ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1.1 INTRODUCTION

The Environment Management Plan (EMP) is required to ensure sustainable development in the area surrounding the proposed project. Hence, it needs to be an all encompassive plan for which the industry, Government, Regulating agencies; like Pollution Control Board working in the region and the local residents of the area need to extend their co-operation and contribution.

It has been evaluated that the proposed project will have minor impacts on the surrounding areas. Mitigation measures at the source level and an overall Management Plan at the site level are elicited so as to preserve the surrounding environment.

The mitigation measures are recommended in order to synchronize the economic development of the project area with the environmental protection of the region. The construction phase impacts are mostly short term, restricted to the plot area and not envisaged on the larger scale. In the operational phase, the environmental impacts are due to continuous operation of the project; hence, the emphasis in the Environment Management Plan (EMP) is to minimize such impacts.

1.2 OBJECTIVE OF ENVIRONMENT MANANGEMENT PLAN

The objective of Environment Management Plan is given below:

- Mitigation measures for each of the activities causing the environmental impacts.
- Sustainable use of resources used for manufacturing activities which includes optimization of resource consumption.
- Monitoring plans for checking activities and environmental parameters and monitoring responsibilities
- Role responsibilities and resource allocation for monitoring.
- To treat all the pollutants, i.e. effluent, air emission, noise pollution & hazardous waste, that contributes to the degradation of environment, with appropriate technology.
- To comply with all the regulations stipulated by central/state pollution control boards related to air emission control and liquid effluents discharge as per Air & water pollution control laws.
- To handle and management hazardous waste storage and disposal as per Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016.
- To encourage, support and conduct development work for achieving environment standards and to improve methods of environment management.
- To promote further forestation in the surrounding areas of the plant.
- To create good environment (devoid of air & noise pollution) for employees.
- To reduce fire and accidental hazards.
- Perspective budgeting and allocation of funds for environment management expenditure.
- Continuous development and search for innovative technologies for better environment.
- To adopt cleaner production technology.

Following sections describe the environment management plan proposed for construction and operation phases.

1.3 ENVIRONMENT MANANGEMENT PLAN

Each of the activities during production phase is critically reviewed for deriving out the mitigation measures. Mitigation measures for the activities considered to be causing significant environmental impacts during production phase.

In general, the best housekeeping practices are incorporated in the design as well as in production phase to reduce the short terms impacts due to the proposed activities.

Table: 10.1 - Environment Management Plan

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
Transportation of Raw Material / Product	• Air • Land / Soil • Noise • Occupational Health	- The vehicles used for transporting raw materials / products shall follow the applicable guidelines given in The Motor Vehicles Act. - PUC need to be obtained and renewed at regular intervals of time and management to ensure the same. - Trained transporters to be engaged for transport of raw materials / products, spill control & other emergency actions. - Avoiding of horn when not necessary. - Vehicular movement only during day time will be ensured. - Transportation by covered vehicles will be ensured. - Regular maintenance and optimum use of the vehicles will be ensured. - Driver will be educated about the characteristics of wastes/ chemicals and immediate actions in case of any spillage accident. - Record maintenance of material. - Optimisation in raw material consumption.	Project Proponent / Units from where the Raw Material is Procured / EHS Manager
Handling & Charging of Raw Materials/Products	• Air • Water • Land / Soil • Noise • Occupational Health	- Management to ensure proper handling of the spillages during transfer, charging operation. Training to be imparted to workers. - The spillages if any during handling and charging to be attended immediately. - Preventive maintenance of flange connections and glands of pumps.	Project Proponent / EHS Manager / Shift In-Charge / Environment Consultant for Monitoring

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
		- Besides, the management will also ensure proper usage of the Personnel Protective Equipments by the workers during handling and charging. - Leakags if any shall be attended immediately. Storm water at the site to be managed properly. - Sheds to be provided to avoid mixing of storm water with any spilled raw material. - Proper ventilation to be provided in storage area to prevent the bad odours and fugitive emissions. - Ensure safe disposal of the empty containers to registered/approved recyclers. Relevant records to be maintained. - The wastewater generated during decontamination of bags shall be taken to ETP. - MSDS of each chemical & finished product to be displayed at the storage area. - Regular Work Place Monitoring, Ambient Air, Stack Air Monitoring to be done. - Records of raw material shall be maintained.	
Manufacturing of Product	• Air • Land • Water • Occupational Health	- Regular maintenance of records for production, raw material consumption, power consumption, water consumption. Submitting regularly to Pollution control Board - Regular monitoring of water consumption. Installation of flow meter. - Optimum use of resources will be ensured - Proper record of resources utilization will be monitored. - Regular maintenance of reactors and other process equipments will be ensured. - Technology for cleaner production, waste minimization, treatment /reuse /recycle / of wastes will be ensured. - Proper treatment and disposal of effluent generated during manufacturing process. Monitoring of effluent quantity and quality	Project Proponent / EHS Manager / Shift In-Charge

