

PREFEASIBILITY REPORT

For

NIRANI SUGARS LTD (Distillery division)

For

**Expansion of distillery from 150 KLPD to 300 KLPD and 5 MW/hr
to 10 MW power generation**

at

**at Sy No.18 and 19, Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka
State, India.**

PREPARED BY



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1. Executive Summary

M/s Nirani Sugars Ltd., have already obtained Environmental Clearance for the establishment of 120 KLPD distillery. Now based on the demand, management has decided to expand the distillery to 300 KLPD and generate 10 MW power.

Note: The proposal of expansion of 120KLPD to 150 KLPD and 5 MW/Hr power generation was place in the 43rd EAC meeting held on 26.11.2018.we are awaiting to issue of Environmental Clearance for 150KLPD distillery and 5 MW/Hr power generation hence this application will be uploaded in the different mail id as niranidistilleryeia@gmail.com

Sl.No	Items	Particulars
1	Objective of the Project	Expansion of present distillery of capacity to 300 KLPD and 10 MW power generation.
2	Promoters	M/s Nirani Sugars Ltd (Distillery Division).
3	Total Investment	Rs. 201 Crores for the expansion
4	Project location	Sy Nos. 18 and 19, Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka State.
5	Extent of land	29 Acres. No additional land required for the proposed expansion.
6	Man Power	Existing: 125 No's, Expansion: 57 No's
7	Water demand and Source	Water requirement 3966 KLD (fresh water- 1800 KLD and Recycled water-2166 KLD) Source : Ghataprabha River
8	Power supply	The total power required for the proposed project will be 500 kwh – for construction phase from KPTCL/In-house During operation phase, power is obtained from incineration unit
9	Latitude	16°21'30.8" N
10	Longitude	75°15'56.9" E
11	Expected period of completion	12 months

Comparison statement

Sl No	Particulars	120 KLPD distillery	150 KLPD	After expansion 300 KLPD 10 MW/hr	Difference
1	Promoters	M/s Nirani Sugars Ltd., (Distillery division)			
2	Location	Sy Nos. 18 and 19, Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka State.			
3	Objective	Establishment of 120 KLPD distillery and 5 MW power generation	Expansion of 120 KLPD distillery to 150 KLPD distillery and 5 MW power from Incineration boiler	Expansion of distillery unit from 150 KLPD to 300 KLPD and 5 MW to 10 MW power generation	Additional 150 KLPD and 5 MW power
4	Plot area	29 Acres			No additional requirement
5	Total Man power including sugar cane crushing	100 nos	125 nos	182	+ 57 nos
6	Total Investment, Rs	96.92 Crores	126.92 Crores	327.92 Crores	+ 201Crores
7	Raw material	Molasses: 480 TPD Concentrated spent wash: 270 TPD Coal: 90 TPD	Molasses: 600 TPD Concentrated spent wash: 328 TPD Coal:100 TPD	Cane Juice/ Molasses (B and C grade) : 1200 TPD Concentrated spent wash: 892 TPD	Additional: Molasses: 600 TPD Concentrated spent wash: 564 TPD

				Bagasse: 274 TPD Coal:152 TPD (considering 40% coal)	Bagasse:274 TPD Coal:52TPD
8	Product	RS/Ethanol/ ENA- Total sprit: 120 KLPD	RS/Ethanol/ ENA-Total sprit 150 KLPD Power: 5 MW	RS/Ethanol- Total Spirit- 300 KLPD Power: 10 MW/hr	Additional: RS/Ethanol/ ENA- Total sprit: 150 KLPD Power: 5 MW
9	Water requirement and source	Fresh water requirement: 960 KLD Ghataprabha	Fresh water requirement: 900 KLPD Ghataprabha	Fresh water requirement: 1800 KLD Ghataprabha	+ 900 KLD
10	Spent wash generation	775 KLD	900 KLD	1800 KLD	+900 KLD
11	Spent wash treatment	Concentration in MEE followed by incineration			New 80 TPH incineration boiler will be installed. Earlier 32 TPH will be used as standby
12	Air pollution control management	ESP	ESP	ESP	New ESP will be installed to the new boiler
13	CPU	700 KLD	700 KLD	700KLD+1500 KLD	+ 1500 KLD
14	ETP capacity	Effluent generated from	1000 KLD ETP	1000 KLD ETP	Capacity adequate

		distillery is being treated in the 1000 KLD sugar industry ETP			
13	Solid waste	Boiler ash/Spent wash Ash: 40 TPD Yeast Sludge: 10 TPD	Boiler ash/ Spent wash Ash: 45 TPD Yeast sludge:17 TPD	Boiler ash/ Spent wash Ash: 90 TPD Yeast sludge:34 TPD	Boiler ash/ Spent wash Ash: 45 TPD Yeast sludge: 17 TPD

2. Introduction of the Project/ Background Information

2.1 Identification of project and project proponent.

Mr. Nirani has created a niche for himself in the social service field. Founder Chairman M/s Nirani Sugars Ltd., Mudhol, M/s Nirani Cements Pvt Ltd., Ningapur M/s Nirani Automobiles Industries Ltd., Mudhol & The President Vijay Souhard Bank Ltd. Mudhol.

2.2. Brief description of nature of the project.

The present proposal is expansion of present distillery unit from 120 KLPD to 300 KLPD and 10 MW power generation.

The Proposed expansion project is located in Sy Nos. 18 and 19, Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka State. This is flat Land whereby Cutting-filling will be balanced and there will be No/Low Borrowing from Nature.

Within 10 km Influence Zone, there is no Tropical Forest, Biosphere Reserve, National Park, Wild Life sanctuary and Coral Formation Reserve. The river Ghataprabha is 3.5 Kms away from the proposed site and the State Highway (SH-34) is around 0.9 Kms from the project site.

2.3. Need for the project and its importance to the country and / or region.

Alcohol has assumed a very important place in the economy of the country. It is used as a raw material for number of chemicals, as a potential fuel in the form of Ethanol blended with petrol and as an ingredient in Alcoholic Beverages. Use of alcohol as a main ingredient in beverages is well known. Further, it is a major source of revenue by way of excise duty to the State Governments. The importance and utility of alcohol as an industrial raw material for manufacture of variety of chemicals is now being increasingly appreciated all over the world. This is partly due to the escalating costs of these chemicals produced through petrochemical route and abnormal increase in crude oil prices. Crude oil which was sold at 3 dollars per barrel in 1969 is more than 100 dollars. The price is predicted to increase further depending upon international situation and with depletion/exhaustion of petroleum resources of the world. The location of the distillery slated for expansion is at rural, agro-based and economically backward region. The proposed expansion programme will fetch better realization to the molasses and in turn to sugar cane grown in the region.

Alcohol is an eco-friendly product. As a substitute to petroleum, the distillery helps to reduce the dependency on petroleum and has potential to save foreign exchange. Petroleum is a scarce, non-renewable and fastly depleting product. Under the National Ethanol Programme, there is a mandate to blend 5 % ethanol, in petrol in nine sugar producing states. This programme was started on 1st October 2003.

This amounts to a demand of 360 million litres of ethanol per year. In addition, the Government of India has directed for introduction of gasoline and diesel conforming to Euro-3 fuel standards in India. The Euro-3 standard specifies the presence of

an oxidant in the fuel, which minimizes the emissions due to the combustions of these fuels. Alcohol being one of the most viable additives available, the oil companies has to use alcohol for blending with petrol. With this, the demand for ethanol would be more than doubled.

The Indian sugar industry is passing through a difficult period. The sugar price in the Indian market is low, and even the world market price is low. On the other hand, the cost of the raw material, the sugar cane, keeps increasing every year and so is the production cost. With high inventories and the prices low and with the raw material and production costs increasing every year, survival has become a major problem for the Indian sugar industry. The sugar industry can hope to come out of this situation by best utilization of the existing resources. Hence, it is proposed to expand the capacity of the existing distillery

2.4. Demand-Supply

The progress of the second phase of the EBP launched in November 2006 has been slow as ethanol usage is subject to commercial viability. Due to a plethora of high taxes and levies, ethanol blending is commercially unviable in several states, particularly sugar/alcohol deficit states. Most states have a labyrinth of rules and regulations (inter-state movement, high excise duties, storage charges, etc) to control alcohol for the potable liquor industry, and these regulations are equally applicable on ethanol for blending purposes.

