danger from spillage.

7.3 Monitoring — Good ventilation should be provided for dispersal of mercury vapours likely to be given off during normal working. As far as possible, mercury should not be left exposed to atmosphere. Routine monitoring of mercury vapour concentration in the work environment should be undertaken. If at any time, it is observed that the mercury vapour concentration is higher than the recommended threshold limit value, appropriate corrective measures should be taken to bring down the concentration and avoiding unnecessary exposure.

7.3.1 Electrically operated mercury vapour meters are commercially available and are convenient to use. Chemical methods based on use of dithizone, etc, are also available.

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7.4 Waste Disposal—Metal mercury being heavy would always accumulate on the bottom. Suitable collection traps should be provided in the drains to collect such mercury. A very small amount of mercury may get dissolved in the effluent water as a result of reaction with the effluent. Effluent should, therefore, be suitably sampled and mercury concentration determined. Necessary steps should be taken to ensure that mercury concentration in the effluent is within the permissible limits before it is discharged to the sewer, etc.

7.5 Pre-employment Medical Examination — In view of the effects of mercury exposure on kidney function, skin and central nervous system, persons showing abnormalities of the above functions as found during a pre-employment examination should be assigned to areas where they will not be exposed to mercury. Persons with poor teeth, infected gums, poor oral hygiene, history of renal disease or with a generally nervous temperament should be preferably excluded.

7.6 Follow-Up Medical Examination – Mercury levels in blood and urine of employees should be determined at suitable intervals and cases showing any deviation from the normal limits should be further investigated. Regular periodic medical examination should be carried out on employees working in areas where mercury exposure is possible. Records of such tests and examination should be properly maintained.

7.6.1 In the periodic medical examination, inspection of mouth for signs of gingivitis, and of hands, and lips for signs of tremors should be included. Urine should be examined for presence of proteins.

(Continued from page 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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Occupational Health Guideline for Inorganic Mercury

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: Hg
- Synonyms: Quicksilver
- Appearance and odor: Silvery, mobile, odorless liquid.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for mercury is a ceiling level of 0.1 milligram of mercury per cubic meter of air (mg/m^3). NIOSH has recommended that the permissible exposure limit be changed to 0.05 mg/m^3 averaged over an eight-hour work shift. The NIOSH Criteria Document for Inorganic Mercury should be consulted for more detailed information.

HEALTH HAZARD INFORMATION

• Routes of exposure

Mercury can affect the body if it is inhaled or if it comes in contact with the eyes or skin. It may enter the body through the skin.

• Effects of overexposure

1. Short-term Exposure: Inhaled mercury vapor may cause headaches, cough, chest pains, chest tightness, and difficulty in breathing. It may also cause chemical pneumonitis. In addition, it may cause soreness of the mouth, loss of teeth, nausea, and diarrhea. Liquid mercury may irritate the skin.

2. Long-term Exposure: Repeated or prolonged exposure to mercury liquid or vapor causes effects which develop gradually. The first effects to occur are often

fine shaking of the hands, eyelids, lips, tongue, or jaw. Other effects are allergic skin rash, headache, sores in the mouth, sore and swollen gums, loose teeth, insomnia, excess salivation, personality change, irritability, indecision, loss of memory, and intellectual deterioration.

3. Reporting Signs and Symptoms: A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to mercury.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to mercury at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Persons with a history of allergies or known sensitization to mercury, chronic respiratory disease, nervous system disorders, or kidney disease would be expected to be at increased risk from exposure. Examination for any signs or symptoms of unacceptable mercury absorption such as weight loss, insomnia, tremors, personality changes, or other evidence of central nervous system involvement, as well as evidence of kidney damage, should be stressed. The skin should be examined for evidence of chronic disorders.

—Urinalysis: Since kidney damage has been observed in humans exposed to mercury, a urinalysis should be obtained to include, at a minimum, specific gravity, albumin, glucose, and a microscopic on centrifuged sediment. Determination of mercury level in urine may be helpful in assessing extent of absorption.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis.