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
		as per Environmental Monitoring Plan. - Recovering the useful products from the effluent generated during manufacturing process. - Personal protective equipments shall be provided to the workers within operating areas. - Wherever, possible sound acoustic shall be provided to minimize the noise. - Proper maintenance / monitoring of green belt area. Provision of water for the gardening purpose. - Management to ensure that spent solvent follows concept of 4 Rs and treated for its maximum use through distillation and other processes.	
Operation of Boiler	• Air • Noise	- Optimization in usage of the fuel. Record maintenance for the same. - Ensure the effective operation of air pollution control equipment. - Preventive maintenance of fuel firing system and optimization of air fuel ratio. - Preventive maintenance of machinery to reduce noise level - Provision of Adequate Stack Height. Ensure usage of PPE. - Generated used oil reuse for lubrication. - Ensure the management of boiler ash. - Ensure the efficiency of boiler and water is recycled. - Regular monitoring w.r.t. EMS, ambient air quality, work area, noise, water quality as per the monitoring program.	Project Proponent / EHS Manager / Shift In-Charge / Environmental Agency
Operation of ETP System	• Land / soil • Water • Noise • Air	- Regular monitoring of wastewater and performance of ETP system. - Storage sump having one day retention time shall be provided to manage the effluent in case of such eventualities. - Monitoring reports will be reviewed and corrective measures will be taken as required. Submission of monitoring reports to the concerned authority as per the norms will be ensured.Compliance of	Project Proponent / EHS Manager / Shift In-Charge / Environmental Agency / GPCB officers

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
		stipulated conditions by concerned authorities will be ensured.	
Hazardous Waste Storage & Transportation	• Water • Land /Soil • Air • Noise	- Storage and handling of hazardous waste in a proper manner to avoid any spillages will be ensured - Manual handling of hazardous waste will be minimized. - Provision of designated hazardous waste storage area with proper roofing, impervious flooring and leachate collection will be ensured. - Regular training to the persons handling hazardous wastes will be provided and use of proper PPEs will be ensured. - Disposal of hazardous wastes at approved TSDF / CHWIF sites with manifest only will be ensured. - Transportation by covered vehicles will be ensured. - Vehicular movement only during day time will be ensured. - Record maintenance for spent solvents / distilled solvents as per the formats prescribed by GPCB. - If the spent solvent is given to the offsite unit then periodical audit of the distillation unit to be done.	Project Proponent / EHS Manager / Shift In-Charge /
		- Regular maintenance and optimum use of the vehicles will be ensured. - Availability of MSDS of all the Hazardous materials to the Offsite Emergency team will be ensured. - Driver will be educated about the characteristics of wastes/ chemicals and immediate actions in case of any spillage accident. - Ensure the proper management of solvents recovered.	
Operation of Domestic Utilities	• Water	- Regular monitoring of water consumption optimum use of water will be ensured. - Proper discharge of sewage to soak pit through septic tank.	EHS Manager
Development and	• Air	- Ensure development and maintenance of	Management

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
maintenance of Green belt	• Land	proper green belt as proposed.	to ensure the same
Direct / Indirect Employment	• Socio – economic issues	- Continue policy of local employment	Management to ensure the same
Risk & Safety Management	• Water • Air • Land • Socio-Economic	- Risk Assessment study for proposed project will be carried out. - Details of Risk assessment study report along with mitigation measures has been given in Chapter-7 of this report. - Fire fighting equipments/system and extinguishers will be installed as per the requirement of the fire risk in all plants/ sections/ departments and/or as per the requirement of Factory Act/ Rules/ IS 2190:1992.	Management to ensure the same
Occupational/ workers health & safety		- To minimize the adverse health effects all necessary/ suitable personnel protective equipments like helmet, safety goggles, gumboots, earmuff/ear plug and safety net etc. will be provided forworking personnel. - All suggested/proposed pollution control devices/measure should be installed and operated / maintained properly on regular basis. - All precautionary methods will be adopted by the company as wellas unit is also committed towards the Health & Safety of workers andwill provide a facility of pre-medical check-up of employees fordetecting any kind of adverse effect on the health of employee dueto the chemical or work place condition and providing opportunityto improve the working condition. - Drinking water supply for the employees will be provided as per IS 10500. - Proper sanitary facilities will be made available by thecompany so that employees do not suffer from any health ailments. - Periodical training programme to inform	Project Proponent / EHS Manager

Activity / Aspects	Environmental Impacts	Environment Management Measures	Action Carried By
		the employees about their task, associated risk, and safe –working practices will be undertaken.Training is also includes information on accident prevention, proper control and maintenance of equipment and safe material handling practices. To refresh the academic and skill improvement as per management requirement, induction raining and external training will be provided to freshers with respect to "Industrial Safety & Health Training".	

The Environmental Management Plan (EMP)

It consists of a set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation (post construction) stages of the project. The plan also includes the actions needed for implementation of these measures. Overall objective of EMP:

Prevention: Measures aimed at impeding the occurrence of negative environmental impacts and/or preventing such an occurrence having harmful environmental impacts.

Preservation: Preventing any future actions that might adversely affect an environmental resource or attribute.

Minimization: Limiting or reducing the degree, extent, magnitude, or duration of adverse impacts.

