Executive Summary

For

Proposed expansion of 45KLPD Distillery Unit to 135 KLPD Distillery Unit

At

Vill – Khursapar (Bela), Tah – Umred, Dist. Nagpur, Maharashtra

Project Proponent

M/S. PURTI SUGAR & POWER LTD

EXECUTIVE SUMMARY

1.1 Introduction:

The proposed project is a expansion project of Molasses based distillery of 45 KLPD to 135 KLPD distillery unit. Molasses based distillery is classified under 5 (g) as category A in Notification 2006 issued by MoEF and it requires environmental clearance from MoEF New Delhi.

The existing 45 KLPD molasses based distillery has been planned to expand to 135 KLPD, thus the expansion will be for 90 KLPD.

1.2 Justification for the project

Molasses based distillation is being used in India for the production of alcohol since ancient days. The molasses based distilleries are linked with sugar factory where sugar producing farmers are benefited. The proposed expansion project where alcohol will be produced from cane molasses by continuous fermentation and multi pressure distillation technology which gives better productivity and quality of alcohol.

Ethyl Alcohol, Alcohol, Spirit, Denatures Spirit, there are myriad descriptions for this agriculture based product. A globally traded commodity, ethanol fires combustible engines in Brazil, slakes the thirst of many in Europe and finds its way in pharmaceutical and chemical industries across the world.

Ethanol is made by two routes either by synthetic one from petroleum substances or by fermentation from sugar-bearing or starchy substrates using yeast.

Alcohol finds its use in diverse application ranging from potable liquor to life-saving drugs to paints & perfumery to renewable source of energy.

Ethyl Alcohol is an important feedstock for the manufacture of various chemicals. These chemicals are primarily the basic carbon based products like Acetic acid, Butanol, Butadiene, Acetic Anhydride, PVC etc.

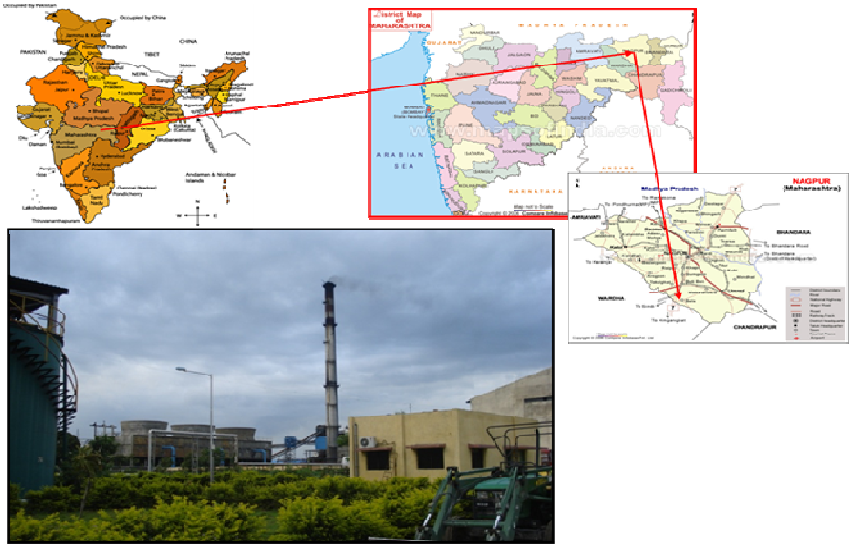
Ethylene, Ethylene oxide are also produced from a petrochemical route, however this requires plants of huge scales and thus require substantially high investments.

The drug industry also uses alcohol as a raw material for production of Insulin, Antibiotics, tonics and several other essential bulk drugs & formulations.

Keeping in view of the above, M/s. Purti Power & Sugar Ltd. Has proposed to expand the existing 45 KLPD distillery unit to 135 KLPD distillery unit

1.3 Location and Boundaries

The proposed expansion project has been identified in Village - Khursapar (Bela), Tehsil- Umred, District – Nagpur, Maharashtra. The industry is located in the vicinity of potential sugarcane-growing area, which reduces the transportation cost of Sugarcane/ Bagasse / Molasses thereby reducing the pollution load due to the proposed activities. The proposed expansion activity has been identified in the existing facilities which will have less impact on cutting – filling of the land.

