

**BEFORE HON'BLE NATIONAL GREEN TRIBUNAL
(WESTERN ZONE) BENCH AT PUNE**

Original Application No. 12 / 2020 (WZ)

Subhash s/o Mhasuji Gadekar **Petitioners**

VERSUS

The State of Maharashtra **Respondents**

**AFFIDAVIT BY RESPONDENT NO.6
RADICO (NV) DISTILLERIES MAHARASHTRA LTD.
(DAILY ORDER 30/09/2021)**

I, **Ashish Kapoor S/o Surendra Kumar Kapoor**, Age 59 years, Occupation Service as a "**Sr. Vice-President**" with **Respondent No. 6** i.e., **M/s. Radico (NV) Distilleries Maharashtra Ltd., Office at D-192 to 195, Shendra Five Star Industrial Area, Aurangabad**, as per the direction given by this Hon'ble Tribunal vide its order dated 30/09/2021 on behalf of Respondent No.6/ M/s Radico NV Distilleries, do hereby state on oath as under :

1. I say and submit that, as per the direction of this Hon'ble Tribunal, on behalf of the company, myself along with ETP-Head, Mechanical Head, Production Head and Financial Head have **visited the Aurangabad Distilleries unit situated at Walchandnagar**, for the technical evaluation for which this Hon'ble Tribunal has directed in its Daily Order dated 30/09/2021. **When we have visited the distilleries, we have noticed the following points/issues:-**

(a) Details of Plant	
Capacity of distilleries	30 KLPD Old Plant & 60 KLPD New Plant,



BEFORE ME
Sanjay Patel
SANJAY PATEL
Notary Advocate

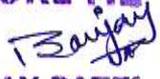




	Evaporator & Potash recovery plant – Supplied by Chem Process Pvt Ltd. Ahmedabad.
Evaporator	– Two falling Film and two Forced Circulation, First stage
	Two falling Film and one Forced Circulation, Second stage
	One Forced Circulation – For Potash Sulphate concentration
Filter Press	8 Nos (Two automatic)
Mechanical Vapour Compression	One
Centrifugal Machine	Two nos.
Power required	1400 kWh

(b) The above facilities were there during the visit. On behalf of the above unit/Distilleries, they have briefed us about the technology adopted by them. They also told us, the modifications made by M/s. Chem Process in the past one and half years. During the above visit, our team observed that a sufficient workforce was not available. MEE section was running on the steam in place of MVR provided by them. The potash drying system was also running. Other systems were not in operation. Meanwhile a person from M/s. Chem Process Mr Ajay Patel reached the site, who told us about the modifications made by them for this process. He further told us about the process flow.

2. We observed that few modifications were going on in the plant. Mr Ajay Patel further told us about the scheme of the modified plant. Since its installation, there has been a sea change in the plant as well as in the final products. The modification began because of the non-availability of the

BEFORE ME

SANJAY PATEL
 Notary Advocate



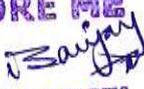
chemical required for the old system of the plant. We also observed that in place of manual filters, the unit has installed two automatic filtration machines. The plant was not fully operational on the date of the visit. Our team has also noticed that the final product (De Potash Vinasse, as cattle feed) made by them was not easily saleable/ marketable/ useable.

3. I say and submit that, our team overall observed that this system will take some more time to stabilize and produce the desired results. As this plant is a single plant in India, there is no other reference to corroborate the claim made by the supplier/company. M/s. Chem Process should do more research and development to stabilize the system.

4. It is pertinent to note that, as per our regular practice, we always research these issues which we are facing. Therefore, **we had already visited this unit on an earlier occasion on 24/12/2019.** That was before the order passed by this Hon'ble Tribunal. The management decided to work on improvement in the system. Coincidentally after the order passed by this Hon'ble Tribunal, our team has again visited the plant situated in **Walchandnagar** on **28/10/2021.** We are submitting a detailed chart / Visit report in this regard herewith & marked it as "**Annexure-1**". We have formed our opinion which is as under:-

Our team has meticulously inspected the plant and formed our opinion, which is as under: -

- (i) Since 2019 till our recent visit, there have been multiple modifications to the system, however, the expected results are unachieved.
- (ii) Since this is the first unit in India, there is a need to do more advanced research by the supplier of the plant.

BEFORE ME

 SANJAY PATEL
 Notary Advocate



- (iii) We feel that even if the unit can achieve the desired results, there will be serious challenges to their final product of cattle feed/fertilizer as per the marketability/saleability/usability is a big challenge and take more time to establish in the market. Presently we are producing Bio-compost which is organic manure having good marketability and is also environment friendly. We are selling Bio-compost to local farmers at affordable rates and is selling like a hot cake in the market and is extremely helpful in conserving the mother earth.
- (iv) **We are of the overall view that the said plant is not viable and compatible to maintain our existing ZLD (Zero Liquid Discharge) system.** Thus, we have firmed our opinion that this system/plant is not at all viable to our unit.

5. I say and submit that, coming to the factual aspect of this matter, there are specific findings given by the **Committee headed by District Collector**, Aurangabad, in its report dated **08/12/2020** the Committee's report, As far as grievance raised by the applicant in his application; there is no substance. **We have upgraded system in our plant in confirmative with CPCB guidelines which is as under:-**

- "(1) *Re-boilers in our Distillation plant ensures effluent is generated @7.2 KL/KL of alcohol produced in case of C heavy Molasses against the CPCB norm of 8 KL/KL, which gets further reduced by 25% in case of use of B heavy Molasses.*
- (2) *Thermophilic condition is maintained in our digesters to achieve maximum efficiency.*
- (3) *Full proofs TSS reduction system is installed which leads to maintaining of quality of effluent fed in seven Stage Multiple*



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 SANJAY PATEL
 Notary Advocate



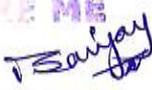
Effect Evaporator to achieve maximum reduction of volume and achieve minimum Final product quantity.