The major components of the Environmental Management Plan are:

- Mitigation of potentially adverse impacts
- Monitoring during project implementation and operation
- Implementation schedule and environmental cost estimates
- Integration of EMP with project planning, design, construction and operation

The EMP has been designed keeping in view the regulatory and other requirements to ensure the following:

- Minimum disturbance to the native flora and fauna.
- Compliance with the air, water, soil and noise quality norms.
- Conservation of water to the extent possible.
- Encourage the socio-economic development.

TPL will incorporate all necessary steps to mitigate environmental pollution in the design stage itself. In addition to that during the operation phase of the project, the company will take all the mitigation measures suggested in the environmental management plan and also comply with the statutory

requirements as per the guidelines of Central and/or State Government. It also details post-project monitoring to be undertaken by the authorities to maintain the environmental quality within the stipulated standards specified by the Gujarat Pollution Control Board (GPCB), Central Pollution Control Board (CPCB) and the Ministry of Environment & Forests (MoEF).

The environmental impacts due to different project activities and proposed mitigation measures have been detailed inThe mitigation measures for reducing the adverse environmental impacts together constitute a part of EMP.

Environmental, Health and Safety Management System

Chemical Industries prefer an integrated approach and make environmental management a part of overall Environmental, Health and Safety (EHS) Management system.

This model EHS system suggests and addresses EMS issues such as:

- Management system expectation
- Management leadership, responsibilities and accountability
- Risk assessment and management
- Compliance and other requirements
- Personnel, training and contractor services
- Documentation and communications
- Facilities design and construction
- Operation, maintenance and management
- Community awareness and emergency response
- EHS performance monitoring and measurement
- Incident investigation reporting and analysis
- EHS management system audit
- Management review and audit

With this type of EHS management approach, proposed expansion of bulk drug unit would be able to integrate the requirements of ISO-14001 into the overall management system.

Adequate and effective environment protection measures will be planned and designed to minimize the impacts due to activities related to pre- construction (preparatory phase) of the project, machinery installation and commissioning stages and end with the induction of manpower and start up. The impacts during the construction phase on the environment will basically be very insignificant as the propject construction area is very small. There will be no need for land movement, levelling and earth movers will not be required. Only foundation for RCC structure will be made. Ready mix Concrete will be used and therefore no possibility of fugitive emission due to material handling. In view of the above, the following measures are recommended to reduce the impact during this period:

Due provision of necessary infrastructural services like water and power supply etc., for the construction area.

All possible care will be taken to reduce the noise level due to construction activity. As planned, no such noise generating machineries will be used. Also, noise prone activities shall be restricted to the extent possible during night particularly during the period 10 PM to 6 AM in order to have minimum environmental impact.

Air Environment

Measures for reducing stack emissions

In the Torrent's plant existing point sources emitting gaseous pollutants include the stacks from

- Two boilers of capacity 10 MT/hr & 14 MT/hr (common stack of height 56 m) and One boilers of capacity 20 MT/hr, stack of height 56 m, PNG or LDO will be used as Fuel.
- 10 nos. process vent through Two Stage Water & Alkali Scrubber for each module (each stack 16 m and 17.5 m)
- Eight nos. DG sets (each of capacity 750 KVA) attached with individual stack of height 12 m each.
- Three nos. DG sets (each of capacity 2000 KVA) attached with individual stack of height 12 each.

As per guidelines of Central Pollution Control Board (CPCB) and Gujarat Pollution Control Board (GPCB), no pollution control equipment are required for oil fired boiler and DG sets and pollution control will be achieved through natural dispersion process by providing stacks of appropriate heights. As such Torrent proposes to have stack height requirement in accordance with the EPA rules as well as CPCB guidelines based on the dispersion and emission levels of SO2.
However, in order to achieve further reduction, it is suggested that during operational phase regular maintenance of air pollution control devices and periodic tuning of the burner system shall be done to ensure proper atomization and subsequent minimization of any unburnt combustibles.

Besides reduction in particulate emissions, it would also result in better operating efficiency. For this, combustion process may be further improved by adopting following measures:

- Optimization of combustion aerodynamics should be done using a flame retention device.
- Re-circulation of flue gas may be considered to achieve the triple goals of low PM emissions, low NOx emissions and high thermal efficiency.

The unit during operation phase may also implement energy conservation measures through installation of heat recovery systems. This would reduce the fuel consumption and in turn the emissions.

Measures for fugitive emissions

The fugitive emissions of organic chemicals and VOCs come from leakage through valves, fittings, pumps, etc. Though this is not expected to be significant, it may be reduced further by adopting the following measures:

- Regular maintenance of valves, pumps and other equipment to prevent leakage and thus minimizing the fugitive emissions of VOCs.
- In case modernisation is undertaken by Torrent, design features for new equipment may be considered.

1.4 WATER POLLUTION AND ITS MITIGATION PLAN

Water Environment

Water conservation measures have been taken to optimize the fresh water requirement in present scenario. Water consumption after proposed expansion will be through water supply from Sardar Sarovar Narmada Nigam Limited (SSNNL) and alternate source will be Borewell.

