

THE CHEYYAR CO-OPERATIVE SUGAR MILLS LTD

S.F.Nos. 93-A, 94, 96, 97
Anakkavoor - Thenthandalam village,
Cheyyar Taluk
Thiruvannamalai District
Tamil Nadu.

The Proposed Distillery Unit

Management Summary for the Proposed Unit of
45 KLD Capacity Distillery Plant

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1.0 INTRODUCTION

Although India is the largest producer of sugarcane and sugar, the sugar factories in India are facing problems due to the mismatch between sugar cane price and sugar price. Sugar factories are not viable if they produce sugar alone. It is necessary to develop the factory into an integrated complex and use the valuable byproducts more beneficially.

Molasses is one of the important by product of the sugar industry. The profits earned by the conversion of molasses to alcohol will be higher than that of the value realized by sale of molasses. There is a good demand for alcohol in the country, as production and consumption of alcohol are not quite balanced.

The target of alcohol demand as projected in the perspective plan for chemical industry, prepared by the Govt of India, Ministry of Industry, Dept. of chemical and petrochemicals is around 2400 million litres per annum. It is with this view that M/s. The Cheyyar Co-operative Sugar Mills Ltd. has proposed to set up a green field distillery in Anakkavoor - Thenthandalam village, Cheyyar Taluk Thiruvannamalai District. The proposed distillery utilizes molasses captively from this sugar factory as the main raw material. Molasses from the other factories are presently sold to Industrial users / cattle feed. In order to add value to molasses, it is proposed to set up a green field distillery to convert all the available molasses to a mix of alcohol products.

1.1 Plant Location

The site is located at S.F. Nos. 93-A, 94, 96, 97, Anakkavoor - Thenthandalam village, Cheyyar Taluk, Thiruvannamalai District. This proposed distillery unit is located about 15 km away from Vandavasi and it is in-between the road connecting Cheyyar. and Vandavasi. This road belongs to state highway (S.H.5) The site is located in the southwest direction of this road. The nearest Major railway station is Kancheepuram. The location of the site is shown in Fig.2.1.

The proposed cost of the project is Rs.36 crores.

Following are the details regarding the proposed site.

a) Archaeological monuments

The location does not have any archaeological monuments in nearby 10 km radius.

b) Biological resources

It was found during study period that the location is devoid of any endangered flora and fauna in 10 km radius.

c) Cultural Monuments

This proposed unit does not have any cultural monuments in nearby 10 km radius.

d) Defence

There is no defence installation located within 25 km radius.

e) Employment Generation

This proposed unit generates the employment in the immediate surroundings of the people who are depending mainly on rain fed agriculture.

f) Highway

The nearest highway is Vandavasi – Cheyyar highway (S.H.5). The setting up of this unit will not harm the traffic and unwanted settlement in the vicinity of highway.

g) Geography

The location is geographically suitable for setting up of distillery unit, as the unit will not be disturbed by climatic and other geographical condition.

h) Transportation facilities

The industrial site is well connected by road. The important townships falling within 60 km radius are Kancheepuram, Arcot, Tindivanam and Arani, Ranipet. The nearest railway station is Kancheepuram and Airport is Chennai. The raw material is conveniently transported by road.

i) Socio-economic

This distillery unit will improve the economy at state/national level.

j) Land use and availability

This plant will be using the existing area purchased by the company for Sugar factory.

k) Meteorology

Both micro and macro meteorology is found to be suitable for this proposed unit.

l) Natural disaster

The area is devoid of natural disasters like earthquake, cyclone, landslides etc.

m) On-site and off-site emergency buffering capacity

The unit will not use any hazardous substance. Hence the only disaster of minor nature can be expected, which will be handled by the work force of the unit without much difficulty.

n) Power

Its own Cogeneration Plant will meet the power requirement of the proposed distillery plant

o) Raw material

Raw material will be obtained from their own adjacent Sugar Mill and other nearby co-operative Sugar Mills._

p) Sensitive area

The location does not have any sensitive area as identified by MoEF in 25 km radius.

q) Topography

The topography is plain and will not lead to any disaster by accumulation of air pollutants