- (4) *We are hereby submitting effluent generation data at source and reduction after MEE with CPCB norms & our achievement –*

Sr. No.	Spent wash Generation at Source		Volume Reduction after Evaporation (MEE)		
	CPCB norms	Achievement	CPCB norms	Achievement	
1.	6-8 KL/KL	7.2 KL/KL	60%	82%	<i>If using 100% C Heavy molasses</i>
2.	6-8 KL/KL	5.4 KL/KL	60%	87%	<i>If using 100% C Heavy molasses</i>
3.	6-8 KL/KL	6.6 KL/KL	60%	83.6%	<i>We are using about 32% B Heavy molasses currently.</i>
4.	6-8 KL/KL	6.1 KL/KL	60%	85%	<i>In future, we are planning to use 60% B Heavy molasses.</i>

6. I say and submit that, for the last two years, we have started using "B" Heavy molasses for making Ethanol and have reduced about 25% of effluent generation by using this "B" Heavy molasses. Our effluent generation will come down from 7.2 KL/KL to 6.6 KL/KL. We are sure enough that our Effluent Treatment system is sufficient to treat even additional effluent than generated by our system. In future, we plan to use more B Heavy molasses to produce more Ethanol and sell it to Oil Marketing Companies (OMC). The intention is to reduce effluent generation at the source and produce more Ethanol. The production of Alcohol/Ethanol and generation of effluent is less than the conditions stipulated in the consent given by MPCB/CPCB.



BEFORE ME

 SANJAY PATEL
 Votary Advocate



7. I say & submit that, we also have a full-fledged Condensate Polishing Unit (CPU) and the condensate received during volume reduction from MEE is repurposed and used in cooling towers.

8. I say and submit that **first time in India** we had adopted **composting under Poly Shed** and have used the composting facility during the rainy season also. This is one of the **approved methods of effluent treatment by CPCB/MPCB to achieve Zero Liquid Discharge (ZLD).**

9. I say and submit that, as we have invested Rs.108 Crores for Effluent Treatment system in our company. **We have also installed Digesters, Bio-composting yards with Poly Shed, Seven Stage Multiple Effect Evaporator (MEE), Condensate Polishing Unit (CPU) & other equipment for air pollution control.**

10. I say and submit that we have never got any complaints, except the present one. In fact, till this date, there is no complaint from the surrounding areas of our company/unit from any person. The Fact-Finding Report given by the committee headed by District Collector confirms the same. **The committee had suggested Short Term Plan and Long-Term Plan, of which, we have executed the short-term plans and are studying the long-term plans meticulously.** This is in progress and will need a **minimum of two years.** Thus, after studying the Committees Report, there is no substance in the grievance raised by the present applicant.

11. In addition to the above submission, in the interest of justice, please note the following points: -

CPCB issued the guidelines on 23 April 2015 for achieving Zero Liquid Discharge (ZLD). CPCB has advised certain technologies and routes to treat the effluent to achieve ZLD.



BEFORE ME

SANJAY PATEL
 Notary Advocate



Point No.2 of these guidelines mention Bio-Composting as one of the approved technologies. Conditions for use of this technology were: -

- (a) Obtaining **valid registration/certification for the production quality Organic manure**. We have already registered to produce Organic Manure.
- (b) As per effluent reduction norms we should install MEE before 2016, whereas we had installed MEE in the year 2013. We should **reduce the volume by 60% as per CPCB** conditions whereas we are reducing up to 82%. With the use of B Heavy molasses, we can reduce the effluent by 83.4%.
- (c) Another condition is that during the rainy season, the unit should conduct the **Bio-composting activity under covered premises**. We have sufficient Poly Sheds with us so that we can conduct composting activities.

12. As far as technology adopted by us in our company/unit at present, we have following facilities/arrangements at the out plant: -

- (i) We have installed Fed-Batch technology at our Fermentation section to achieve 10.5 – 12.5% of Alcohol in fermenters.
- (ii) We have installed re-boilers in our Distillation plant to ensure effluent is generated @ eight it is per BL of Alcohol produced in case of "C" Heavy molasses.
- (iii) We have installed decanters in our plant to separate yeast sludge from the effluent which is about 2% of the total spent wash generation, this leads to the proper, effective, and maximum generation of Gas in Biogas Digesters.

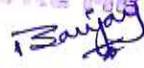
BEFORE ME

Sanjay
SANJAY PATEL
Notary Advocate



- 
- (iv) We have maintained thermophilic conditions in our digesters to achieve maximum efficiency.
- (v) We have installed full proof of TSS reduction system which leads to maintaining of quality of effluent fade in seven Stage Multiple Effect Evaporator to achieve maximum reduction of volume and achieve minimum final product quantity. We have reduced volume by 82%.
- (vi) First time in India, we had adopted composting under Poly Shed. We have used composting facility during the rainy season also. This is one of the approved methods of effluent treatment CPCB/MPCB to achieve Zero Liquid Discharge (ZLD).
- (vii) From the last two years, our company/plant has started using "B" Heavy Molasses for making Ethanol. We have reduced about 25% of effluent generation by using this "B" Heavy Molasses. Thus, we are ensuring that our Effluent Treatment system is sufficient to treat even additional effluent than generated by our system/plant. In future, we are planning to use more "B" Heavy Molasses to produce more Ethanol and sell it to Oil Marketing Companies (OMC). The intention is to reduce effluent generation at the source and produce more Ethanol. The production Of Alcohol/Ethanol and generation of effluent is less than the conditions stipulated in the consent given by MPCB/CPCB.