Consequently, ethanol for blending with petrol in Indian sugar marketing year 2006/07 (October/September) is estimated to reach just 250 million liters against the target of 550 million liters. The GOI is actively engaged in working with state governments to resolve the underlying issues constraining adoption of the EBP program in other states and hopes to resolve them in the next few months. Assuming the EBP program is effectively implemented in all target states, ethanol for blending with petrol in MY 2007/08 is forecast at 550 million liters.

Petroleum companies are currently buying fuel grade ethanol from the sugar companies at rates ranging between Rs. 19.0 to 21.5 (47-53 cents) per liter. The cost of production of ethanol depends on the price of molasses, which fluctuates widely during the season.

Industry sources estimate the average cost of production of ethanol to range from Rs. 16 to 18 (40-44 cents) per liter at current molasses prices. With expected bumper sugar and molasses production and consequent depressed molasses prices in the remaining MY 2006/07 and MY 2007/08, the cost of production of ethanol is expected to remain low and the sugar industry will be encouraged to supply ethanol for the EBP program.

2.5. Imports vs. Indigenous production

Not Applicable

2.6. Export possibility and Domestic / Export markets.

Not applicable. Will be used for domestic use. The power is exported to the grid.

2.7. Employment Generation (Direct and Indirect) due to the project.

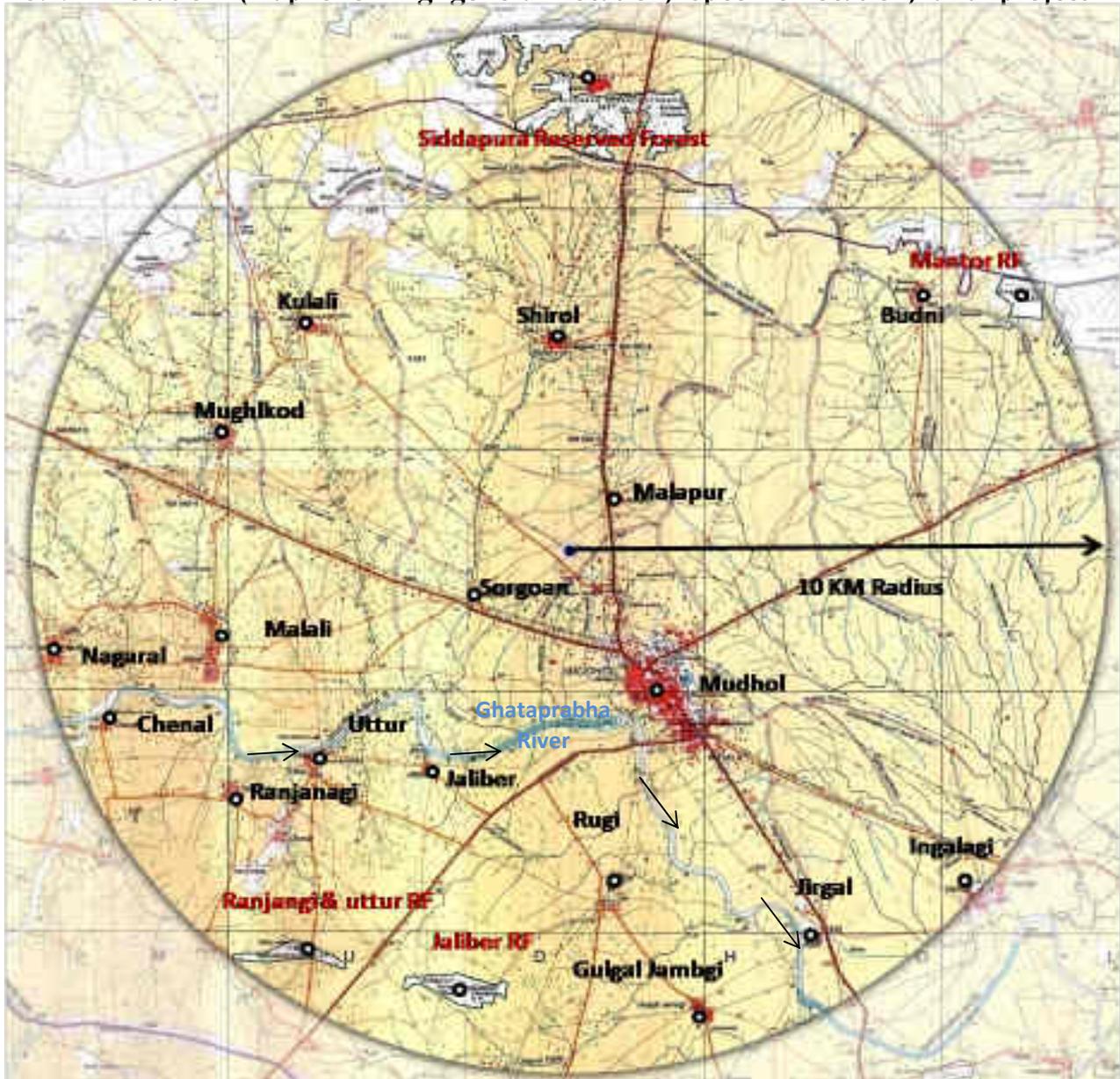
About 57 no of additional employees of all categories will be employed additional for the expansion proposal.

3. Project Description

3.1. Type of project including interlinked and interdependent project, if any.

Not applicable

3.2. Location (map showing general location, specific location, and project



Location of the Project site on Toposheet with 10 Kms radius demarcation (Toposheet No: 47 P/3 & 47 P/7 Scale: 1:50,000)



Project Site Photographs

3.3. Details of alternative sites, considered and the basis of selecting the proposed site particularly the environmental considerations gone into should be highlighted.

Not applicable as the project is an expansion proposal.

3.4. Size & magnitude of operation

The company is an established 120 KLPD distillery, wherein the expansion is proposed within the same premises.

3.5. Project description with process details (a schematic diagram/flow chart showing the project layout, components of the project etc) should be given.

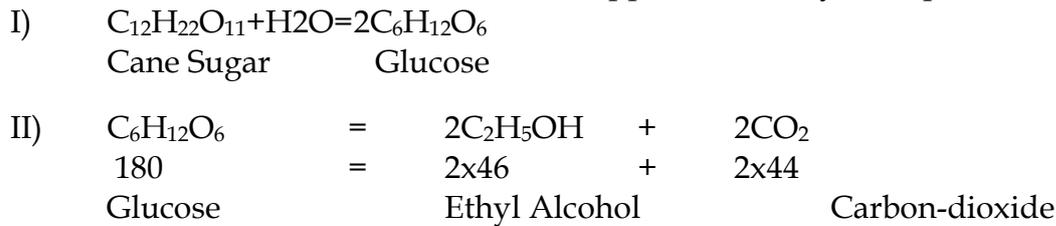
Process Description

This is a simple three step process namely molasses preparation, fermentation and distillation.

General Process of Alcohol Production:

Molasses is the chief raw material used in India for production of Alcohol. Molasses contain about 50% total sugars, of which, 30 to 33% are cane sugar and the rest are reducing sugar. During the fermentation, yeast strains of the species *saccharomyces cerevisiae*, a living micro-organism belonging to class fungi converts sugar present

in the molasses, such as sucrose or glucose to alcohol. Chemically this transformation for sucrose to alcohol can be approximated by the equation.



The 180gm of sugars on reaction gives 92gm of alcohol. Therefore, 1tonne of sugar gives 511kgs of alcohol. The sq. gravity of alcohol is 0.7934. Therefore, 511kg of alcohol is equivalent to 511/0.7934=644 liters of Alcohol. During fermentation other by7-products like glycerin, succinine acid etc. Are also formed form sugars. Therefore, actually 94.5% total fermentable sugars are available for alcohol, under ideal condition theoretically. Normally only 80 to 82% efficiencies are realized on plant. One tone of molasses containing 45% F sugars given alcoholic yield 255-265 litres per ton.

For bringing out above biochemical reaction, we require proper and careful handling of yeast, optimum parameters like pH and temperature control and substrate concentration, which results into effective conversion of sugars to alcohol. For manufacture of yeast, separate equipment known as pure yeast culture apparatus is required. Initially, yeast is developed in the laboratory from the single cell yeast culture. In the laboratory, yeast is propagated in a test tube 10ml. Then it is transferred to a bigger flask of 500 ml flask, and transferred to 5litre flask containing the sterilized molasses solution. It is necessary to adjust the pH of the molasses solution in the range etc. Each stage of development of yeast propagation, namely 100 litres, 500 litres and 5000 litres. All these equipment's are designed so as to facilitate boiling molasses solution in order to sterilize it and also cooing o bring it to the proper temperature of 33oC and letting in culture and taking out culture. Boiling, cooling introducing culture, Etc. is done in aseptic manner, i.e keeping the fermentation medium free from any kind of infection. Further, stages of yeast propagation are done in open tanks i.e pre-fomenter requires about 8 hours in order to build up necessary concentration of yeast in them. Finally, pre-fomenter is emptied in an empty fomenter, which is previously cleaned and kept ready. Dilute molasses solution is allowed to flow in this fomenter so as to fill it to its working capacity, say about one lakh litre.

