

UNIT- DISTILLERY

Ref no-

Dt-.....

To,
The Director
Ministry of Environment & Forest (IA Division)
ParyawaranBhawan
Lodhi road, CGO complex
New Delhi

Subject- Application form-1& Pre-feasibility report for Environmental Clearance(EC) for the Expansion of Distillery from 100 KLPD to 250 KLPD (RS/ENA/AA) with associated 5 MW Power at Vill-Asmoli, Distt- Sambhal(U.P)

Regarding- Proposed Terms of Reference, Scoping

OUR TREATMENT STRATEGY- BIO DIGESTER, BIO COMPOST, ONE TIME CONTROLLED LAND APPLICATION, NANO FILTRATION , MEE, INCINERATION BOILER

Dear Sir,

Kindly find enclosed herewith duly filled form-1& Pre-feasibility report along with the proposed terms of reference for preparing the Environmental Impact Assessment on our proposals to seek Environmental Clearance(EC) for the expansion of our existing Distillery from 100 KLPD to 250 KLPD (RS/ENA/AA)plant and 5.0 MW Power at Vill- Asmoli, Distt- Sambhal(U.P).

Kindly consider our application for the grant of Additional Terms of reference for which we shall be highly obliged.

Thanking you,

Yours sincerely,

Subhash Pandey
Vice President
DSM Sugar, Asmoli Distt. Sambhal - U.P
Mobile no-09837534442
Enclosed all Documents Soft Copy in CD

FORM - 1

FOR

**THE PROPOSED
EXPANSION OF EXISTING DISTILLERY
FROM 100KL TO 250KL
WITHIN EXISTING PREMISES;**

By;

**DHAMPUR SUGAR MILLS LTD.,
Unit: DSM SUGAR ASMOLI, DISTILLERY DIVISION
ASMOLI ; DISTT- SAMBHAL - 244304**

**Submitted to
Ministry of Environment & Forest
IA DIVISION
New Delhi**

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FORM - 1
SALIENT FEATURES OF THE PROJECT

Serial Number	Item	Details		
1.	Name of the project	Dhampur Sugar Mills Ltd.		
2.	Location of the project	Vill- Asmoli Tehsil & District- Sambhal (U.P) Pin-244304		
3.	Total project area	Existing land : 44 Acre Proposed Land : Not Required		
4.	Proposed capacity of Distillery	Existing : 100 KLPD RS/ENA/AA Proposed Expansion : 150KLPD RS/ENA/AA		
		Total Capacity : 250 KLPD RS/ENA/AA (after expansion)		
5.	Proposed capacity of Power generation	Proposed: 5 MW		
6.	Total project cost	Rs 9720 LAKHS (Estimated)		
7.	Category of Project	'A'		
8.	Raw material	Molasses		
9.	Quantity of Molasses	Existing	100 KLPD	450MT/Day
		Proposed Expansion	150 KLPD	675MT/Day
		Total	250 KLPD	1125 MT/Day
10.	Steam requirement	50 TPH (total)		
11.	Water requirement	Existing	Proposed expansion	
		Industrial - 1500KLPD Domestic - 20 KLPD	Industrial :2250 KLPD Domestic-Nil	
		Total Requirement After Expansion - Industrial: 3750 KLPD @15 KL per KL of product Domestic - 20 KLPD NET REQUIREMENT : 3770 KLPD		
12.	Waste water generation	EXISTING	PROPOSED EXPANSION	
		1000 KLPD @ 10M ³ /KL	1500 KLPD@ 10 M ³ /KL	
		Total Waste Water Generation After Expansion- 2500 KLPD		
13.	Waste water treatment	BIOMETHANATION ,RO,MEE,BIOCOMPOST, INCINERATION, ONE TIME CONTROLLED LAND APPLICATION AS MANURE.		
14.	Evaporation plant capacity	1400 KLPD		
15.	Concentrated spent wash quantity	350 TPD @ 60% W/W total solids This thick liquor thus obtained is used as fuel in boiler along with bagasse/other biomass fuels.		

16.	Waste water discharge	ZERO
17.	No of Boilers	(01) 50 TPH Slop fired boiler
18.	Fuel quality & quantity	Proposed expansion - Concentrated spent wash (SLOP) 350 TPD & Bagasse as support fuel 310 TPD
19.	Air pollution control device	In proposed Boiler (50 TPD) - ESP (Electro Static Precipitator)
20.	No of Stack	01 No attached with proposed boiler
21.	Solid waste generation (I)Suspended solids from Spent slops coming out from Distillation DISPOSAL- (II) Fly ash from Boiler DISPOSAL-	Spent wash @ 10 KL/KL of alcohol. Spent wash is concentrated in multiple effect evaporators and then used as fuel in Incineration boiler. Approx 10-11 TPH 1-Bagasse Ash used in filling of low lying areas or in manufacturing of briquettes 2- Slop used as a Manure due to nutritive value.
22.	Power Generation	Proposed: 5.0 MW (incidental to incineration boiler)
23.	Power requirement	2.3 -2.5 MW
24.	Green belt development	Approx. 33 % of total area
25.	Cost towards Environmental protection measures(Capital cost)	Approx. Rs. 1885 lacs
26.	Recurring cost towards Environmental control measures.	Approx. 50 Lacs per annum
27.	CSR expenses	2% of the total profit of project as per the CSR Act (By Ministry Of Corporate Affairs) Notification GSR 129(E).

FORM -1**(1) Basic Information**

Sl. No.	Information/ Checklist Confirmation	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
1	Name of the Project	Dhampur Sugar Mills Ltd; Unit DSM Sugar Asmoli (Distillery Division) Asmoli Distt. Sambhal (UP) - 244304
2	Sr. No in the Schedule	Schedule 5 (g) under category-A of EIA Notification dated 14 th September 2006.
3	Proposed capacity/Area/length/tonnage to be handled/command area/lease area/number of wells to be drilled.	Expansion of existing distillery production capacity from 100KLPD to 250 KLPD Project cost: Rs 9720 LAKHS + CSR 2% of the total profit of project
4	New/Expansion/Modernization	Expansion of existing 100 KLD distillery to 250 KLD and 5.0 MW (incidental power)
5	Existing capacity/Area etc	Existing Capacity : 100 KLPD and 2.5 MW Power
6	Category of Project i.e. A or B	Category - A
7	Does it attract the specific condition? If yes, please specify.	No
8	Does it attract the specific condition? If yes, please specify.	No
9	Location	Village: Asmoli Tehsil: Sambhal District: Sambhal State: Uttar Pradesh
10	Nearest railway station/airport along with distance in Kms.	Railway Station: Amroha - (Broad gauge)- 17 Km -N.Railway Airport: New Delhi Air Port, 180 Km
11	Nearest town, City, District Headquarters along with distance in Kms.	Sambhal - 13 km
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (Complete postal addresses with telephone nos to be given)	Panchayat: Asmoli Zilla Parishad: Sambhal Municipal Corporation: - NA
13	Name of the applicant	Mr. Subhash Pandey
14	Registered address	Dhampur Sugar Mills Ltd., Dhampur, Railway Road, Tehsil: Dhampur, Distt. Bijnor

15	Address for correspondence	DSM, Asmoli Distillery Division, Asmoli, Distt Sambhal U.P. 244304
	Name	Shri Subhash Pandey
	Designation	Vice President
	Address	DSM Sugar, Asmoli Distt. Sambhal - U.P.
	Pin Code	244304
	E-mail	subhashpandey@dhampur.com ,
	Telephone No.	(05923)-221438 Mob. No. 9837534442 Fax- 05923-221310
16	Details of Alternatives sites examined, if any. Location of these sites should be shown on a topo sheet.	Expansion will be done within existing premises
17	Interlinked projects	No
18	Whether separate application of interlinked project has been submitted	Not Applicable
19	If yes, date of submission	Not Applicable
20	If no, reason	Incineration Boiler will be used to generate additional 5 MW power. This is an inherent part of the Distillery waste water treatment proposals.
21	Whether the proposal involves approval/clearance under: If yes, details of the same and their status to be given. <ul style="list-style-type: none"> • The forest (Conservation) Act, 1980. • The wildlife (Protection) Act, 1972 • The C.R.Z. Notification, 1992 	No No No
22	Whether there is any Government Order/Policy relevant/relation to the site	No
23	Forest land involved (Hectares)	No

24	<p>Whether there is any litigation pending against the project and/or land in which the project is propose to be set up?</p> <ul style="list-style-type: none"> • Name of the Court • Case No • Orders/directions of the court, if any and its relevance with the proposed project. 	No
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(II) ACTIVITY

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

Sl. No.	Information/Checklist confirmation	Yes / No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	No	Expansion will be done within existing premises
1.2	Clearance of existing land, vegetation and buildings?	No	Land is without habitation.
1.3	Creation of new land uses?	No	For expansion purposes
1.4	Pre-construction investigations e.g. bore-houses, soil testing?	Yes	Raw Water Characteristics: pH: 7.5; Total dissolved solids (TDS): 242.8 mg/l. Total hardness 88 mg/l. Soil Bearing Capacity: 8-10 T/m ²
1.5	Construction works?	Yes	Molasses Storage tanks, Fermenter, Distillation column, ware house, Utilities & modifications related to ETP
1.6	Demolition works?	Yes	No demolition work is envisaged
1.7	Temporary sites used for construction works or housing of construction workers?	Yes	Construction workers shall be housed temporarily at the proposed site, for which temporary shelters shall be created.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	Yes	Ware houses, sheds, Utilities & modifications related to ETP, Molasses Storage tanks.
1.9	Underground works including mining or tunnelling?	No	Only foundation work.

1.10	Reclamation works?	No	None
1.11	Dredging?	No	None
1.12	Offshore structures?	No	None
1.13	Production and manufacturing processes?	Yes	Fermentation & Distillation (process flow diagram provided in DPR)
1.14	Facilities for storage of goods or materials?	Yes	Warehouse for raw material and finished chemicals.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	Proposed(Existing+Proposed) 250 KLPD treatment system - Biomethenation, RO, MEE, Biocompost, Incineration, One Time Controlled Land Application As Manure.
1.16	Facilities for long term housing of operational workers?	No	Housing facilities are available for long term housing of operational workers.
1.17	New road, rail or sea traffic during construction or operation?	No	Not required.
1.18	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	Not required.
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	Not required.
1.20	New or diverted transmission lines or pipelines?	No	Not required
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of water sources or aquifers?	No	Not required
1.22	Stream crossings?	No	Not required
1.23	Abstraction or transfers of water from ground or surface waters?	Yes	Existing Requirement- 1500KLPD(industrial) +20KLPD(domestic) Proposed requirement- 2250 KLPD Total Requirement- 3770 KLPD @15 KL/KL of product Water requirement will be meet out from already existing tubewells (no new tubewell will be bored)
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	
1.25	Transport of personnel or materials for construction,	Yes	Most of the personnel shall reside within the plant premises. Any additional shall travel using

	operation or decommissioning?		public/private transport system. Construction material shall be transported by road. Part of raw material required during operation shall be generated in the plant itself during the manufacturing process. Other material shall be transported by road.
1.26	Long-term dismantling or decommissioning or restoration works?	No	
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	
1.28	Influx of people to an area in either temporarily or permanently?	Yes	80 Nos. During construction phase.
1.29	Introduction of alien species?	No	
1.30	Loss of native species or genetic diversity?	No	
1.31	Any other actions?	-	N/A

2. Use of natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply)

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	Within existing premises Distillery expansion will be carried out within the existing factory premises and available land area of sugar factory All the land is already industrial land
2.2	Water (expected source & competing users) unit: KLD	Yes	3770 KLPD for 250 KLPD spirit production(All water requirement will be meet out from existing tube wells .
2.3	Mineral (MT)	No	
2.4	Construction material - stone, aggregates, and / soil (expected source - MT)	Yes	Material from excavation at project site shall be used for construction. Additional construction materials like stone, aggregate, sand shall be procured from nearby areas.
2.5	Forests and timber (source - MT)	No	
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	Fuel: Bagasse- 310 T/hr, Slop- 350 T/hr Proposed Slop fired Boiler capacity- 50 TPH -01 no
2.7	Any other natural resources (use appropriate standard units)	No	

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
3.1	List of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	No	N/A
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	The project shall impact welfare of people by generating employment opportunities.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	No	
3.5	Any other causes	No	

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	No	
4.2	Municipal waste (domestic and or commercial wastes)	No	Domestic waste-will be collected by authentic vendors. Commercial waste- Will be sold to authentic Vendors.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Waste insulating and lubricating oil, oil barrels shall be collected in dedicated drums and stored on impervious concrete floor. The same shall be sold to vendors authorised by MoEF/UPPCB for recycling and reusing.
4.4	Other industrial process wastes	Yes	Ash generation ; 10-11 TPH
4.5	Surplus product	No	
4.6	Sewage sludge or other sludge from effluent treatment	Yes	Sewage will be treated via septic tank and soak pit.
4.7	Construction or demolition wastes	-	N/A
4.8	Redundant machinery or equipment	No	
4.9	Contaminated soils or other materials	No	
4.10	Agricultural wastes	No	
4.11	Other solid wastes	No	

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Boiler operations shall result in emissions. A 90 m stack along with 50 TPH boiler, with ESP. The stack shall be of RCC with internal fire-brick lining
5.2	Emissions from production processes	Yes	PM ,NO _x ,SO ₂ ,CO
5.3	Emissions from materials handling including storage or transport	Yes	Dust emissions and fugitive emissions shall arise from raw material storage, handling and transport. The control measures shall include concrete/asphalt road construction, water sprinkling, tarpaulin cover on trucks carrying raw materials and covered storage yard for fuel.
5.4	Emissions from construction activities including plant and equipment	Yes	Emissions during construction phase shall be from operation of DG set. The existing DG set of the Distillery shall be used, which has a chimney of adequate height with acoustic chambers.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	Yes	Dust shall be generated during civil construction and movement of vehicles. These activities shall be for a short duration and their impact shall be minimised by taking the following measures: <ul style="list-style-type: none"> • Water sprinkling • Use of dust arresting panels/ sheets • Regular removal of construction waste material • Proper storage of construction material • Use of cover on trucks • Speed limit for vehicles Sewage will be treated via septic tank and soak pit.
5.6	Emissions from incineration of waste	No	
5.7	Emissions from burning of waste in open air (e.g. slash	No	

	materials, construction debris)		
5.8	Emissions from any other sources	No	

6. Generation of Noise and Vibration, and Emissions of Light and Heat

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	Noise shall be generated during construction phase by construction and material handling equipment. During operation phase, noise shall be generated by the operation of pumps, air compressors, boilers, TG set etc. as open structure is there, no abnormal sound level is expected. Persons working in the high noise area will be provided the required earplugs & earmuffs.
6.2	From industrial or similar processes	Yes	During operation phase, noise shall be generated by the operation of pumps, air compressors, boilers, TG set etc. Effective mitigation measures shall be built in.
6.3	From construction or demolition.	Yes	Noise shall be generated during construction phase by construction and material handling equipment. This shall largely be localised. Effective mitigation measures like barrier sheets, earplugs for labour etc. shall be provided.
6.4	From blasting or piling	Yes	Preparation of foundations for equipment will be undertaken with necessary precautions.
6.5	From construction or operational traffic	Yes	There will be marginal additional traffic which may not lead to any increase in the noise levels.
6.6	From lighting or cooling systems	No	No equipment shall be permitted to be installed in proposed project which generates noise level exceeding the permissible standards
6.7	From any other sources	No	

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	No	All necessary precautions shall be taken in storage and handling of hazardous materials. Waste insulating and lubricating oil, oil barrels shall be collected in dedicated drums and stored on impervious concrete floor. The same shall be sold to vendors authorised by MoEF/UPPCB for recycling.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	Sewage will be treated via septic tank and soak pit. Industrial effluent: It is ZERO discharge based Distillery. For inland surface water one time land application is proposed after careful evaluation and as per CPCB protocol.
7.3	By deposition of pollutants emitted to air into the land or into water	No	A 90 m stack with ESP shall be provided for the boiler.
7.4	From any other sources	No	
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sl.No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage handling, use or production of hazardous substances		Adequate safety measures will be followed to control of fire. As per applicable safety regulations.
8.2	From any other causes	No	All standard safety measures shall be taken during establishment and operation of proposed Distillery expansion.
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	The proposed project area lies in Zone 4 Seismic Area. All necessary design considerations for earthquake resistant structures shall be incorporated in the design of the project.

			The area is not prone to landslides, floods, cloudburst etc.
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9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

Sl. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: - Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) - housing development - extractive industries - supply industries. - other	Yes	The project shall lead to development and prosperity of the area by generating additional employment opportunities. Green belt development and other such activities undertaken by project proponents shall have a positive impact on the ecology of the area.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	
9.3	Set a precedent for later developments	Yes	It will increase Ethanol production of the country, which in turn in the long run could lead to further industrial development and considerable savings of Petrol.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects.	No	

(III) ENVIRONMENTAL SENSITIVITY

Sl. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) of proposed project location boundary
1	Areas protected under international conventions national or local legislation for their ecological, landscape cultural or other related value	No	
2	Areas which are important or sensitive for ecological reasons (Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests)	No	
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	
4	Inland, coastal, marine or underground waters	No	
5	State, National boundaries	No	
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	
7	Defence installations	No	
8	Densely populated or built-up area	No	The proposed project site lies in the vicinity of Sambhal(13 Km)
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	Some such areas exist in Sambhal.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry,	No	No such area exists.

	agriculture, fisheries, tourism, minerals)		
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	No such area exists.
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	No	The proposed project area lies in Zone 4 Seismic Area. All necessary design considerations for earthquake resistant structures shall be incorporated in the design of the project.

I hereby give an undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost.