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

• Summary of toxicology

Acute exposure to mercury at high levels causes severe respiratory irritation, digestive disturbances, and marked renal damage; chronic mercurialism, the form of intoxication most frequently caused by occupational exposure, is characterized by neurologic and psychic disturbances, anorexia, weight loss, and stomatitis. Skin absorption of inorganic mercury probably adds to the toxic effects of vapor inhalation. Intraperitoneal injection of metallic mercury in rats has produced sarcomas. Exposure of humans to mercury vapor in concentrations of 1.2 to 8.5 mg/m³ causes cough, chest pain and dyspnea, leading to bronchitis and pneumonitis. Metallic mercury readily vaporizes at room temperature, and the vapor has no warning properties. At low levels, the onset of symptoms resulting from chronic exposure is insidious; fine tremors of the hands, eyelids, lips and tongue are often the presenting complaint. Coarse jerky movements and incoordination may interfere with the fine movements considered necessary for writing and eating. Psychic disturbances such as insomnia, irritability, and indecision occur; headache, excessive fatigue, anorexia, digestive disturbances, and weight loss are common; stomatitis with excessive salivation is sometimes severe; muscle weakness has been reported. Proteinuria may occur, but is relatively infrequent. Mercury has been reported to be capable of causing sensitization dermatitis. Examination of urine for mercury may be of value. There is no "critical" level of mercury in urine above or below which poisoning cannot be seen. Various observers have suggested from 0.1 to 0.5 mg of Hg/l of urine as having clinical significance. Mercury, particularly organic forms, is known to adversely affect the fetus if the mother is exposed during pregnancy.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 200.6
2. Boiling point (760 mm Hg): 357 C (674 F)
3. Specific gravity (water = 1): 13.5
4. Vapor density (air = 1 at boiling point of mercury): Not applicable
5. Melting point: -39 C (-38 F)
6. Vapor pressure at 20 C (68 F): 0.0012 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): 0.002
8. Evaporation rate (butyl acetate = 1): Not applicable

• Reactivity

1. Conditions contributing to instability: None
2. Incompatibilities: Contact with acetylene, acetylene products, or ammonia gases may form solid products that are sensitive to shock and which can initiate fires of combustible materials.
3. Hazardous decomposition products: None
4. Special precautions: Mercury can attack copper and copper alloy materials.

• Flammability

1. Not combustible

• Warning properties

1. Odor Threshold: Mercury is odorless.
2. Eye Irritation Level: Grant states that "when mercury metal droplets are in the epithelium, rather than the corneal stroma or anterior chamber, they are extruded rapidly with little reaction, as was reported in a patient who was sprayed forcefully with metallic mercury and was observed to have many fine silvery globules beneath the epithelium of the cornea

"Mercury metal in contact with the conjunctiva has been shown in rabbits to be absorbed and ultimately to be detectable in the urine. While in contact with the conjunctiva, metallic mercury produced no clinical signs of conjunctivitis, but histologically an inflammatory reaction has been demonstrable. External contact with mercury vapor has repeatedly been observed to induce a characteristic discoloration of the crystalline lens (mercurialentis)." Mercurialentis also is caused by systemic poisoning "from absorption of mercury vapor through the respiratory tract, the skin, and the gastrointestinal tract."

For the purposes of this guideline, mercury is not treated as an eye irritant.

3. Evaluation of Warning Properties: Mercury has no warning properties, according to the *Hygienic Guide*.

MONITORING AND MEASUREMENT PROCEDURES

• Ceiling Evaluation

Measurements to determine employee ceiling exposure are best taken during periods of maximum expected airborne concentrations of mercury. Each measurement should consist of a fifteen (15) minute sample or series of consecutive samples totalling fifteen (15) minutes in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). A minimum of three (3) measurements should be taken on one work shift and the highest of all measurements taken is an estimate of the employee's exposure.

• Method

Sampling and analyses may be performed by collection of mercury with a three-section solid phase sampler, followed by analysis with an atomic absorption spectrophotometer. An analytical method for mercury is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 6, 1980, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00369-6).

RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may

be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with liquid mercury.

- If employees' clothing may have become contaminated with mercury, employees should change into uncontaminated clothing before leaving the work premises.

- Clothing contaminated with mercury should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of mercury from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the mercury, the person performing the operation should be informed of mercury's hazardous properties.

- Non-impervious clothing which becomes contaminated with mercury should be removed promptly and not re worn until the mercury is removed from the clothing.

SANITATION

- Workers subject to skin contact with liquid mercury should wash with soap or mild detergent and water any areas of the body which may have contacted mercury at the end of each work day.

- Skin that becomes contaminated with mercury should be promptly washed or showered with soap or mild detergent and water to remove any mercury.

- Eating and smoking should not be permitted in areas where mercury is handled, processed, or stored.