13. I say and submit that we have never got any complaint/grievance except present grievance. There is no complaint from the surrounding areas of our company/unit from any person. The Fact-Finding Report given by the committee headed by District Collector is confirming the same. The committee had in overall interest with larger perspective suggested Short Term Plan and Long-Term Plan. We have already executed the short-term plans and are studying long

BEFORE ME

 SANJAY PATEL
 Notary Advocate



term plans meticulously. This study is in progress and will require a minimum of two years.



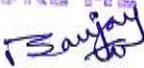
14. I say and submit that, at present the **Vasantdada Sugar Institute is an institution approved by CPCB and MPCB**. It is regarded as one of the premier institutes on this issue and their experts have submitted the **Adequacy Report**. It is noticeably clear that there is no substance in the averment and allegations made by the present applicant in his application against the deponent's company/plant.

15. I say and submit that we have annexed all the photographs taken during the committee visit of Plant/distilleries at Walchandnagar and have marked them as "**Annexure-2**" collectively. We have also annexed the Process Flow Sheet for Aurangabad Distillery Walchandnagar provided to us/our team on 28/10/2021 and have marked it as "**Annexure-3**".

16. I say and submit that, we have annexed the report of the chart/visit to the plant dated 24/12/2019 with this document and have marked it as "**Annexure-4**".

17. I say and submit that, as the Central Pollution Control Board/ CPCB had also issued a direction in 2015 that molasses-based distilleries including yeast manufacturing units shall achieve Zero Liquid Discharge of effluents. CPCB provided Bio-compost as an alternate method for achieving ZLD. (CPCB, F. No. B-410/PCI-111/DIST/NGRBA/2K14-2K15, December-7, 2015). **As per these directions, the industries had to achieve Zero Liquid Discharge (ZLD) of effluent by following either of the two routes as follows: -**

- (a) Installing systems for solids separation for the reduction in the volume of spent wash and evaporation-concentration or only evaporation concentration to reduce the volume to a minimum of 40% with 30% solid concentration and water

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 SANJAY PATEL
 Notary Advocate



conservation by using appropriate technology as such R. O. or M.E.E. or only M.E.E. by December-31st, 2015, followed by Bio-composting with press mud from the sugar industry.

Industries opting for Bio-composting had to ensure that –

- (i) They have valid registration/certification for the quality of Bio-Compost as per Gazette Notification S. O. 2776(E) dated 10/10/2015 under the Fertilizer (Control) Fourth Amendment Order issued by the Ministry of Agriculture and Farmers Welfare from the Ministry of Agriculture/concerned agency.
- (ii) The storage of concentrated spent wash is not more than 30 days equivalent of spent wash (40% by volume of spent wash generated).
- (iii) They have packed and sealed the finished bio-compost in poly bags super scribed with quality of composition of the Bio-Compost along with the name of the manufacturing industries.

18. I say and submit that, at present the "**Vasant Dada Sugar Institute,**" which is **approved by CPCB/MPCB** and regarded as one of the premier institutes on this subject, which institute has submitted its "**Adequacy Report,**" which we received in the last week of November-2021. I say and submit that, in this Adequacy Assessment Report of **implement Treatment Plan of our 140 KLPD Distillery Plan based on Molasses 60 KLPD Distillery Plan based on Grain,** at our unit i.e. Radico NV Distillery Maharashtra Ltd., in which it has been observed and crystal clear that there is no violation of the rules and guidelines issued by the authorities of **CPCB and MPCB,** nor the violation of such rules and guidelines has been observed by them and thus overall report is strengthening our case/stand which we have adopted that as there is no substance in the alleged allegations levelled by the applicant in his



BEFORE ME

 SANJAY PATEL
 Notary Advocate



application against our company/distillery towards amounting to pollution in the environment due to manufacturing process of our unit/distillery for manufacturing of our products. We have attached a **copy** of the said **Adequacy Report** recently received by us from Vasant Dada Sugar Institute and have marked it as "**Annexure-5**".

19. I say and submit that, our unit is situated in Shendra Five Star Industrial Area, Aurangabad as well as our Bio-compost Unit is at "**Takli site**". Both have been visited by the **Vasant Dada Sugar Institute (VSI)** and after their visit and observations, the said institute has submitted the above Adequacy Report. VSI has categorically mentioned that our company is complying all rules and guidelines issued by the authorities of CPCB/MPCB, during the manufacturing process of our products. Report should be accepted being as a cogent one of the evidence in written form, for denying the alleged allegations levelled by the applicant in his application against our company for creating pollution in the environment due to manufacturing process adopted by us, for production of our products. This Report is having substantial value in the eyes of law and as this Hon'ble National Green Tribunal has been accepting the assessment reports submitted by this institute.

20. I say and submit that the above report directs us to install an **online camera or CCTVs** at our Takli Site/Yard and connect it to the server of the CPCB/MPCB. Accordingly, we have initiated necessary steps in this regard, for complying with these suggestions for the installation of an online camera and its connectivity with the servers of the above authority. **Overall observations in the report, with respect to our Bio-compost Takli site, are as under:**

- (a) The designed capacities of effluent treatment plants i.e., Bio methanation as a primary effluent treatment system, followed by standalone multiple effects biomethane spent



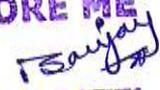
BEFORE ME

 SANJAY PATEL
 Notary Advocate



wash evaporation plant as a secondary treatment system, followed by bio-composting as final treatment are adequate for molasses-based distillery plant. The performance of RNVDML effluent treatment plants was satisfactory during the visit. RNVDML should analyse the raw material and ETP samples regularly from NABL accredited laboratory.