Date:

Place: Asmoli

Signature of the applicant

**(Name: Subhash Pandey)
DSM Sugar Mills Ltd
Asmoli 244304,
DISTT.Sambhal (U.P.)**

Authorised Signatory

TERMS OF REFERENCE

1.0 PROPOSED SCOPE OF WORK FOR EIA STUDY

The components of the EIA study include:

- Determination of baseline data using primary data generation and secondary data available from various government published reports on air, meteorology, water, soil, flora & fauna, socio-economics, infrastructure, sensitive areas (forests, archaeological, historical etc);
- Detailed description of all elements of the project activities during the pre-construction, construction and operational phases. The elements analyzed include the infrastructures of the project including drainage features, roads, waste collection, disposal and management and utility requirements;
- Identification of the sources of pollution and assessing the impacts on the environment due to proposed project if any;
- Preparation of EIA and EMP documents with recommendations on preventive and mitigative measures for limiting the impact on environment to the desired level during various stages of project. Development of a suitable post study-monitoring program to comply with various environmental regulations; and
- Risk Assessment (RA) and Disaster Management Plan (DMP) describing the probable risks and preventive & precautionary measures to be followed in the event of emergency situations such as accidents, fire etc.

2.0 BASELINE ENVIRONMENTAL DATA GENERATION

Sr. No.	Attributes	Scope of Work
1	Ambient Air Quality	8 Locations - 2 days/week for 13 weeks. PM₁₀, PM_{2.5}, SO₂, NO_x, .will be collected. Design of ambient air quality sampling network with regard to topography, population, sensitive locations, emission sources, background concentrations and possible impact zones, through application of screening air quality models for assessing the maximum GLC zones prior to start of baseline study.
2	Meteorological	1 Location - 90 days

Sr. No.	Attributes	Scope of Work
	data	<p>A fully instrumented continuous recording micro-meteorological observatory with battery back-up facilities will be installed to facilities to measure barometric pressures, Wind speed, direction, temperature, humidity, cloud cover and rainfall will be monitored with one hr avg. recording. Occurrence of Inversions will be calculated based on the daily temperature profile.</p> <p>This is to be further supported by the meteorological data for last 5-years for the area of interest from the nearest meteorological observatory and Trend analysis of micrometeorological data generated at the site.</p>
3	Water Quality	<p>8 Locations - Once during study period</p> <p>Parameters as per IS-10500, IS:2296 and EPA Act as applicable etc will be carried out for surface water and ground water in the study area.</p> <p>The survey also include estimation of water balance, recommendations on water conservation and rain water harvesting measures based on past experience on similar projects; water samples will be collected around the ash pond area to know the baseline water quality around ash pond.</p>
4	Soil Quality	<p>Soil profile of minimum 1-m depth at 8 locations once during the study period will be undertaken for parameters related to afforestation, organic matter, water percolation, infiltration rate, water holding capacity, nutrients, pollutants etc. will be carried out.</p>
5	Noise Levels	<p>8 Locations once during the study period for 24 hrs at each location during EIA study for Leq, Ld and Ln.</p>
6	Land use	<p>Land use as per the district census handbooks as well as with the help of satellite imagery will be presented in 10-km radius study area. Once in the study period. Areas under various crops, crop nutrient requirements and nutrient status</p>

Sr. No.	Attributes	Scope of Work
		of soils.
7	Geology and Hydro-geological aspects	These aspects will be covered for study area for the proposed project. The data will be compiled for geology and hydrogeology from the primary survey as well as secondary sources. Once in the study period.
8	Socio-Economic and Health aspects	Socio-economic and health aspects will be covered for 0.5-km, 0.5-3.0 km, 3.0-10.0 km from the periphery of the site based on the Census documents and NIC database for the past two decades. Once in the study period.
9	Ecological studies (Terrestrial and Aquatic)	Flora and fauna will be studied in 10-km radius study area, once during the study period. These studies will be based on primary as well as secondary sources. The survey also includes assessment of the species diversity, density, abundance etc. in the study area and formulation of ecological indexes, assessment of likely changes on flora and fauna due to the project related activities, suggestions for conservation and protection of flora and fauna in the study area and suggestions for development of new conservation areas locally.
10	Aesthetic/Cultural / Sensitive Aspects	Identification of all historical/ archeological sites/cultural/ religious / tourist interests/ deference installations in the study area. Other sensitive locations such as tropical forests, important lakes, important lakes, biosphere reserves, coastal areas rich in coral reef within 25-km radius will be identified. Once in the study period.
11	Traffic Survey	Traffic volumes will be measured once during the study period at three important traffic intersections leading to the project matter to assess the traffic volumes.

3.0 Legislation and Regulatory Considerations:

Government policies, legislation and regulations relevant to the proposal will be identified. Local plans and policies will also be evaluated. Project characteristics will be analyzed to ensure compliance with these policies, legislation and regulations. Appropriate recommendations will be provided to

ensure regulatory compliance. The legislation relevant to the project will be summarized and presented in the EIA Report.

4.0 Environmental Impact Assessment

There are various qualitative as well as quantitative methods of conducting EIA studies, each having its own merits and demerits. We intend to use the best logical tool to assess the impact of the project.

A qualitative and quantitative assessment of pollution aspects of proposed project (air and dust, wastewater, noise pollution, wastewater discharges etc.) will also be done to identify the adequacy of the proposed control measures as well as the likely impact on existing critical areas. The short term and long-term impacts, particularly on sensitive targets such as endangered species, plants and historically important monuments, will be identified and mitigation measures to reduce adverse impacts will be suggested.

Air Impacts:

Emission Inventory will be carried in an area of 10-km around the project site. A computer based internationally recognized mathematical air quality models - **AERMOD 8.2** and other model suitable for the region will be identified and run to predict the concentration of SO₂, NO_x & PM due to the operation of the proposed project. The dispersion model results will be included in the report using isopleths or other graphical methods, over laying a land use map of the surrounding area.

- Prediction of short term and long term ground level concentrations of SO₂, NO_x, HC, PM and graphical representation in the form of isopleths through application of air quality models taking effects of terrain and requirements specified in the publication by Central Pollution Control Board, New Delhi - 'Assessment of Impact on Air Environment: Guidelines for conducting Air Quality Modelling';
- Justification of air dispersion modelling used with a detailed listing of all assumptions; and
- Combined impacts due to the existing plant and the proposed new plant will be estimated.

Water Environment

- Estimation of water balance for the proposed plant.
- Characterization/collection of data on waste water streams;
- Assessment of the nature of effluents likely to be discharged and its impact;
- Assessment of feasibility of water recycles, and reuse for green belt

- development and irrigation;
- Recommendations on water conservation measures based on past experience on similar projects.

Land Environment

- Collection of data on soil characteristics and soil types;
- Quantification of solid wastes likely to be generated during operation and suggestions on proper collection, treatment and disposal methods;
- Delineation of environmentally compatible options for value added utilization of solid wastes;
- Strengthening of green belt keeping in view the selected plant species and attenuation factors for noise and air pollutants.

Biological Environment

- Collection of the existing and available information on flora and fauna in the study area including rare and endangered species;
- Assessment of the species diversity, density, abundance etc. in the study area;
- Assessment of likely changes on flora and fauna due to the projects and related activities;
- Delineation of conservation measures for the protection of flora and fauna in the study area.

Noise Impacts:

Sources of noise and its impact on the environment would be clearly brought out. The noise level at varying distances for multi-sources will be predicted using suitable model. A comparison of measured noise (Leq) at monitoring locations to that of predicted noise levels (Leq) would be made and mitigatory measures required, if any, will be recommended to conform to regulatory ambient air noise standards.

We propose to estimate increase in noise levels over the baseline conditions in different zones like industrial, residential and sensitive areas like hospitals, wild life habitation etc. The potential noise level exposure will be determined and evaluated for acceptable limits of exposure.

Socio-economic and Health Environment

- Study of parameters to assess/characterize the quality of life in the study area;
- Assessment of changes from the baseline in the socio-economic parameters due to proposed plant operations;

- Assessment of economic benefits to community.

Aesthetic/Cultural

- Identification of all historical/archaeological sites/monuments in the study area.

Traffic Study

- Field study at important points on the approach roads to assess the existing total daily traffic, peak hour traffic and traffic composition;
- Assessment of the change in traffic composition and volumes.

5.0 Environment Management Plan

For each potential negative impact identified, recommendations will be presented for avoidance, minimization or mitigation of impacts along with costs associated with potential mitigation.

An EIA/EMP, based on three months baseline study, will be prepared for the project. The EMP will address the following:

- Identify and summarize all anticipated significant adverse environmental impacts;
- Identify and summarize all mitigation measures, including the type of impact to which it relates and the conditions under which it is required;
- Define a set of policies and objectives for environmental performance and continual enhancement of performance;
- Green belt development plan;
- Recommend monitoring and reporting procedures including the parameters to be monitored, methods to be used, sampling locations, frequency of measurements, detection limits and definition of thresholds that will signal the need for corrective actions;
- Recommend capacity development and training requirements for implementation of EMP;
- Recommend an organizational structure for effective implementation of the EMP; and
- Draw up an implementation and cost schedule for EMP.

An environmental monitoring and management plan will be developed for the sensitive elements of the environment that may require monitoring during construction and implementation of the proposed project. Recommendations will be made on the institutional arrangements that will be necessary to ensure effective monitoring and management.

A detailed management and monitoring program will be developed to reduce the effects of potential negative environmental impacts.

6.0 Risk Assessment and Disaster Management Plan

Risk Assessment studies comprising sub-activities such as hazard identification, assessment and quantification of risk for suggesting risk mitigation measures based on Maximum Credible Accident (MCA) Analysis to be carried out for the proposed project. Preparation of the Risk Assessment Report will be followed by Disaster Management Plan (DMP) and Emergency Preparedness Plan (EPP) based on the quantitative Risk Assessment of the proposed activity and associated infrastructure for the project.

The study includes identification of process hazards, preliminary of hazardous sections of the plant and that of storage with recourse to fire and explosion index for these units, analysis of major inventories in process and storage and identification of major hazardous locations of the plant with recourse to Go I rules, 1989.

7.0 Occupational Health and Safety

We will review the safety management and occupational health surveillance system in the proposed facility plant and recommend for further appropriate measures.

8.0 IMPACT OF TREATMENT TECHNOLOGIES ON AGRICULTURE

We will review the Identification of impact of the treatment technologies on agricultural land in the study area.

Ministry of Environment and Forests
Pre-Feasibility Report as per Ministry of Environment and Forests

Contents	Details
1. Executive Summary	<p>M/s Dhampur Sugar Mills Ltd Unit D.S.M Chemicals Vill- Asmoli Tehsil & District- Sambhal (U.P) Pin-244304</p> <p>Location Co-ordinates: Latitude : 28° 42' 26.33''N Longitude: 78° 32.41.77''E Elevation : 670 ft Total project cost :- Rs 9720 LAKHS</p>
2. Introduction of the project Background information	<p>The proposed Expansion of Distillery Plant is from 100 KLPD to 250 KLPD and 5 MW. It is Green field project. Ethyl alcohol is agriculture based product which is recognized globally by different name like Rectified Spirit, Denatured Spirit, Extra Neutral Alcohol, Absolute Alcohol etc. with multiple uses, like chemical industries, pharmaceutical Solvents, potable purposes and as other alternative source of energy world wise.</p> <p>Alcohol can be produced either synthetically from petroleum substances or by fermentation from Sugar or starchy substrates using yeast.</p> <p>INDUSTRIAL USE OF ALCOHOL</p> <p>Important feed stock for manufacture of various Carbon Based chemicals like Acetic Acid, Butanol, Butadine, PVC etc.</p> <p>Alcohol is also used in essential drugs and formulations.</p> <p><u>FUEL ETHANOL-</u> Alcohol has a great future in the energy sector. August 13, 2002 was a historic day for the Indian Ethanol programme as on this day the Government of India finally announced that from January 1, 2003 blending of 5% of Ethanol were be made mandatory in Nine States and Four Union Territories of India i.e. 70% of Gasoline consumed in India has to doped with 5% of Ethanol. To ensure that 350 million Litres of Ethanol of right quality will have to be made available in adequate quantities to various oil depot throughout the Country.</p>

Contents	Details						
	<p data-bbox="557 279 1495 457">In future when India has to reduce the dependence on petroleum imports due to very high world market prices the doping of gasoline by ethanol may go as high as 10% to 20%. In that case the requirement of ethanol will be still higher as shown below-</p> <p data-bbox="557 485 1495 552">The present supply and future projection in terms of ethanol use in India -</p> <table border="1" data-bbox="613 579 1242 993"> <tbody> <tr> <td data-bbox="618 585 1005 716">Ethanol Required per Annum @ 5% blending</td> <td data-bbox="1005 585 1237 716">450 Million Litres</td> </tr> <tr> <td data-bbox="618 716 1005 856">Ethanol Required per Annum @ 10% blending</td> <td data-bbox="1005 716 1237 856">900 Million Litres</td> </tr> <tr> <td data-bbox="618 856 1005 989">Average production of Alcohol per Annum</td> <td data-bbox="1005 856 1237 989">1600 Million Litres</td> </tr> </tbody> </table> <p data-bbox="557 1052 1495 1268">The projection of fuel ethanol required with the @5% blending is about 31% of total alcohol production in India. Considering the possibility of blending of petrol @ 10% in near future the requirement will increase substantially and therefore installation of more ethanol plants also becomes necessary in order to cope up with the requirement.</p> <p data-bbox="557 1295 1495 1512">Alcohol has a very important place in the country's economy. This a vital raw material for a number of chemicals. It has been a source of larger amount of revenue by way of excise duty levied by state government on alcoholic liquors. It has potential as fuel in the form of power alcohol for blending of gasoline in ratio 20: 80.</p> <p data-bbox="557 1539 1495 1717">Fermentation alcohol is in great demand in countries like Japan, USA, Canada, Sri Lanka etc. The synthetic alcohol produced from Nephtha of petroleum crude is not useful for beverages. These countries import large quantities of alcohol and India is one main supplier.</p> <p data-bbox="557 1745 1495 1885">India produced 25% of the world cane molasses production. Uttar Pradesh has enough potential to develop cane production to increase the capacity of existing sugar factories and produce as much molasses as possible to increase alcohol</p>	Ethanol Required per Annum @ 5% blending	450 Million Litres	Ethanol Required per Annum @ 10% blending	900 Million Litres	Average production of Alcohol per Annum	1600 Million Litres
Ethanol Required per Annum @ 5% blending	450 Million Litres						
Ethanol Required per Annum @ 10% blending	900 Million Litres						
Average production of Alcohol per Annum	1600 Million Litres						

Contents	Details
	<p>production and earn revenue for Uttar Pradesh and India on the whole and can also help in industrial growth of Uttar Pradesh.</p> <p>The main process involved in production of Alcohol from cane molasses are fermentation in which sugars are broken down in alcohol and Carbon-di- Oxide (CO₂) and then pumped to distillation section in which alcohol is stripped off from fermented wash in form of Vapour and then condensed to have Alcohol.</p> <p>These days many Technologies are available for fermentation process like Batch Fermentation, Bio Still Process, Hiform-Continuous Fermentation etc.</p> <p>The same way the various technologies of distillation process range from -</p> <ul style="list-style-type: none"> • Conventional direct steam Heating &Rectifier columns. • Multi pressure distillation technology heating for Stripping off alcohol under vacuum in flubex heat exchanger known as MPR technology.
<p>i. Identification of project and project proponent. In case of mining project, a copy of mining lease/letter of intent should be given.</p>	<p>N/A</p>
<p>ii. Brief description of nature of the project.</p>	<p>The proposed Expansion of Distillery Plant from 100 KLPD to 250 KLPD and 5 MW power. It is Green field project .Proposed within the premise of existing sugar belt due to availability of molasses from own sugar mill.</p>
<p>iii. Need for the project and its importance to the country and or region.</p>	<p>Besides the technical and environmental benefits fuel ethanol offers, it makes tremendous economic sense in India as India's Import bill of crude petroleum is increasing every year.</p> <p>India is number two in the world in Sugarcane production. The number of sugar factories is 416 and 295 distilleries in the country. Large number of sugar factories co-produce ethanol. The introduction of ethanol fuel will give big boost to Indian economy by following ways:</p> <ul style="list-style-type: none"> • The efficiency and commercial viability of sugar factories will improve.

Contents	Details						
	<ul style="list-style-type: none"> • Farmers will get higher price for sugarcane which will improve the socio-economic status of farmers. • Agriculture will get boost because of additional production of sorghum, jawar and sugarcane. • Mixing of ethanol to petrol will save foreign exchange worth Rs. 4000 crores every year. • Less dependence on imports and cheaper cost o production of ethanol will bring down the prices of fuels. • Overall it is "Ecofriendly Project". <p>In view of the above positive results, it is recommended without any reservation that the establishment of this factory be granted.</p>						
iv. Demand-Supply Gap.	<table border="1" data-bbox="753 814 1300 1262"> <tbody> <tr> <td data-bbox="753 814 1094 951">Ethanol Required per Annum @ 5% blending</td> <td data-bbox="1094 814 1300 951">450 Million Litres</td> </tr> <tr> <td data-bbox="753 951 1094 1087">Ethanol Required per Annum @ 10% blending</td> <td data-bbox="1094 951 1300 1087">900 Million Litres</td> </tr> <tr> <td data-bbox="753 1087 1094 1262">Average production of Alcohol per Annum</td> <td data-bbox="1094 1087 1300 1262">1600 Million Litres</td> </tr> </tbody> </table> <p>70% of Gasoline consumed in India has to doped with 5% of Ethanol. To ensure that 350 million Litres of Ethanol of right quality will have to be made available in adequate quantities to various oil depot through out the Country.</p> <p>In future when India has to reduce the dependence on petroleum imports due to very high world market prices the doping of gasoline by ethanol may go as high as 10% to 20%. In that case the requirement of ethanol will be still higher as shown below-</p> <p>The present supply and future projection in terms of ethanol use in India -The projection of fuel ethanol required with the @5% blending is about 31% of total alcohol production in India. Considering the possibility of blending of petrol @ 10% in near future the requirement will increase substantially and therefore</p>	Ethanol Required per Annum @ 5% blending	450 Million Litres	Ethanol Required per Annum @ 10% blending	900 Million Litres	Average production of Alcohol per Annum	1600 Million Litres
Ethanol Required per Annum @ 5% blending	450 Million Litres						
Ethanol Required per Annum @ 10% blending	900 Million Litres						
Average production of Alcohol per Annum	1600 Million Litres						

Contents	Details
	installation of more ethanol plants also becomes necessary in order to cope up with the requirement.
v. Imports vs. Indigenous production.	Only indigenous production.
vi. Export Possibility.	No
vii. Domestic/export Markets.	Domestic Only
viii. Employment Generation (Direct and Indirect) due to the project.	Direct employment :- approx 80 persons Indirect employment :- approx 100 persons
3. Project Description	
i. Type of project including interlinked and interdependent projects, if any.	Expansion of Distillery Unit
ii. Location (map showing general location, specific location, and project boundary & project site layout) with coordinates.	Location map Enclosed (Google EARTH MAP)
iii. Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.	Proposed site is adjacent to the existing sugar unit so it is convenient to operate by our common officer/staffs. Proposed Expansion will be Done in Existing Distillery Capacity
iv. Size or magnitude of operation.	250 KLPD Distillery along with 5 MW power
v. Project description with process details (a schematic diagram flow chart showing the project layout, components of the	Distillation And Fermentation flow diagram enclosed with Project report.