The mitigation measures for minimizing the impacts on water environment in general includes following:

- Minimization of water use
- Wastewater from different sources to be discharged after proper metering.
- Segregation and collection philosophy for effluent to minimize waste generation and facilitate treatment as well as recycle and reuse.
- Treatment philosophy to achieve regulatory standards. Reuse/recycle and disposal

Some of the measures, which has been implemented, include:

- Use equipment wash down waters as makeup solutions for subsequent batches, if feasible.
- Use high-pressure jet hoses for equipment cleaning to reduce the amount of water consumption and wastewater generation.
- Reducing the actual process water consumption by way of improvement in operation of processing units
- Ensuring proper operation and maintenance schedule for the ETP.
- Segregation and Collection Philosophy

The segregation of effluents has been already implemented as per feasibility. The emphasis has been given on resource recovery potential. The concept of waste minimisation circles has been implemented in the existing plant and the same shall be maintained in the proposed expansion also. The suggestions provided in Comprehensive Industry Document on Pharmaceuticals and Formulation Industry by GPCB has been applied depending on technical feasibility.

Waste Water Treatment

Wastewater generated from different area at TPL is presently treated in existing Effluent Treatment Plant which consists of Primary, Secondary and Tertiary treatment facility. Treated effluent is found well within prescribed limit of wastewater parameters (i.e. COD, BOD, SS, etc.). Treated effluent with desired quality is used on the land for irrigation and gardening within the premises as well as used in the utility unit. After proposed expansion, treatment of wastewater shall be done in the augmented ETP to take care of the additional effluent generated and disposal of wastewater. The quantity of the recycled effluent will be increased. There will not be any significant impact on ground water quality as only treated effluent shall

be discharged on land. Record of the wastewater generation, treatment & disposal and hazardous waste generation and disposal are maintained on printed logbook and the same shall be done after the expansion too.

The effluent shall be segregated into non-biodegradable and biodegradable stream. The bio-degradable effluent after primary, secondary and tertiary treatment and after meeting the Prescribed norms above shall be used for recycling and green Belt development. The non-biodegradable effluent shall further segregated into solvent rich mother liquor and aqueous base. The solvent rich mother liquor shall be distilled in distillation plant .The residue shall be sent to common incineration facility for incineration or co-processing. The aqueous base after neutralization and chemical treatment shall be treated in Effluent treatment plant or stripper and MEE. The high TDS stream shall be treated in RO plant and reject from RO shall be sent to MEE or solar evaporation pond during the non-monsoon period.
Domestic effluent generated 265 KLD will be treated in an existing Formulation ETP plant and treated water will be utilized for plantation/ gardening and irrigation purposes within the premises.
The Total Effluent generated will be 1015 KLD, 580 KLD from API plant is treated in API ETP. The API Plant consists of the primary, secondary and Tertiary Treatment. 522 KLD Treated effluent from API ETP is further treated in RO for recycling permeate in utility and 58 KLD Rejected will be treated in In-house MEE, the condensate generated will be further treated in ETP. Remaining 435 KLD will be used in Gardening purpose. Therefore no effluent will be required to be discharged and the stated process would be a ZERO DISCHARGE process.

Suggested Management Plan
As stated, the three stage treatment in the plant including the sand filter followed by activated carbon filter is in line with the Gujarat Pollution Control Board guidelines detailed in Comprehensive Industry Document Series on pharmaceutical and formulation industry.

Solid Waste Management
Solid Waste management includes following:
Measures to minimize waste generation

- Operation of waste handling, treatment and disposal facilities.
- Solid wastes like process waste and organic waste etc. in process, packaging is to be separately collected & sent for incineration. ETP Sludge and incinerable wastes are separately collected in polythene/HDPE bags or drums and stored temporarily onsite on an impervious floor at a specified place before final disposal.TPL is also having membership of Gujarat Enviro Protection and Infrastructures Limited located in Surat and Naroda Enviro Projects Ltd. at Odhav. Both the facilities are authorized by GPCB and are operated as per the requirements. The hazardous solid wastes generated from the existing TPL plant are being sent for landfill as well as for incineration as per GPCB guidelines. The same practice will be followed after the proposed expansion of the project.

The Waste Management plan includes:

- Waste Inventory

- Classification of waste
- Packaging, Storing and Transporting Wastes to Disposal site
- Data Management and Reporting
- Contingency Plan
- Personnel Training
- Waste Minimization

The requirements specified in the Authorization from GPCB are being followed and shall also be followed. The manifest system has already been implemented for control and record keeping. Resource Conservation/ Waste Minimization

The units shall also implement the concept of waste minimization circle including:
Volatiles in the by-products may be condensed and reused.
Volatile raw materials and solvents can be separated by rectification and these can be recycled into process.

Good House Keeping: Proper house keeping practices makes the system easier and less costly. Some of these are as follows:

Solid wastes e.g. powders, spills, etc. in process, and packaging are to be separately collected and disposed off instead of allowing these to join effluent streams. This will reduce load and increase the efficiency of treatment system.