The average efficiency of conversion of sugars in molasses to alcohol is 80 to 85% of theoretical value. All the sugars are not converted to alcohol during the process of fermentation because chemicals like glycerin; succinine acid, etc. are also produced by yeast during their metabolic process. Therefore, it is not possible to have 100% efficiency of conversion of sugars to alcohol. The average yield of alcohol from molasses is about 250 liters from 1 MT of molasses.

Recently, attractive developments have taken place in the field of fermentation and distillation whereby one can get high yield of 270 to 285 litres per tone of molasses.

The next stage in the manufacture of alcohol is to separate alcohol from fermented wash and to concentrate it to 95% alcohol called as rectified spirit. For this purpose,

method of distillation is employed. The distillation column consists number of SIEVE plates where wash is boiled and alcoholic vapours are separated and concentrated on each plate stage by stage.

PROCESS DESCRIPTION:

We have adopted HIFERM-GR and Multi Pressure Technology in our distillery. The details are as below:

FERMENTATION SECTION:

HIFERM-GR fermentation technology uses Granulating Yeast, which settles under gravity. Section-wise description is as below:

Molasses free from suspended particles is transferred to molasses receiving tank and is weighed. Weighed molasses is distributed to cell mass propagation, fermentation and yeast activation section.

GR yeast is grown in laboratory during plant start up. Yeast propagation section comprises of molasses diluter and hygienically engineered yeast vessels equipped with heating, cooling and air sparging facility.

Dilute molasses media is prepared in yeast vessel by recirculation of media through molasses diluter. Laboratory propagated cell mass is scaled up in series of yeast vessels. Air is sparged in pasteurized and cooled dilute molasses medium for optimum growth of GR yeast. The Temperature is maintained at 32°C by recirculating cooling water through jacket of yeast vessels. Cell mass from Yeast vessel is transferred to yeast activation vessel to build up cell mass required for fermentation (during start up only) by cell mass transfer pump.

At steady stage, activated cell mass from yeast activation vessel is transferred continuously to fermentor-I. Molasses, process water and vinasse recycle stream from distillation is added to fermentor. Fermented wash from fermentor-I overflows continuously to fermentor-II & then to yeast settling tank.

As fermentation is exothermic process, optimum temperature required for yeast activity is maintained by forced recirculation through fermentor wash coolers. Efficient mixers are provided in both fermentors.

Fermented wash from Fermentor-II is sent to yeast settling tank for separation of yeast under gravity. Vinasse stream from distillation is recycled to fermentor depending on solids concentration in fermented wash and molasses composition.

GR yeast having granulation property, settles in yeast settling tank under gravity, while fermented wash overflows to wash holding tank. Settled yeast is transferred at rated flow to yeast activation vessel with screw pump.

In yeast activation vessel, molasses, process water, nutrients and additive are added for activation of recycled cell mass. Filtered air is sparged as required for re-activation of cell membranes and other cell components.

Mixer is provided for better mass transfer in yeast activation vessel. Activated cell mass is transferred to fermenter-I to maintain desired cell mass concentration in fermenter.

Carbon dioxide generated in fermentation is entrained with alcohol vapours. Alcohol from Carbon dioxide is scrubbed with water in gas scrubber. The scrubber water is transferred to wash charger. Fermented wash from wash charger is fed to Analyzer column.

DISTILLATION

Technology offered (multi-Pressure)

This technology is based on heat recovery principle.

The system comprises of 7 columns operating at different pressures and is designed to produce Rectified Spirit/ENA.

The columns in order of flow are as follows:

1. Analyzer cum Degasifying (Column (operating under vacuum))
2. Aldehyde Column (operating under Vacuum)
3. Pre- rectifier column
4. Extractive distillation column
5. Rectifier cum Exhaust Column (Operative under Pressure)
6. Refining column
7. Recovery column

RECTIFIED SPIRIT PRODUCTION:

Fermented wash from the clarified wash tank is pumped to the fermented wash pre-heater and preheated to about 68-70°C by circulating hot spent wash on other side. Incoming spent wash temperature is 80-82°C and after exchanging heat with fermented wash out let lamp of spent washes remains at 35-40°C this hot fermented wash is then feed at the top of Degasifying column.

Analyzer column cum Degasifying Column:

Analyzer column strips the fermented wash before discharging the rest of the material as spent wash. Metered flow of fermented wash is feed to the top of the analyzer column. Vapours of Rectifier column provide energy to Analyzer column through a evaporator. Rectifier top vapours are condensed on the shell side of the evaporator and spent wash is getting re-circulated on tube side. Vapours generated from the re-boiler are used in the analyzer column now consist approximately 50% alcohol and 50% water with impurities such as higher alcohols, aldehydes, acids, sulphur dioxide, etc.

Spent wash from the analyzer column bottom is sent for treatment to the Effluent Treatment Plant. The level in the column bottom is controlled to ensure proper distillation and correct concentration of the spent wash. The vapour drawn from top of the Analyzer is condensed in forth stage of evaporator system and pumped to Rectifier column for concentration. Analyzer column is operating under vacuum.

Using water ring vacuum pump creates vacuum and the vacuum in the column is maintained by manual valve, which bleeds extra air in the system.

Aldehyde Column:

Aldehyde column is principally used for removal of low boiling impurities. Vapours from degasifying column are fed to Aldehyde column. The vapours coming out of the top of the Aldehyde column are fed to the condenser-I where they are partially condensed bypassing cooling water on the tube side. Balance alcohol vapours are condensed in the condenser-II. Water is used for the Condensation. From aldehyde column top Technical Alcohol cut of 2% of total plant capacity is taken out. Aldehyde column works under vacuum.

Rectifier cum Exhaust Column:

Analyzer column top vapours condensed in forth stage of evaporator and fed to Rectified column for further concentration. Rectifier column designed in sieve trays construction and operates under pressure for obtaining desired strength of alcohol. Condensing steam provides heat to Rectifier column.

Fusel Oil draws are taken from Rectifier column and are send to fusel oil decanter. The fusel oil stream is diluted with water for separation of fusel oils. The aqueous layer sends backs to Rectifier column and fusel oil are sent to storage.

Technical Alcohol cut of 3% of total plant capacity is taken out from top of Rectifier Column. Rectified Spirit of 95% v/v concentration is drawn from one of the upper trays of Rectifier Column and sends to storage after cooling.

Multipressure Distillation

The fermenter wash is fed to CO₂ stripper column to remove CO₂ to remove in wash. Alcohol is stripped off water in stripper column. The top vapours feed to calendria for heat source to concentrate the spent wash and the stream from calendria will be fed to Extraction column. In extraction column most of the high boiling impurities separated from ethanol in presence of water. The bottom ethanol water mixture is preheated by steam condensate and spent lees before being fed to rectifier column. In rectified column RS is taken out from top tray. The impure spirit from top of CO₂ stripper column, extraction column, rectified column are led to fusel oil column. The final impure spirit cut is taken out from the fusel oil column and partly alcohol is recycled to extraction column. The alcohol containing fusel oil from oil column.

Rectification column works under pressure. The CO₂ stripper, stripping column and extraction works under vacuum and fusel oil column works under atmospheric condition.

The top vapours from rectifier column are condensed in stripper Reboiler. The alcohol water vapours from stripping column are partly sent to CO₂ stripper bottom

for heating. The rectifier column, extraction column and fusel oil column gets heat from steam.

The distillation process is operated through PLC.

Multi pressure Distillation (ENA)

The fermentation mash containing alcohol, non-fermentable solids and water is supplied to distillation to separate the alcohol and other impurities, as a continuous flow.

The distillation system is designed for premium quality extra neutral alcohol. The system details are as below.

The system consists of 8 main columns namely CO₂ stripper, stripper column, Pre-rectifier column, fusel oil column and heads concentration column.