Contents	Details
project etc. should be given)	
vi. Raw material required along with estimated quantity, likely source, marketing area of final products, Mode of transport of raw Material and Finished Product.	Molasses is 675 MT/Day for Expansion which will be transported from the local source.
vii. Resource optimization/recycling and reuse envisaged in the project, if any, should be briefly outlined.	Waste Water (Spent Wash) shall be used in boiler as a fuel. Bagasse Ash used in filling of low lying areas or in manufacturing of briquettes Slop used as a Manure
viii. Availability of water its source, Energy/power requirement and source should be given.	Ground water through Tube well. Existing water requirement- <ul style="list-style-type: none"> • Industrial use: 1500 M3/Day • Domestic Use: 20 M3/Day Expansion Water requirement <ul style="list-style-type: none"> • Industrial use: 2250 M3/Day • Domestic Use: Nil M3/Day
	Total Water Requirement- <ul style="list-style-type: none"> • Industrial use: 3750 M3/Day • Domestic Use: 20 M3/Day
ix. Quantity of wastes to be generated (liquid and solid) and scheme for their Management/ disposal.	Liquid effluents- Industrial waste: 2500 M3/Day will be utilized in BIOMETHENATION, RO, MEE, BIOCOMPOST, INCENERATION, ONE TIME CONTROLLED LAND APPLICATION AS MANURE. <ul style="list-style-type: none"> • Domestic Waste: 12 M3/Day will be treated in separate soak pit and septic tank. Solid Waste- Ash approx -10-11 TPH and Bagasse + Slop Ash which shall be used as a manure.
x. Schematic representations of the	It will be enclosed in EIA report.

Contents	Details
feasibility drawing which give information of EIA purpose.	
4. Site Analysis	
i. Connectivity.	Railway Station: Amroha - (Broad gauge)- 17 Km -N. Railway Airport: New Delhi Air Port, 180 Km
ii. Land Form, Land use and Land ownership.	Plain land , Industrial Land is registered under Dhampur Sugar Mills.
iii. Topography (along with map).	Location Map (Google Earth map) enclosed
iv. 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 sanctuary, eco from the HFL industrial area, be given.	Land use pattern will be incorporated in EIA Study report.
v. Existing Infrastructure.	Existing Distillery Unit
vi. Soil classification	Silty/Clay/Sand
vii. Climatic data from secondary sources.	Max. Temp:43 Degree C Mini. Temp: 4 Degree C Ave Temp: 27 Degree C Relative Humidity: 65 - 85 %
viii. Social Infrastructure available.	Road, School & electricity.
5.Planning Brief	
i. Planning Concept (type of industries, transportation etc) Town and Planning/ Development authority	Transportation by Road.

Contents	Details
Classification	
ii. Population Projection	70-80 Staff
iii. Land use planning (breakup along with green belt etc).	60% for Plant establishment and other Facilities and Green belt development: 40% of total area of existing land.
iv. Assessment of Infrastructure Demand (Physical & Social).	Local labours & construction material.
v. Amenities/Facilities.	Companies employees and consumer shall be provided.
6. Proposed Infrastructure	
i. Industrial Area (Processing Area).	Industrial land
ii. Residential Area (Non Processing Area).	Available with existing Sugar mill.
iii. Green Belt.	Green belt development: 33% of total area of existing land.
iv. Social Infrastructure.	Proposed expansion will lead to the development of certain local ancillary facilities and consequent employment opportunities. Further the proposed expansion will also lead to the development of market, trade centres, banking activities etc.
v. Connectivity (Traffic and Rail/Metro/Water ways etc)	Railway Station: Amroha - (Broad gauge)- 17 Km -N.Railway Airport: New Delhi Air Port, 180 Km Road: State Highway - 51
vi. Drinking Water Management (Source water)	Ground water.
vii. Sewerage System.	Septic tank / Sock pit for domestic effluent treatment.
viii. Industrial Waste Management.	BIOMETHENATION,RO,MEE,BIOCOMPOST,INCENERATION, ONE TIME CONTROLLED LAND APPLICATION AS MANURE.
ix. Solid Waste Management.	1-Bagasse Ash used in filling of low lying areas or in manufacturing of briquettes 2- Slop used as a Manure
x. Power Requirement & Supply / source.	Power generation 5MW surplus power shall be transported to Power Grid.

Contents	Details
7. Rehabilitation and Resettlement (R&R) Plan	
i. Policy to be adopted (Central/State) in respect Of the project affected persons including home oustees, land oustees and landless laborers (a brief outline to be given).	No R & R
8. Project Schedule & Cost Estimates	
ii. Likely date of start of construction and likely date of completion (Time schedule for the project to be given).	After receipt of NOC & Environmental Clearance.
iii. Estimated project cost along with analysis in terms of economic viability of the project.	Rs 9720 lacs
9. Analysis of proposal (Final Recommendations)	
i. Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area.	<p>Financial Benefits: Benefits and advantages of bagasse/biomass cogeneration include: a) Increasing the viability of sugar mills b) Increased fuel efficiency</p> <p>Social Benefits: Greater employment for local populations</p> <p>Environmental benefits: a) Low emission of particulates,SO₂,NO_x and CO₂ compared to coal and other fossils fuels b) It is a Green field project. c) Own generation of power.</p>

Contents	Details
	<p data-bbox="558 310 786 348">Other Benefits:</p> <p data-bbox="558 386 1243 424">Revenues to the State and Central ex-chequers.</p> <p data-bbox="558 462 1495 533">Over all development of Sambhal District in particular and Uttar Pradesh State in general.</p>

WATER BALANCE CHART
For 250 KLPD Molasses Based Distillery

Total Water Inputs:

The total water input streams are as mentioned below:

TOTAL WATER INPUTS		
	Total Qty.	UNIT
PROCESS WATER IN FERMENTATION	2165	KL
DM WATER FOR RS DILUTION	1890	KL
DM WATER FOR BOILER FEED	1820	KL
SOFT WATER FOR VACUUM PUMP & OTHERS	180	KL
SOFT WATER MAKEUP FOR COOLING TOWER	2195	KL
OTHER DOMESTIC USAGE (PROVISIONAL)	60	KL
MISC. WASHINGS (PROVISIONAL)	15	KL
	8325	KL

Total Water Outputs :

The total water output streams are as mentioned below:

TOTAL WATER OUTPUTS		
	Total Qty.	UNIT
STEAM CONDENSATE	1090	KL
WATER IN SPENT WASH	3140	KL
SPENT LEES (RECTIFIER)	1590	KL
SPENT LEES (PRE-RECTIFIER)	800	KL
CT EVAPORATION & DRIFT LOSSES	1330	KL
DOMESTIC CONSUMPTION	60	KL
BOILER DRIFT & BLOWDOWN	120	KL
VACUUM PUMP SEALING / PURGE	180	KL
MISC. WASHINGS	15	KL
	8325	KL

Note: The above mentioned data is tentative and subject to variation; can be confirmed only after detailed engineering

Total Recycle and Utilization Streams:

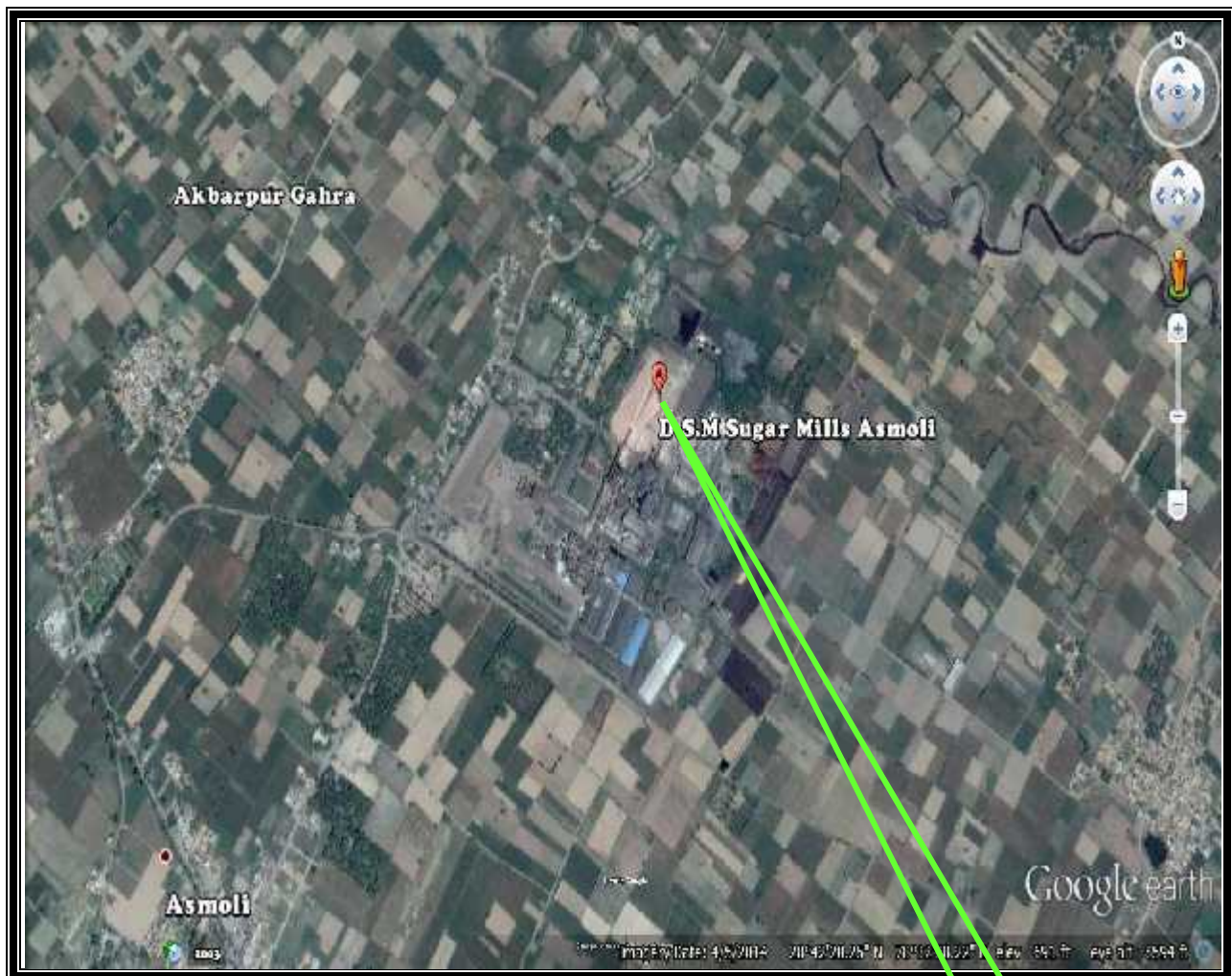
The total water recycles and utilization streams are as mentioned below:

TOTAL WATER OUTPUTS		
	Total Qty.	UNIT
LEES RECYCLE FOR RS DILUTION	1010	KL
STEAM CONDENSATE RECYCLE FOR BOILER	1100	KL
SPENT LEES (RECT) - COOLING TOWER MAKEUP	800	KL
PROCESS CONDENSATE RECYCLE TO PROCESS & CT	1600	KL
VACUUM PUMP WATER RECIRCULATION	65	KL
Total Recycling /Utilizations of water per day (55%)	4575	KL
Total Process Loss + Effluent Generation	3750	KL