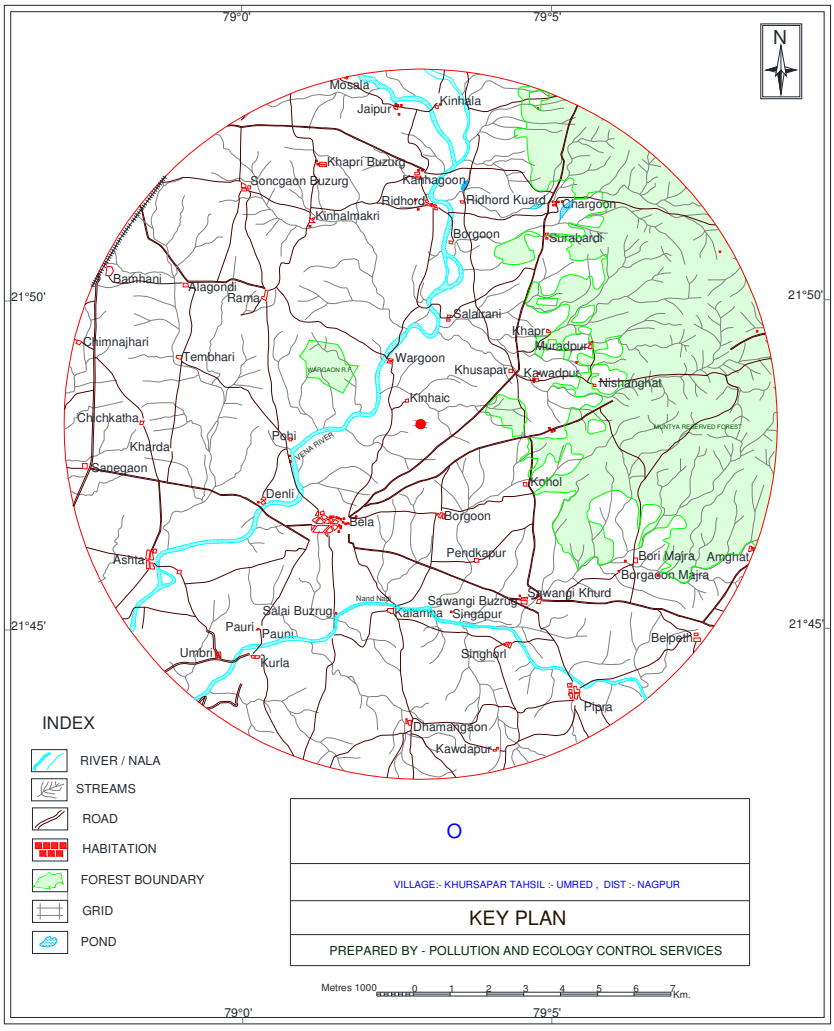


Location Map of the Proposed Expansion of Distillery Unit at Khursapar

Detailed Features of the Project Site within 10 km radius

SR. NO	FEATURES	PARTICULARS
1	Location	At/Po – Khursapar (Bela), Tah – Umred, Dist.- Nagpur State –Maharashtra.
2	Nearest National Highway	NH-7, 14 km at Sonegaon Village
3	Coordinates	Latitude – 20° 47’ 57.88”N Longitude – 79° 02’ 42.8”E
4	Nearest railway station	ButiBori, 25 km
5	Nearest village	Khursapar, 2 km
6	Nearest major city	Nagpur, 65 Km
7	Nearest water body	Rama Dam ,2 Km Venna River ,3Km
8	Nearest industry	Ideal Energy Projects Ltd. 0.5 Km
9	Sensitive locations	Archaeological structures, Historical places,