2.0 PLANT DETAILS

2.1 Products Manufactured

Distillery Basic details	Quantity	Unit
No of days of operation	300	Days
Alcohol production (Rectified Spirit) from molasses	45	KL / Day
Ethanol	40.8	KL / Day

2.2 Raw Materials

S.No.	Raw Material	Quantity
1.	Cane Molasses	196 Mt/ day
2.	Nutrients	45 kg/day
3.	Antifoam Oil	90 kg/day
4.	Sulphuric Acid	67.5 kg/day

2.3 Manufacturing Process

The alcohol production process using molasses is based on the properties, which some specific microorganisms have in metabolizing sugar, generating a product of ethyl alcohol. As the alcohol produced has a low percentage of alcohol, there is a need to remove the water portion using distillation. Further water is removed from alcohol by molecular sieve. The major process can be classified into 6 major categories:

- Propagation
- Fermentation
- Distillation
- Molecular sieve dehydration

1. PROPAGATION

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 sparing facility.

Dilute molasses media are prepared in yeast vessel by recirculating media through molasses diluter. Laboratory propagated cell mass is scaled up in series of yeast vessels.

Sterile air is sparged in pasteurized and cooled dilute molasses medium for optimum growth of yeast. Temperature is maintained at 30-32 ° C b recirculation cooling water through jacket of yeast vessels.

Cell mass from Yeast vessel is transferred to build up cell mass required for fermentation transferred by cell mass transfer pump.

2. FERMENTATION

Molasses, diluted with water to the desired concentration is metered continuously into the bigger fermenter. The aeration of the yeast is done in the smaller fermenter & both the fermented broths are intermixed with cross flow arrangement through the fermenter broth cooling circuit using external cooling heat exchangers. Additives like DAP, urea (if required in the form of pellets or prills) and de-foaming oil are also introduced in the either or both the fermenters as required. There is an automatic foam level sensing and dosing system for de-foaming oil.

Every kilogram of alcohol produced, generates about 290 Kcal of heat. This excess heat is removed by continuous circulation of the fermenting wash through an external plate heat exchanger called the **Fermenter Cooler**. The fermenter temperature is always maintained between 32 and 35 deg C, the range optimum for efficient fermentation.

The yeast for the fermentation is initially (i.e during start-up of the plant) developed in the Propagation Section described further on. Once propagated, a viable cell population of about 300 – 500 million cells/ml is maintained by yeast recycling and continuous aeration of the fermenter. Yeast cell vitality which is usually above 70% may, in times of stress (such as prolonged shut-downs) drop to 50% without affecting the fermentation.

that would have otherwise been consumed in yeast growth, is made available for alcohol production, ensuring high process efficiency.

3. DISTILLATION SECTION

Distillation section is designed with multi pressure vacuum distillation technique to produce Export Quality Rectified Spirit (EQRS). The system designed is integrated for minimum steam consumption while producing good quality EQRS directly from the fermented wash. The system comprises of Wash-cum-Degassifier Column with Rectifier Column, Recovery Column and Aldehyde columns.

The clarified wash is pre-heated with weak wash/spent wash and then fed to Degassifying section. The vapours from Analyzer/Wash column are taken to integrated evaporation section to the first effect of the Falling Film evaporator & condensed against spent wash. The beer/ wash column is operated under vacuum and designed with sieve trays. The energy to beer column is provided by re-boiler located at the bottom of column and heated by over head vapours from rectifier column.

The condensed raw spirit from first effect of the Falling film evaporator approx. 40% w/w is sent to intermediate raw spirit tank. Raw Spirit is then fed to rectifier column for removing high volatile impurities. Fusel oils are tapped from appropriate trays and separated in fusel oil decanter after cooling in fusel oil cooler. The stripper rectifier column is designed to operate under pressure with sieve trays construction and heated by steam through re-boiler located at the bottom of column.

The 95 – 96% v/v alcohol from rectifier column is then cooled in final product cooler & sent to storage. Both heads and tails like higher alcohols are removed from the respective tapping points and sent to recovery column feed tank & in turn to recovery column for concentrating the impure cut & recovery of alcohol. The recovered alcohol is sent back to Raw spirit Feed tank and the impure cut is taken out to impure receiver tank which is subsequently cooled in the impure spirit cooler & sent to storage. The Recovery column is operated under atmospheric pressure.