Wash is fed to CO₂ stripper column to remove CO₂ gas present in wash. Alcohol is stripped off water in stripper column. The top vapours feed to calendria for heat source to concentrate the spent wash and the stream from calendria will be fed to pre-rectifier column as feed and stream is supplied as heat source. Pre-rectifier removes most of the fusel oils. Top of the pre-rectifier column are fed to reboiler of refining column and part of the distillate from pre-rectifier column is fed to extraction column after dilution where process water is used as dilution water and remaining return back as a reflux. In extraction column most of the high boiling impurities separate from ethanol in presence of water. The bottom ethanol water mixture is preheated by steam condensate and spentlees before being fed to rectifier column. Top vapours of rectifier column and fed to stripper reboiler as a heat source. In rectifier column product rectified spirit is taken out from top tray and fed to refining column where mainly methanol impurities are separated. Clear ENA is obtained at bottom of refining column which is cooled and stored. The impure spirit from top of CO₂ stripper column, extraction column, rectifier column and refining column are fed FO column. The final impure spirit cut is taken out from heads column top and balance alcohol is recycled to pre-rectifier column. The alcohol containing fusel oil from pre-rectifier and rectifier column is fed to fusel oil column.

The top vapours from stripper column and FO column are condensed in condenser. The rectifier column, FO column, HC column and Pre-rectifier column get heat from steam at 3,5 bar (g).

Rectification column and pre-rectifier column works under positive pressure. The top vapour from rectifier column is condensed in stripper column for giving heat to stripper reboiler. Most of the other columns work under vacuum. The distillation process is operated through PLC.

MOLECULAR SIEVE DEHYDRATION SECTION (MSDH)

The Dehydration system is configured as a stand-alone unit and is capable of operating independently from any other process equipment, once properly connected to the utilities. The unit basically consists of two beds of desiccant, and an evaporation/regeneration column. While one bed is on line, the other is regenerated for an equal period. A computer-controlled control System actuates the required valves operation, switching the flow from one bed to the other in a continuous operation, at the same time constantly monitoring all process, quality and safety parameters.

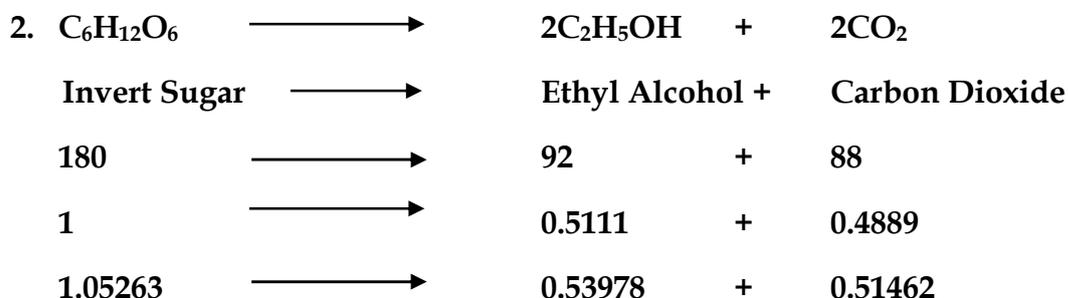
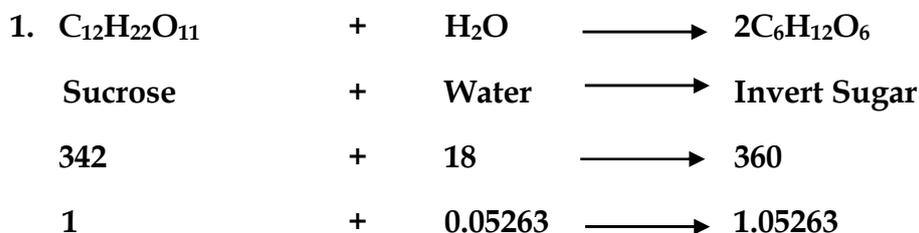
The feed is pre-heated, (when operating as a standalone unit) and fed to the evaporation/regeneration column. The resulting overhead vapours is superheated and send to Sieve Bed 1, where the vapour is dehydrated i.e. moisture is absorbed from feed alcohol and dry product vapours come out from the bottom of sieve bed. Product vapours are then condensed and cooled, and pumped to storage. A portion of the dry product vapour is circulated through Sieve Bed 2, under vacuum, to regenerate the bed in preparation for cycle changeover when Bed 2 goes on line.

The regeneration operation forces the release of the moisture from the desiccant, making the bed 2 ready for the next cycle. The recovered low strength vapours are condensed and recycled back to a new Recovery column.

The stream (less) from the bottom of recovery column, containing a maximum of 500 ppm of ethanol, is pumped to battery limits.

The chemistry behind this with controlling equations can be presented as

Controlling Equations:



Thus,

	Input	Output Alcohol
1.	1 kg Reducing Sugar	0.511 kg by Equation
2.	463.68 kg Reducing Sugar	298.23 Lit. by Equation
3.	463.68 kg Reducing Sugar	259.46 Lit. Actually (87% η)

3.6. Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished products.

Raw Material and Product

Sl. No.	Particulars	Quantity, T/d
Raw materials		
01	Molasses (B & C)/ Cane Juice	1200
02	Slop	892
03	Bagasse	274
04	Coal	152
Consumables		
02	DAP	0.1
03	Antifoam	0.2
Products and byproducts		
04	RS/EA/AA/ENA	300 KLPD
05	Power	10 MW/hr
06	Yeast sludge	34
07	Boiler ash	90
08	CO ₂ gas	140

3.7. Resource optimization/recycling and reuse envisaged in the project, if any, should be briefly outlined.

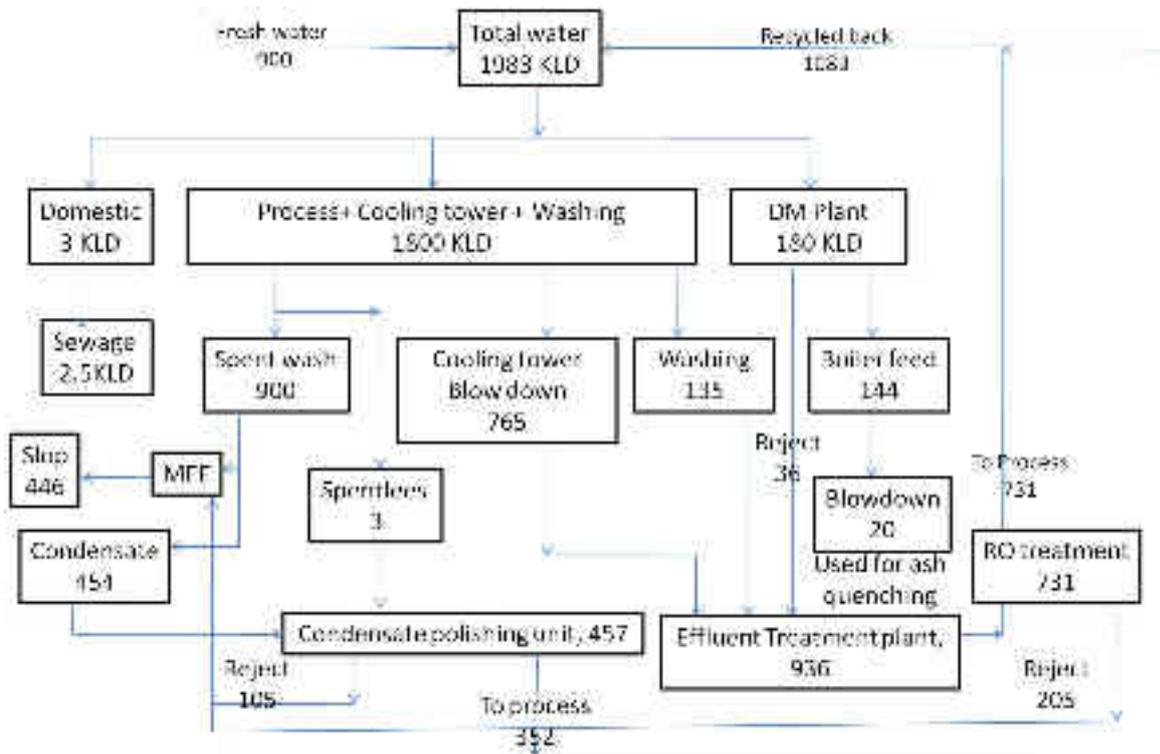
The generated spent lees sent to cooling tower and reused within the process. Similarly, condensate available being treated in RO and re-used in the process thereby reducing the freshwater requirement.