- Employees who handle mercury should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to mercury may occur and control methods which may be effective in each case:

Operation

Use as a liquid cathode in electrolytic production of chlorine and caustic soda from brine

Use during manufacture and repair of industrial and medical apparatus; use during manufacture of inorganic and organic compounds for use as pesticides, antiseptics, germicides, and skin preparations, and miscellaneous applications as chemical intermediates, preservatives, and pigments

Use in preparation of amalgams for use in tooth restorations, chemical processing, and molding operations; use during manufacture of mildew-proof paints and marine antifouling agents

Use in manufacture of organic mercurials; use in manufacture of batteries, lamps, and power tubes; manufacture of tungsten-molybdenum wire and rods; use in manufacture of inorganic salts for use as catalysts in production of urethanes, vinyl chloride monomers, anthraquinone derivatives, and other miscellaneous chemicals

Controls

General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment; meticulous housekeeping

General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment; meticulous housekeeping

General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment

General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment; meticulous housekeeping

Operation	Controls
Use as a chemical intermediate and in the manufacture of felt; as a flotation agent in manufacture of bowling balls; use as a laboratory reagent or as a working fluid in instruments	General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment; meticulous housekeeping
Use as a conductor during construction and maintenance of military and nuclear power systems, in mercury-stem boilers, and in air-rectifiers	General dilution ventilation; personal protective equipment; meticulous housekeeping
Liberation during roasting and smelting operations	General dilution ventilation; local exhaust ventilation
Use in manufacture of explosives; in preparation of amalgams for use in artificial jewelry	General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment; meticulous housekeeping
Use in manufacture of compounds for pulp and paper industry as controls for biological growths	General dilution ventilation; process enclosure; local exhaust ventilation; personal protective equipment
Liberation during mining and subsequent refining of ore containing cinnabar	General dilution ventilation; personal protective equipment; meticulous housekeeping

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• Eye Exposure

If liquid mercury gets into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with this chemical.

• Skin Exposure

If liquid mercury gets on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If liquid mercury penetrates through the clothing, remove the clothing promptly and wash the skin using soap or mild detergent and water. If irritation persists after washing, get medical attention.

• Breathing

If a person breathes in large amounts of mercury, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• Swallowing

When large quantities of mercury have been swallowed or mercury has been swallowed repeatedly and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

• Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL PROCEDURES

• Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

• If mercury is spilled, the following steps should be taken:

1. Ventilate area of spill.
2. Collect spilled material for reclamation using commercially available mercury vapor depressants or specialized vacuum cleaners.

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RESPIRATORY PROTECTION FOR INORGANIC MERCURY

Condition	Minimum Respiratory Protection* Required Above 0.1 mg/m ³
Particulate or Vapor Concentration	
1 mg/m ³ or less	Any supplied-air respirator. Any self-contained breathing apparatus.
5 mg/m ³ or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
28 mg/m ³ or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 28 mg/m ³ or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against mercury. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.



Occupational Health Guideline for Organo (Alkyl) Mercury

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

APPLICABILITY

The general guidelines contained in this document apply to all organo (alkyl) mercury compounds. Physical and chemical properties of several specific compounds are provided for illustrative purposes.

SUBSTANCE IDENTIFICATION

Ethylmercuric chloride

- Formula: C_2H_5HgCl
- Synonyms: Chloroethylmercury; cerasan
- Appearance and odor: Colorless, odorless solid.

Dimethylmercury

- Formula: $(CH_3)_2Hg$
- Synonyms: Mercury dimethyl
- Appearance and odor: Colorless liquid with a weak, sweetish odor.

Diethylmercury

- Formula: $(C_2H_5)_2Hg$
- Synonyms: Mercury diethyl
- Appearance and odor: Colorless liquid with a weak, sweetish odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for organo (alkyl) mercury is 0.01 milligram of organo (alkyl) mercury per

cubic meter of air (mg/m^3) averaged over an eight-hour work shift, with a ceiling level of $0.04 mg/m^3$.

HEALTH HAZARD INFORMATION

• Routes of exposure

Organo (alkyl) mercury can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. It may enter the body through the skin.