- (b) The designed capacities and performance of RNVDML grain-based plant and effluent treatment plants are satisfactory, considering the thin slop generation and the treatment scheme adopted.
- (c) The bio-compost area of two bio-compost yards is a total of 22 Acres. Out of the total bio-compost yard area, 12 Acres of bio-compost yard area is shade covered. Therefore, the unit can continue the bio-composting process during the rainy season also. Total bio-compost yard area of 22 Acres (12 acres covered plus ten acres uncovered bio-compost yard area) is adequate for bio-compost.
- (d) The installed online stack monitoring systems for 30 TPH biogas cum biogases fired boiler is working satisfactorily and connected with the CPCB/MPCB server during our visit.
- (e) The unit has not connected the online camera at the Takli bio-composting yard to the server of MPCB and CPCB.
- (f) The Piezometers (3 Nos.) installed at bio-compost yard No.1 (Shendra site) and Piezometers (4 Nos.) installed at bio-compost year No.2 (Takli site) are working. Piezometers are not online connected. RNVDML has been submitting a third-party monthly analysis report to MPCB/CPCB.

BEFORE ME

SANJAY PATEL
 Notary Advocate





- (g) The capacity of the tanks used for storage of concentrated spent wash is sufficient for 30 days. The gross storage capacity of the concentrated spent wash (30% total solids) impervious storage tanks is 20,000 m³ and 16,000 m³ (working volume 85% of gross capacity).
- (h) As suggested by MPCB/CPCB, the unit has installed a magnetic flow meter at the inlet & Mass flow meter at the outlet of the SMEE plant of molasses-based distillery plant and have connected it with the CPCB/MPCB servers and are operational.
- (i) During the visit, all online monitoring systems were working satisfactorily.
- (j) During the visit, the VSI team also inspected the area surrounding impervious spent wash storage tanks and bio-compost. The team did not notice any evidence of effluent discharge from the distillery complex of RNVDML, Aurangabad.

21. I say and submit that, as per the above suggestions, our management of the company has taken immediate steps for the installation **of online cameras and their connectivity with the servers of CPCB and MPCB and we are soon going to finalize the same as well installation and connectivity of Mass Flow Meter.**

22. I say and submit that our plant/company has scrupulously complied with the above-issued direction issued by CPCB and there is no violation on our part, as alleged by the applicant in his application.

BEFORE ME

 SANJAY PATEL
 Notary Advocate





23. The comparison of the ground water quality with BS 10500:2012 (Revised) is not appropriate. These are the standards for packaged mineral bottled water and not for the surface or ground water fit for human usage. The values submitted by the Applicant by itself are compliant with the standards for human usage. TDS values of up to 2500 mg/L are commonly found in many wells and ground water aquifer in draught prone areas of Maharashtra (Marathwada, Khandesh). The source of such TDS can be water-soluble fertilizers, pesticides and nutrients, apart from the salts dissolved from soil.

24. I say and submit that, considering the above facts and peculiar set of circumstances, there is no substance in the grievance/allegations made by the applicant in his application against our plant/company. Our company is scrupulously complying with the directions issued by CPCB and MPCB incorporated in consent terms of CPCB/ MPCB, and authorities of these offices are monitoring the activities from time to time by visiting and inspecting the plant/company. There is no substance in the allegations/ grievance raised by the present applicant in his application against the deponent's company. The application is devoid of merits, and we pray that the same should be dismissed/reject by imposing the cost on the applicant for wasting valuable time of this Hon'ble Tribunal.

Hence this **Affidavit**.

FOR Radico MV Distilleries Maharashtra Ltd.

Ashish
Authorised Signatory

Place: Pune
Date: 15-12-2021

Ashish Surendra Kumar Kapoor
DEPONENT

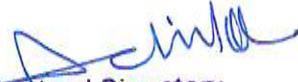
SUBMITTED BY *(Prabhakar K. Joshi)*
(Prabhakar K. Joshi)
Advocate for Respondent No.6

BEFORE ME
Sanjay
SANJAY PATEL
Notary Advocate

VERIFICATION

I, **Ashish Kapoor s/o Surendra Kumar Kapoor**, Age 59 years, Occu. Service as a "**Sr. Vice-President**" with respondent no. 6 i.e., **M/s. Radico (NV) Distilleries Maharashtra Ltd., Office at D-192 to 195, Shendra Five Star Industrial Area, Aurangabad**, do hereby state on oath that, the contents of this Affidavit as per the direction given by this Hon'ble Tribunal from para-Nos. 1 to 24 are true and correct to the best of my knowledge as per information gathered from the official record.

FOR Radico NV Distilleries Maharashtra Ltd.