3.8. Availability of water its source, Energy/power requirement and sources should be given.

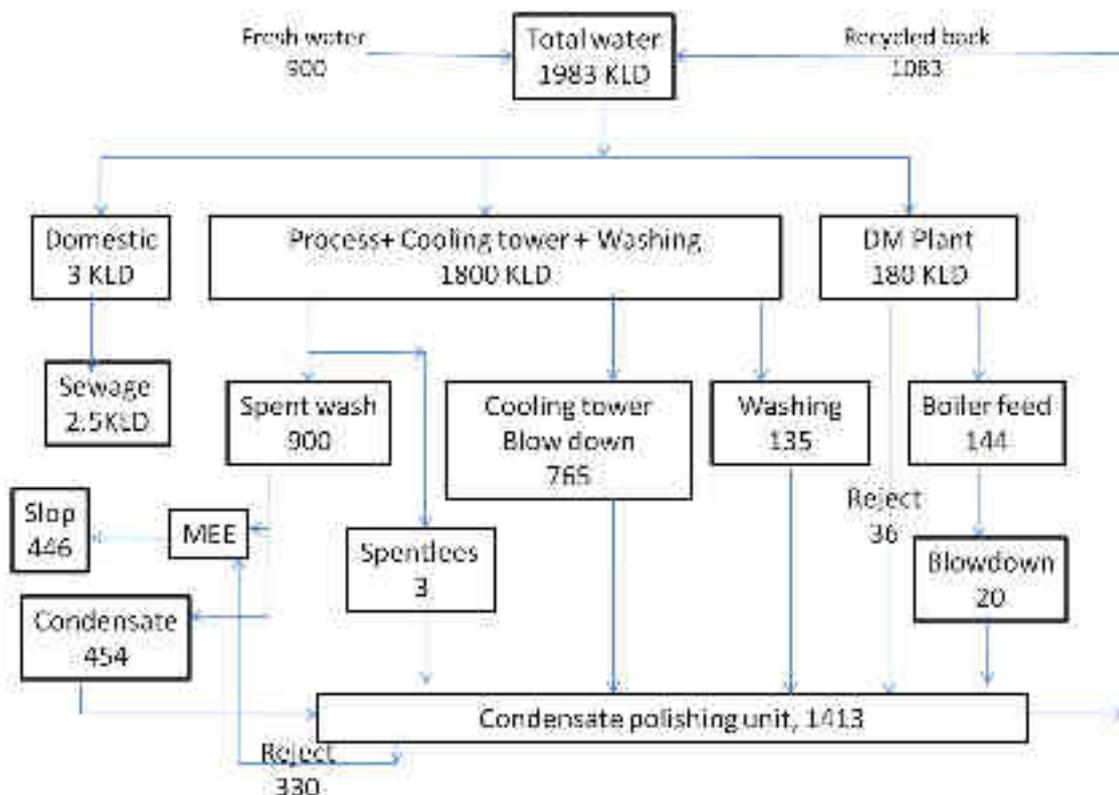
Water Requirement

Source of water is from Ghataprabha river

Total water requirement 3966 KLD out of which freshwater demand will be 1800 KLD and recycled water is 2166 KLD



Water balance for 150 KLPD distillery (Existing facility)



Water balance for 150 KLPD distillery (New facility)

All units in m³

Total water requirement: 3966 KLD

Total fresh requirement: 1800 KLD

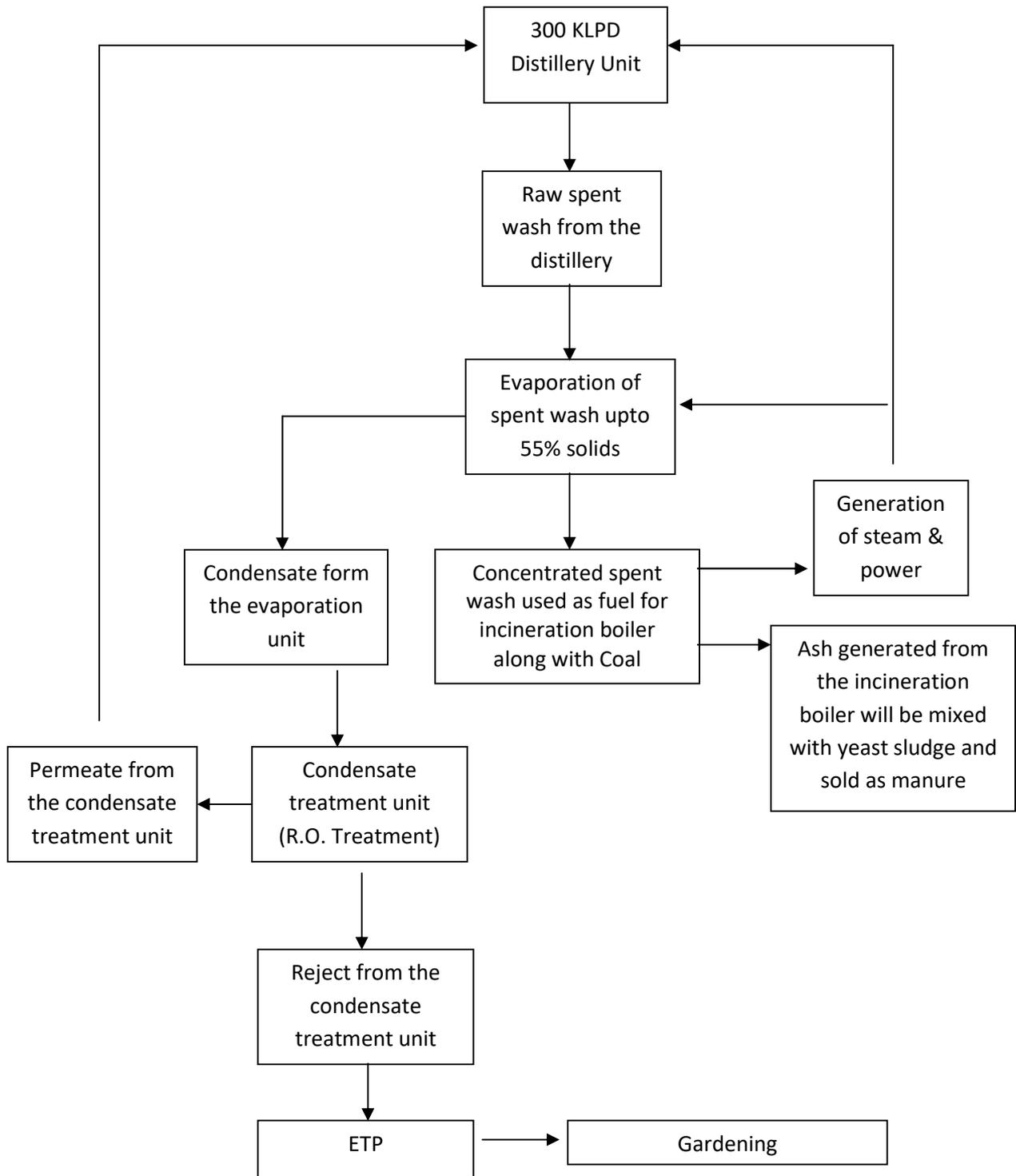
Total recycled water: 2166 KLD

Power Requirement

Power met from own cogeneration power plant

3.9. Quantity of wastes to be generated (liquid and solid) and scheme for their Management/disposal.

The main liquid waste generated from distillery is spent wash.



Spent wash and condensate treatment flow chart

The spent wash generated from the distillery unit will be first concentrated to 55% solids and then burnt in the incineration boiler. The existing boiler of 32 TPH will be sufficient to treat 936 KLD of spent wash from the expansion and production of 5

MW power using slop as fuel. New boiler of 80 TPH is proposed for the additional 150 KLPD distillery. The detailed process is as below

Evaporation:

Principle: We have adopted ECOVAP-FB evaporation system based in unique fluidized bed heat exchanger “ FLUBEX” in which fluidizing media (metallic, ceramic or glass) is added to impart gentle scouring action on tube surface, while moving with the liquid to be evaporated. This keeps the tube clean. Media are being de-fluidized in the top disengagement zone before being re circulated for re-fluidization.

The system consists of single or multiple effect evaporators and can be operated under vacuum or pressure. Fully automated systems are also available to ensure consistent product quality and efficient performance. Process fluids with higher viscosities can also be handled effectively.