AFTER ALL RECYCLES (45%) :		
TOTAL FRESH WATER INPUT	3750	KL

TOTAL FRESH WATER REQUIREMENT IS 15.0 KL/KL PRODUCT

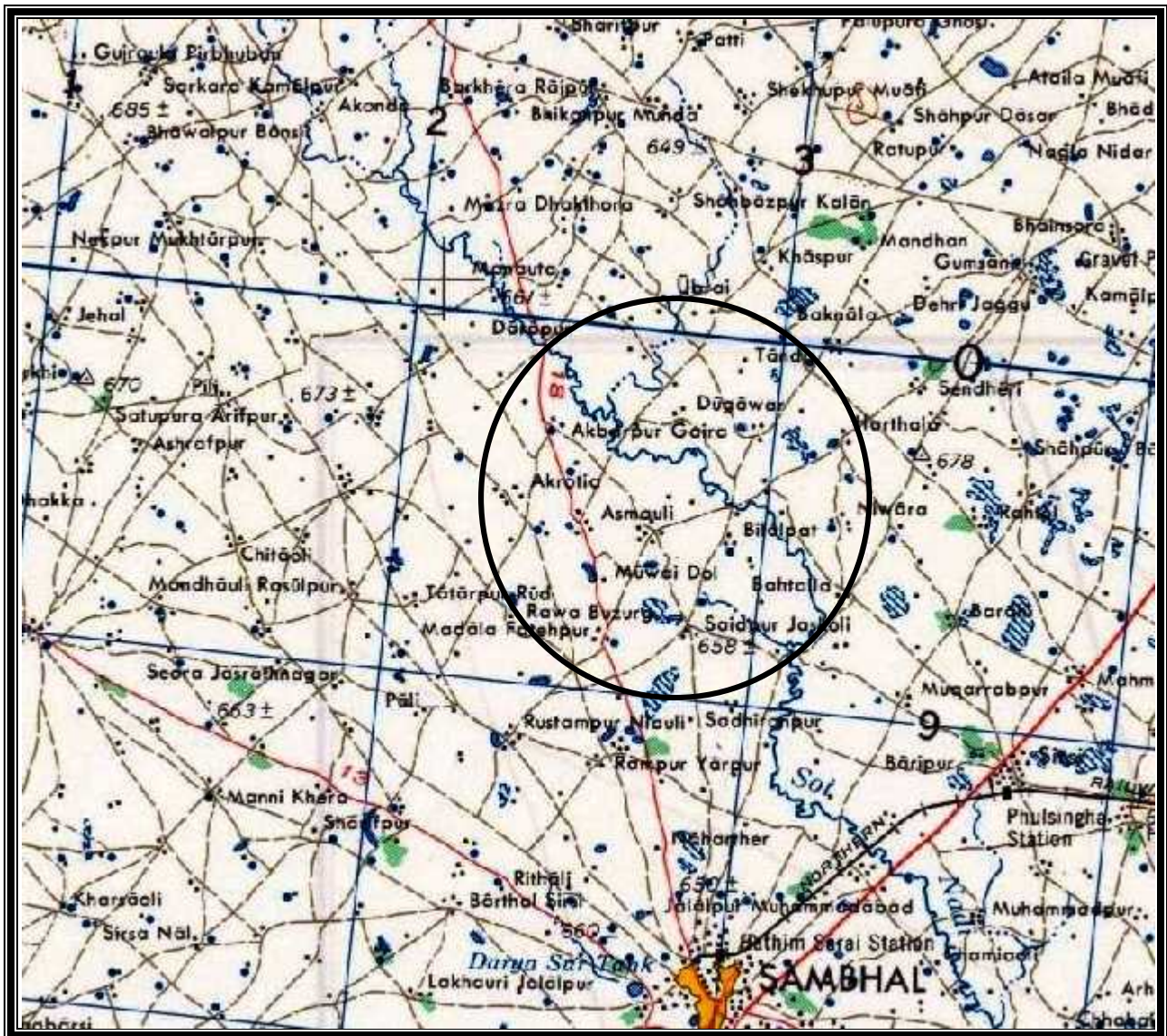
LOCATION OF PROPOSED SITE



Source- Google Earth

Project site

LOCATION OF PROPOSED SITE ON TOPOSHEET



○ — 10 Km Area On Topo Sheet

OUR TREATMENT STRATEGY

For 100-250 KLD DISTILLERY PLANT

**TOTAL FACTORY CAPACITY - 250KLD AFTER
EXPANSION**

Treatment Strategy of DSM-Chemicals

Asmoli Unit

Flow Diagram of Waste Management at DSM ASMOLI

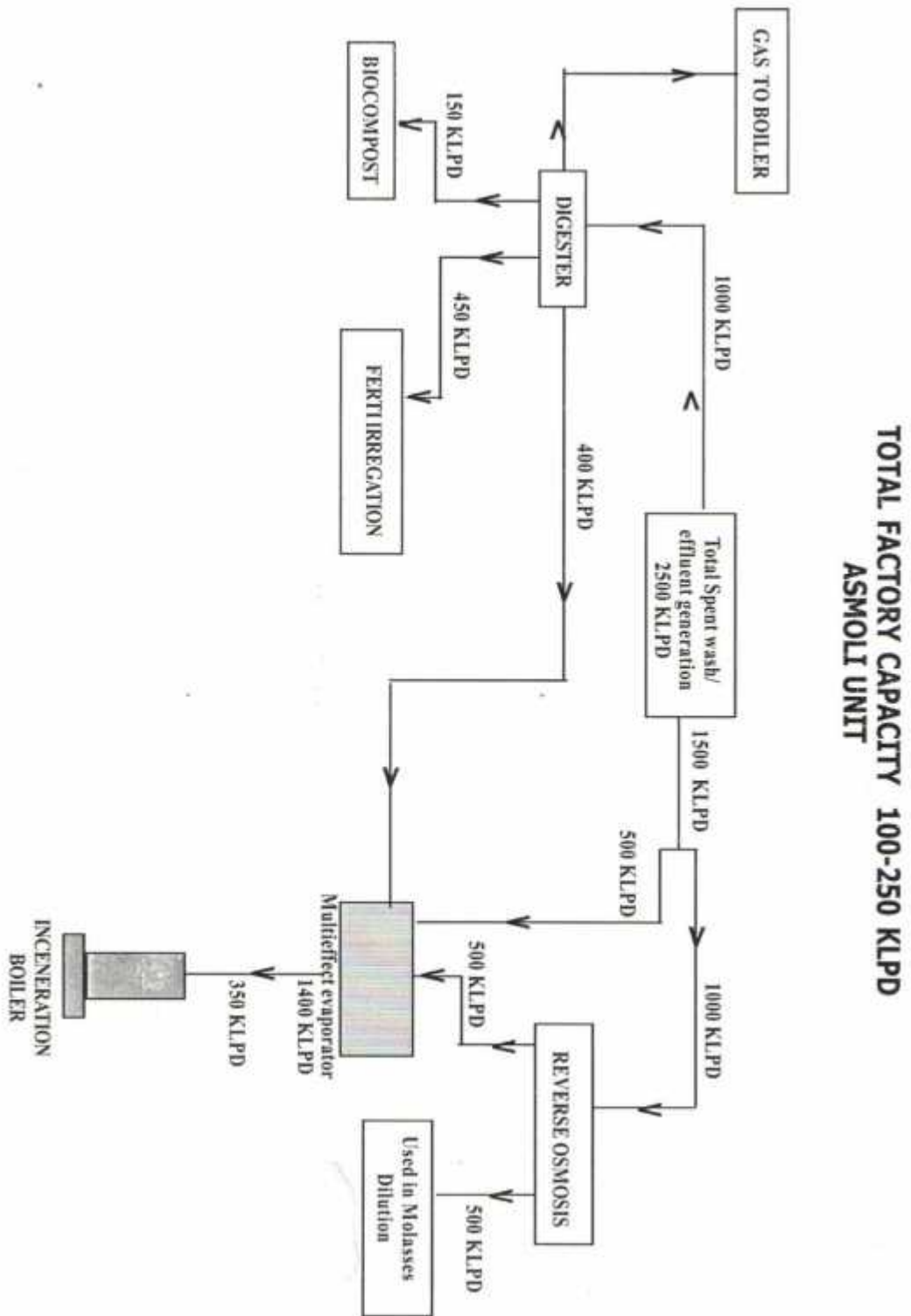


FIG-1

SPENT WASH TREATMENT AND UTILIZATION

Dhampur Sugar Mills, Distillery Unit, Asmoli, which is an attached distillery along with a 9000 TCD Sugar unit now proposes to expand its distillery capacity from 100 KLD to 250 KLD of rectified spirit/AA/ENA. The capacity enhancement to this Batch process distillery is likely to increase the spent wash generated from 1000 KLD to 2500 KLD during distillery operation.

The distillery endeavors to maintain its spent wash discharge at 10 KL per KL of alcohol which is within the range of 8.5 to 11.0 KL/KL, generated from continuous process molasses based distilleries. The raw spent wash from molasses based distillery operations is generally expected to exhibit the following characteristics.

Spent wash characteristics from different manufacturing processes.

S. No.	Parameter	Batch Process	Continuous Process	Biostill Process
1.	Colour	Dark brown	Dark brown	Dark brown
2	pH	3.7-4.5	4.0-4.3	4.0-4.2
3	COD	80,000-1,00,000	1,10,000-1,30,000	1,40,000-1,60,000
4	BOD	45,000-50,000	55,000-65,000	60,000-70,000
	Solids			
5	Total	90,000-1,20,000	1,30,000-1,60,000	1,60,000-2,10,000
	Total volatile	60,000-70,000	60,000-75,000	80,000-90,000
	Inorganic dissolved	30,000-40,000	35,000-45,000	60,000-90,000
6	Chlorides	5,000-6,000	6,000-7,500	10,000-12,000
7	Sulphates	4,000-8,000	4,500-8,500	8,000-10,000
8	Total Nitrogen	1,000-1,200	1,000-1,400	2,000-2,500
9	Potassium	8,000-12,000	10,000-14,000	20,000-22,000
10	Phosphorus	200-300	300-500	1,600-2,000
11	Sodium	400-600	1,400-1,500	1,200-1,500
12	Calcium	2,000-3,500	4,500-6,000	5,000-6,500

NOTE: All values from S. No. 4 to 13 are in mg/L.

Spent wash with a design characteristics as per column 1 of the Table as above is proposed to be segregated and treated through 2 streams-

1. 1000 KLD out of a Total Raw Spent Wash generation of 2500 KLD is proposed to be sent to the Continuous Stirred Tank Reactor for biogas generation. 600 KLD of post methanated effluents from here is proposed to be used for Bio-composting (150 KLD) and One Time Controlled Land application (450 KLD) and the balance 400 KLD sent to the Multi effect evaporator and incineration boiler for concentration and incineration.
2. Of the remaining 1500 KLD raw spent wash, 1000 KLD is proposed to be subjected to reverse osmosis with 500 KLD(50%) of the rejects to be taken to the Multi-effect evaporator for concentration and incineration. The permeate (500 KLD) will be used for dilution of molasses.
3. 500 KLD of the raw spent wash remaining after steps 1 and 2 as above are proposed to be taken directly to the Multi effect evaporator and thereafter to the incineration boiler for incineration.

The Biomethanation Unit, the Reverse Osmosis unit and the multi effect evaporator of adequate capacities are already installed. Biomethanation facilities exist for 1000 KLD, Reverse osmosis for 1000 KLD, Multi effect evaporator for 1400 KLD and Incineration boiler for 350 KLD. Bio-methanated effluents from the C.S.T.R are presently taken to a Reverse Osmosis unit from where they are sent to the multi effect evaporator and the rejects for incineration or biocomposting. Permeates are used for dilution of molasses. The modified scheme will utilize 450 KLD of post methanated effluents, from the existing unit for one time controlled land application and 150 KLD for composting.

A schematic layout of the proposed process is given at Fig.-1

Continuous Stirred Tank Reactor

The CSTR process is a high rate process in which anaerobic digestion takes place in the mesophilic range (37-39`c) and at a pH of around 7.2. Hydrolysis, acidogenesis and Methanogenesis are carried out in a single reactor. The reactor also

has a recirculation arrangement of settled solids from treated spent wash in order to maintain adequate population of micro organisms. The CSTR process is very consistent with a high Biogas generation and the capacity to reduce the BOD by 95% and COD by 65 to 70%

Digester Specifications

Diameter	32mt
Depth	25mt
Post Methanated BOD	5500-6000 mg/L
Post Methanated COD	35000-38000 mg/L

Reverse Osmosis and Multi effect evaporation

Reverse Osmosis technologies have the distinct ability to process both the raw and post methanated spent wash to give a stream of clear and colorless water and the other of concentrated spent wash in a ratio of 50:50 in the case of biomethanated and 45:55 in the case of raw spentwash . The reduced volume of concentrated spent wash also facilitates convenient composting. Reverse Osmosis unit with a capacity of 1000 KLD is installed and is suitable for both raw and biomethanated spent wash. In case of direct spent wash feed, the quantity of permeate may be around 45% instead of 50-52%. The reject would be about 55%.The membrane can work at a pH of 4.5-5.

Multi effect evaporation will be utilized to concentrate part of the Raw Spent Wash(500KLD), part of the biomethanated effluents(400 KLD) and RO rejects expected to be 500KLD and reduce them to 350 KLD. This will be Incinerated in an existing incinerator boiler and ash used as manure.

The existing Multi Effect concentration unit is of 1400m³/day capacity along with 70% and 90% concentration unit. The unit is suitable for raw spent wash and Bio-Methanated spent wash feed. The raw spent wash unit efficiency will be much better as compared to Bio-Methanated spent wash feed.

Utilisation of postmethanated spent wash in presown land(Controlled) application

The Central Pollution Control Board, in 2005, issued a protocol for one time controlled land application of post methanated distillery spent wash as liquid manure. The said protocol advocates the use of post methanated spent wash with a BOD of less than 7000 mg/L and a pH of more than 7. (Attached- Ann.1)

Post methanated spent wash has been recommended to be applied uniformly on land at least 20 days prior to the sowing of the crop and ploughed before raising the crops. The protocol has also prescribed the application rates for various crops which for loam are 90-125 m³/ha for sugarcane and 80-150 m³/ha for paddy etc. The Central Pollution Control Board had recommended Bio methanation followed by pre-sown irrigation as a 'Zero discharge option' to be followed by distilleries.

The Industry (Dhampur Sugars, Asmoli) has a command area of 80027.81 Hectares from where it sources its cane crop. Out of this the total cane area is 28537.20 Hectares, with a sowing season spreading from October to May, wheat crop area is 23207 Hectares with a sowing season spread from October to November and the Paddy area is 10131 Hectares with the sowing season in June and July. The industry proposes to use 450 KLD of post methanated spent wash for presown irrigation/ controlled land application. The total spent wash available for utilization on a 270 days working of the plant is expected to be 121500 KL per annum. Assuming a minimum application rate of 90 m³ per Ha as per the protocol prescribed by the Central Pollution Control Board, the land requirement works out to be only 1350 Ha as against the total cane area availability of 28537 Ha. Sufficient land is also available in terms of year long utilisation in other crops.

The only shortcoming that the Central Pollution Control Board has found with the utilization of biomethanated spent wash, in its resolution of May 2008, is that the effluents cannot be utilized in the Monsoon season although the CPCB protocol also suggests that a minimum storage of one month shall be provided for the storage of effluents during the monsoon season. The Industry has an existing storage capacity of

75000 Kilolitres for storage of effluents for one month. This will be sufficient to safeguard against the apprehensions of the CPCB.

JUSTIFICATIONS FOR THE USE OF SPENT WASH AS FERTILIZER AND FOR BIO-COMPOST

In spite of the recalcitrant nature of spent wash and the enormous damage, which may be caused as a result of uncontrolled discharge of untreated spent wash into water bodies and lands, many authors have classified it as a dilute organic fertilizer with 7 to 9% solids and 90 to 93% water. More than 75% of the solids are organic in nature and about 25% are inorganic. The occurrence of nitrogen in a mostly colloidal form allows it to behave as a slow release fertilizer and better than any inorganic source of nitrogen. The presence of phosphorus in the organic form has also enabled a better availability. In a study comparing spent wash to farm yard manure, it has been observed that spent wash solids contained more ether soluble, alcohol soluble and hot water soluble fractions than farm yard manure and a total potassium content almost 12 times higher than farm yard manure.

Organic compounds extracted by alkaline reagents have been found to be humic in nature and similar to those in soil. They also do not contain any toxic elements or compounds and the highly acidic nature and rich calcium and magnesium contents make them a good agent for reclamation of non saline sodic soils.

Because of its high organic matter, the spent wash is also a potential source of bioenergy. If this energy is trapped, distilleries producing 3.2 billion litres of alcohol can generate 5 trillion kilo calories of energy annually, apart from the post-methanated effluents providing 2,45,000 tonnes of potassium, 12,500 tonnes of nitrogen and 2,100 tonnes of phosphorus. One year's effluent has been estimated to meet the potassium requirements of 1.55 million hectare land, nitrogen requirement of 0.13 million hectare and phosphorus requirement of 0.025 million hectare of land if two crops are taken in a year.

Estimates also point out to the fact that the 40 billion litres of effluents generated from distilleries have at least Rs 500 crores of macronutrients (N, P, K and S) and Rs 50 crores worth of micronutrients and organics. The environmental costs of these effluents is put at Rs 800 crores, which includes Rs 100 crores to fisheries, 500 crores to water treatment, 100 crores on public health and 100 crores on landscape.

It has been widely recognized that there is a need of utilizing the nutrient capacity of spent wash to recharge the soil in order to maintain its continued productivity.

In Australia spent wash is blended with additional crop nutrients and sold as manure. CSR Ethanol is the second largest Australian producer of fuel ethanol. CSR Sugar produces 40% of Australia's sugar. Ethanol products and Fertilizer products are the two main product streams at CSR's Sarina Distillery in Mackay near North Queensland. The distillery is marketing Bio-dunder, a process co product which is value added into a complete liquid fertilizer. Bio-dunder is certified as organic and has been granted "Beneficial Use" status by the E.P.A. The key advantages of using Bio-dunder are the recycling of nutrients back into the soil. In Australia Bio-dunder fertilizer is now precision applied using variable rate application technology. The fertilizer returns are positively supported by projections in agriculture outputs. The Australian Government has recognized that CSR'S Sarina Distillery has changed into an environmental pariah in the local community into a welcome industry. Apart from process innovations, they have turned a pollutant into a saleable, import replacing product and improved its business position through an increased community acceptance. The communities complaints have also ended. Conversion of Spent wash into Biodunder also resulted in the

- Use of Biodunder as a cane field potassium fertilizer.
- Elimination of odour and contamination of water bodies.
- Increased plant productivity
- Improved quality of ethanol production.
- Reduction in steam usage within the plant by 30%.
- Reduction in water consumption by 70%.

Bio-dunder has been accepted by Cane and other farmers as a valuable potassium-rich fertilizer and 100% of the Bio-dunder product at the Sarina distillery is now recycled into this market. Previously only imported fertilizers were used. In 1992, the Australian Chemical Industry Council awarded its annual Environment Award to CSR employees who had been instrumental in developing the Biodunder concept.

Dunder (or concentrated spent wash) from the Sarina Distillery is also blended with Nitrogen, H₂SO₄ and Phosphorous and converted into another product called “Liquid One Shot” for application as fertilizer in cane and other crops. Nitrogen volatilization is reduced in liquid One shot products, uptake by plants is more rapid and it is cost competitive.

Spent wash could also be utilized for composting the trash in the field. In Brazil, the accumulated trash material in the sugarcane harvested field is sprayed with spent wash to facilitate the accelerated composting of the trash in the field itself. Brazilian experience suggests that efficient application technologies and spray applications reduce the damage to soil and prevent ground water pollution. Up to 70% crops are being irrigated by spent wash.

Central Pollution Control Board on One Time Land Application

The CPCB in its document entitled “Management of Distillery Wastewater” (Resource Recycling Series: RERES/4/2001-2002) had suggested the following options:

- Biomethanation followed by irrigation
- Biomethanation and secondary treatment followed by irrigation or disposal in surface water
- Composting after or without biomethanation
- Controlled land application, after or without biomethanation
- Concentration and incineration with energy recovery
- Disposal by dilution in sea or estuary after biomethanation

The CPCB has recognized in the above document that a combination of composting and controlled land methods of spent wash utilization is an ideal disposal option.

The Charter on Corporate Environmental Responsibility, 2003, does not speak of one time controlled land application as a treatment option but in 2005, the CPCB published a protocol for one time controlled land application of treated biomethanated distillery spent wash as liquid manure, which was based on field and experimental studies carried by the I.A.R.I, Delhi and Tamil Nadu Agricultural University, Coimbatore. The said protocol advocates the use of post methanated spent wash with a BOD of less than 7000 mg/L and a pH of more than 7. (Attached-Ann.1) Post methanated spent wash has been recommended to be applied uniformly on land at least 20 days prior to the sowing of the crop and ploughed before raising the crops. It has also prescribed the application rates for various crops which for loam are 90-125 m³/ha for sugarcane and 80-150 m³/ha for paddy etc.

The Central Pollution Control Board had recommended Bio methanation followed by pre-sown irrigation as a 'Zero discharge option' to be followed by distilleries. In 2008 the CPCB through a Board resolution decided not to permit existing stand alone distilleries for expansion based on composting, ferti-irrigation and one time land application. There were no recommendations with respect to existing attached distilleries going in for an expansion. Existing distilleries (both stand alone or attached) which were not complying with standards were expected to switch over from composting, ferti-irrigation and one time land application in a time bound manner. The CPCB does not appear to have discouraged pre-sown application in the case of existing attached distilleries going in for expansion.

The Member Secretary, CPCB in his paper of 2011 (Emerging Issues and Emerging Technologies in Distillery Sector) has referred to one time land application as an irrigation system, while the protocol of 2005 by the CPCB refers to it, as a manuring system. The contention of the CPCB against one time land application appears to be based on difficulties in the rainy season, high dilution to meet irrigation norms and ground water contamination. All these apprehensions have not been able to take into consideration that the technology also involves spent wash to be sprayed uniformly on agricultural land.

The CPCB had prescribed Guidelines for Water Quality Management in January 2008. These guidelines have recognized that the reuse and recycling of wastes for agricultural purpose would not only help to reduce the pollution and requirements of fresh water for such use but also would supplement the much needed nutrients and organic manure to plants. These guidelines also state that the resolution under CREP should also be adhered to. The CPCB resolution of May 2008 does not find any demerit in its statement of January 2008 regarding the enormous irrigation and fertilization potential of spent wash. It only says that ferti-irrigation, composting and land application options did not work in rainy seasons. Interestingly the said minutes, which discourage use of spent wash in ferti-irrigation, composting and land application, on the very next page also recognize that “As per CPCB, the bio-compost contains 2.5% nitrogen, 1.8% phosphorus and 3% potassium. Based on the total production of bio-compost produced, the requirement of nitrogen on an all India basis is met up to 6.24%, phosphorus 9.06% and potassium 51.06%. Moreover, the above fertilizer is produced from organic matter substituting the imported chemical fertilizer, which is highly subsidized.”