4. Molecular sieve dehydration

The process drives the rectified spirit feed from rectifier column through a bed of desiccant beads. Twin beds are provided to allow for bead

regeneration in continuous operation. One bed is in dehydration mode while the other is regenerating. Depending on feed and product specifications, dehydration- regeneration exchange takes place approximately every few minutes. As the regeneration process releases adsorbed water together with contained ethanol, it is recycled back to the vaporizing column for reprocessing.

The feed is pumped to vaporizing column, overhead vapor of which is superheated to required operating temperature and circulated to sieve bed 1 assumed in the description to be in dehydration mode. After passing through the desiccant, the vapor is condensed, cooled and sent to product storage.

A small portion of the product vapor is sent, under high vacuum, through bed 2, in regeneration mode, to prepare the desiccant, for cycle changeover when bed 2 goes online.

The regeneration operation forces release of moisture from the desiccant, making the bed ready for next cycle. The recovered low concentration vapors are condensed and recycled back to the vaporizing column.

The stream from the bottom of the vaporizing column, containing a maximum of 2000 mg/l of ethanol is pumped to battery limits.

2.4 Power and Fuels

Total Power requirement of the Plant will be 500 KWH. Total Power and steam will be obtained from its own Cogeneration Plant. The boiler and turbogenerator from distillery plant itself.

2.5 Raw Water

The total requirement of raw water for this unit will be 548.5 KLD, which will be met from bore well inside the factory premises.

2.6 Land

The total area allotted for this factory is 22.56 Acres.

2.7 Manpower

The total workforce including staff and workers will be 57.

3.0 POLLUTION CONTROL MEASURES

3.1 Air Emissions

As the steam required for the proposed distillery will be taken from their co-generation plant and sugar plant located adjacent to proposed site. The

minimum quantity of Co₂ emitted from the fermentor will be washed in Co₂ scrubber and the clean air alone will be vented to atmosphere. Hence in this project, there will not be any chance of air Pollution. For better atmosphere the proper ventilation will be provided in the structure. For wet scrubber, 15-meter height from ground level and 0.25m diameter of stack will be provided

3.2 Wastewater Generation

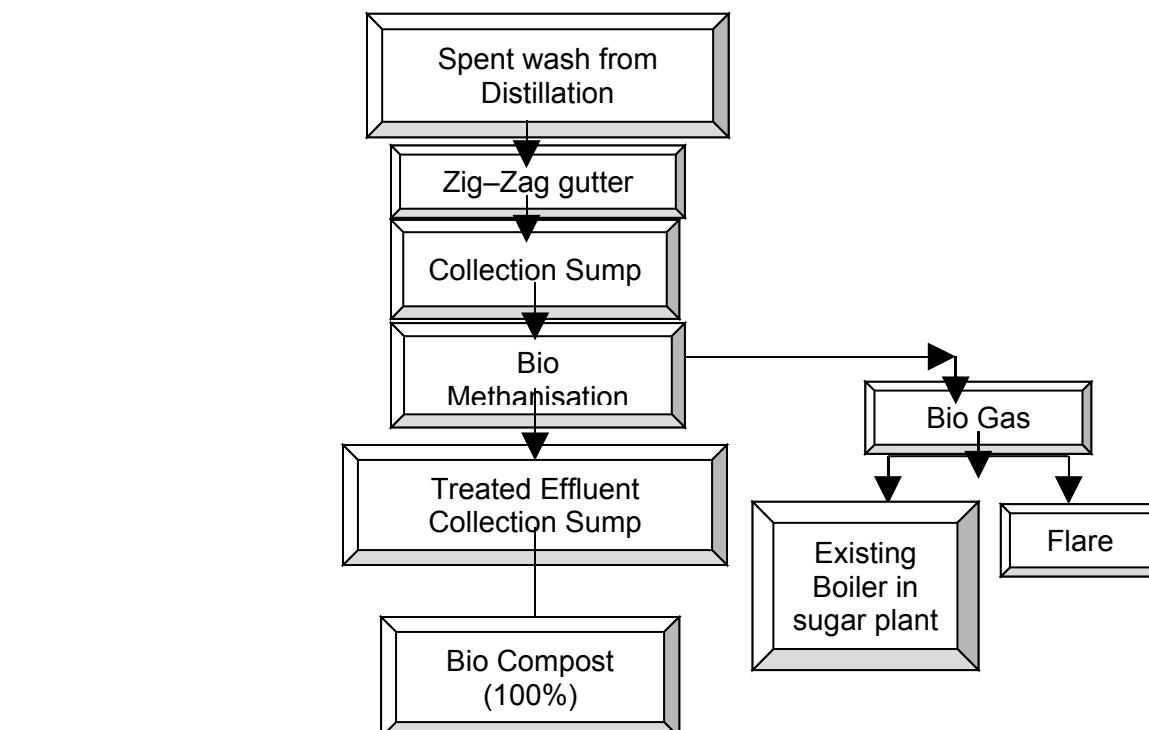
The waste water from the domestic usages (4 KLD) will be sent directly to the septic tank of size 2.5 x 2.0 x 2.5 m followed by dispersion trench of size 5.0 X4.0 X 2.5 m .