Operation: The fouling liquid is fed from an inlet nozzle into the lower section by a specially designed plate, with nozzles having dome shaped caps placed over them to prevent backflow of the solid fluidizing medium. The liquid along with solid media is then distributed uniformly through all the tubes. The solid media is maintained in a fluidized state, which imparts a slight scouring effect on the inside of the tube walls while moving upward through the tubes. This also enhances the heat transfer coefficient without any damage to the tube material while simultaneously keeping the tube walls free of scales. At the top of the channel, a disengagement zone is provided which separates the solid particles from the liquid. The solid are then re circulated to the inlet chamber through several down comer tube bundles. The fluidizing media is selected according to the requirements of the process. The material can be metal, gravel, ceramic or glass in spherical or cylindrical shapes. A minor topping up is required annually.

Cleaning of evaporation unit: CIP of evaporator is mandatory and will be done in as below:

1. CIP of falling film effect will be done in every 15 days
2. CIP of finisher effect will be done in every 10 days.
3. CIP of flubex effect will be done in every 35 days.

ECOVAP - FB*

Fluidized Bed Evaporator



A number of industries involved in the processing of fouling liquids lose productivity due to scaling problems in the conventional tubular evaporator. This results in loss of efficiency of the evaporator. Removing scales is a very cumbersome process and involves considerable down time for cleaning. Alternatively, one can keep another unit as stand-by, which would involve substantial investment. To overcome these problems, the technique of solid-liquid fluidization in heat exchangers has been successfully employed on a commercial scale by PRAJ.

**A revolutionary Self-Cleaning
Fluidized Bed Evaporator From
PRAJ**



PRINCIPLE OF ECOVAP-FB SYSTEM

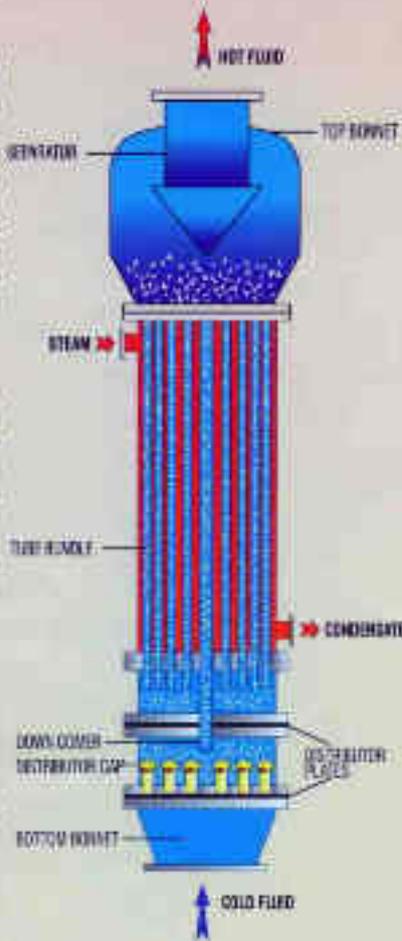
ECOVAP-FB evaporation system is based on unique fluidized bed heat exchanger "FLUBEX" in which fluidizing media (metallic, ceramic or glass) is added to impart gentle scouring action on tube surface, while moving with the liquid to be evaporated. This keeps the tubes clean. Media are being de-fluidized in the top disengagement zone before being recirculated for re-fluidization.

SPECIAL FEATURES

The system consists of single or multiple effect evaporator and can be operated under vacuum or pressure. Fully automated systems are also available to ensure consistent product quality and efficient performance. Process fluids with higher viscosities can also be handled effectively.

OPERATION OF FLUBEX HEAT EXCHANGER

The fouling liquid is fed from an inlet nozzle into the lower section by a specially designed plate, with nozzles having dome shaped caps placed over them to prevent backflow of the solid fluidizing medium. The liquid along with solid media is then distributed uniformly through all the tubes. The solid media is maintained in a fluidized state, which imparts a slight scouring effect on the inside of the tube walls while moving upward through the tubes. This also enhances the heat transfer coefficient without any damage to the tube material while simultaneously keeping the tube walls free of scales.



At the top of the channel, a disengagement zone is provided which separates the solid particles from the liquid. The solid are then recirculated to the inlet chamber through several downcomer tube

bundles. The fluidizing media is selected according to the requirements of the process. The material can be metal, gravel, ceramic or glass in spherical or cylindrical shapes. A minor topping up is required annually.

BENEFITS

- No loss in production time since downtime is virtually nil.
- Maintenance costs are practically nil, since there is no tube cleaning required.
- Initial investment would be generally lower since lower heat transfer areas are required.
- Standby unit, related piping and frequent CIP is not required.
- Lesser floor space as compared to conventional system.
- Disposal problem of CIP effluent is avoided.

APPLICATIONS

Waste water Evaporation

- Cane Molasses based Distillery spent wash.
- Fermented mash.
- Yeast plant effluent.
- Black liquor from paper mills.
- Tannin liquors.

PRAJ provides complete system with accessories according to your requirements. For trouble free continuous operation, ECOVAP-FB Fluidized Bed Evaporator is the right choice for you!

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Alcohol Plants | Fuel Ethanol Plants | Bio-diesel Plants | Brewery Plants | Waste Water Systems | Bio-nutrients

Benefits:

1. No loss in production time since downtime is virtually nil.
2. Maintenance costs are practically nil, since there is no tube cleaning required
3. Initial investment would be generally lower since lower heat transfer areas are required.
4. Standby unit, related piping and frequent CIP is not required.
5. Lesser floor space as compared to conventional system.
6. Disposal problem of CIP effluent is avoided.

Incineration:

The spent wash which is generated after recovery of alcohol from the distillery is a highly pollutant liquid which will cause great pollution to receiving body like land or water. Hence this needs to be taken care. The latest technology developed to achieve the zero discharge is spent wash incineration boiler. This is a specially designed boiler which will burn the concentrated spent wash along with the Bagasse as supporting fuel. The ratio of this spent wash to coal is 70 : 30.

In this specially designed boiler after burning the spent wash we can generate the steam which is required to run the distillery. In turn, we can save bagasse upto some extent. The calorific value of the concentrated spent wash is around 1800 K Cal. Hence this special technology helps us in achieving zero discharge of spent wash. The air pollution causing from this boiler is also very minimum and normal Electrostatic Precipitator can be used as air pollution control equipment to achieve SPM $100\mu\text{gm}/\text{Nm}^3$. The ash collected from the ESP will be utilized as manure.

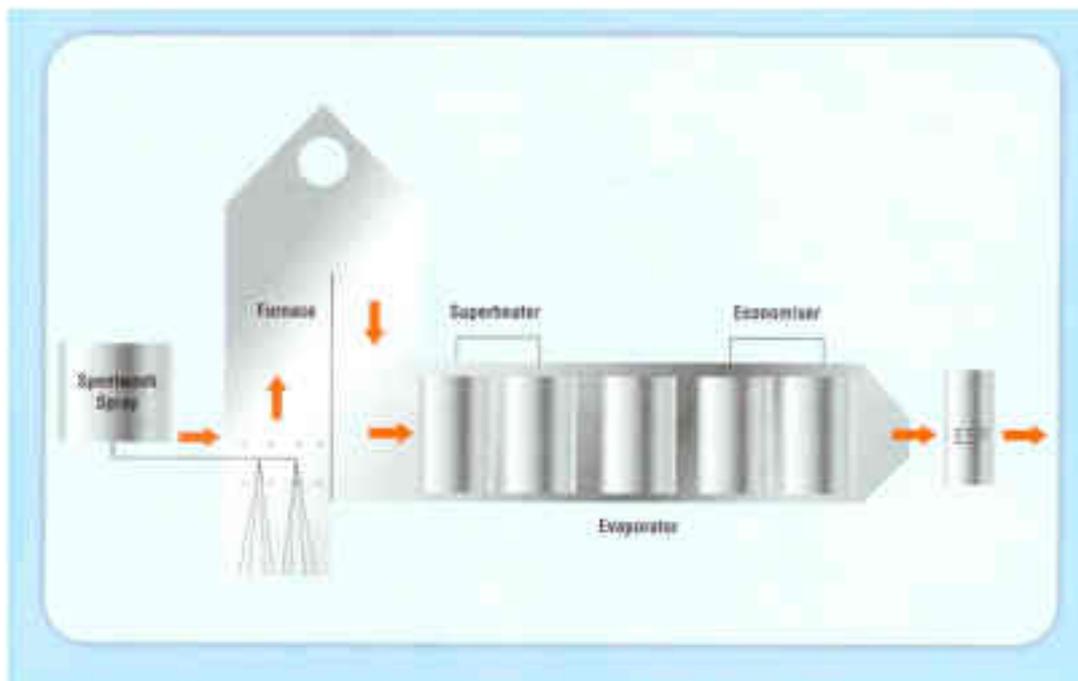
This technology helps us in generating steam, power and most important is achieving zero discharge of spent wash.