The CPCB, Central Zonal Office, Bhopal has published a report entitled “Assessment of grain based fermentation technology, waste treatment options, disposal of treated effluents” in 2010-11. This paper also recognizes Controlled Land application as a viable alternative but refers to it as not being supported by regulatory agencies because of management problems. It admits that the Protocol developed by CPCB is based on the protocols followed in other parts of the world with great success and also studies carried out by Agricultural Universities in India.

The same paper also suggests that concentration and incineration is also associated with problems of high COD condensates, sludge disposal (as composting is not allowed), clogging of boilers and that the sustainability of this technology needs to be established.

No standards have been prescribed by the CPCB for ferti-irrigation (the CPCB earlier accepts 500 mg/L BOD and 2100 mg/L TDS as safe criteria) or for one time

land application and composting it would appear just if existing attached distilleries are allowed to operate as per the existing protocols, evaluated in terms of the protocols for these technologies and required to shift only if they do not meet the protocol. It is important to again note here that emerging technologies may require major changes and the fact that hardly 25% existing distilleries are in a position to concentrate spent wash. Only 24 distilleries in U.P. are having R.O. system.

Co-processing of spent wash concentrate has been recommended to the extent of 3.0 to 3.5% of heat/coal substitution - a concentration up to which co-processing of spent wash has not been considered to influence clinker quality or change kiln behavior. A maximum loading of 1000 Litres per hour has been experimented. This would only mean about 24 KLD of concentrated or about 50 KLD of raw spent wash per day in a 3000 TPD cement kiln. This is a very small quantity as compared to the total spent wash available. Also the availability of willing cement mills, furnaces and TPPs may be limited in the area of the distillery. U.P. has been reported to have 56 molasses based distilleries, with only 1 cement plant and 11 TPPs. This would again support the view of a mix of technologies with bio-composting, ferti-irrigation and one time land application also being considered on account of their ecological and agronomical advantage. Co-processing could however be a preferred option for standalone distilleries and in Karnataka, Madhya Pradesh and Rajasthan where the ratio of cement plants/TPPs to distilleries is higher. In terms of the co-processing project, the CPCB document accepts that “Even though the initial trials appear encouraging, the effect of inorganic constituents in spent wash on the finished product is to be assessed.” It also recognizes that “The applicability of the technology for Distilleries that are located far away is to be assessed in terms of cost effectiveness”.

PROJECT REPORT FOR EXPANASION OF DISTILLERY

CAPACITY (100 KLPD TO 250 KLPD)

150 KLPD RECTIFIED SPIRIT/ABSOLUTE ALCOHOL / ENA PLANT

AT DSM SUGAR ASMOLI

(DISTILLERY DIVISION)

(A UNIT OF THE DHAMPUR SUGAR MILLS LTD)

ASMOLI, SAMBHAL

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EXECUTIVE SUMMARY

DSM Sugar Asmoli (Distillery Division), Asmoli, a unit of the Dhampur Sugar Mills Ltd is located in district Sambhal of Uttar Pradesh. The factory is most ideally located with respect to the availability of raw material, water, skilled and unskilled manpower and infrastructure facilities.

In view of the availability of molasses from sugar plant at Asmoli and other sugar plants of the group located nearby, it is a suitable location for expansions of an alcohol plant to meet the demand of the automobile fuel sector. Blending of Ethanol with petrol is being encouraged by the Indian Government to reduce the country's dependence on high priced imported crude oil.

Ethanol is manufactured from molasses in three steps. First molasses is fermented to produce fermented wash, followed by distillation of fermented wash to produce rectified spirit and finally rectified spirit is dehydrated into ethanol, using molecular sieve system. Molecular sieve system is better than the conventional distillation system as it consumes less steam as compared to the latter.

A suitable effluent treatment plant has been conceived to reduce BOD level to the acceptable limit. Spent wash will be first treated in a biomethanation plant, which converts organic matter into useful energy in the form of biogas. Biogas is sent to the Boiler as a Fuel, resulting in saving of bagasse. Spent wash from the biomethanation plant is proposed to be converted into useful manure by bio-composting.

Total project cost for the proposed ethanol plant is estimated at 9720 lac. The project is planned to be funded partly through commercial loans and partly through the Sugar Development Fund. The cost benefit analysis indicates that the project is commercially viable and offers a favourable debt service coverage ratio.

SECTION 1

BACKGROUND

The Dhampur Sugar Mills Ltd (DSM) started operation in 1933 with a 300 TCD sugar mill located at Dhampur in North India and has a successful track record of about seven decades of efficient operation. During this period it has grown into one of the largest sugar manufacturing groups in India, owning at present five sugar mills in the state of Uttar Pradesh with a combined cane crushing capacity of more than 30,000 TCD.

DSM has diversified into molasses based chemicals, by setting up a distillery and manufacturing facilities for alcohol based chemicals, such as; acetaldehyde, acetic acid, acetic anhydride and ethyl acetate. Licensed Distillery Capacity is 100 KLPD. Distillery is already in production of Rectified Spirit, Extra neutral Alcohol and Fuel Ethanol.

DSM is now proposing to expand the Distillery Capacity from **100 KLPD to 250 KLPD**, which will be based on most modern technologies and the state of art features. Project will result in Higher efficiencies, Energy conservation and Zero Effluent Discharge.

The present project report covers salient features of the project; such as market scenario, process of manufacture, raw material and utilities, project implementation schedule and estimated cost of project.

This Project Report involves the additional Infrastructure required to enhance the capacity of distillery from 100 KLPD to 250 KLPD i.e. an additional set up of 150 KLPD Distillery with Effluent Handling System.

SECTION 2

NEED FOR ETHANOL PLANT

India is predominantly an agro based economy. Sugarcane plays a vital role in this agro-based economy by providing sugar, the main sweetener, used in India. The state of Uttar Pradesh is the largest producer of sugarcane in India among all the states and accounts for over 45% of the sugarcane production in the country.

There are three important by- products of the sugar industry:

- **Molasses** which is converted into alcohol, an important raw material for organic chemicals and polymer industry.
- **Bagasse** which is used as a fuel for cogeneration of power and also as a raw material for production of paper.
- **Press Mud** which is used for the effluent treatment to produce biofertiliser.

The sugarcane available in U.P. yields on an average; 10% sugar, 32% bagasse and 4% molasses. Molasses is used for manufacturing industrial alcohol, potable alcohol and other organic chemicals.

There are at present 45 distillery units in U.P., Out of which 37 are in private sector and 8 in the Government / Cooperative sector. Six of these units (4 in the private sector and 2 in the cooperative sector) are presently closed. Only 39 units are functional, of which 37 are molasses based and two are based on non conventional sources of raw material i.e. broken grain and malt.

The Alcohol Distillery industry in U.P., with its symbolic link to the sugar industry constitutes a major segment of the state's industrialization. Its contribution to the state revenue was Rs 1511.50 crores, Rs 1870.80 crores and Rs 2101.60 crores by way of excise duty, in the years; 1998-99, 1999-2000 and 2000-2001 respectively, which is second only to the trade tax realization in the state. This is also the highest contribution by any single industry to the state exchequer. It also provides employment to about 8000 persons in the state, thus leading to overall growth.

With the opening up of the automobile fuel sector for blending with ethanol, the alcohol industry is slated for a major expansion to play a vital role in meeting the ever-growing energy requirement of the country. Ethanol blended fuel is set to be made mandatory once again, as part of a long term commitment to the blending programme in keeping with the policy prevailing in countries, such as the USA and Brazil. The main reason for switching back to ethanol blending is the better properties of ethanol as an oxygenate compared to the conventional oxygenate MTBE. The latter is being phased out globally on the contention that it is carcinogenic. Moreover, ethanol blending is expected to reduce the country's dependence on high priced imported crude oil.

The introduction of Euro III norms for automobiles should also push the demand of ethanol, as an oxygenate. Ethanol is now proved to have a higher octane content than MTBE and in the USA, high cost ethanol is being produced from corn for blending in fuels and to replace MTBE. Australia, Nepal, Columbia, Poland and Sweden have also initiated fuel ethanol programs

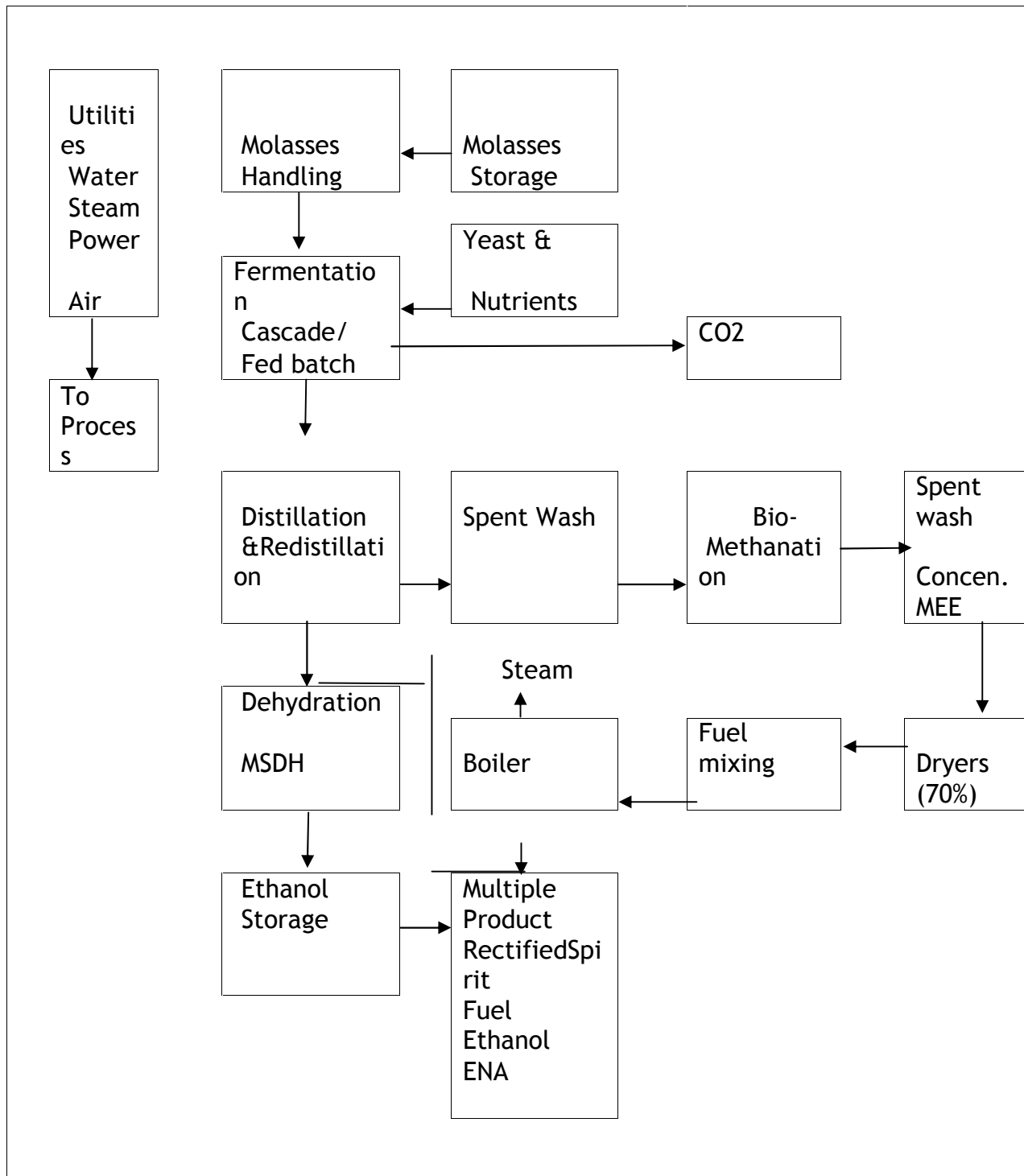
Sugar industry will also benefit, as its profitability will increase by producing a value added product, having an assured market.

This diversification will also strengthen the sugar industry's ability to balance the Sugar and Ethanol production according to the prevailing International prices of sugar and crude oil. This is the kind of model successfully employed by the Brazilian sugar industry.

What has come as a big boost to the sugar industry is the favourable current projection that sugar production will reach normal levels of 18 million tons for the next sugar year. This will fully cover the ethanol requirements of the oil companies for blending after catering to the needs of the liquor and the chemical sectors. In the wake of increased ethanol prices world wide, many potential producers of ethanol have been prompted to re-evaluate opportunities in the sector. There is also increased enthusiasm for national fuel ethanol programme designed to reduce vehicle carbon emissions. At the same time, environmental concerns, most notably in the USA, look set to boost the demand for fermentation ethanol at the expense of its synthetic counterpart, MTBE.

SECTION 3

PROCESS DESCRIPTION: DISTILLERY BLOCK DIAGRAM



PROCESS BLOCK DIAGRAM FOR DISTILLERY/ENA/ETHANOL PLANT

The process for the manufacture of Ethanol consists of the following steps:

- Fermentation of molasses to produce fermented wash.
- Distillation of fermented wash to produce rectified spirit (RS).
- Distillation of fermented wash to produce Extra Neutral Alcohol (ENA).
- Dehydration of RS to Ethanol, using the molecular sieve system.

3.1 FERMENTATION:

3.1.1 Molasses: Storage & Handling

Molasses is a by product of the sugar industry and is generally stored in steel tanks. It is pumped to the molasses weighing system located in the plant premises. The weighing system is generally a load cell based system with a counter for measurement of quantity of molasses being processed in a given period of time. After weighment, molasses is pumped to the molasses diluter located alongside the fermenter.

3.1.2 Yeast Propagation:

Molasses is taken into the yeast vessel and sterilized by steam. Yeast seed material is prepared and added to the yeast vessels by inoculating molasses with yeast. The contents of the yeast vessel are then transferred to the yeast activation vessel. The purpose of aeration in the yeast activation is to allow time for the multiplication of the yeast cells.

3.1.3 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, however; the fermentation temperature is maintained between 32-34 deg C by recirculation of cooling water through forced circulation heat exchangers.

The fermentation system has a provision for addition of anti foam, nutrients etc. Alcohol concentration of 5% V/V is maintained in the first fermenter, while the same is maintained between 7-8% V/V in the second fermenter, depending upon FS content of molasses.

At the end of the fermentation cycle, wash is received in a wash holding tank, from where it is fed to the distillation section. Yeast growth critically required for the fermentation process, is maintained under aerobic conditions and the aerated cell mass is transferred to the fermenters.

3.1.4.a Distillation of Wash to Rectified Spirit:

The process requires analyser, aldehyde, degasifying, pre rectification column and rectifier cum exhaust columns. The analyser, pre rectification and degasifying columns are operated under vacuum, whereas; rectifier cum exhaust column is operated under pressure.

Rectifier column top vapours meet the energy requirement for analyser column. The rectifier column top vapours are condensed in a thermo-siphon reboiler, connected to analyser column and these vapour transfers the heat to spent wash of analyser column.

The fermented wash is fed to the degasifying column top. Analyser vapours are fed to the Pre rectifier column & the vapour of Pre rectification column are condensed & fed to rectifier column. Final RS is drawn from the top of the rectifier column.

3.1.4.b Distillation of Wash to ENA Spirit:

The process requires analyser, aldehyde, degasifying and primary rectifier cum exhaust columns, hydro-extractive distillation column, rectifier column, fusel oil column, refining column. The analyser, Pre rectifier and degasifying columns are operated under vacuum, whereas; rectifier cum exhaust column, fusel oil column, dealdehyde and hydroextractive distillation column are operated under pressure.

Rectifier column top vapours meet the energy requirement for analyser column. The rectifier column top vapours are condensed in a thermo-siphon reboiler, connected to analyser column and these vapour transfers the heat to spent wash of analyser column.

The hydroextractive distillation column top vapour is used for heating refining column and dealdehyde column.

The fermented wash is fed to the degasifying column top. Analyser vapours are fed to the Pre rectifier column & the vapour of Pre rectification column are condensed & fed to rectifier column. Final RS is drawn from the top of the rectifier column. The RS is fed to hydroextractive column for purification. The dilute alcohol from bottom of this column is fed to the Rectifier column where from the top ENA is taken and fed to refining column. The final refined ENA product is taken from refining column bottom.

3.2 Ethanol Plant Based on Molecular Sieve

The sid mounted molecular sieve 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 consists of two beds of desiccant and an evaporator / 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 and fed to the evaporation / regeneration column. The vapours are drawn from the top of the column and are partially condensed. A part of the vapour drawn is superheated and sent to Sieve bed 1, where the vapour is dehydrated, condensed and cooled, and pumped to storage. A portion of the dry vapour is purged to sieve Bed 2, under vacuum, to regenerate the bed in preparation for cycle changeover when bed 2 goes on line.

The regeneration process releases the adsorbed water and ethanol as low strength vapours. These are condensed and recycled with the feed to the evaporation column. A stillage stream (containing not more than 500 ppm ethanol) is obtained from the bottom of the evaporation column.

SECTION 4 : PROJECT AT A GLANCE

A) DESIGN BASIS OF THE ETHANOL PROJECT

1. Capacity of the plant : 150,000 litres per day total Alcohol.
(Design Basis)
2. Extra Neutral Alcohol : 150,000 litres per day.
3. Anhydrous Alcohol : 150,000 litres per day.
4. Raw material : Cane Molasses with 40 % FS Min.
5. Molasses Requirement : 665- 685 MT per Day
6. Water source : Ground water after suitable treatment.
7. Fuel for steam : Bagasse - Dhampur Sugar.
8. Electricity source : Steam turbine for regular operation and
9. Waste water treatment : Bio-methanation, R.O. Plant, Bio-
Composting, Spent Wash Evaporation,
Conc. Spent Wash Incineration Boiler

4 B) PERFORMANCE PARAMETERS

	Parameters	Description
1	Plant capacity	150,000 litres / day
2	Main products	150,000 litres / day of Fuel Grade Ethanol OR Rectified Spirit /ENA 5,000 liters per day Technical Alcohol at 94.68 % v/v. OR 150,000 litres / day Anhydrous Alcohol at 99.8 % v/v. <u>It can produce above products simultaneously in any ratio.</u>
3	Technology	<u>Cascade continuous fermentation with special yeast strain.</u> The fermentation is trouble & maintenance free without using recycle of yeast or spent wash, which ensures cleaner & longer fermentation cycle. <u>8 columns vacuum distillation with hydro extractive distillation.</u> The distillation is designed to produce any of the products at any ratio and superfine neutral alcohol is produced using hydro extractive distillation.
4	Efficiency & alcohol yield at 45 % w/w Fermentable sugars	1. EFFICIENCY Fermentation efficiency-90 % (91% for FS more than 45%) Distillation efficiency - 98.0 % 2. YIELD 265 to 267 litres 96 % v/v alcohol per Ton molasses at 45 % Fermentable Sugars. 251 TO 253litres of 99.8% v/v Alcohol per Ton of molasses at 45 % Fermentable Sugars.