Liquid wastes from various sections such as bulk drugs facility, recovery and purification of final product should be collected and stored separately and released at a regulated rate so as to avoid shock loads to the treatment plant.
Minimizing Solid Wastes Disposal: The following points are suggested to facilitate solid wastes disposal:

To investigate the large scale regionalized treatment centres for centralized disposal and reuse of solid wastes.
Efficient collection and transportation mechanism for disposal of solid wastes.
Search for future recycling schemes and evaluate their worth and implement such schemes wherever a promise of economic feasibility exists.

Noise Environment
The statutory national standards for noise levels at the plant boundary and at residential areas near the plant are being met (existing plant productions) and will be met. The selection of any new plant equipment will be made with specification of low noise levels. Noise suppression measures such as enclosures, buffers and/or protective measures may be provided (wherever noise level is more than 90 dB(A) and exposure limits to workers is more than 8 hours a day) to limit noise levels within occupational exposure limits. Areas with high noise levels will be identified and segregated where possible and will include prominently displayed caution boards.

However, in areas where noise levels are high and exposure time is less, employees are provided with ear protection measures like earplugs or earmuffs. Earplugs are provided to all workers where

exposure is 85 dB(A) or more. The exposures of employees working in the noisy area are regularly monitored to ensure compliance with the regulatory requirements.

Monitoring of noise levels is essential to assess the efficacy of maintenance schedules undertaken to reduce noise levels and noise protection measures.

Occupational Health Programme

Torrent has followed occupational health program right from the start of operation of bulk drug project. Following activities are in existing in view of Occupational Health Programme -

- OHSAS 18001 Certification.
- HSE Policy.
- Safety Manual.
- Health, Safety and Environment Management System Manual
- Medical Examination facilities available.
- TPL is having SOP for Medical examination which covers,

Pre-employment medical examination.

- Existing employee's (Periodic) medical examination.
- Personal health record.
- First aid treatment facilities as per following details
- First aid boxes- 26 Nos.
- Emency Ambulance services (full-fledged ambulance van).
- Health surveillances analysis on yearly basis.
- Each employee's health data analysis on the basis of Job Description.
- Department – Wise First Aid treatment analysis with Graph.
- Master Blood Group list available
- Over Weight Analysis.
- Training programme conducted
- All Related MSDS programme.
- First Aid Training programme
- Awareness of Hazards of Chemical.
- Use of Personal Protective Equipment's.

- Annual health check for employees is carried out and record is maintained.
- Fire hydrant system networking, fire detection system, continuous monitoring system and qualified fire staff are running in round the clock for handling any emergency. Regular training to plant personnel in safety fire fighting and first aid is provided.
- The existing plant maintains a healthy work environment. This is accomplished through the identification, evaluation and control of workplace environmental factors, which may cause sickness, impaired health or significant discomfort and inefficiency among workers. Environmental factors such as noise, physical hazards toxicity/chemical hazard and ergonomic hazards are regularly monitored to assist in maintaining a healthy work environment.
- Worker's exposure to noise and toxic materials are evaluated against applicable recognised exposure levels in the Factories Act.

- Hearing protection aids are provided to workers who work in the high noise areas, during construction of the proposed facilities and also to those who will continue through the life of the facility.

Hazard Communication and Chemical Safety

Torrent's existing bulk drug unit has provided proper communication tools to communicate its workers information on hazards of the materials used in the plant. A hazardous chemical directory has been developed to maintain information on the hazards associated with each chemical used. Copies of Material Safety Data Sheets for all hazardous materials at the proposed facility have been provided at the unit and are available for employee review. Specific programs and procedures for the control of health hazards associated with potentially harmful materials such as Methylene Chloride, Cyclo Hexane, Acids, Alcohols /Methanol, Toluene etc. are made to follow the guiding principles established for Occupational Health. The hazard communication programmes regularly being arranged serve as the basis for selection of personal protective equipment such as gloves, goggles, face shields, etc. A select group of employees at the proposed facilities have been trained on first aid to provide an immediate response and medical care for injuries. Safety department arrange the in-house safety training programs for workers, supervisors, senior staff and management personnel at regular intervals. The Safety Training Calendars are made on the basis of identifying training needs at different level of employees (Management staff, company supervisory staff and contractor employees). Three tiers of training programmes are conducted regularly as:

- Induction Safety Training
- Basic Safety Training and
- Specialized training programs

ACTION PLAN TO CONTROL AND MONITOR SECONDARY FUGITIVE EMISSIONS (VOCS) FROM ALL THE SOURCES

To mitigate fugitive emissions, the following steps would be taken:

- Minimum number of flanges, joints and valves in pipelines
- Selection / use of state-of-the art leak proof valves
- Provision of mechanical seals in pumps
- Proper preventive maintenance of roofs and seals for tanks
- Monitoring and preventive maintenance of valves, flanges, joints, etc.
- Fugitive emission over reactors, formulation areas, centrifuges, chemical loading, transfer area, shall be collected through hoods and ducts by induced draft and controlled by dust collector.
- For particulate / dust emissions from the coal handling system: Water will be sprinkled to control particulate / dust emission from coal storage area.
- Soild fuel will be recivied in closed trucks
- Green belt will be developed along the plant premises
- De-dusting system will be provided at solid product fineshing area.
- All transfer points will be fully closed.