Authorised Signatory

Ashish Surendra Kumar Kapoor
DEPONENT

Place: Pune
Date: 15-12-2021

Identified & explained by

(Prabhakar K. Joshi)
Advocate

AFFIDAVIT

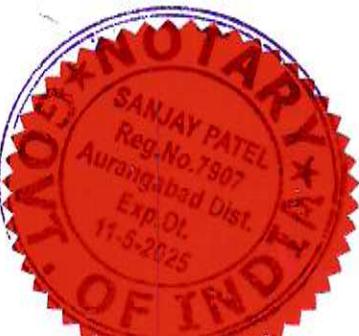
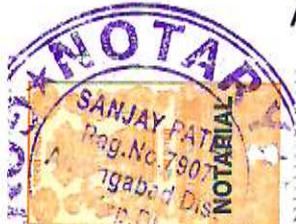
Sworn before me on the 15 12 2021
by Shri Ashish Kapoor Surendra Kapoor
Age 59 Occ. Service
at Aurangabad
who has been identified by Shri P K Joshi
personally known to me whose signature here by
is appended

SANJAY SATESH PATEL
ADVOCATE

NOTARY

(Govt. of India)
Supari Hanuman Road,
Aurangabad (M.S.)
Regd. No. 7907/2010

15 DEC 2021



NEXT DATE: 22.12.2021

**BEFORE HON'BLE NATIONAL GREEN TRIBUNAL
(WESTERN ZONE) BENCH AT PUNE**

Original Application No. 12 / 2020 (WZ)

Subhash s/o Mhasuji Gadekar **Petitioners**

VERSUS

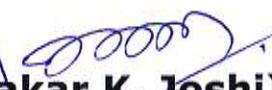
The State of Maharashtra **Respondents**

**AFFIDAVIT BY RESPONDENT NO.6
RADICO (NV) DISTILLERIES MAHARASHTRA LTD.
(DAILY ORDER 30/09/2021)**

LIST OF DOCUMENTS

Sr. No.	Particulars	Annex.	Page Nos.
1.	A copy of the process chart / Visit Report 28.10.2021	'1'	216 to 221
2.	Copies of photos during a visit on 28/10/2021 at the Unit situated at Walchandnagar.	'2'	222 to 225
3.	Copies of process flow sheets of Walchand Nagar Plant	'3'	226 to 226
4.	A copy of the visit report at Unit situated at Walchandnagar dated 24/12/2019.	'4'	227 to 228
5.	A copy of the Adequacy Report submitted by the Committed, appointed by the Vasant Dada Sugar Institute.	'5'	229 to 269
LAST PAGE NO:			269

Place: Pune
Date: 15-12-2021


(Prabhakar K. Joshi)
Advocate for Resp.No.6

Name of Distillery	Aurangabad Distillery Walchand Nagar
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From RNV : Mr.Ashish Kapoor, Mr.K N Thakur, Mr. Sushil Saroha, Mr. Sunil Rana and Mr. Mahadev Patil

From Visiting Industry : Mr. Karan Yadav (MD) Mr. Mukund Garge -Process Incharge & Mr. Ajay Patil - Chem Procees system Pvt ltd

S.no.	Paritculars/parameter	Unit	Details/Value(As per design)	Actual Operation - 28.10.2021	Remark
1	Capacity of Distillery	KLPD	60 KLPD MPWE (Make Praj), 30 KLPD old plant	60 KLPD plant was in operation	60 KLPD New Plant supplied by M/s Praj Industries , 30 KLPD old plant stopped.
2	Steam Consumption- Dstillation plant	Kg/BL	3.20 Kg/BL	3.40 Kg/BL	Steam consumption is high due to plant designed 1.50 kg/cm2 (g)
3	Power Consumption	kw/BL			
4	Working days	Nos	330 Days	330 days	
5	Boiler capacity	MT	15	10.5	Boiler make -CHEEMA BOILER, travelling grate Boiler
6	Boiler pressure	Kg/cm2	32	32	
7	Fuel consumption		Baggase & Biogas	Baggase & Biogas	
	Baggase Consumption	TPD	42	42	
8	Bio gas per day generation	m3/day		25000	Flowmeter was not available. Biogas quantity is measured by on back calculation.
9	Turbine Capacity	KW	1000	900	Turbine make -BELLIS
10	Turbine Back pressure	Kg/cm2	1.5	1.5	
11	Treatment Details as per EC		MEE + Increation boiler	Only MEE	Modify EC is not availble at portal , plant is running on potash recovery plant consent of MPCB.
12	Evaporator & Potash Recovery Plant (After amendement in form -1)		M/s Chem process Pvt LTD Ahmedabad Gujrat	Used 50 KL spent wash per batch	Design on Raw spent wash and Biomethanation batch type only Plant was running on Raw spent wash Mode.

Equipment list					
1	Heat Intigrated /stand alone		Stanalone	Stanalone	
2	Evaporator	no	4 Falling effects & 4 forced circulation		
3	Decanter	no	1	Under maintenance	
4	Filter Sytem	no	1+1	1	Chem process is installed automatic vertical pressure filter system made by Rotofilt engineers ltd Ahmedabad
5	Filter press	no	8	3 no are used in process	5 no filter press are spare due to change in operation philosphy.
6	Mechanical Vapour re-compression	no	1 no		
7	Centrifugal machine	no	1	Running for separation of K2 So4	Pusher centrifugal machine is used for separation of Potassium sulphate.
8					
9	Type Of evaporator	Nos	(2 falling film + 2 forced)	(2 falling film + 2 forced)	2 Falling & two foked are used to increase concentration of spent wash 10-12 to 32 -35 % Total solid.
10			(2 falling film + 2 forced)	(2 falling film + 2 forced)	2 no Falling film and one forced circulation are used to increse TS 32-35 to 55 % for production of Animal D- Potashed Vinasses (ADPV) and one forced circulation is used to increase concentraion of K2so4 production.
11	Feed to evaporation	M3/day	600	480	
12	Total solid % in evapoarion plant feed	%	10-11 %	10-11 %	
13	Total solid after evaporation plant Ist Stage	%	35-40	32	
14	Steam Consumption				
15	Steam Consumption in Ist Evaporator	TPH	1.50	1.50	1.5 TPH steam used in Ist stage evaporation plant
16	Steam Consumption in Ist Evaporator	TPH	0.50	0.50	0.5 TPH used in II stage evaporation with MVR Operation.