SECTION 5 : SPECIFICATIONS - PRODUCT, INPUT AND PROJECT
PRODUCT SPECIFICATIONS

Indian Standard 6613 of 1972, Revised 1984

Specification requirements for ENA (Extra Neutral Alcohol)

1. Relative density at 15°C	0.81245 - 0.81679
2. Ethanol content, percent by volume at 15.6 °C	94 - 96
3. Miscibility with water	Miscible
4. Alkalinity	Nil
5. Acidity, as acetic acid, g/100 ml, maximum	0.002 (20 p.p.m)
6. Residue on evaporation, g/100 ml, maximum	0.002 (20 p.p.m)
7. Aldehydes, as acetaldehyde, g/100 ml, maximum	0.004 (40 p.p.m)
8. Esters, as ethyl acetate, g/100 ml, maximum	0.01 (100 p.p.m)
9. Copper, as Cu, g/100 ml, maximum	0.0002 (2 p.p.m)
10. Lead, as Pb, g/100 ml, maximum	Nil
11. Methyl alcohol:	To satisfy test
12. Isopropyl alcohol, acetone and other ketones	To satisfy test
13. Furfural	To satisfy test
14. Permanganate decolorization time, minimum, minutes	30

Please note: The figures in parentheses for parts per million (p.p.m) do not appear in the original standard, but have been added here to facilitate comparison with standards of other countries.

Indian Standard 323 of 1959

Specifications requirements for Rectified Spirit

Grade 1 (Potable) and Grade 2 (Industrial)

	<u>Grade 1</u>	<u>Grade 2</u>	<u>Test method</u> (Refer to appendix)
1. Specific gravity at 15.6°C, maximum:	0.8171	0.8171	B
2. Ethanol content:			
(a) Percent by volume at 15.6°C, minimum:	94.68	94.68	C
(b) Degrees overproof, minimum:	66	66	C
3. Miscibility with water:	Miscible	Miscible	D
4. Alkalinity:	Nil	Nil	E
5. Acidity, as acetic acid, percent by weight, maximum:	0.002 (20 ppm)	0.01 (100 ppm)	E
6. Residue on evaporation, percent by weight, maximum:	0.005 (50 ppm)	0.01 (100 ppm)	F
7. Aldehydes, as acetaldehyde, g/100 ml, maximum:	0.006 (60 ppm)	0.10 (1000 ppm)	G
8. Esters, as ethyl acetate, g/100 ml, maximum:	0.02 (200 ppm)	-	H
9. Copper, as Cu, g/100 ml, maximum:	0.0004 (4 ppm)	-	J
10. Lead, as Pb, g/100 ml, maximum:	0.0001 (1 ppm)	-	K
11. Methyl alcohol:	To satisfy test.	-	L
12. Fusel oil:	To satisfy test.	-	M
13. Furfural:	To satisfy test.	-	N

****Please note: The figures in parentheses for parts per million (ppm) do not appear in the original standard, but have been added here to facilitate comparison with standards of other country

D) ANHYDROUS ALCOHOL SPECIFICATIONS FOR FUEL USE

Fuel Ethanol Specifications: IS 15464: 2004

Absolute (Anhydrous) Alcohol	Special Grade	Test Method
Relative Density @ 15.6/15.6 °C, Max.	0.7961	A
Ethanol content @ 15.6 °C, vol %, v/v Min. (excluding denaturant)	99.6	B
Miscibility with water	Miscible	C
Alkalinity	Nil	D
Acidity (CH ₃ COOH), mg/l, Max.	30	D
Residue on evaporation, wt%, Max.	0.005	E
Aldehydes, as (CH ₃ CHO), mg/l, Max.	60	F
Copper, mg/kg, Max	0.1	G
Conductivity, micro S/m, Max.	300	H
Methyl alcohol, mg/l, Max.	300	J
Appearance	Clear & Bright	Visual

SPECIFICATIONS OF INPUTS

1. MOLASSES

Molasses should be free from caramalisation products and known inhibitory elements of yeast metabolism i.e. lead, Arsenic polyelectrolytes etc. or micro organisms producing side products. Such available molasses will have :-

- (a) Fermentable sugars : Min 40% (w/w)
- (b) F/N Ratio : Min 0.9 ***
- (c) Sulphated ash : Max 15 % (w/w)
- (d) Volatile Acids : Normal - 5000 to 8,000 ppm
- (e) Bacterial content : Max. 10 cfu/gm
- (f) Caramel content : Max 0.3 Absorbance at 375 nm.

***: Ratio of Fermentable sugars to Non-Fermentable sugars.

2. PROCESS WATER / SEALING / CLEANING / TESTING WATER

Process water should be filtered and shall not contain any E. COLI or COLIFORM bacteria with total germs count being limited to 60 Nos / ml. The chloride content shall be less than 25 ppm.

3. COOLING WATER FOR CIRCULATION

Cooling water at a temperature of 30 Deg. C max. with a total hardness of 5 ppm maximum & Total Dissolved solids of 30 ppm max.

4. SULPHURIC ACID

Concentrated, Commercial Grade, Composition as below value in % W/W

- (a) Sulphuric Acid : 98 MIN
- (b) Lead : 0.001 MAX
- (c) Arsenic : 0.0001 MAX
- (d) Iron : 0.03 MAX
- (e) Moisture : 2 MAX

5. UREA

In the form of prills or pellets with total Nitrogen not less than 46% W/W.

6. DIAMMONIUM PHOSPHATE (D A P)

In the form of granules. Composition as below. Values in % w/w

- (a) P2O5 : 50 MIN
- (b) Nitrogen : 20 MIN
- (c) Arsenic : 0.0001 MAX.
- (d) Iron : 0.01 MAX.
- (e) Lead : 0.001 MAX

7 ANTIFOAM

Turkey red oil. Composition as below, Value in % w/w

- | | | |
|--------------------------|-------------|------|
| (a) Degree of sulphation | : 6 | MIN |
| (b) Total alkali (KOH) | : 3 | MAX. |
| (c) Total fatty matter | : 60 | MIN |
| (d) Total Ash | : 8 | MIN |
| (e) pH | : 6.5 - 7.5 | |

8 STEAM FOR PASTEURISATION

Dry, saturated should be provided at the inlet of steam header in fermentation plant. and the pressure required shall be 1.5 kg/cm² (g) at the steam header.

9 STEAM FOR DISTILLATION

Dry, saturated should be provided at the inlet of steam header in Distillation plant and the pressure required shall be 3.5 kg/cm² (g) at steam header. The max variation in the steam pressure shall not be more than +/- 0.1 kg/cm².

PROJECT SPECIFICATIONS

The turnkey ethanol project will be designed and constructed in strict compliance with the international standards and brands of equipment.

Design codes:

The following are the design standards used for the equipment for design.

1. Pressure Vessels and distillation columns as per ASME
2. Storage tanks as per API
3. Heat Exchangers as per TEMA
4. Piping and valve as per DIN/JIS
5. Instruments as per ISA.

**SECTION 6
PLANT AND MACHINERY LIST
(EQUIPMENT LIST IN ABCD FORMAT)**

APPENDIX- A (RECTIFIED SPIRIT SECTION)

Sr. No.	Technical Data	Analyser Column	Degasser Column	Rectifier Column -I	Heads Conc. Column
1	Total height of Column (m) (Dish end to Dish end)	16.500	5.200	16.750	10.700
2	Outer Diameter of Column (mm)	3712	2200	3212	2480
3	Inner Diameter of Column (mm)	3700	2190	3200	2470
4	Material Of Construction	SS 304	SS 304	SS304	SS 304
5	Thickness (mm)	6	5	6	5
6	Total No. Of Plates	20	6	60	45
7	Plate Spacing (mm)	750	4	250	200
8	Design Details of Trays	Tunnel	Tunnel	Bubble Cap	Bubble Cap
9	Material Balance	NA	NA	NA	
10	Location & Design of Feed Plate	NA	NA	21/23	15/16/17
11	Capacity Of Column in terms of Litres of				
11.a	Feed (m ³ /hr)	83.15 m ³ /hr	83.15 m ³ /hr	12.67 m ³ /hr	3.15 m ³ /hr
11.b	Output (m ³ /hr)	m ³ /hr	83.15 m ³ /hr	12.67 m ³ /hr	3.15 m ³ /hr
12	Percentage of alcohol in Feed and Output				
12. a	Feed % V/V	7.5 % V/V	7.5 % V/V	45 % v/v	94 % AND 55 % AL
12. b	Output % V/V	45 % V/ V	55 % V/V	96 % V/V	95 %
13	Base and Top Pressure of column (Bar)	0.6/0.45	0.45/0.42	2.5/1.8	0.385/0.29
14	Pressure Drop across Tray mm WC	65	65	40	40
15	Vapour velocity (Superficial Velocity) m/sec	Proprietary Item	Proprietary Item	Proprietary Item	Proprietary Item

16	% Of Alcohol in reflux, reflux ratio	N.A.	NA	95-96 % V/V	94-95 % V/V
17	Efficiency	98.0 %	98.0 %	98.0 %	NA

(EXTRA NEUTRAL ALCOHOL SECTION)

Sr.No	Technical Data	Hydro Extractive Column	Fusel Oil Column	Refining Column
1	Total height of Column (m) (Dish end to Dish end)	13.5	11.500	11.500
2	Outer Diameter of Column (mm)	2330	1200	1088
3	Inner Diameter of Column (mm)	2320	1190	1080
4	Material Of Construction	SS304	SS 304	Copper
5	Thickness (mm)	5	4	4
6	Total No. Of Plates	45	50	50
7	Plate Spacing (mm)	250	200	200
8	Design Details of Trays	Bubble Cap	Bubble Cap	Bubble Cap
9	Material Balance			
10	Location & Design of Feed Plate	17/29	21/23,25/27	31/31
11	Capacity Of Column in terms of Liters			
11.a	Feed (m ³ /hr)	28.125 m ³ /hr	0.175 m ³ /hr	6.25 m ³ /hr
11.b	Output (m ³ /hr)	28.125 m ³ /hr	0.175 m ³ /hr	6.25 m ³ /hr
12	Percentage of alcohol in Feed and Output			
12.a	Feed % V/V	95 %	-----	95 %
12.b	Output % V/V	96 %	94 %	96 %
13	Base and Top Pressure of column (Bar)	1.20/1	1.20/1	0.63/0.4
14	Pressure Drop across Tray mm WC	40	40	40
15	Vapour velocity	Proprietary	Proprietary	Proprietary

	(Superficial Velocity) m/sec	Item	Item	Item
16	% Of Alcohol in reflux, reflux ratio	95-96 % V/V	94-95 % V/V	95-96 % V/V
17	Efficiency	98.0%	98.0 %	NA

Sr.No	Technical Data	Rectifier Cum Exhaust column
1	Total height of Column (m) (Dish end to Dish end)	19.5
2	Outer Diameter of Column (mm)	2950
3	Inner Diameter of Column (mm)	2940
4	Material Of Construction	Copper
5	Thickness (mm)	5
6	Total No. Of Plates	72
7	Plate Spacing (mm)	250
8	Design Details of Trays	Bubble Cap
9	Material Balance	NA
10	Location & Design of Feed Plate	21/23
11	Capacity Of Column in terms of Litres of	
11.a	Feed (m ³ /hr)	34.37 m ³ /hr
11.b	Output (m ³ /hr)	34.37 m ³ /hr
12	Percentage of alcohol in Feed and Output	
12. a	Feed % V/V	15 % v/v
12. b	Output % V/V	95 % V/V
13	Base and Top Pressure of column (Bar)	2.5/1.8
14	Pressure Drop across Tray mm WC	40
15	Vapour velocity (Superficial Velocity) m/sec	Proprietary Item
16	% Of Alcohol in reflux, reflux ratio	95-96 % V/V
17	Efficiency	98.0 %

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ABSOLUTE ALCOHOL PLANT

Sr.No	Technical Data	Recovery Column
1	Total height of Column (m) (Dish end to Dish end)	8.700
2	Outer Diameter of Column (mm)	2070
3	Inner Diameter of Column (mm)	2060
4	Material Of Construction	SS 304
5	Thickness (mm)	5
6	Total No. Of Plates	35
7	Plate Spacing (mm)	200
8	Design Details of Trays	Sieve Tray
9	Material Balance	NA
10	Location & Design of Feed Plate	26/27
11	Capacity Of Column in terms of Liters of	
11.a	Feed (m ³ /hr)	6.6 m ³ /hr
11.b	Output (m ³ /hr)	6.25 m ³ /hr
12	Percentage of alcohol in Feed and Output	
12.a	Feed % V/V	94.68 %
12.b	Output % V/V	99.9 %
13	Base and Top Pressure of column (Bar)	3.0/2.8
14	Pressure Drop across Tray mm WC	40
15	Vapor velocity (Superficial Velocity) m/sec	Proprietary Item
16	% Of Alcohol in reflux, Reflux ratio	99.9 % V/V
17	Efficiency	98.5 %

APPENDIX- B

Sr. no	Technical Data	Rectifier Vent Condenser	Primary Column Reboiler	Mash Preheater	Degasser Column Condenser I & II	Dealdehyde Condenser I & II	Rectifier Vent Condenser	Hydro Extractive Condenser I	Rectifier Column Reboiler
1	Area m ²	40	480	144	40/12	80/12	400/48	40	560
2	Tube Length m	3	3	3	3	3	3	3	3
3	Tube Diameter MM	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
4	No. Of Tubes	168	2016	604	168/50	336/50	1680/200	168	1882
5	No. Of Pass	4	1	12	4/2	4/2	4/2	4/2	1
6	Tube Side Fluid temp. IN/OUT	32/42	128/105	32/45	32/45	32/40	32/45	32/45	128/128
7	Shell side Fluid Temp. IN/ OUT	92/92	140/128	NA	72/72	50/50	96/96	78/78	140/128

Sr.no	Technical Data	Fusel Oil Vent Condenser I	Refining Column Condenser I & II	Refining Column Reboiler	Main Product Cooler	Technical Alcohol Cooler	Fusel Separator	Fusel Oil Cooler	Mash Preheater Using PHE	Water Preheater PHE
1	Area M ²	32	144/12	200	80	6	NA	5	NA	NA
2	Tube Length m	3	3	3	3	3	NA	3	NA	NA
3	Tube Diameter MM	25.4	25.4	25.4	25.4	25.4	NA	25.4	NA	NA
4	No. Of Tubes	134	604/50	840	336	26	NA	22	NA	NA
5	No. Of Pass	2	4/2	1	1	1	NA	1	NA	NA
6	Tube Side Fluid temp. IN/OUT	32/45	32/40	68/67	32/45	NA	NA	NA	NA	NA
7	Shell side Fluid Temp. IN/OUT	78/78	57/57	96/68	78/32	NA	NA	NA	NA	NA

ABSOLUTE ALCOHOL PLANT

Sr .n o	Technical Data	Mol. Sieve Condenser	Weak Alcohol condenser	Recovery column Reboiler	Superheater	Feed Preheater	Absolute alcohol cooler
1	Area m ²	74	96	64	54	74	80
2	Tube Length m	3	3	3	3	3	3
3	Tube Diameter MM	25.4	25.4	25.4	25.4	25.4	25.4
4	No. Of Tubes	310	404	268	226	310	336
5	No. Of Pass	4	4	1	1	1	1
6	Tube Side Fluid temp. IN/OUT	32/45	32/40	68/67	NA	NA	NA
7	Shell side Fluid Temp. IN/ OUT	78/78	78/78	96/68	NA	NA	NA

PUMPS For Distillation

S.N	Discription	Type	Capacity	Head	Material	Quantity
1	Reflux Pumps	Centrifugal	35 m ³ /hr	40 MWC	With SS internals	1+1
		Centrifugal	32 m ³ /hr	30 MWC	With SS internals	1+1
2	Spent wash pump	Centrifugal	100 m ³ /hr	30 MWC	With SS internals	1+1
3	Spent Lees hot water pumps	Centrifugal	30 m ³ /hr	25 MWC	With SS internals	1+1
4	Vacuum pump	Water ring type	-----	-----	With SS internals	1+1
5	Alcohol pumps	Centrifugal	50 m ³ /hr	25 MWC	With SS internals	1+1
6	HydroExtractive Transfer pumps	Centrifugal	35 m ³ /hr	35 MWC	With SS internals	1+1
7	Rectifier reflux pump ENA	Centrifugal	35 m ³ /hr	40 MWC	With SS internals	1+1
8	HCC Reflux IS Feed Pumps	Centrifugal	10 m ³ /hr	25 MWC	With SS internals	1+1
9	FO Reflux Transfer Pump	Centrifugal	3 m ³ /hr	35 MWC	With SS internals	1+1
10	Air Compressor		-----	-----	-----	1
11	Pump for rect. column	Centrifugal	-----	-----	Flame Proof	1+1

12	Pump for reflux to Recovery column	Centrifugal	-----	-----	Flame Proof	1+1
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TANKS For Distillation