		Protected Forests, Sanctuaries and Biosphere Reserves, Wild Life sanctuary and Coral Formation Reserve are not present within 10 km
10	Nearest forest	Muniyar Reserve Forest 3 km East of the project site



Study Area Map (10 km radius)

2.1 Raw Materials: (ToR 6)

List of main raw material along with its quantity and source is given in table

Sr. No	Particulars	Existing Plant	Proposed Expansion	Total
1	Molasses	180 TPD	360 TPD	540 TPD
2	Nutrients N, P	50 Kg	100 Kg	150 kg

3	Turkey Red Oil (TRO)	250 Kg	500 Kg	750 kg
2	Urea	0.05 TPD	0.1 TPD	0.15 TPD
3	DAP	0.05 TPD	0.1 TPD	0.15 TPD
4	Antifoam	0.25 TPD	0.5 TPD	0.75TPD
5	Yeast	Lab Multiplication	Lab Multiplication	-
6	Sulphuric acid	0.05 TPD	0.1 TPD	0.15 TPD
7	Baggas		1232.4 MT/Month	
8	Biogas		212.79	

2.2 Utilities

Water Requirement

For the proposed Continuous Fermentation based 90 KLPD distillery unit producing Rectified Spirit as a finished product, the water requirement will be 1138 m^3/day .Water storage reservoir facility is already available for the proposed expansion project within the premises of the industry. Source of water will be Rama dam.

Water Requirement and Waste Water Generation

All figures in cum/day

Sr.No.	Stations	Input	Loss	Loss as	Effluent	Recycling
1	Domestic	8	01	Domestic Use	7	7
2	Cooling Tower	224	24	Evaporation	200	200
3	DM Water Plant	Nil	Nil	Nil	Nil	Nil
4	Fermentation					
	i) Fresh Water	820	0	-	820	820
	ii) CO_2 Scrubbing	20	-	-	20	20
	iii) Spent less	66	20	Evaporation	46	46
5	Distillation i) From Fermentation	Nil	Nil	Nil	Nil	Nil
6	Floor & vessel washing	Nil	Nil	Nil	Nil	Nil
7	CO_2 scrubbing	Nil	Nil	Nil	Nil	Nil

	Total	**1138**	**45**	**-**	**1093**	**1093**

Power Requirement

Power will be sourced from own captive Biomass based Power plant of 24.5 MW. The cost of electricity from the existing turbo alternator to the distillery and ETP has been assumed as Rs 4.70 /unit.

Steam Requirement

The steam requirement of the proposed distillery will be around 10 - 12 MT/Hr which will be met from the existing boiler unit, no additional boiler will be installed. The existing facilities are having two boilers with 50 Mt/hr and 100 Mt/hr steam generation capacity.

Fuel Requirement

The fuel requirement for the proposed expansion is given below

Sr. No.	Fuel	Quantity
1	Coal	164 MTPD
2	Bagasses	1087 MTPD
3	Methane	21600 M^3PD

2.3 Process :

Manufacturing Process for Molasses Based Distillery:

Rectified Spirit production in the plant is based on continuous Fermentation Technology with yeast recycle using yeast separators.

Production of rectified spirit is mainly carried under the following three steps. Figure gives the process flow diagram of rectified spirit production.

1. Dilution – Preparation of molasses for fermentation
2. Fermentation – Production of alcohol from fermentable sugars in molasses solution
3. Distillation – Product recovery

Each of the above steps of production is detailed below:

Dilution

Molasses available from sugar mills contains solid content between 76-90% and sugar content varies between 45 and 50%.

The main dilution operation occurs in a diluter where the solid concentration is brought down to 20 – 25^0C. The bulk of this diluted molasses is fed to the fermentation tank while a small quantity is further diluted to 10 – 15^0C and used for preparation of the final yeast inoculums. Propagation of yeast for the final inoculation is done in successive stages.