Salient Features of Incineration boiler:

The proposed Boiler has the following features

- ❖ The construction of the boiler is such that the fouling potential is minimized through multi- pass design.
- ❖ The boiler is designed such that it is easily maintainable.
- ❖ The convective section of the boiler (consisting of Economiser, Superheater and Evaporator) are of vertical tubes.
- ❖ A Steam Coil Air Preheater is provided to preheat combustion air. This is required to Maintain the bed from quenching.
- ❖ Deep Fluidised bed construction to improve combustion efficiency.
- ❖ Fluidised bed combustor ensures complete combustion.
- ❖ Special On-line cleaning devices are provided.
- ❖ Stack height provided is 80 meters.

The boiler will need off-line cleaning once in 30 days of operation. The cleaning will include the water wall, super-heater, evaporator and economiser section. The total time required will be 2-3 days. The cleaning frequency and duration is an estimated one, and will be decided based on the actual operating parameters condition.



Typical Boiler Schematic

Solid waste generated from different operations

- Yeast sludge 34 T/d, Boiler ash 90 T/d & CO₂ gas 140 T/d will be generated from the 300 KLPD distillery unit.

- Domestic Solid waste (Garbage/ Trash/ garden litters) will be stored in Garbage collection pits and disposed to nearby municipality
- Used Oil generated from the industry will be collected and stored in barrels/drums and later disposed to the Karnataka State Pollution Control Board approved waste oil reprocessors/dealers.
- Any other solid waste generated from the facility will be disposed off by using proper disposal mechanism.

3.10. Schematic representations of the feasibility drawing which give information of EIA purpose

As per EIA notification, 2006 and further amendments the proposal is 5 (g)- 300 KLPD Cane juice/molasses based distillery

4. Site Analysis

The Proposed project shall be located in Sy.Nos. 18 & 19 of Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka. The total land area for the proposed project is 29 Acres. This is flat Land whereby Cutting-filling will be balanced and there will be No/Low Borrowing from Nature.

Within 10 Km Influence Zone, there is no Tropical Forest, Biosphere Reserve, National Park, Wild Life sanctuary and Coral Formation Reserve. The River Ghataprabha is 3.5 Km away from the distillery site and the state highway is around 0.9 Km.

This is one of the units among the several sugar plants, which have come up in Karnataka state in recent years.

Location features of the proposed project site

Sl.No	Features	Particulars
1	Location	Sy.Nos. 18 & 19 of Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka
2	Present Land use	Industrial
3	Temp., Max and Min	27 ⁰ C to 42 ⁰ C and 14 ⁰ C to 26 ⁰ C
4	Average Humidity	65%
5	Annual Rainfall	560 mm (average)
6	Soil Type	Black Cotton Soil
7	Topography	Plain
8	Nearest Village	Malapur
9	Nearest Town	Mudhol
10	Latitude	16 ⁰ 21'30.8'' N
11	Longitude	75 ⁰ 15'56.9'' E

Environmental Settings around the proposed project site (Within 10 Kms Radius)

Sl.No	Items	Particulars
01	Nearest river	Ghataprabha River - 3.5 Km, S
02	Nearest Reserved Forest	Siddapur RF-7.5 Km, N Muntur RF -9.3 Km, NE Ranjanagi and Uttur RF- 10 Km, SW Jaliber RF-8.5 Km, SW
03	Nearest Wildlife Sanctuaries	Nil ; Yadahalli Chinkara Wildlife Sanctuary, Bagalkot Dist-15.5 Km, W
04	Nearest Village	Malapur Village 1.2 Km, NE
05	Nearest Town	Mudhol -3.5 Km, SE
06	Nearest Defence Installation	Nil
07	Nearest Highway	State Highway 18 - 0.9 Km
08	Min and Max Temperature	10°C to 42°C
09	Annual Rainfall	586 mm (average of 10 years)
10	Soil Type	Black cotton soil
11	Archaeologically important sites	Nil

4.2. Land form, land use and land ownership.

M/s. Nirani Sugars Ltd, established the 120 KLPD distillery unit at Sy.Nos. 18 & 19 of Malapur Village, Mudhol Taluk, Bagalkot District, Karnataka. The total land area of the industry is 29 acres and no additional land required for the present proposal of expansion to 300 KLPD.

4.3. Topography (along with map)

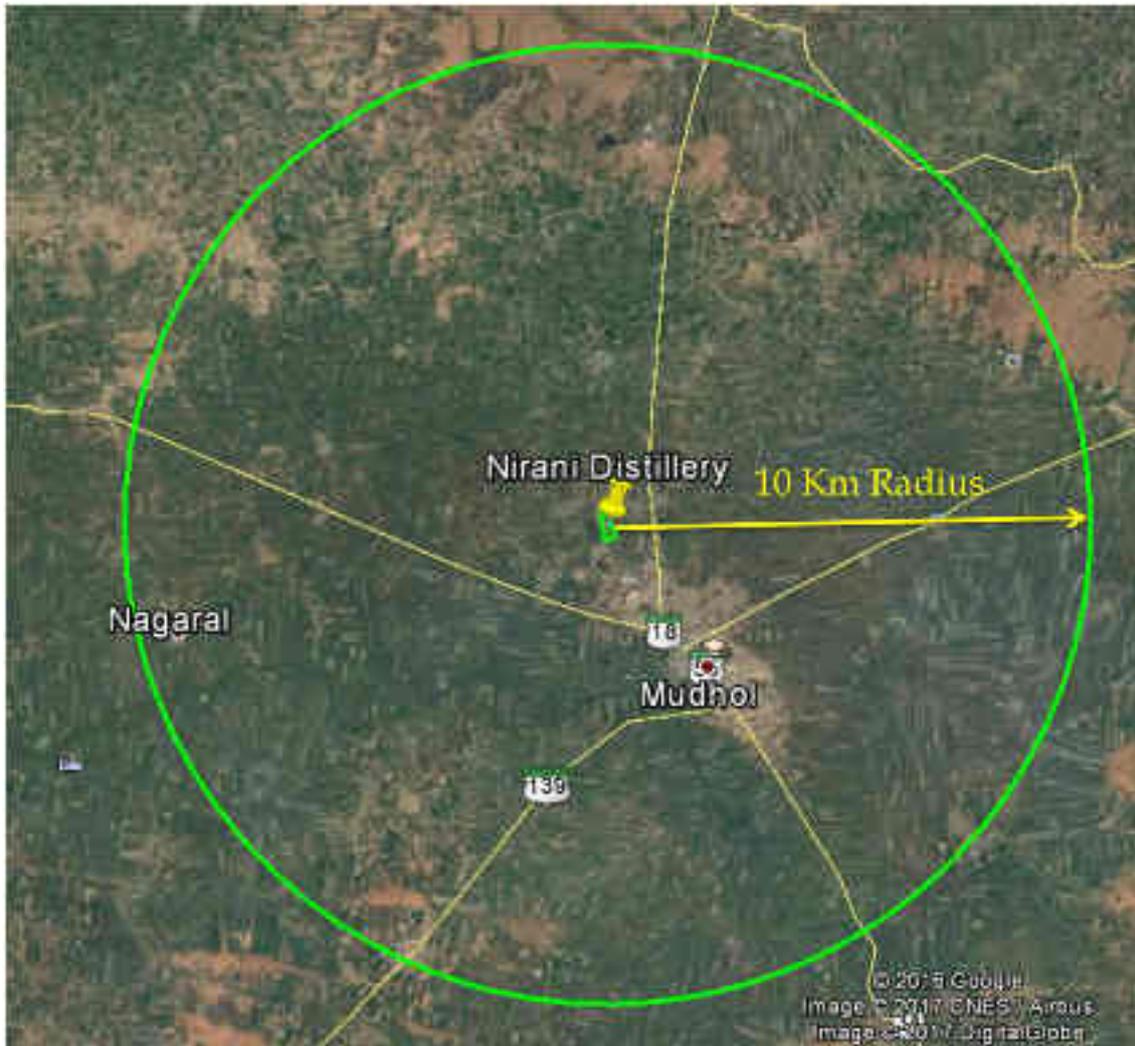


Aerial View of the proposed project site (showing salient features)



Location of the Proposed Project site on Toposheet with 10 Km radius

demarcation (Toposheet No: 46P/6, 46P/10 Scale: 1:50,000)



Aerial view of the project site showing 10 Km radius

4.4. Existing land use pattern (agriculture, non agriculture, forest, water bodies (including area under CRZ), shortest distances from the periphery of the project to periphery of the forest, national parks, wild life sanctuary, eco sensitive areas, water bodies (distance from, the HFL of the river)). In case of notified industrial area a copy of the Gazette notification should be given.