S.N	Discription	Type	Capacity	Material	Quantity
1	Gas Liquid Separator	Cylindrical type	-----	SS 304	1
2	Alcohol Continuous Diluter	Static Mixer type	-----	SS 304	1
3	Reflux Collectors	Cylindrical type	-----	SS 304	9
4	Water & Steam Header	Cylindrical type	-----	Carbon Steel	1
5	Over Head water tank	Cylindrical type	40 M ³	MS	1
6	Alcohol Buffer tanks	Cylindrical type	2 M ³	SS 304	2

APPENDEX-C

Sr. NO	Service	Material Of Construction	Service Temperature (°C)
1	Alcohol-Water liquid	MS/SS304	30-80 °C
2	Alcohol-Water liquid	MS/SS304	80-120 °C
3	Product Alcohol	SS304 / COPPER	30-80 °C
4	Cooling Water	MS	32-40 °C
5	Steam	CS	170-125 °C
6	Instrument Air	GI/SS 304	32-40 °C
7	Steam Condensate	CS	80-95 °C

APPENDIX -D

A	EXCISE DOCUMENT	Quantity	Capacity	Height (meters)	Diameter (meters)
Sr.NO	Equipment List				
1.	Molasses Storage	1	11,650.7 MT	Existing	Existing
2.	Molasses Storage	1	10721.6 MT	Existing	Existing
3.	Molasses Receiving Tank	1	50 M ³	6.5	3.2
4.	Molasses Weighing Tank	1	50 M ³	6.5	3.2
5.	Pre-fermentor	2	60 m ³	7.6	3.18

6.	Fermentor	5	574 m ³	10.95	8.169
7.	Stabilizer Tank	1	300 M ³	7.5	7.1
8.	Buffer Tank	1	300 m ³	7.5	7.1
9.	Settler Tank	1	50 M ³	3.75	4.12
10.	Aldehyde Column Receiver	1	1 M ³	1.5	1
11.	Rectification Column Receiver	1	2 M ³	1.8	1.2
12.	Fusel oil Decanter	1	1 M ³	1.5	1
13.	Fusel Oil Receiver	1	1 M ³	1.5	1
14.	Vent Scrubber	1	1 M ³	1.5	1
15.	Vent Scrubber Separator	1	0.2 M ³	1	0.6
16.	Molasses Diluter	1	1 M ³	1.5	1
17.	R.S Daily Receiver	3	200 M ³	7.5	5.85
18.	Ethanol Receiver	3	200 M ³	7.5	5.85
19.	ENA Receiver	3	200 M3	7.5	5.85
20.	Technical Alcohol Tank	1	30 M ³	3.75	3.2
21.	Solution Tank	1	1 M ³	1.5	1
A	EXCISE DOCUMENT	Quantity	Capacity	Height (meters)	Diameter (meters)
22.	Fusel Oil Storage Tank	1	30 M ³	3.75	3.2
23.	Absolute Alcohol Bulk Storage	3	900 M ³	12.0	9.8
24.	R.S. Bulk Tank	3	900 M ³	12.0	9.8
25.	E.N.A. Bulk Tank	3	300 M ³	10.0	6.2
26.	Technical Alcohol Storage Tank	1	300 M3	10.0	6.2

SECTION 7

EFFLUENT TREATMENT PLANT

Effluent discharged from the distillation process, commonly known as Spent Wash, is one of the most polluting effluents with very high values of BOD and COD. It is first treated in a Biomethanation System, which not only reduces the effluent load, but also produces methane rich biogas. Biogas is a high calorific value fuel and is used to produce power, by feeding into biogas based power plant. The production of extra power from biogas improves the economics of the ethanol project. The effluent after biomethanation is converted into bio-manure in a bio-composting plant. The basic motive of waste management is -

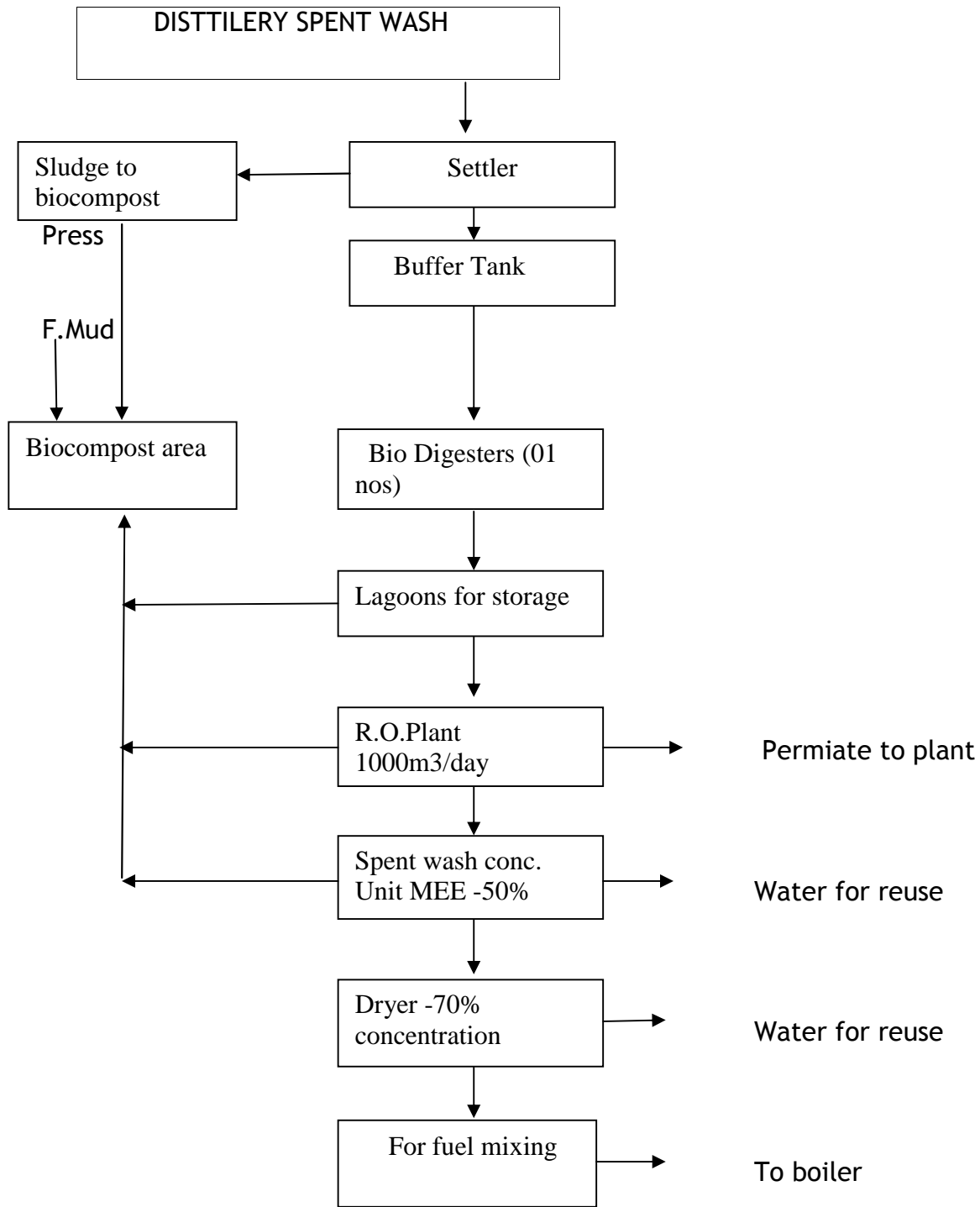
- To utilize all the available technology for distillery waste management with their limitations to the fullest use at Asmoli.
- To convert the waste into useable product/energy for effective utilization to the industry
- To reduce the harmful effect of any waste to the society and preserve the land and river
- To save and protect animals and creatures in general.
- To follow the guidelines of environment protection rules & regulations.

Keeping in view the above DSM Asmoli has opted for-

- Mud settling and its separation and utilization in Bio-compost
- Bio-methanation process to generate bio gas and utilize it in boiler
- R.O.Plant for concentrating the bio methanated spent wash and permeates reuse in the Industry
- Spent wash concentration to reduce the water load and mixed it with bagasses and reuse the heat value of the concentrated mass.
- Balance liquid effluent use in bio compost and its effective application to the field.

- For the present expansion it is proposed to install a balancing spent wash concentration unit upto an additional capacity of 1600m³/day spent wash handling as present system is capable enough to handle 100 KLPD distillery liquid effluent.
- The combind liquid effluent treatment flow diagram is given below-

Flow Diagram of Waste Management at DSM Asmoli -Asmoli



Waste Management at DSM Asmoli - Asmoli

7.1 Biomethanation Process:

Biomethanation involves conversion of organic compounds present in the effluent, using a consortium of bacteria under anaerobic conditions. During their life cycle, the bacteria break down these organic compounds into methane and carbon dioxide.

The bacteria, being living organisms, require specific conditions to prosper. This is achieved by controlling the following parameters:

- Temperature
- Acidity
- Organic Loading
- Nutrient Balance

There are various biomethanation systems available for treating various types of waste water, using different processes.

The proposed biomethanation system uses a specially designed Mixed Tank Reactor (MTR) or CSTR (Completely Stirred Type Reactor) Bio-Digester, to convert organic matter into useful energy in the form of biogas. The biological process of conversion takes place at mesophilic temperature in a controlled atmosphere, ensuring maximum conversion efficiency and production of biogas.

Following are the salient features of the process:

a. Buffer Tank:

Before entering the biodigester, the spent wash from the distillery unit is received into a spent wash pit to enable settling of suspended solids. The system ensures consistent operation by reducing the solid build up in the biodigester. The settled solids are removed periodically from the pit for further disposal.

b. pH Control:

Spent wash pH is adjusted to 6.5-7.0 by recycling part of the treated effluent.

c. Mixing in Biodigester:

Mixing is done by recirculation of biomass, using a specially designed mixing system and is further enhanced by gas propagation. Efficient mixing helps micro organisms to reach fresh nutrients in a favourable living condition and convert organic matter into methane and carbon dioxide. Various sample points are provided in the biodigester to measure the concentration of sludge. Drain points are provided to drain the sludge from the biodigester.

The sludge is settled in the parallel plate clarifier, which is recycled to increase solid retention time in the biodigester. Supernatant liquid from the clarifier is sent for further treatment. Excess biomass and sludge is removed from the bottom of the biodigester regularly and sent to sludge drying beds for disposal.

d. Gas Collection & Handling:

Biogas produced in the biodigester is collected from the top of the digester and flows to the gas holder. The gas holder acts as an intermediate gas storage and pressure control device. Biogas is transferred to a biogas power plant to produce power. A flare unit is provided for excess gas burning.

e. Safety System:

For safe operation, flame arresters are provided on gas lines to protect the biodigester from backfire & pressure relief valves are provided on biodigester to protect from excess pressure or vacuum.

f. Control System:

Controlling pH ensures the smooth and safe operation of the system. Temperature, volatile acidity and alkalinity are also controlled, using various control features provided.

g. Type of Bacteria:

Anaerobic digestion of organic compounds is carried out, using different bacteria. Three main groups of bacteria, used in the process are indicated below:

- Hydrolyzing bacteria (Solubilising bacteria)
- Acetogenic bacteria (Acetate forming bacteria)
- Methanogenic bacteria (Methane forming bacteria)

7.1 1 Performance Parameters of Biomethanation Plant

a: Input (Spent Wash) Characteristics:

- Spent wash generation per litre of alcohol : 10 litres
- Spent wash generated : 1000 m³/day
- Spent wash solid : 10-11% w/w
- Digestive COD in spent wash : 1,00,000- 1,20,000 mg/lit
- Digestive BOD in spent wash : 50,000- 55,000 mg/lit
- TSS in spent wash : 5000 mg/lit (max)
- Spent wash temperature : 80-85 deg C
- Spent wash pH : 4.0-4.5

b. Performance Parameters:

- Biogas produced : 0.50-0.55 m³/Kg of COD reduced
- Digestive COD reduction : 65.00%
- Digestive BOD reduction : 85.00%
- Expected biogas composition : Methane 50 to 55%

7.2 RO System (Membrane Filtration)

The Biomethanated Spent wash from the Bio-digester after recovering the BIOGAS is being fed to REVERSE OSMOSIS Membrane Filtration system and leads to two streams of Permeate and Reject @ 50% of the feed (each). Permeate is recovered as clear and reusable water, which is recycled back to the process. While reject is sent for Bio-composting. Major advantage of this unit is to reduce the water consumption in process and less liquid effluent handling.

7.3 Bio- Composting Plant:

The composting process consists of converting the spent wash into useful manure. This is done with the help of specialized microbial culture or using fresh compost as seed for the micro-organisms. The raw materials required for composting are spent wash, bacterial culture and a filler material. The most common filler material is press mud obtained from the sugar factory. Other filler materials are agricultural residues, such as bagasse, segregated municipal solid waste and ash.

Composting is a biological oxidation process for decomposing organic material by a mixed microbial population in a suitably warm and moist environment under aerobic conditions. The degradation converts the material to a stable organic fertilizer which is also a soil improver.

The aerobic composting process involves arranging the press mud (filler material) in 150 to 200 m long windrows of triangular section of about 1.5 m height by 3.0 m. width on impervious ground usually with the help of front end loaders. The windrows are sprayed with a measured quantity of spent wash, in the ratio of 3.0:1 (spent wash to press mud). The ratio will vary depending on the moisture content of the filler materials. The spraying of spent wash is done when the moisture content of the press mud drops to 50%. The moisture content is not allowed to exceed 65% as at that moisture anaerobic condition start prevailing which is detrimental to the composting process.

The windrows are inoculated with the seed material after the first spray. About 1 Kg. of bio culture is required per ton of press mud. From ambient temperature at start up the temperature rises to 65 Deg. C. by the second week and continues up to the 7th week. The total duration for completion of the reactions is about 8 weeks by which time the temperature returns to ambient. A further 2 weeks is allowed for curing. Carbon to nitrogen ratio is the deciding factor to determine the completion of the bio composting process. It should be 20 or below.

Specialized mixing machines called aerotillers, traveling along the length of the windrows are used to mix and aerate the decomposing mass, about once in three days. This results in increased spent wash absorption, oxygen supply for proper growth of micro-organisms and dissipation of heat, which is liberated due to metabolic activity of micro-organisms. The moisture content during composting is maintained at 50-60% by periodic spraying of the spent wash.

Adequate holding capacity (min. 30 days) is to be provided for the spent wash in lined lagoons to cater to any demand mismatch. The lagoons should be duly lined with 250 micron HDPE and pitched by stone/bricks with cement mortar to prevent leachate.

Composting is to be carried out on a raised impervious floor protected by bunds with provision for leachate collection and surface runoff and it's pumping to the holding lagoon. Pipe network is laid for automatic spraying of spent wash.

7.3.1 Compost Quality

Typical compost quality will conform to the following specifications:

- Moisture content : < 35%
- Organic carbon : 20-25%
- Phosphorous : 1.5-2%
- Nitrogen : 1.5-2%
- Potassium : 2-3.5%
- C : N ratio : < 17

7.3.2 Advantages of Bio Compost

The importance of recycling organic wastes is being increasingly recognised. Bioearth compost provides early nitrogen, enhances nutrient availability, increases water retention, and provides colloidal nitrogen, phosphorus, potassium, calcium, sulphur and micro-nutrients. It energizes the soil micro organisms.

Humus provides slow release of all the nutrients which is essential for crops. It absorbs the nutrient elements from leaching and thus nutrients are utilized efficiently.

It is non-pathogenic. High temperature decomposition process (60°C to 70°C) assures the elimination of disease causing organisms. Compared to raw press mud, the bioearth compost application has following advantages:

- Very little quantity of bioearth compost is sufficient for crops and thus input and transport cost could be reduced.
- Improved fertility value.
- Provides early nitrogen.
- Humus rich, very slow release of nutrients which is essential for crop growth.
- Immediate usage of compost for crops without allowing extended period of decomposition.
- Increases water holding capacity of soil.
- Improved yields of cane have been reported worldwide after using this bio compost.

7.4 SPENT WASH CONCENTRATOR/DRYER

Biomethanated spent wash from Biodigester is fed to concentrator which is a combination of Multi Effect Evaporation concentrating up to 45% to 50% solid level and a concentrator concentrating the above material from 50% to 70% as the case may be. There are two type of Multi Effect Evaporators. First type uses falling film Evaporation technology and the second type uses four circulation system. Advantage of first type falling film Evaporator body is less steam consumption and less power consumption. While it is having a disadvantage of choking of the tubes and daily down time of 4-6 hrs. for CIP Cleaning. This problem has been minimized in the forced circulation system. But there is more power consumption in the unit due to high flow of effluent in the tube. A degasification unit in it is mandatory to avoid contamination of process condensate. We have selected forced circulation system to avoid choking of the tubes and better performance with continuity. Here in the unit bio methanated wash is concentrated from 7% to 50% TSS level.

The concentrated mass from the MEE is taken to the concentrator where with the help of the steam the effluent is further concentrated upto 70% level. 70% concentrated

mass will be taken to our bagasse area where it will be mixed with bagasse and used as mixed fuel to 60TPD & 64 kg/cm² co-gen boiler. By doing this the total effluent of the distillery will be consumed. The process condensate will be utilize for the process water to our chemical complex for various applications e.g. molasses diluation, cooling tower, make up water, fire hydrant, U/G tank etc. For making distillery from 100-250KLPD additional unit of spent wash concentration of having capacity 1600m³/day is proposed.

Incineration Boiler:

Bagasse with 50% moisture from Mill house to Boiler & spent Wash with 70 Bx in the ration of 30:70 respectively is fed after mixing in static mixer through Carrier. This mixer of bagasse & spent wash is spread over in the furnace of Boiler with the help of F.D. and S.A. air. The furnace is travelling grate type and maintains the furnace temp. about 800 to 900° C on full load 50 TPH.

After mixing of air and bagasse, it is converted into flue gas, which flows through super heater, economizer, air pre heater and dust collector with the help of I.D. fan. This I.D. fan pulls flue gas and sends it to chimney for stack out in atmosphere through chimney.