Fermentation

Fermentation in the fermentation tank continues for about 15 to 20 hours after the final inoculum is added to it. The basic reaction in the fermentation process is

$$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$$

Glucose/Fructose ***Ethyl Alcohol Carbon Dioxide***

Yeast Propagation

Yeast seed material is prepared in water-cooled yeast vessels by inoculating molasses with yeast. The contents of the yeast vessel are then transferred to the yeast activation vessel. The purpose of aerated yeast activation vessel is to allow time for the yeast cell multiplication.

Fermentation

The purpose of fermentation is to convert the fermentable sugars into alcohol. During fermentation, sugars are broken down into alcohol and carbon dioxide. Significant heat release takes place during fermentation. Fermentation temperature is maintained at optimum level by forced recirculation heat exchangers.

At the end of fermentation, the wash is fed through a yeast separator where the yeast cream is separated, acidified in the yeast treatment tank and returned to the yeast activation vessel for activation. Sludge is separated in a sludge decanter. The clear wash from both the yeast separator and sludge separator flows to the clarified wash tank. The wash is then pumped to distillation.

Distillation

Fermented wash is preheated in fermented wash preheater and fed to the analyzer column. The dilute alcohol water vapours from the analyzer top are fed to the Pre-Rectification column. An impure spirit draw of 3% is drawn from this column. Bottom liquid from pre-rectified column is fed to the IS purification column. Draw from IS purification column is fed to purified column.

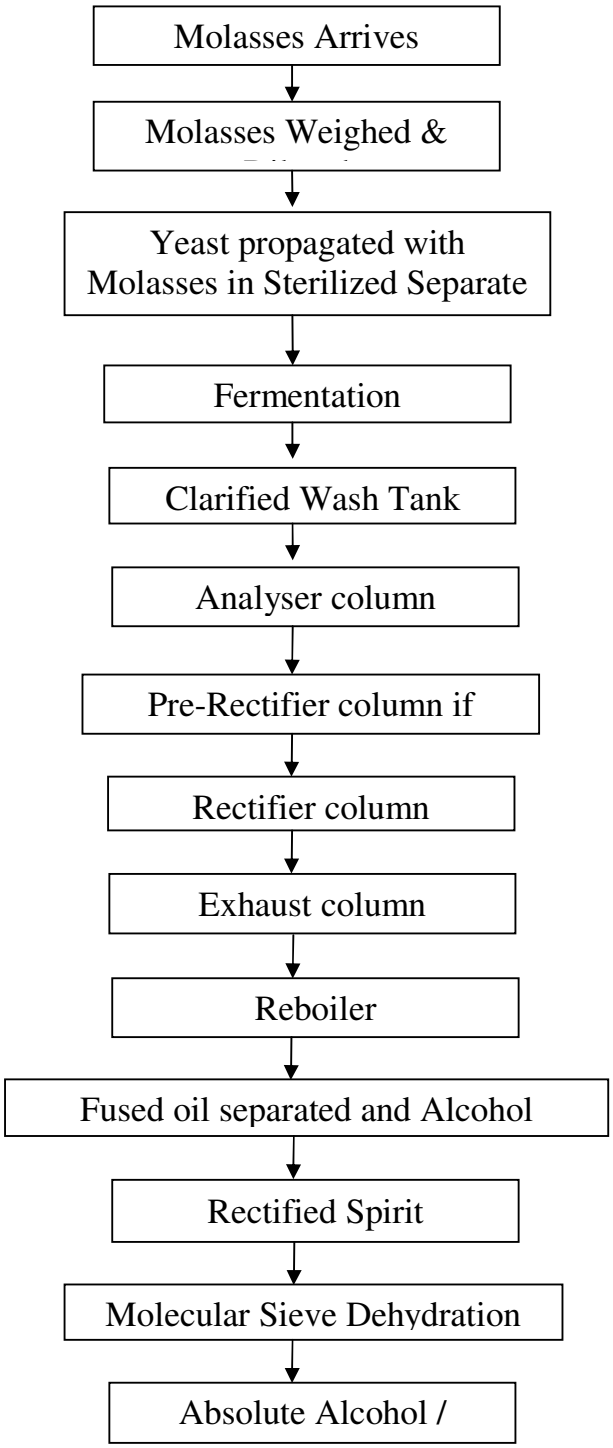
The purification column is operated under atmospheric pressure and is heated by using steam. The bottom of this column is maintained at 20% alcohol and is fed to

the rectified / exhaust column. A small draw from the top of the column is fed to the IS purification column.