- Overflow system with return line to storage tank from batch tank will be provided to prevent hazardous material overflow.

LEAK DETECTION AND REPAIR SYSTEMS (LDAR)

Bulk Drugs Intermediates is manufactured in multi-stages in batch mode. In the manufacture of Pharmaceuticals Intermediate, various types of solvent are being used by the industries. Some of the solvent used are low vapor pressure (below 2 kPa) which will be required to recover more than 95 % and some of the solvents used are having low boiling solvent which will generate Volatile Organic Compounds.

Industries are using valves, pumps, pipeline & other fitting for transfer of Raw Material/Solvent from storage to the reactor and other ancillary facility. To reduce fugitive emission in the plant proper Leak Detection & Repair program is required.

The Followingmethodology to be adopted during LDAR study:

- Identify the Chemical streams that must be monitored.
- Types of components (pumps, valves, connectors, etc.) to be monitored
- Frequency of monitoring.
- Actions to be taken if a leak is detected.
- Length of time in which an attempt to repair the leak must be performed.
- Actions that must be taken if a leak cannot be repaired within guidelines.
- Record-keeping and reporting requirements.

LDAR Program consists of five basic elements, which are as follow:

A. Identifying Component
Sources of Generation

- **Identification of Sources**
  - Valves, pipes, joint, flanges.
- **Sources of equipment leak**
  - Leak from pump typically occur at the seal.
  - Leak from valves usually occur are commonly caused by a failure of the valve packing or O-ring.
  - Leak from conductor are commonly caused from gasket failure.
  - Leak from sampling connections usually occur at the outlet of the sampling valve when the sampling line is purged to obtain the sample.
  - Use of inadequate equipment/component.
- **Mitigation Measure**
  - Identification of each component with unique ID number.
  - Regular Monitoring and periodic inspection of components in order to identify any abnormality.
  - Preventive maintenance of each equipment/component as per SOP.
  - Periodical testing of pipelines.
  - Periodic painting of pipelines in order to avoid corrosion.

B. Leak Definition

Many equipment leak regulations also define a leak based on visual inspections and observations (such as fluids dripping, spraying, misting or clouding from or around components), sound (such as hissing), and smell.

C. Monitoring Component

Sources of Generation

- Use of improper method.
- Not monitoring all regulated components.
- Use of inadequate instruments for VOC monitoring.

Mitigation Measure

- Audit the LDAR program to help ensure that the correct equipment is being monitored, proper procedures are being followed and the records are being kept for comparison.
- Eliminate any obstructions (e.g. grease on the component interface) that would prevent monitoring at the interface.
- Monitoring shall be carried out as per statutory requirements.

D. Repairing Component

Sources of Generation

- Not repairing leaking equipment within the required amount of time specified.
- Improperly placing components on the Delay of Repair list.
- Communication gap between intra departments.

Mitigation Measure

- Develop a plan and timetable for repairing components.
- Make a first attempt at repair as soon as possible after a leak is detected.
- Replace problem components with “leakless” or other technologies.
- Repair leaking components as soon as practicable, but not later than a specified number of calendar days (usually 5 days for a first attempt at repair and 15 days for final attempt at repair) after the leak is detected.
- First attempts at repair include, but are not limited to, the following practices where practicable and appropriate:
    - Tightening bonnet bolts
    - Replacing bonnet bolts
    - Tightening packing gland nuts
    - Injecting lubricant into lubricated packing

Input/output mass balance of solvents (VOCs):

To obtain a sufficiently sound basis for assessing the risks and recommendable actions that are related to VOC emissions, an estimation of the amounts of used solvents and the annual volatile organic compound emissions is necessary.

The simplest way to estimate VOC emissions from a production site is using the mass balance approach. This method sums up all the VOC relevant solvents that are purchased and used at the production site and records all the output flows.

Following frequency of monitoring of leaks and schedule for repair of leaks shall be followed:

S.N.	Component	Frequency of monitoring	Repair schedule
1.	Valves / Flanges	Quarterly (semi-annual after two consecutive period with < 2% leaks and annual after 5 periods with < 2% leaks)	Repair will be started within 5 working days and shall be completed within 15 working days after detection of leak.
2.	Pump seal	Quarterly	
3.	Compressor seals	Quarterly	
4.	Pressure relief devices	Quarterly	
5.	Pressure relief devices (after venting)	Within 24 hrs.	
6.	Process drains	Annually	Repair will be started within 5 working days and shall be completed within 15 working days after detection of leak.
7.	Components that are difficult to monitor	Annually	
8.	Pump seals with visible liquid dripping	Weekly	Immediately
9.	Any component with visible leaks	Weekly	Immediately

Green Belt Development

Greenbelt

Torrent's plant is already having existing 1,20,0000 sq. m organized green area within the plant premises.
Plantation has been done all along the periphery of the existing plant.