17	Steam consumption per Kg/m3	Kg/m3	0.08	0.10	
18	Electric power consumption	kwh / Day	13000	13000	Power consumption in MVR-600 KWH, MSEB power is used from grid. MVR is not running continuously, it run based on batch system.
19	CIP		Weekly	Weekly	
20	Hydrojet cleaning		Once in a month	Once in a month	
	Actual By Product				
1	Animal D- Potashed Vinasses	TPD		48	Animal D- Potashed Vinasses Price - Rs 10 /Kg used as cattle feed.
2	Potassium sulphate (K2so4)	TPD		3	Potassium Sulphate Price - Rs 40 /Kg (98-99 % purity)
3	Process Condensate	TPD		430 -445	It is not used in process. Aurangabad distillery is planning for installation of CPU plant. Company has approx 500 acrs land for ferti-irrigation.
	Chemical Consumption				
1	Sulphuric acid	Kg/Day		500	Price Rs 7 /Kg
2	Patent Chemical -1	Kg/Day	Unkwn chemical Dosing Confidential	5000	Price Rs 17 /Kg
3	Patent Chemical -2	Kg/Day	Unkwn chemical Dosing Confidential	1000	Price Rs 18 /Kg used one times than it is recycled continuously
4	Lime	Kg/Day		2000	Price Rs 7 /Kg
	Costing				
1	Chemical cost Rs /m3 effluent	Rs/m3		251.04	
2	Chemical cost Rs /BL Production	Rs/BL		2.01	
3	Steam cost Rs /m3 effluent	Rs/m3		160.00	
4	Steam cost Rs /BL Production	Rs/BL		1.28	
5	Power cost Rs /m3 effluent	Rs/m3		190	
6	Power cost Rs /BL Production	Rs/BL		1.52	

	Total Cost Rs /m3 (Chemical, Steam & Power)	Rs/m3		600.6	
	Total Cost Rs /BL(Chemical, Steam & Power)	Rs/BL		4.81	

Remark

- 1 Initially Chem process designed the plant with RSW feed . Plant is under some modification to run in BMSW also .
During visit plant was partial running with Raw spent wash feed and plant is designed to run in
- 2 only batch mode.
Chemprocess provided the parameters when plant will be run with BMSW feed mode. They are
- 3 facing chocking problem so unable to run the plant in continuity with BMSW .feed.

	By product(quantity MT/M) As MPCB consent				
1	Potassium Nitrate (KNO3)	MT/M	870		
2	D- Potashed Vinasses	MT/M	402		
3	Magnesium sulphate (Mgso4)	MT/M	456		

Visit Report of Aurangabad Distillery

Visit report of Aurangabad Distillery, Walchandnagar for the Technical Evaluation as per the Directions given by Honourable NGT.

As directed our team of ETP head, Mechanical Head, Production Head, Finance Head and Sr. Vice President had visited the distillery on 28/10/2021. We have met their ETP head Mr Mukund Gharge and their Director Mr Karan Yadav.

Capacity of the Distillery – 30 KLPD old plant & 60 KLPD New Plant

Evaporator & Potash recovery plant – Supplied by Chem Process Pvt Ltd, Ahmedabad

Details of Plant

Evaporator – Two falling Film and two Forced Circulation, First stage

Two falling Film and one Forced Circulation, Second stage

One Forced Circulation – For Potash Sulphate concentration

Filter Press – 8 Nos (Two automatic)

Mechanical Vapour Compression – One

Centrifugal Machine – two nos

Power required – 1400 KWh

They briefed us about the technology adopted by them and also told us the modifications made by M/S Chem Process in past almost one and half years. During visit we observed that sufficient manpower was not available. MEE section was running on steam in place of MVR provided by them. Potash drying system was also running. Other systems were not in operation, due to modification in system.

Mr Ajay Patel from M/S Chem Process told us about the scheme of the modified plant. There has been a sea change in the plant since it was originally installed. There has been a change in the final products. The chemical required for the old system of the plant is not available leading to modification. In place of manual filters, two automatic filtration machines were installed. Plant was not fully operational on the date of visit. We have also noticed that the final product (De Potash Vinasse, as cattle feed) made by them was not easily saleable/ marketable/ usable.

Our overall observation is that this system will take some more time to stabilise and produce the desired results. If system is stabilised then sale/use of the product will be a great challenge. As this plant is the single plant in India, There is no other reference to corroborate the claim made by the supplier/ Company. M/S Chem Process is required to do more research and development to stabilise the system.

We have already visited this plant on 24/12/19 prior to the order of Hon'ble NGT as part of our management decision to work on improvement in the system. Coincidentally after the order passed by hon'ble Tribunal we have again visited the plant on 28/10/2021. We have submitted detailed chart, which is annexed herewith. We have formed our opinion and conclusion as under