The spent wash water from the process i.e. 450 KLD will be utilized for (100%) bio composting after biomethanisation.

S.No.	WASTE WATER	QUANTITY (KLD)	METHOD OF DISPOSAL
1.	Spent wash water	450	Utilized for Bio-methanization followed by Bio-composting.
2	Waste water from domestic usages	4	Septic tank followed by a dispersion trench.

EFFLUENT TREATMENT PLANT

(a) Treatment Flow Chart



(b) Effluent Plant Process Description

The spent wash from distillation column is generated as effluent and it is passed to zigzag gutter. Then it is collected in a collection sump to equalize the shock load during distillation process.

The remaining portion is allowed to pass through spent wash gutter. Then it is collected in Bio-Methanisation plant. Since the above effluent is rich in high carbon BOD, it is subjected to anaerobic digestion in which the organic load is converted in to biogas. The biogas is used as fuel in boilers. The digested slurry from the bio-Methanisation process is collected in a treated effluent collection sump and this effluent is used for bio composting using press mud as the base material.

Biogas Recovery:

The Bio-gas is generated as a by product during the treatment of effluent. COD of the effluent gets reduced during methanogenesis reaction. The bio-gas consist the following components:

Methane 65%

CO₂ 32%

H₂S 1.5%

Vapor 1.5%

The calorific value of the bio-gas is about 5200-5300 kcal / Nm³. this bio gas with this hit value is utilized as a substitute for coal / oil heating systems. In case of LDO/ furnace oil wherein the calorific value of the oil is about 10000 kcal / kg, the biogas replaces about ½ kg of LDO / furnace oil. This alternative fuel not only saves energy but also provides a source of energy for process industries so that they can become self sufficient.

3.3 Solid Waste

The solid waste will be generated from this unit is as follows.

S.No.	Solid Wastes	Quantity	Method of Disposal
1.	Settled Yeast Sludge	7 t/Day	Collected and used in Bio-composting.

3.4 Hazardous Waste

There will be no hazardous waste generated from this proposed distillery unit.

3.5 Noise

Noise generated from the industry would be minimized by the following preventive measures.

- Providing sound attenuators for ventilation ductwork.
- Installing mufflers on any duct openings for the passage of cooling air.
- Developing a thick greenbelt.
- Providing shock-absorbing technique to reduce impact providing noise barriers, silencers etc. in the equipment.

3.6 Odour Control System

Since the entire process like distillation and CO₂ scrubber will be proposed with world-class technology, the Odour from the process.

4.0 Present Environment Scenario

4.1 Climate

The climate is generally arid with temperatures varying from 15.6°C to 40.3°C. The rainfall is maximum in the NE monsoon period and minimum in SW monsoon period.

4.2 Ecology

There is no endangered species of flora and fauna noticed in this area. The area does not shelter any specific wildlife.

4.3 Hydrological Conditions

4.3.1 Surface Water

The run-off during monsoon period contributes to the surface water. There is no perennial stream or river in the surrounding villages. These villages get water from open wells and bore wells which get recharged in rainy season

4.3.2 Ground water

The ground water table varies from 38 m to 41 m. It is therefore a low to medium potential zone for ground water.

4.4 Water Quality

Water samples were collected from different locations, and the following parameters will be monitored for pH, Colour (Visual), Odour, Turbidity (NTU), Electrical Conductivity.