• Effects of overexposure

Organo (alkyl) mercury compounds may cause damage to the central nervous system and are irritants of the eyes, respiratory tract, and skin. Symptoms of methyl and ethyl mercury intoxication may occur weeks to months after an acute exposure to toxic concentrations. The symptoms of acute and chronic intoxication from both compounds are similar and include numbness and tingling of the lips, hands and feet, staggering, joint pain, narrowing of vision, hearing difficulties, and emotional disturbances. With severe intoxication the symptoms are usually irreversible. Severe intoxication also results in periods of spasticity and jerking movements of the arms and legs, head or shoulders, and bouts of groaning, moaning, shouting, or crying. Other symptoms are dizziness, increased watering of the mouth, watering of the eyes, nausea, vomiting, and diarrhea or constipation. Infants born to mothers who have been exposed to large amounts of methyl mercury have shown mental retardation and cerebral palsy with convulsions. The symptoms of exposure to methoxyethyl mercury are loss of appetite, diarrhea, weight loss, and fatigue. Kidney damage has occurred. The alkyl mercury halides are irritating to the eyes, upper respiratory tract, and skin and may cause severe skin rash and burns. Allergic skin rashes may occur.

• Reporting signs and symptoms

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to organo (alkyl) mercury.

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to organo (alkyl) mercury at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the central nervous system, the kidneys, and eyes should be stressed. The skin should be examined for evidence of chronic disorders.

—Blood test: Analysis of the blood for mercury may be useful in monitoring absorption.

—Urinalysis: Since kidney damage has been observed in humans exposed to organo mercury, a urinalysis should be obtained to include at a minimum specific gravity, albumin, glucose, and a microscopic on centrifuged sediment.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis.

• Summary of toxicology

Organo (alkyl) mercury compounds cause dysfunction of the central nervous system and irritate the eyes, mucous membranes, and skin. Symptoms of methyl and ethyl mercury intoxication may occur weeks to months after an acute exposure to toxic concentrations. The symptoms of acute and chronic intoxication from both compounds are similar and include numbness and tingling of the lips, hands, and feet; ataxia; dysarthria; concentric constriction of the visual fields (tunnel vision); impairment of hearing; and emotional disturbances. With severe intoxication, the symptoms are usually irreversible. Severe intoxication also results in incontinence, periods of spasticity and jerking movements of the limbs, head or shoulders, and bouts of groaning, moaning, shouting, or crying; less frequent symptoms are dizziness, hypersalivation, lacrimation, nausea, vomiting, and diarrhea or constipation. An epidemic of intoxication from ingestion of fish contaminated with methyl mercury occurred in the Minamata district in Japan, and methyl mercury intoxication is often referred to as Minamata disease. Infants born to mothers with exposure to large amounts of methyl mercury had mental retardation and cerebral palsy with convulsions; methyl mercury has a strong effect on cell division and chromosome segregation, which may produce chromosomal alterations. The biological half-life in humans for methyl mercury is about 70 days; since elimination is slow, irregular, and individualized, there is a considerable risk of an accumulation of mercury to toxic levels. A precise relationship between atmospheric levels and concentrations of mercury in blood or urine cannot be shown. Clinical observations indicate that concentrations of 50 to 100 ug mercury/100 ml of whole blood may be associated with symptoms of intoxication; concentrations around 10 to 20 ug mercury/100 ml are not associated with symptoms. In a

study of 20 workers engaged in the manufacture of organic mercurials and exposed for 6 years to mercury concentrations in air between 0.01 and 0.1 mg/m³, there was no evidence of physical impairment or clinical laboratory abnormalities. The symptoms of exposure to methoxyethyl mercury are anorexia, diarrhea, weight loss, and fatigue, and are probably due to inorganic mercury; kidney damage with albuminuria, and occasionally a nephrotic syndrome, has occurred. The alkyl mercury halides are irritating to the eyes, mucous membranes, and skin and may cause severe dermatitis and burns; skin sensitization has occasionally occurred.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data—Ethylmercuric chloride

1. Molecular weight: 265.1
2. Boiling point (760 mm Hg): Sublimes above 40 C (104 F)
3. Specific gravity (water = 1): 3.48
4. Vapor density (air = 1 at boiling point of ethylmercuric chloride): 9.2
5. Melting point: 192 C (378 F)
6. Vapor pressure at 20 C (68 F): Much less than 1
7. Solubility in water, g/100 g water at 20 C (68 F): 0.00014
8. Evaporation rate (butyl acetate = 1): Data not available

• Physical data—Dimethylmercury

1. Molecular weight: 230.7
2. Boiling point (760 mm Hg): 95 C (203 F)
3. Specific gravity (water = 1): 3.2
4. Vapor density (air = 1 at boiling point of dimethylmercury): 7.9
5. Melting point: -80 C (-112 F) (approximately)
6. Vapor pressure at 20 C (68 F): 50 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Data not available