Agriculture is the most important means of survival in the district. Over 60% of the working people in Bagalkot district are engaged in agriculture.

Land utilization pattern of the Bagalkot District

Sl.No	Land classification	Area (in Sqkms)
1.	Forest	811.26
2.	Net area sown	4697.83
3.	Cultivable area	4754.59

4.5. Existing Infrastructure

The factory site is well connected by roads. Road connecting to Kulali - Mudhol is at a distance of 0.13 Km. The nearest townships with residential areas are Malapur, Kulali, Shirol, Mudhol and Soragaon which are at a distance of 1.2 Km, 5.6 Km, 3.5 Km, 3.0 Km and 1.52 Km away from the plant respectively. Belgaum airport is at a distance of 89 Km towards SW and Bagalkot railway station is at a distance of 50 Km towards SE direction.

4.6. Soil Classification

The district is occupied by three types of soils viz. Black soils, Red sandy soils and mixed soils. Formation of various types of soils is a complex function of chemical weathering of bedrocks, vegetative decay and circulation of precipitated water. Soils are mostly insitu in nature.

Black soils derived from basaltic bedrock. These soils in upland areas are shallower and are deeper in valley portions. The Don River valley has plains and consisting of rich tracks of deep black cotton soils stretching from west to east in the central part of the district. The infiltration characteristics are poor to moderate. The constant rate of infiltration in these soils varies from 0.75 to 2.5 cm/hr. These soils are alkaline in nature, low in potassium and nitrogen. Black cotton soils with high clay and humus content in low-lying areas. They have high moisture holding capacity and on drying up these soils develop open cracks. Red soils, which are sandy in nature derived from granites, gneisses and sandstones, are found in southern part of Muddebihal taluk of the district. The infiltration rates of these soils range from 2.6 to 3.8 cm/hr.

Mixed soils are derived from the fringe areas of Deccan traps and granites, gneisses, lime stones and sandstones in Muddebihal and Basavana Bagewadi taluks of Bijapur district. These are dark greyish brown and dark brown to dark reddish brown in colour. Their texture varies from loam to clay. The infiltration characteristics of these soils are moderate to good in nature.

The proposed project site has Black Cotton Soil and is suitable for agriculture and horticulture crops

4.7. Climatic and Rainfall data from secondary sources

The climate of the district is hot and dry. Hot season starts from middle of the February to end of May. Post monsoon is during October and November. Cold season is from December to middle of February. The normal average rainfall is 560 mm and number of rainy days are 35.

4.8. Social Infrastructure available

The factory site is well connected by roads. Road connecting to Kulali - Mudhol is at a distance of 0.13 Km. The nearest townships with residential areas are Malapur, Kulali, Shirol, Mudhol and Soragaon which are at a distance of 1.2 Km, 5.6 Km, 3.26 Km, 3.5 Km and 1.52 Km away from the plant respectively. Belgaum airport is at a distance of 89 Km towards SW and Bagalkot railway station is at a distance of 50 Km towards SE direction.

5. Planning

5.1. Planning concept (type of industries, facilities, transportation, etc.) Town and Country Planning Development authority classification.

The factory site is well connected by roads. Road connecting to Kulali - Mudhol is at a distance of 0.13 Km. The nearest townships with residential areas are Malapur, Kulali, Shirol, Mudhol and Soragaon which are at a distance of 1.08 Km, 5.6 Km, 3.26 Km, 3.0 Km and 1.52 Km away from the plant respectively. Belgaum airport is at a distance of 92.6 Km towards SW and Bagalkot railway station is at a distance of 50 Km towards SE direction.

5.2. Population Projection:

As of 2011 Census of India, Bagalkot had a population of 18,89,752 stands in the 11th position in terms of population in the State. The district ranks 12th in terms of rural population and 11th in terms of urban population. Bagalkot district accounts for 3.1 percent of the total population of the State. With the decadal growth rate of 14.4 percent, it ranks 10th in the State in terms of decadal growth rate. The district with a Sex ratio of 989 holds 11th rank in the State. The district with a Sex ratio of 935 among the child population in the age-group 0-6 holds the antepenultimate rank of 28th in the State. The proportion of child population, (0-6 age-group) is 14.3 percent in the district and ranks 5th in the State. The district has a literacy rate of 68.8 percent and is placed at 23rd rank in the State. The male literacy rate in the district is 79.2 percent and the female literacy rate is 58.4 percent. The male - female literacy gap in the district is 20.8 percentage points, which is higher than the male - female literacy gap registered by the State (14.4 percentage points)

5.3. Land use planning (breakup along with green belt etc.)

Table showing Break up of present land use

Sr. No.	Break up of land requirement	Land in Ha
1.	Built-up area	8.5
2.	Roads/ ETP/ open space	10.5
3.	Green belt area	9.57

5.4. Assessment of infrastructure Demand (Physical & Social).

There will not be any negative effect on the living conditions of people. Due to project activities, the surrounding areas are expected to improve by way of socio-economic development due to direct and indirect employment and the project will also lead to supporting utilities by improving business opportunities in the locality.

5.5. Amenities/facilities

Basic amenities and facilities will be provided for all workers working at site.

6. Proposed Infrastructure

6.1. Industrial Area (Processing area)

Sr. No.	Break up of land requirement	Land in Acres
1.	Built-up area	8.5
2.	Roads/ ETP/ open space	10.5
3.	Green belt area	9.57

6.2. Residential Area (non processing area)

Housing facility are provided for working staff.

6.3. Green Belt

9.57 Acres of area is already provided for green belt development

6.4. Social Infrastructure

Good infrastructure facilities seen around the unit.

6.5. Connectivity Traffic and Transportation Road/Rail/Metro/Water ways etc

The factory site is well connected by roads. Road connecting to Kulali - Mudhol is at a distance of 0.13 Km. The nearest townships with residential areas are Malapur, Kulali, Shirol, Mudhol and Soragaon which are at a distance of 1.08 Km, 5.6 Km, 3.26 Km, 3.0 Km and 1.52 Km away from the plant respectively. Belgaum airport is at a distance of 92.6 Km towards SW and Bagalkot railway station is at a distance of 50 Km towards SE direction.

6.6. Drinking Water Management (Source & Supply of water)

Drinking water is met through Ghataprabha river located at 3.5 Km from the site.

6.7. Sewerage System

Domestic sewage is treated in septic tank and soak pit. Industrial effluent will be treated in the ETP through internal sewer network

6.8. Industrial Waste Management

Effluent generated will be treated in the ETP and treated water will be reused for greenery development.

6.9. Solid Waste Management

Solid waste generated from the expansion of Distillery plant is yeast sludge 34 T/d which is used in the composting process with RO rejects & spent wash during the maintenance of the incineration boiler. Boiler ash (90 T/d) generated will be mixed with yeast sludge and given to farmers as manure.

6.10. Power Requirement & Supply/Source

Power requirement will be met through incineration unit.

7. Rehabilitation and Resettlement (R&R) Plan

7.1. Policy to be adopted (Central/State) in respect of the project affected persons including home oustees, land oustees, and landless labourers (a brief outline to be given).

Not applicable.

8. Project Schedule & Cost Estimation

8.1. Project Schedule

The company is an established 120 KLPD distillery unit. Proposal of 150 KLPD distillery has been already submitted to MoEF and Final EIA presentation was held on 26-11-2018 during the 43rd EAC meeting. Based on the recent development on the encouragement on the ethanol plant by the government, now management proposes to expand the distillery unit to 300 KLPD with 10 MW cogeneration unit within the same premises after obtaining Environmental Clearance and Consent for establishment.

8.2. Cost Estimates

Rs. 201 Crores as estimated for the expansion.

9. Analysis of proposal (Final recommendation)

9.1. Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area

57 nos of additional employees will be required for the expansion, the company provides all necessary basic amenities to the workers of the industry.