The purified rectified spirit is removed from the bottom of the purified column.

The lees from the exhaust column bottom is used to pre heat the heat from the purified bottom to the rectifier / dilution water.

Lower side draws streams are taken from rectified column to avoid fuel oil build up in the column. These streams are then taken to the IS purification column.



Process Flow Diagram

Manufacturing process for Anhydrous Alcohol:

Alcohol is manufactured by Indian distilleries is rectified spirit ,which is 94.68%alcohol,and rest is water .It is not possible to remove remaining water from rectified spirit by straight distillation as ethyl alcohol forms a constant boiling mixture with water at this concentration and is known as azotrope. Therefore, special process for removal of water is required for manufacture of anhydrous alcohol. In order to extract water from it is necessary to use some dehydrant or entrainer, which is capable of separating, water from alcohol. The various process used for dehydration of alcohol are Azeotropic distillation, Molecular sieve, Prevaporation /Vapor permeation system. Already we are having 120 KLPD Molecular sieve dehydration plant.

2.4 POLLUTION CONTROL

Water Environment

The total water requirement for the proposed expansion activities is 1584 m^3/day.

The major sources of wastewater for molasses based distilleries are

- Process Waste Water

  Spent wash from the analyser column
  Fermenter Sludge
  Spent lees from the Rectifier
- Non-process Waste Water
  Cooling water
  Waste wash water
  Boiler blow down
  Domestic / Sanitary wastes

Process Waste Water

Industrial wastewater with high BOD and COD (spent wash)

The industrial wastewater is low in pH, has deep color, and has high BOD, COD and TDS and inorganic matter. It is rich in the plant nutrients such as potassium

phosphate. The treatment scheme proposed for spent wash is to achieve zero discharge of spent wash and also to recover valuable products.

Bio-Methanation of the Spent Wash

It is proposed to treat the spent wash in two stages, by Anaerobic Methane Bio-Digestion and by Aerobic Bio-composting spent wash is biomethanated in an anaerobic digestor. Bio-methanated spent wash is collected in storage tank of seven days capacity.

Treatment in M/s. Purti Power & Sugar Ltd. Anaerobic Methane bio-digester will have following units

Sr. No.	Unit	Unit Purpose	Environmental significance
1	Plate type heat exchanger	Bringing down the temperature suitable to microbes	Open lagoons for cooling is avoided in order to recover heat which is favorable for microbial multiplication.
2	Collection sump	Efficient mixing of all effluent sub streams and return stream	Equalizes BOD, pH, flow for uniform loading of effluent
3	Digestion tank	Biological activity	High HRT (15 days) given, provided 25 HP mixing unit for higher efficiency
4	Clarifier	Settling the active biomass for returning	Skilled worker operating the digestor can only increase the efficiency, resulting in more Methane and less outgoing BOD
5	Gas holder	To adjust the demand	In no-demand period methane is burned through burner

In addition to the above units Pump House, Electrical Panel Room and Sludge Drying Beds will also be provided.

The characteristics of the spent wash from continuous fermenting process is given below

Sr. No.	Parameter	Characteristics
1	pH	4.0 – 4.3

2	Temperature	45^0C
3	Color	Dark brown
4	Chlorides	6000-7500mg/lit
5	Solids- Total Solids Volatile Solids Inorganic dissolved Solids	 1,30,000-1,60,000mg/lit 60,000-75,000mg/lit 35,000-45,000 mg.lit
6	BOD	55,000-65,000mg/lit
7	COD	1,10,000-1,20,000mg/lit
8	Sulphates	4,500-8,500mg/lit

Compost Plant

A compost yard of 10 acres area is constructed as per CPCB guide lines for utilization of bio-methanated spent wash generated from anaerobic process. The compost yard will be provided with impervious HDPE lining with garland drains around the yard. The surface runoff waste water will be collected from compost yard through garland drains and will led to the leachate collection tank. Machineries such as tractors, Aero-tiller along with spent wash spraying system, loader, pulver-izer and packing machinery are also provided for compost plant operation.