• Physical data—Diethylmercury

1. Molecular weight: 258.7
2. Boiling point (760 mm Hg): 159 C (318 F)
3. Specific gravity (water = 1): 2.5
4. Vapor density (air = 1 at boiling point of diethylmercury): 8.9
5. Melting point: Data not available (very low)
6. Vapor pressure at 20 C (68 F): 2 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F): Insoluble
8. Evaporation rate (butyl acetate = 1): Data not available

• Reactivity

1. Conditions contributing to instability: Elevated temperatures cause decomposition to flammable and explosive hydrocarbon gases.
2. Incompatibilities: Contact with strong oxidizers such as chlorine may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases

and vapors (such as toxic mercury fumes and carbon monoxide) may be released in a fire involving organo (alkyl) mercury.

4. Special precautions: Liquid organo (alkyl) mercury will attack some forms of plastics, rubber, and coatings.

• **Flammability**

1. Flash point: Ethylmercuric chloride: Not applicable; Dimethylmercury and diethylmercury: Data not available

2. Autoignition temperature: Data not available

3. Flammable limits in air, % by volume: Data not available

4. Extinguishant: Dry chemical, foam, carbon dioxide

• **Warning properties**

1. Odor Threshold: The American National Standards Institute (ANSI) states that many alkyl mercury compounds "are disagreeable in odor."

2. Irritation Levels: ANSI states that "the organo-mercurials are severe skin, eye, and mucous membrane irritants. The first complaints following surface contact may be delayed for several hours and are usually those of local warmth and redness, which progress to blistering. In cases of repeated exposure, skin sensitization may occur."

3. Evaluation of Warning Properties: Not all alkyl mercury compounds have adequate warning properties.

MONITORING AND MEASUREMENT PROCEDURES

• **Eight-Hour Exposure Evaluation**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

• **Ceiling Evaluation**

Measurements to determine employee ceiling exposure are best taken during periods of maximum expected airborne concentrations of organo (alkyl) mercury. Each measurement should consist of a fifteen (15) minute sample or series of consecutive samples totalling fifteen (15) minutes in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). A minimum of three (3) measurements should be taken on one work shift and the highest of all measurements taken is an estimate of the employee's exposure.

• **Method**

An analytical method for organo (alkyl) mercury is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 6, 1980, available from the Government Printing Office,

Washington, D.C. 20402 (GPO No. 017-033-00369-6).

RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with organo (alkyl) mercury or liquids containing organo (alkyl) mercury.

• If employees' clothing has had any possibility of being contaminated with organo (alkyl) mercury or liquids containing organo (alkyl) mercury, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing which has had any possibility of being contaminated with organo (alkyl) mercury should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of organo (alkyl) mercury from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the organo (alkyl) mercury, the person performing the operation should be informed of organo (alkyl) mercury's hazardous properties.

• Where there is any possibility of exposure of an employee's body to organo (alkyl) mercury or liquids containing organo (alkyl) mercury, facilities for quick drenching of the body should be provided within the immediate work area for emergency use.

• Non-impervious clothing which becomes contaminated with organo (alkyl) mercury should be removed immediately and not reworn until the organo (alkyl) mercury is removed from the clothing.

• Employees should be provided with and required to use dust- and splash-proof safety goggles where there is any possibility of organo (alkyl) mercury or liquids

containing organo (alkyl) mercury contacting the eyes.

- Where there is any possibility that employees' eyes may be exposed to organo (alkyl) mercury or liquids containing organo (alkyl) mercury, an eye-wash fountain should be provided within the immediate work area for emergency use.

SANITATION

- Skin that becomes contaminated with organo (alkyl) mercury should be immediately washed or showered with soap or mild detergent and water to remove any organo (alkyl) mercury.

- Workers subject to skin contact with organo (alkyl) mercury or liquids containing organo (alkyl) mercury should wash with soap or mild detergent and water any areas of the body which may have contacted organo (alkyl) mercury at the end of each work day.

- Eating and smoking should not be permitted in areas where organo (alkyl) mercury or liquids containing organo (alkyl) mercury are handled, processed, or stored.