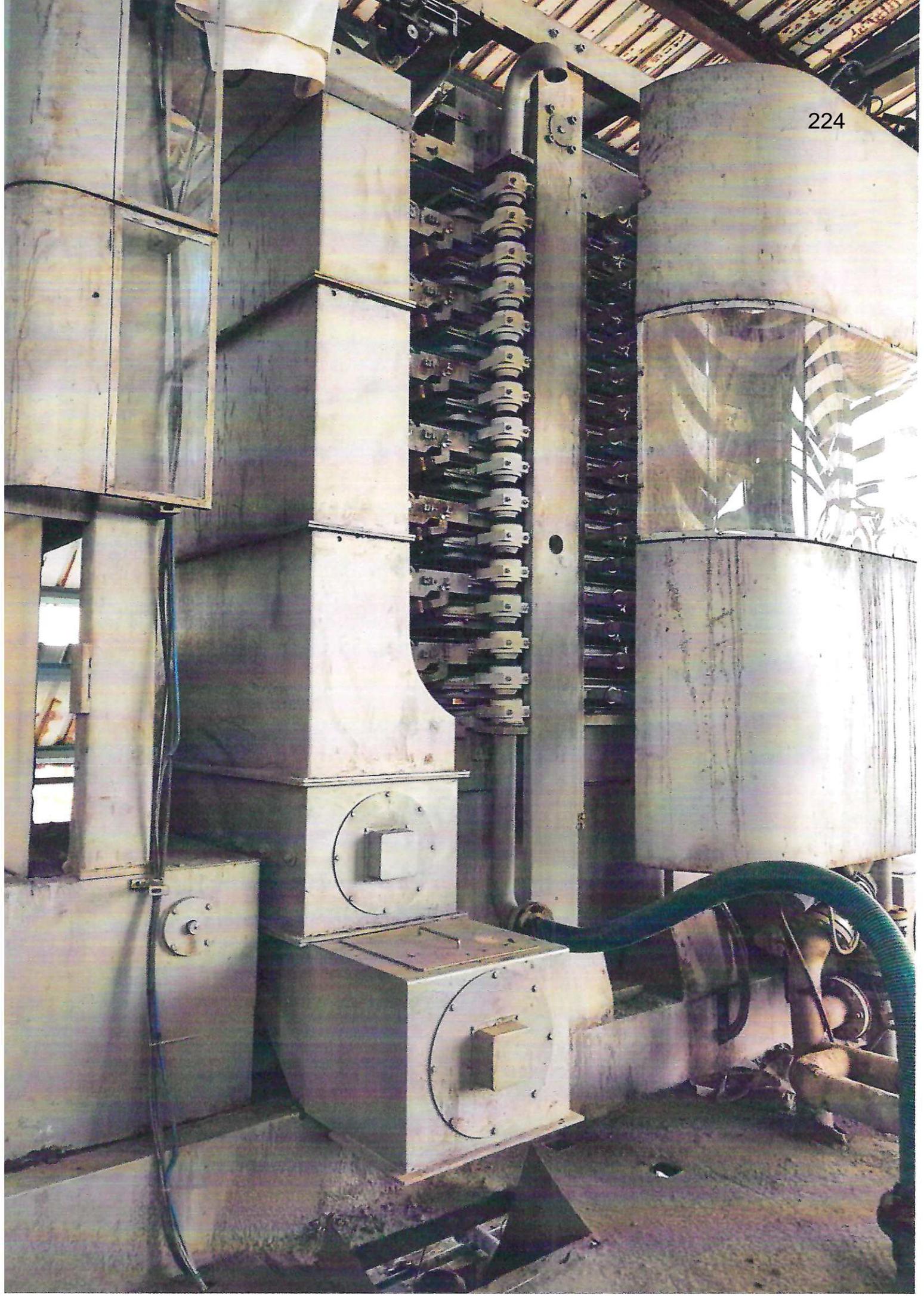
- 1- Since 2019 till our recent visit, there have been a large number of modifications to the system, however, still expected result are yet to be achieved.
- 2- Since this is first unit in India, still some advance research is required to be carried out by the supplier of the plant.
- 3- We feel that even if the unit is able to achieve the desired results, there will be serious challenges to their final product of cattle feed/fertiliser as the marketability/ saleability/ usability is a big challenge and take more time to get established in the market. Presently we are producing Bio compost which is a kind of organic manure and is well established in the market and is also environment friendly. We are selling Bio compost to local farmers at affordable rates and is selling like a hot cake in the market and is very helpful in conserving the mother earth.
- 4- We are of overall view that said plant is not viable and compatible to maintain our existing ZLD (Zero Liquid Discharge) system.

Our overall observation is that the technology is not proven. The cost is very high. Technology is not stabilising even after lots of modifications.