Non-process Waste Water

Wastewater from demineralisation plant, excess spent lees and floor- vessel washings

This is biodegradable. The quantity is so small, no separate ETP is possible. This is used as a diluent before the effluent is fed to bio-digestor. This is possible only in the molasses based distillery unit wastewater from stream.

Wastewater from boiler blow down and cooling purging water

This is the less polluted stream without organic load except high temperature. This is cooled and is used for gardening purpose.

Reusable wastewater from Spent lees and CO_2 scrubbing

This will be used as boiler feed, process and fermentation process.

Sanitary / Domestic

The effluent is with low BOD (90-120 mg/lit) which is biodegradable and can be treated in a well designed septic tank of hydraulic retention time of more than 24 hours.

M/s. Purti Power & Sugar Ltd. has provided septic tank in the existing facilities. The treated effluent used for irrigation is disinfected to control odour. This disinfected treated effluent is being used safely by sewage farm workers for irrigation / gardening. This is found to be satisfactory.

Solid Waste

Ash

Fuel used in the boiler are bagasses and biogas. The consumption of baggasses is 1232 MT/Month and biogas 212.79 Nm^3. The bagasses used contain 1% ash. Thus the ash generation will be 12.32 MT/Month from Bagasses. The ash will be disposed to low lying area. The ash can also be used soil conditioner in agricultural field.

Fermenter Sludge

The sludge with spent yeast and mineral mater composition contains about 30% solid content.This solid waste will be subjected to drying. The dried fermenter sludge cake will have sufficient nutrient value to form an excellent cattle feed. The following table provided the typical composition of the dried fermenter sludge cake.

Typical Composition of Dried Fermenter Sludge

Sr No.	Item	Content (% by Weight)
1	Moisture content at 100^0C	4.14
2	Protein content as (6.25 x N)	12.54
3	Acid insoluble matter	3.93
4	Mixed oxide of iron & aluminium as (R_2O_3)	1.23
5	Calcium Carbonate as $CaCO_3$	8.89
6	Calcium Sulphate as $CaSO_4$	40.02
7	Calcium Phosphate as ($Ca_3(PO_4)_2$)	1.10
8	Magnesium Salts	Traces
9	Sodium Sulphate (Na_2SO_4)	0.57
10	Potassium Sulphate (K_2SO_4)	0.61

Non Hazardous Solid Waste

The non hazardous solid waste management in Purti Power & Sugar Ltd. Will be as follows

Sr. No.	Waste	Quantity/day	Treatment	Disposal
1	Canteen	1.0 Cum	Composting	Composted material is used as fertilizer in garden.
2	Colony	1.0 Cum	Composting	
3	Yeast Sludge from the fermenter	60 kg	Composting	
4	ETP sludge	480 kg	Mixed with Compost	
5	Office & Packing trash	2 Cum		Sales

The solid waste from the fermenter is mostly spent yeast. The spent yeast can be separated by dewatering on the screen, thus separating the filterate as spent wash. The spent yeast can also be used as secondary yeast along with the primary yeast culture in fermentation process.

2.5 Benefits

- Alcohol is well known raw material for manufacture of a variety of organic chemicals including pharmaceuticals, cosmetics, polymers etc.
- Alcohol is a potential fuel in the form of power alcohol when blended with petrol. In presence of ethanol petrol burns with more efficiency and low toxic smoke reducing the pollutant in exhaust gases of vehicles.