- Employees who handle organo (alkyl) mercury or liquids containing organo (alkyl) mercury should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to organo (alkyl) mercury may occur and control methods which may be effective in each case:

Operation	Controls
Liberation during manufacture/production for use as fungicides and slimicides	Replacement/substitution; dilution ventilation; local exhaust ventilation; personal protective equipment
Liberation during processing mercury ore and during mining and extraction operations	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment
Use in treating and disinfecting of seeds and bulbs	Replacement/substitution; general dilution ventilation; personal protective equipment
Liberation during utilization (spraying) of seeds and bulbs	Replacement/substitution; general dilution ventilation; personal protective

Operation

Use as a wood, timber, and paper preservative and slimicide; liberation during analysis at seed control stations

Controls

equipment

Replacement/substitution; general dilution ventilation; personal protective equipment

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• Eye Exposure

If organo (alkyl) mercury or solutions containing organo (alkyl) mercury compounds get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with these chemicals.

• Skin Exposure

If solid organo (alkyl) mercury or solutions containing organo (alkyl) mercury get on the skin, immediately wash the contaminated skin using soap or mild detergent and water. If solid organo (alkyl) mercury or solutions containing organo (alkyl) mercury penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Get medical attention.

• Breathing

If a person breathes in large amounts of organo (alkyl) mercury, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• Swallowing

When organo (alkyl) mercury has been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

• Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL, LEAK, AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of spills or leaks until cleanup has been completed.

- If organo (alkyl) mercury compounds are spilled or leaked, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill or leak.
3. If in the solid form, collect for reclamation or disposal in sealed containers in a secured sanitary landfill.
4. If in the liquid form, for small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Large quantities can be collected and reclaimed or collected for reclamation or disposal in sealed containers in a secured sanitary landfill.

• Waste disposal methods:

Organo (alkyl) mercury may be disposed of:

1. If in the solid form, by collecting for reclamation or for disposal in sealed containers in a secured sanitary landfill.
2. If in the liquid form, for small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Large quantities can be collected and reclaimed or collected for reclamation or disposal in sealed containers in a secured sanitary landfill.

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RESPIRATORY PROTECTION FOR ORGANO (ALKYL) MERCURY

Condition	Minimum Respiratory Protection* Required Above 0.01 mg/m ³
Particulate or Vapor Concentration	
0.5 mg/m ³ or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
10 mg/m ³ or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 10 mg/m ³ ** or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against organo (alkyl) mercury vapors and particulates. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.

**Use of supplied-air suits may be necessary to prevent skin contact while providing respiratory protection from airborne concentrations of organo (alkyl) mercury; however, this equipment should be selected, used, and maintained under the immediate supervision of trained personnel. Where supplied-air suits are used above a concentration of 10 mg/m³, an auxiliary self-contained breathing apparatus operated in positive pressure mode should also be worn.

Annexure- XIV

- **Justification for TOR # 2:** Explore the possibility of substitute products and processes containing or using mercury with non-mercury (Mercury free) alternatives.

Annexure- XIV

Justification for TOR # 2: Explore the possibility of substitute products and processes containing or using mercury with non-mercury (Mercury free) alternatives.

- ❖ When the mercury metal is converted to its salt, possibility of mercury vapour is eliminated as the mercury is fully stabilized.
- ❖ The mercury is used in our existing inorganic product and is converted to mercury salt; hence, Moving towards a stabilized state and making handling much safer.
- ❖ Issue of major hazards arises when mercury is used in thermal and catalytic manner. In our industry mercury is not utilized for such purpose but it is used to manufacture stable form of mercury (i.e., mercury salts). Hence issue of major hazards of mercury is not arising in our unit.
- ❖ Considering this all necessary safety and hazard prevention measures are planned and implemented in our existing unit. Similarly all necessary safety and hazard prevention measure for mercury will be implemented in our proposed project. **(Please refer Annexure-XIII)**
- ❖ Moreover, hazards of mercury in our unit are minor as we are handling very low quantity of mercury metals and mercury salts. Thus it is very easy to overcome the issue of the hazard in our unit.
- ❖ The existing mercury products are inorganic mercury salts which are used in pharmaceutical industries as raw material to manufacture various drugs/ medicines. It is also used in many other products like paints and analytical reagents. The demand of our product for the above said application / use is established and existing . Hence, it is necessary to have mercury salts in our product profile. Thus, it is not possible to eliminate the mercury products from our product profile to sustain in the business at the moment. However, with consideration of above points,
- ❖ we would like to continue our mercury based products in our product profile with implementation of safety and hazard prevention measures for mercury. Further, we would like to inform you that the production of mercury product will be on campaign basis to minimize the use of mercury and production of mercury product. It is also noteworthy that gradually we are switching to non-mercury product in our product profile and by doing so we will be able to make our product profile mercury free.