DETAILS OF PLANTATION & SHURBS IN TPL, INDRAD PLANT.				
Sr. No	**New Plant**	**Nos. of Plants**	**New Shrubs**	**Nos. of Plants**
1	Acassia Austelian	85	Alpinia	421
2	Acasia arbica	9	Androsace Sarmentosa	15
3	Acassia Austelian	29	Angiolonima	370
4	Albizia Libbek	18	Aspregrass	8150
5	Alstonia scholeresis	2	Baboosa-Vulgaris	1464
6	Azadirachta Indica	50	Bird Of Paredise	331
7	Azadirachta Indica	132	Bougenvillia Spectabillis	1645
8	Bahunia blackeana	32	Caribea(Heliconia)	571
9	Bauhunia pupuria	130	Cassia Biflora	55
10	Bignonia megapotamica	189	Cleredendron Innermi('Mehandi)	12000
11	Callistemon lanciolatus	23	Croton	561
12	Callistemon Lanciolatus	1	Dianella	400
13	Cassia renigera	9	Exora-Singapuri	30
14	Cassia Siamea	111	Ficus Benjamina	16
15	Cassia Siamea	95	Gajraj	1850

16	Casuriana equisitifolia	48	Ginia Grass	750
17	Cieba pentendra	106	Golden Rod	1300
18	Conocarpus	102	Green Tea	600
19	Cordia sebestina	43	Gunia Grass	2300
20	Delonix regia	19	Ipomia Bioloba	19600
21	Erythrina Indica	134	Jasminum Officinum	211
22	Eukliptis(Nilgiri)	18	Jecomonsea	50
23	Ficus infectirea	2	Jetropha Curcas	442
24	Lagestromia tharoli	43	Jetrophacurcas	166
25	lemon	**3**	Lycorisredeata(Spider Lily)	12098
26	Markhamia lutea	8	Madhumalti	340
27	Melaluca bracteta	16	Madhukamini	2078
28	Milling tonia - Hortensis	85	Para Grass	1700
29	Milling tonia - Hortensis	1	Pedilanthus	1860
30	Mimusopes elengea	116	Putranjiva Roxburghii	500
31	Mimusopes elengea	36	Singonium	3018
32	Paras pipdo	91	Thatea Pureveana	12
33	Peltophorum ferruginum	151	Umberela Palm	1200
34	Peltophorum ferruginum	20	-	-
35	Plumeria alba	**3**	-	-
36	Plumeria Alba	82	-	-
37	Pollylthea longifolia	276	-	-
38	Pollylthia longifolia	5	-	-
39	Pongamea pinnata	4	-	-
40	Putranjiva Roxburghii	36	-	-
41	Saraka Ashoka	10	-	-
42	Singpuri chery	8	-	-
43	Spethodia campenulata	38	-	-
44	tabobia argentina	30	-	-
45	Tabubuia rosea	78	-	-
46	Temarindes Indica	1	-	-
47	Termanalia Arjuna	54	-	-
48	Termanalia cattapa	115	-	-
TOTAL	-	**2697**	-	**76104**
	Lawn Plantation area	**120000 squ. Meters**		

10.1 ENVIRONMENTAL MANAGEMENT CELL

An environment management cell has been created and implemented to manage all environmental issues. The Manager (EHS) will be responsible for environmental issues at plant. The responsibilities of the various members of the environment management cell are given in ***Table 10.2*** as follows:

Table 10.2 - Environment Management Cell

Sr. No.	Designation	Proposed responsibility
1	Site Head	• Environmental policy and Procedures

Sr. No.	Designation	Proposed responsibility
		• Overall responsibility for environmental management and decision making for all environmental issues • Ensuring legal compliance by properly conducting activities as required by various regulatory agencies from time to time and interacting with the same
2	EHS Manager 6 Nos of Assistant Manager 13 Executive	• Responsible for overall effective and regular operation of Environment Management System (EMS) at plant level. • Guiding the team in operation and monitoring of pollution control equipments. • Responsible for immediate actions for any kind of spills, leakages & emissions. • Managing the raw material and hazardous waste handling and storage. • Responsible for overall compliances and co-ordination with pollution control boards / CHWIF. • Responsible for reducing the resource consumption and good house keeping within the premises. • Responsible for training of the workers.
2	Shift-In-Charge / Supervisor	• Ensure correct records of production, raw material, fuel consumption, water consumption, solid hazardous wastes. • Ensure of compliance of Stack Emissions, Ambient Air, and Noise as per the GPCB norms. • Operation of effluent treatment plant. • Ensure environmental monitoring as per appropriate procedures.
4	Doctors	• Regular Health Checkups of the workers.

CLEANER PRODUCTION

Cleaner Production in recent times has emerged as an attractive proposition to tackle the environmental problems posed by rapid industrialization and is being accepted worldwide. Besides reducing pollution, it also improves the process efficiency, thus reducing the cost of production. Applications of cleaner production mainly focus on preventing or minimizing the generation of waste and gaseous emissions. The basic idea of cleaner production is to avoid a problem altogether rather than trying to find remedial measure by adopting proactive approach of waste management. As far as the production processes are concern, CP will be achieved by raw material and energy conservation, by reducing quantum of emission and waste generation. To obtain fruitful results, CP should be implemented by adopting the concept of product modification, source reduction and recycling.