- Petroleum is scarce, non-renewable and environmentally harmful product. On the contrary alcohol is an eco-friendly product and it is a substitute to the imported petroleum. Alcohol is produced from molasses which is a by-product of the sugar industry.
- Alcohol is a potential source of revenue as it is mostly used in the beverage industry.
- The use of molasses as a raw material in the distillery unit will increase revenue of the sugar industry and thus the sugar industries can give better prices to the farmers supplying the sugar cane. The nutrients present in the spent wash can be used as a fertilizer in agriculture.

2.6. EIA Study Report

This is finally prepared and submitted as per guidelines given by MoEF as

Chapter 1: Introduction

Chapter one provides purpose of the report, background information of the proposed project, brief description of nature, size and location of project, environmental setting of the project, estimated project cost, and scope of the study. The key environmental legislation and the standard relevant to the project and the methodology adopted in preparation of the report have also been described in this chapter.

Chapter 2: Project Description

Chapter two deals with the layout of the plan, location, process, details of the proposed project, other technical and design information and sources of anticipated pollution.

Chapter 3: Baseline Environmental Status

Chapter three presents the methodology and findings of field studies undertaken to establish the environmental baseline conditions, which is also supplemented by secondary published literature.

Chapter 4: Anticipated Impact Assessment and Mitigation Measures

Chapter four details the inferences drawn from the environmental impact assessment of the proposed project during various stages of project advancement, such as design, location of project, construction and regular operations. It also describes the overall Impacts of the proposed expansion project activities and underscore the areas of

concern, which need mitigation measures during both construction and operation phase of the project.

The chapter also provides recommendations/Environment Management Plan (EMP) including mitigation measures for minimizing the negative environmental impacts of the project and enhancing the positive impacts.

Chapter 5: Analysis of Alternatives for Technology and Project Site

The technology and project site alternatives are discussed in the chapter five.

Chapter 6: Environmental Monitoring Program

Environmental monitoring requirements for effective implementation of mitigatory measures during construction and operational phase have been delineated in this chapter. Infrastructural facilities, monitoring equipment needs and environmental monitoring cost are discussed to execute the environmental monitoring programme.

Chapter 7: Additional studies

Chapter seven describes various additional studies carried out for the project. Various risks associated during operational stage of the project are assessed in this chapter. Hazard identification and consequences analysis is worked out to understand the remedial actions required during operation phase. A disaster management plan to minimize the risks or to combat the associated risks is also presented.

Chapter 8: Project Benefits

Chapter eight describes various benefits of the project to the community in the vicinity and as well as to the region on the whole.

Chapter 9: Environmental Management Plan

Chapter nine describes the institutional arrangements for environments protection and Conservation during the operational stage of the Project and the management strategy for the project. Activities for Corporate Social Responsibility (CSR) are delineated in depth.

Chapter 10: Summary and Conclusion

The summary of the EIA report has been given in this chapter along with conclusions. It is an effort to present the EIA report in the form of a chapter. It will be easy for a reader to cover the whole report by studying this chapter.

Chapter 11: Disclosure of Consultants

The list of experts involved in preparation of the present EIA/ EMP report is given along with brief introduction of the consultancy organization involved in EIA report.

2.7 Conclusion:

This industry will manufacture Alcohol which are in good demand for growing infra-structural facilities in India and abroad. This will not disturb the present land use because it is an expansion project. No Prime Agriculture Land will be put to the industrial use. Trees will be maintained and not razed down. No Rehabilitation is involved. There will be no problematic waste materials as all will be utilized.

- This project is very necessary in view of making useful material available to Indian developmental activity for community, defense and as a foreign exchange saver/ earner product.
- The local people desire that industries should come here on existing plot.
- The candidate site is suitable from general MoEF expectations.
- Water, power, Raw material, and Market is assured and found available with ease.
- Full precautions will be taken for Pollution Control, Resource Conservation and Environmental Protection.
- This is cost effective and Sustainable Development.

The Report gives the details and finds that the impact overall is favorable to the country, to the people and to the environment as a sustainable development.

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