Super heater is used to super heat the steam. Temp. of flue gas drop 800°C to 500°C. This flue gas passes through economizer and temp. drop from 500°C to 250°C after that it passes through APH and temp. drop 250°C to 150°C then passes through dust collector in which unbrunt /Ash is collected and temp. drop from 150°C to 130°C then it goes to chimney.

Steam temp. increases in super heating area from 320°C to 480°C .

Feed water temp. increases in economizer from 120°C to 320°C.

In APH atmosphere air temp. is increased and it goes up to 150°C.- 160°C.

Boiler No. 1 -1993	
Single drum, water tube membrane wall, travelling grate, bagasse fired, natural circulation, top supported balanced draught boiler.	
Design Data	
Capacity at MCR	60 TPH
Capacity at peak load	66 TPH

Working Pressure	60 kg/ cm sq.
Design Pressure	64 kg/ cm sq.
Steam outlet Temp.	480±5°C
Feed water at eco inlet	105 °C
Fuel feeder and spreader	
Number feeders	03
Drive	A C Drive
Spreader	Pneumatic with fabricated water cooled spout and pulsation dampers
Pulsation damper drive	Geared motor with chain sprocket
Heating Surface Area (Sq. Mtr,)	
Boiler	2815
Economiser	2165
Primary Super Heater	380
Secondary Super Heater	264
Air Preheater	2670
I D Fan 02 Nos	
Capacity	126000 m ³ / hr
Head	275 mmwg
Type	Centrifugal backward curved vane
Speed	960 rpm
Drive	VFD
P. Block	2332, 02 Nos
Bearing	22332K, 0 2Nos
e	H - 2332, 02 NOs
F D Fan 02 Nos,	
Capacity	61200 m ³ / hr
Head	200 mmwg
Type	Centrifugal backward curved vane
Speed	1440 rpm
Drive	VFD
P. Block	SNA- 618, 02 Nos.
Bearing	23218K, 02 Nos
Sleeve	H- 2318, 02 Nos
S A Fan 02 Nos.	
Capacity	12000 m ³ / hr
Head	600 mmwg
Type	Centrifugal backward curved vane

Speed	2900 rpm
P. Block	SNA 618, 02Nos
Bearing	23218K, 02 Nos
Sleeve	H-2318, 02 Nos
Temperature Profile (°C)	
Flue gas side	
Furnace exit	800-850
Flue gas at eco inlet	600-650
Flue gas at eco outlet	240-250
Flue gas at A. H. outlet	165-185
Flue gas at before I D fan	85-90
Air at F D outlet	Ambient
After airheater	140-180
S A / Pneumatic Spreader Air	Ambient
Water at eco inlet	105
Intermediate header	220-240
Final outlet header	290 approx.
Steam at PSH inlet	290
Steam at PSH outlet	420-440
Steam at SSH outlet	480±5°C
Draught Profile (mmwg)	
Flue gas side	
Furnace exit	-3 to -5
Flue gas at eco inlet	-25 to -35
Flue gas at eco outlet	-75 to -85
Flue gas at A. H. outlet	-125 to -120
Flue gas at before I D fan	-200 to -220
Air at F D outlet	+35 to + 55
After airheater	+25 to +35
S A / Pneumatic Spreader Air	+600 to +650

SECTION 8

MAN POWER REQUIREMENT

S. N.	Designation	Numbers
1.	General Manager/ Unit Head	1
2.	Manager - Production	1
3.	Asst. Manager - ETP	1
4.	Asst. Manager - Maintenance/ Dy. Chief Engineer	1
5.	Asst. Manager - Stores & Purchase	1
6.	Asst. Manager - Q.C. & Q.A.	1
7.	Asst. Manager - Utilities	1
8.	Blending Officer	1
9.	Microbiologist	1
10.	Q.C. Chemist	1
11.	Shift Officers & Shift Chemists (Including ETP)	8
12.	Account Officers	1
13.	Liaisons Assistant	1
14.	Account Assistants	2
15.	Stores Assistants	2
16.	Plant Operators	4
17.	Yeast Men	4
18.	ETP Operators	5
19.	Boiler Operators	4
20.	Turbine Operators	4
21.	D.M. Plant Operators	3
22.	Utility Operator	4
23.	Electricians	5
24.	Fitters	5
25.	Helpers (Unskilled) for main Plant	8
	TOTAL	70

SECTION 9

ESTIMATED PROJECT COST FOR 150 KLPD DISTILLERY PROJECT

(Rs. In Lacs)

Sr. No.	Description	Estimated Cost	Remarks
1	Land (60 Acres)	800.00	
2	Main Plant & Machinery		
	Fermentation and distillation plant suitable to produce 150 KLPD total spirit, based on multi-pressure distillation plant. Molecular sieve based alcohol dehydration plant of 150 KLPD capacity	3500.00	
3	Evaporation Plant suitable to treat 1600 m ³ /day spent wash generated from 150 KLPD total spirit plant, along with cooling water system, Electricals, instrumentation & erection including civil	1100.00	
4	Molasses and spirit Storage Including transfer pumps	450.00	
5	Bio digester (825m ³ /day) & piping network for reuse the water	785.00	
6	Steam Generation facility along with suitable back pressure turbine Capacity: 60 TPH, Pressure: 64 Kg/cm ² Turbine:5.0 MW, back pressure	500.00	
7	Water supply and treatment Plant: Tubewell, pumps, storage tanks, piping and softening plant of 90 m ³ /hr capacity	100.00	
8	Cooling towers for Distillation and	125.00	

	Fermentation		
9	Electricals, comprising of PCC, MCC, Cables, lighting etc	125.00	
10	Automation including control system, panel, hardware and software	150.00	
11	Civil and structural work <ul style="list-style-type: none"> • Main plant building • Cooling tower basin • Equipment foundations • Boiler and turbine sections • Internal roads • Boundary wall 	800.00	
12	Miscellaneous cost like packing and forwarding, transit insurance, excise duty, sales tax and transportation	400.00	
	Sub Total	8835.00	
(i)	Working Capital margin @ 5%	443.00	
(ii)	Pre-operative Expenses @2%	177.00	
(iii)	Contingency @ 3%	265.00	
	Total Cost of Project	9720.00	
		Lacs	

SECTION 10

PROJECT IMPLEMENTATION SCHEDULE

Systematic and well planned scheduling is a very important aspect for the implementation of the project. Proper planning and monitoring of the project is essential for the commissioning of the plant within the stipulated time frame and also for preventing substantial financial drain on pre-operative expenses. Considering these factors, a bar chart has been prepared and various activities have been discussed below:

10.1 Site Development:

After land is acquired, site development work will be started. This will include levelling, lying of roads, construction of boundary walls, gates etc. Also activities, such as contour plan of site, soil testing and preparation of plot plan are expected to be carried out during this period. This activity will take about 7 weeks time.

10.2 Process Engineering:

The process engineering will consist of preparation of process flow diagrams, material and energy balance, equipment data sheets, plant layout, P&I diagrams etc. This activity will take about 4 weeks time.

10.3 Detailed Engineering:

Detailed engineering will be started after completion of process engineering. This activity will consist of civil design and Mechanical, Electrical and Instrumentation engineering. Total time required for completion of detailed engineering has been estimated at 8 weeks.

10.4 Procurement:

Procurement activity will be initiated, after data sheets of equipment have been prepared during detailed engineering. Based on data sheets, enquiries will be sent to various suppliers, starting from 4th month. Quotations received from suppliers will be evaluated

and orders will be placed. Equipment deliveries are expected to be completed at the end of 7th month.

10.5 Civil Construction:

Civil construction will be started after the release of basic civil drawings in the 4th month and major work will be completed at the end of 4th month.

10.6 Erection:

Erection of equipment will be started in the 8th month, after major equipment have been received at site. Fabrication of equipment will proceed in parallel with the civil construction, so that their installation can also be taken up along with the bought out equipment. After equipment erection; piping and cabling installation will be taken up. Erection activity will be completed at the end of the 9th month.


10.7 Trial Runs:

During trial runs; first, no load and load trials of equipment will be conducted and thereafter trial runs for the complete plant will be started. This activity will take about 1 month time and plant is expected to start production at the end of 10th month, from the starting date of the project.

ANNEXURE 1

The Central Pollution Control Board, in 2005, A Protocol for One Time Controlled Land Application Of Post Methanated Distillery Spent Wash as liquid manure.

APR-30-2005 10:52AM FROM-



केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
(पर्यावरण एवं वन विभाग, भारत सरकार)
(MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

B-149/PCI-III/2K04-2K05 *By Registered Post* April 15, 2005


To
All State Pollution Control Boards & Committees

Sub.: Protocol for one-time controlled land application of treated post bio-methanated distillery spent wash as liquid manure - regarding

Sir,

A sub-committee was constituted on one-time controlled land application of post-methanated distillery spent wash as liquid manure. Based on the studies carried out by the Tamil Nadu Agricultural University, Coimbatore, the sub-committee proposed a protocol for one-time controlled land application of post bio-methanated distillery spent wash as liquid manure.

A copy of the protocol, as recommended by the Task Force on implementation of the CREP recommendations for Distillery as well as Central Board is enclosed herewith for implementation, please

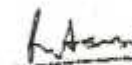
Yours faithfully,

(P.M. Ansari)
Additional Director

Encl : as above

Copy to :

✓ Shri L.N. Batra
Secretary General,
All India Distillers' Association,
805, Siddharth 96, Nehru Place,
New Delhi - 10 019

2 Shri Jasbir Singh
Technical Advisor,
National Federation of Co-operative Sugar Factories Ltd.,
Ansal Plaza, 2nd Floor.,
August Kranti Marg, Andrews Ganj,
New Delhi - 110 049


(P.M. Ansari)

परिवेश भवन, पूर्वी अरुन नगर, दिल्ली - 110 032
"Parvash Bhawan", East Arun Nagar, Delhi - 110032
दूरभाष : 22306792, 22303717 22306793, 22307078, 22307079, 22301832, 22204240
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Grams : ALCOHOL
Fax No. : 011-26476628
E-mail : distiler@vsnl.net

26432743
Phones : 26444974
26476628



All India Distillers' Association

805, SIDDHARTH 96, NEHRU PLACE, NEW DELHI-110019

Ref. No. C/2005/21

Self
Dated the 14th March, 2005

ALL MEMBER DISTILLERIES AND
MEMBERS OF MANAGING COMMITTEE.

3
21-3/005

SUB:- CONTROLLED LAND APPLICATION WITH
BIO-METHANATED DISTILLERY SPENTWASH.

You will kindly recall that we have been pressing the Union Ministry of Environment, New Delhi to permit irrigation of land with treated distillery effluent. This was allowed by Government. On our continued efforts the Government have now allowed controlled land application with bio-methanated distillery spent wash. The protocol for controlled land application has been furnished by the Government, a copy of which is sent herewith, for your information and record.

In case you find any difficulty in this regard, you may please refer the matter to us for further necessary action. We hope that it will now become much easier for the members to achieve zero discharge.

L. N. BATRA
Director General.

Encl: As above.

PROTOCOL FOR
CONTROLLED LAND APPLICATION
OF TREATED POST BIO - METHANATED DISTILLERY SPENT
WASH
AS LIQUID MANURE

Based on the field and experimental studies carried out by Indian Agricultural Research Institute, Delhi and Tamil Nadu Agricultural University, Coimbatore, the following protocols are recommended for the utilisation of treated Post Methanated spent wash for Pre-sown Controlled Land Application as basal manure.

1. Basic Requirements:

1. Any distillery desirous of utilising the spent wash for Pre-sown controlled land application should use treated post bio - methanated spent wash only

The effluent to be utilized for one time controlled applications after post bio-methanation shall have a BOD₃ 27°C value not exceeding 7000 mg/l and pH should be more than 7.

2. The distillery shall engage a full time expert and other required manpower for the implementation and monitoring of controlled land application of spentwash.
3. The distillery shall construct pucca and lined storage tanks with a maximum holding capacity of 30 days for storing the spent wash during the monsoon and / or non-application period.
4. The command area for spentwash application shall be preferably within a considerable distance from the distillery unit in order to facilitate easy monitoring and effective control over land application of spentwash.
5. The distillery shall either provide pipeline network or engage tanker lorries for spentwash transportation based on the location and distance of the command area meant for spentwash land application
6. The distillery should maintain pucca records and data regarding spentwash land application. In case, tanker lorries are engaged for spentwash transportation to the field they should carry a "Transit Card with the following details

- a) Tanker lorry number
- b) Date / Time of loading & unloading
- c) Field address
- d) Receiving person
- e) Distance travelled

Contd..../2

7. Infrastructure facilities should be arranged for collection and analysis of samples drawn from the application zones
8. The distillery after fulfilling the above basic requirements shall maintain a comprehensive "Controlled Land Application Plan" for utilisation of treated post bio-methanated spentwash. The plan includes the details on
 - a) Survey No. / Plot No. / Field Name of land for controlled land application along with their area/extent.
 - b) The distillery shall obtain the acceptance of the farmers in the form of "Spentwash Request Application" before the application of spentwash to their land.
 - c) Agronomic plan for effective utilisation of land by crop rotation.
 - d) Spentwash application schedule to the fields.

9. Controlled Land Application of Treated (post bio-methanated) Spent Wash shall be carried out as described below:

Pre-sown Controlled Land Application as basal manure :

Treated (post bio-methanated) spent wash should be applied uniformly on land at least 20 days prior to the sowing of the crop and ploughed before raising the crops.

The dosage of treated (post bio-methanated) spentwash for various crops is furnished Annexure - I.

10. The rate of application of spentwash shall be quantified by the following techniques (Annexure -II(a), II(b),II(c)
 - i) Horizontal open discharge method
 - ii) measuring container
 - iii) V-notch

II. Safety Protocol :

1. Though the crops normally cultivated in the area can be grown under the scheme the rotation of crops is preferable.
2. Post bio-methanated spent wash application during the germination and seedling growth shall be avoided.
3. Any concurrent use of fertilizers shall be done judiciously to avoid super imposed effect.

III. Monitoring Protocol.

1. The unit shall form an internal monitoring cell under the supervision of an agricultural graduate to closely monitor the application of treated (post bio-methanated) spent wash for controlled land application

Contd../3

- 3 -
2. The farmers should be educated about the application of treated (post bio-methanated) spent wash for controlled land application
 3. The application of treated (post bio-methanated) spent wash on the soil should be with farmer's acceptance and transport through tankers should not cause any environmental concern.
 4. Short-term and long-term monitoring must be carried out with agricultural experts. The distillery units should have their own monitoring team with renowned agricultural experts to assess the compliance status of protocol on controlled land application protocol for treated (post bio-methanated) spent wash
 5. The physico-chemical characteristics of the soil under treated (post bio-methanated) spent wash application shall be regularly monitored for pH, electrical conductivity (EC), Nitrogen (N), Sodium and Potassium (K). One representative sample per 50 ha at depths of 30 cm and 60 cm shall be collected at least twice a year for this purpose. The pH and EC of the extract of the mixture of 2 parts of soil with 5 parts of water shall not exceed 8.5 and 4 millimhos/cm respectively.
 6. The ground water quality shall be monitored for BOD, TDS and NO_3 by collecting one representative sample from open wells / bore wells situated in every 50 ha area of land under spent wash application at least twice a year. The increase in BOD, TDS and NO_3 shall not exceed 3mg/l, 200mg/l and 10mg/l over the initial results.
 7. Piezometers shall be installed to study the long-term nutrient mobility in soil and its impact on ground water quality, at minimum 5 zones in the command area for continuous monitoring.
 8. In the event of first observation of any of the soil and groundwater monitoring parameters exceeding the prescribed limits, the treated (post bio-methanated) spent wash application in that particular location shall be discontinued immediately and the distillery should implement corrective measures for remediation.
 9. The records of soil and groundwater quality monitoring data collected shall be properly maintained for verification by the State Pollution Control Board/Central Pollution Control Board.
 10. A MoU with nearby reputed agricultural university shall be entered into (prior to application of post methanated spent wash on land) for monitoring of required dose of spent wash, quality of spent wash used monitoring of soil, ground water and productivity of crop.
 11. The findings of minimum one year study by the concerned agricultural universities shall be made available by distilleries to SPSCB/CPCB prior to one time controlled land application of post methanated spent wash. The report on findings will be reviewed also by the sub-committee.

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It was also decided that :

- (i) The unit should obtain consent for utilization of post-methanated spent wash for one time controlled land application.
- (ii) The unit should sign MoU with reputed agricultural University.
- (iii) The agricultural university should also monitor the soil and ground water quality during the application phase.

ANNEXURE - I

Spent wash(bio-methanated) Dosage for various Crops based on Nitrogen Requirement

Crops	Spent wash (post bio-methanted) to be applied based on Nitrogen requirement (m ³ /ha)		
	<u>Loamy Soil</u>	<u>Clay Soil</u>	<u>Sandy Soil</u>
Sugarcane	90 - 125	80 - 115	70 - 95
Paddy	80 - 150	70 - 135	60 - 115
Maize	100 - 150	90 - 135	75 - 115
Sunflower	35 - 90	35 - 80	25 - 70
Turmeric	30 - 50	30 - 45	25 - 40
Banana	125 - 250	115 - 225	100 - 190
Cotton	70 - 80	65 - 75	55 - 60
Tobacco	60 - 70	55 - 65	45 - 55
Sorghum	35 - 90	30 - 80	25 - 70
Groundnut	35 - 90	30 - 80	25 - 70
Ragi	60 - 80	55 - 75	45 - 60
Gingelly	20 - 30	20 - 30	15 - 25
Chillies	70 - 90	65 - 80	55 - 70
Brinjal	60 - 70	55 - 65	45 - 55
Tomato	90 - 100	80 - 90	70 - 75
Onion	40 - 60	35 - 55	30 - 45

* Derived from the experimentals conducted by Tamil Nadu Agricultural University, Coimbatore at different locations of Tamil Nadu

Contd../5