The following objective would be adopted for effective implementation of Cleaner Production (CP):

- The concept of Four -R's- reduce, reuse, Recover and recycle would be implemented as much as possible.
- The effluent would be treated for recovery of by-products.

- The feeding of solid raw material would be done by hopper so that there is least spillage due to fugitive emission.
- Liquid raw materials would be fed through metering pumps to reduce manual contact.
- Optimum operating conditions would be maintained to get maximum yield.
- Cleaner production technology adopted by other similar industries shall be followed if applicable.
- Improved housekeeping and training of cleaner production to all employees of the organization.
- High density polythene bags or drums will be used. Hence, the generation of plastic waste will be reduced. Moreover, Discarded Bags / Container will be decontaminated and reused/sold.
- The unit will maintain the proper inventory of the hazardous chemicals and keeping the buffer stock as minimum as possible. This will help to reduce the possibilities & magnitude of environmental hazards.
- There will be periodic arrangement of environmental training program to create understanding among plant personnel towards environment.
- Unit will manufacture products with maximum yield by using high-quality of raw material and advanced process technology.
- To minimize material wastage, standard SOP will be followed by the unit.
- As a part of water conservation, excess service water taps will not provided in the plant premises.
- Flow meter will be installed at raw water intake and at Effluent Treatment plant as well.
- Condensate water will be reused.
- High Pressure Jet Pump will be used for the cleaning of equipment, vessel & rector etc.
- Water sprinkle system will be used instead of hose pipe for the green belt development.
- First step to conserve energy is to identify source of energy utilization.
- Variable frequency drives (VFD) in pumps, whenever required will be provided to save energy.
- Use of low loss transformer instead of conventional transformer.
- As far as possible the unit is planning to use solar street lights in the factory premises which is the renewable energy.
- Proper air to fuel ratio will be maintained for the maximum efficiency of boiler.
- Good insulation practice will be adopted to prevent heat losses.
- Regular cleaning of the lamps and fixtures will be done to get better illumination in the plant.
- To avoid loss of precious quantum of energy, regular maintenance/ servicing will be provided to all the equipments.
- Unit will plan energy audit regularly as a tool for monitoring purpose

BUDGETARY PROVISIONS FOR ENVIRONMENTAL PROTECTION MEASURES

Table – 1.5: Cost of Environmental Protection Measures

Sr. No	Unit	Detail	Capital Cost (Rs. In Crores	Operating Cost (Rs. In Crores)	Maintenance Cost (Rs. In Crores	Total Recurring Cost (Rs. In Crores)
1	Waste Water	Existing ETP,RO MEE Sludge Dryer	46.54	1.88	0.60	2.48

		and Biogas plant				
2	Air	Scrubbers and others		0.40	0.10	0.5
3	Hazardous Management	Volute, decanter, shed		1.89	0.04	1.93
4	AWH Monitoring	Inhouse lab+ outsourced monitoring		0.05	--	0.05
5	Fire & Safety	Fire hydrant Fire extinguishers , Detection and control systems	10.0	2.02	0.27	2.29
6.	Green Belt Development (120000 Square meter)	Machinery	0.15	0.70	0.10	0.8
7	Occupational Health	Construction + Facility	0.50	0.30	0.02	0.32
8	CER Activity	For Corporate environment Responsibility	0.04	--		
Total			**57.23**	**7.24**	**1.13**	**8.37**

CER: CORPORATE ENVIRONMENT RESPONSIBILITY

Details of CER as per OM dated 01/05/2018

As per the office memorandum dated 1st May, 2018, the fund allocation for Corporate MoEF Environment Responsibility (CER) is subject to capital investment. For projects having investment less than 100 crores 1% (Brown field project) of the project cost shall be spent for CER activities. The cost of the proposed project is 3.9 Cr hence 4.0 lacs shall be spent on CER activities.

Sr. No.	Area	CER – Proposed planned Activities	Yearly Budgetary Provision (Rs)	Time Frame
1	Solar	Provision of grid connected solar panels in Indrad.	2.0	December 2021 to December 2022
2	Health/ Education	Sanitation facilities in schools Ambavpura	2.0	December 2021 to December 2022
		Total	4.0 Lac	

CONCLUSION

The study brings out the following points:

1. Ambient air quality, ground water quality and noise levels shall remain within acceptable limits after the proposed manufacturing activities due to effective design and implementation of environmental management plans.
2. Risk to flora/fauna and soil is negligible due to effective management and handling of hazardous wastes and wastewater.
3. Socio-economic benefits due to creation of direct / indirect employment. CER activity shall be carried out in the surrounding areas.

Thus, it can be concluded on a positive note that after the implementation of the mitigation measures and Environmental Management Plan, the regular operations of **M/s. Torrent Pharmaceuticals Pvt. Ltd.** will have negligible impact on environment and will benefit the local people.