4.5 Ambient Air Quality and Noise Levels

The ambient air quality will be conducted as per the SPCB Norms. The following parameters will be measured as follows, SPM, RPM, SO₂, No_x.

4.6 Land Use Pattern

The entire area is a patta land owned by the company and it is in the form of shrub land. The buffer zone has no forests.

4.7 Socio-Economic Conditions

There is no habitation or settlement in the industrial area. The nearest village of anakkavoor is having a population of 4941 with 2483 males and 2485 females as per 2001 census data. The workers constitute 47.9%. The major source of income of the local population is from these types of industries and agriculture only.

5.0 ENVIRONMENTAL IMPACT ANALYSIS

5.1 Air Quality

In the Fermentor (4 nos., 4.5 m height & 0.5 m dia), the CO₂ will be scrubbed and recycled in the process. The CO₂ scrubber will also scrub the traces of CO₂ from the fermentor and the clean air will be discharged into the atmosphere. For Boiler (10 t/hr) 30m height and 2.0m dia of stack will be provided.

5.2 Water Resource

This proposed unit is depending on own infiltration well from cheyyar river for its different water requirements and the quantity will be 548.5 KLD.

5.3 Waste Water

The wastewater from the domestic uses is sent directly to the septic tank and dispersion trench. The spent wash will be biomethanated followed by the bio-composting. Hence the impact from the wastewater will be almost nil.

5.4 Solid Waste Management

The solid waste will be generated from this unit settled yeast sludge (7t/day) and it will be collected and used in Bio-composting.

5.5 Land Degradation

Since, the small quantity of wastewater will be generated from domestic usages, the chances of contamination of soil will be nil. The vacant area in the industry will be used for tree plantation to improve the surrounding environment of the industry.

5.6 Noise Level

As per the observations, the noise level in the buffer zone is found to be very low.

5.7 Socio-Economic Consideration

This project does not involve any displacement of local people. Employment opportunities will be improved in the nearby villages because of this

proposed unit and this will provide direct employment opportunity for 57 persons. The unit as a responsible corporate citizen tries to contribute towards social causes like health, education, and amenities for the surrounding areas.

6.0 Environments, Safety and Health Management

6.1 Organization Structure

The Administrator is responsible for the factory operations. There are several executives for various sections such as Production, Human Resource, Purchase, Store, Accounts, Environmental & Safety, Maintenance, and Quality Control etc.

6.2 Budgetary Allocation for Environmental Management

<i>Category</i>	Capital Investment	Annual Operating Costs
	<i>(Rupees in Lakhs)</i>	
Air Pollution Management	2.5	1.5
Water and Wastewater Management	535.0	62.5
Solid Waste Management	30.0	18.5
Greenbelt	12.5	4.0
Environmental Monitoring and Training	5.0	2.5
Total	585.0	89.0

6.3 Air Quality Management

Proper control measures will be provided in all process area in order to control all emissions if any to maintain a safe and healthy work place environment. The vent air will be passed through pollution control equipments before it is released into the atmosphere.

6.4 Wastewater Management

The sewage will be sent to the septic tank with dispersion trench. 450 KLD of spent wash will be generated from the process will be utilized for Bio-methanization followed by the Bio-composting. Hence no trade effluent will be discharged into the land.

6.5 Greenbelt Plan

Greenbelt is developed inside the factory premises covering a total area of about 7.5 acres. The unit will also develop the nearby area around the

industry for greenbelt. The inter-spaces are laid with shrubs. The inter-space between trees planted is about 5m. It is proposed to double the tree density in future.

GREEN BELT AREA	7.5 ACRES
TOTAL AREA	22.56 ACRES

6.6 Environment, Safety and Health Monitoring

The environment, safety and health-monitoring programme in the factory are as follows:

- Monthly monitoring of stack emissions
- Daily monitoring of water and wastewater
- Quality monitoring of ambient air, noise and work place air
- Monitoring of occupational safety
- Yearly monitoring of occupational health.

Once again the unit assures that, there will be no adverse impact due to proposed activities.

**For The Cheyyar Co-Operative Sugar Mills Ltd
(Distillery Division)**

ADMINISTRATOR.