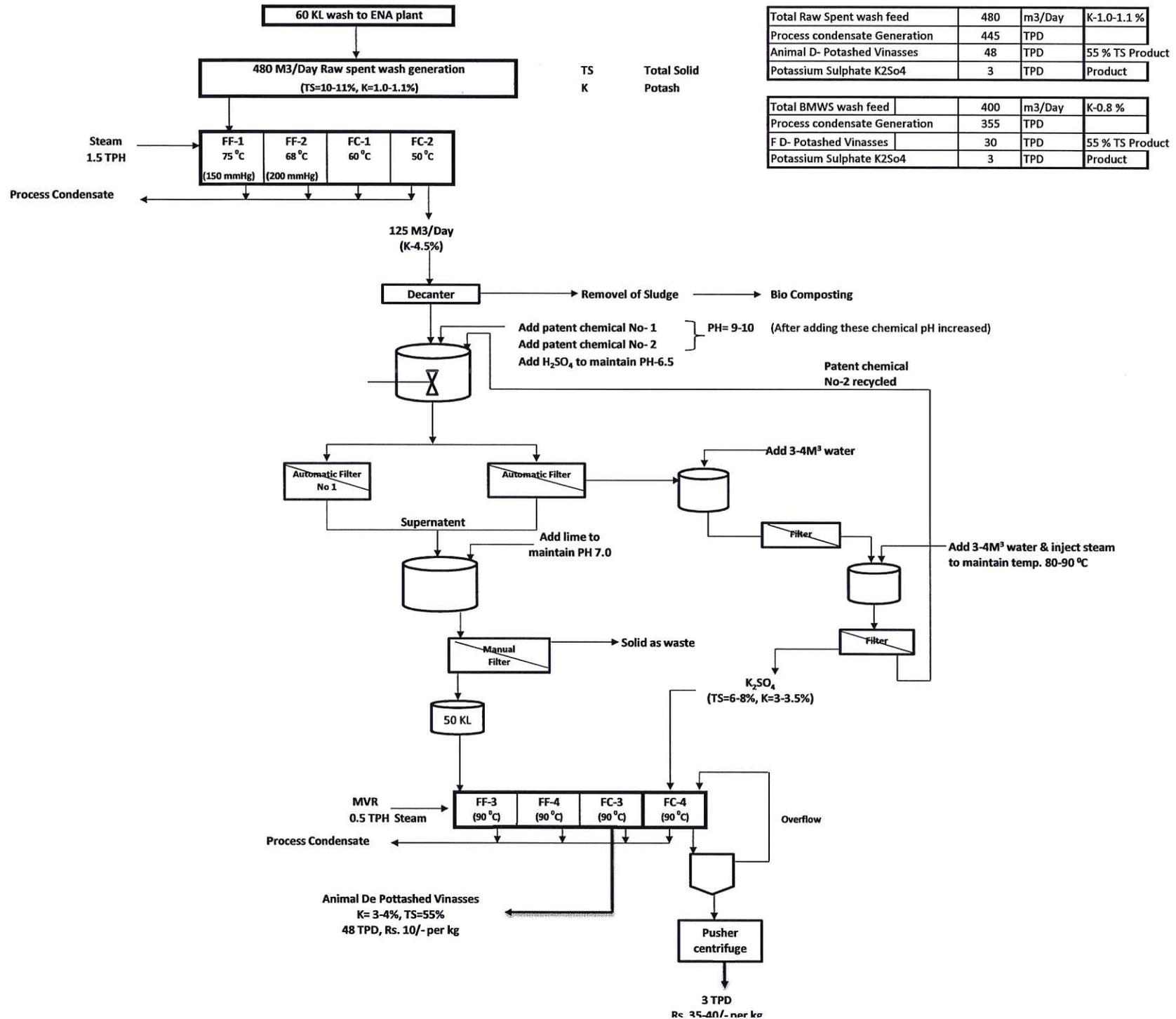
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PROCESS FLOW SHEET FOR AURANGABAD DISTILLERY WALCHAND NAGAR Detail as provided by ADL



Name of Distillery	Aurangabad Distillery Walchand Nagar
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From RNV : Mr.Ashsish Kapoor, Mr.Sunil Rana & Mr. MG Patil

From Visiting Industry : Mr. Mukund Gharge - Aurangabad Distillery & Mr. Mukul Mistry - Chem Proces system Pvt ltd

S.no.	Paritculars/parameter	Unit	Details/Value(As per design)	Actual Operation - 24.12.2019	Remark
1	Capacity of Distillery	KLPD	ENA 30 KLPD old plant & 60 KL MPWE (Make Praj)	60 KL plant was in operation	60 KLPD New Plant supplied by M/s Praj Industries
2	Evaporator & Potash Recovery Plant		M/s Chem process Pvt LTD Ahmedabad Gujrat		
	Equipment list				
1	Evaporator	no	2 Falling effects & 4 forced circulation		
2	Reactor	no	4 no reactors		
3	Filter press	no	8 no		
4	Mechanical Vapour re-compression	no	1 no		
5	Centrifugal machine	no	2 no		
1	Type Of evaporator	Nos	(2 falling film + 1 forced)	(2 falling film + 1 forced)	2 Falling & one foked circulation used to increase concentration of spent wash 10-12 to 20 -22 % solid.
2			3 forced circulation	3 forced circulation	3 no forced circulation are used for CMS (De potash) & Potassium Nitrate process. Existing plant run in batch mode in place of continuous operation.
3	Heat Intigrated /stand alone		Stanalone	Stanalone	
4	Feed to evaporation	M3/day	600	300	Plant is designed for 600 m3 feed per day but to chocking problem in filter press, they are unable to run at designed capacity. 50 % Spent wash goes to bio-composting .
5	Total solid % in evapoarion plant feed	%	10-11 %	10-11 %	

6	Total solid after evaporation plant	%	20-22 %	20-22 %	
7	Steam Consumption	Ton/day	0.50	0.50	Plant run with very low steam consumption due to installation of MVR (Mechanical vapor re-compression)
8	Electric power consumption	kwh/Day	1400	1400	Power consumption in MVR-600 KWH, MSEB power is used from grid.
	Product				
1	Potassium Nitrate (KNO ₃)	MT	6	3	Potassium Nitrate Price - Rs 40 /Kg (98-99 % purity)
2	D- Potashed Vinasses	MT	40	16-18	Used in cattle feed @ Rs 10 /Kg
3	Magnesium sulphate (Mgso ₄)	MT	40		Presently they are not producing
	BY Product				
1	Gypsum	MT	40	15-20	Gypsum is produced during Potassium Nitrate processing . It is used for POP. Gypsum price - Rs 3-4 /Kg.
2	Poltry & Fishery food	MT	30-40		Poltry & fishry product are produced during Mgso ₄ Processing. Price @ Rs 4-5/Kg
3	Process Condensate	TPD	300-350	140- 150	It is not used in process. Aurangabad distillery is planning for installation of CPU plant. Company has approx 500 acrs land for ferti-irrigation.
	Chemical Consumption				
1	Sulphuric acid		Dosing Confidential		
2	Nitric Acid		Dosing Confidential		
3	KM-1 -		Unkwon chemical Dosing Confidential		
4	KM-2-		Unkwon chemical Dosing Confidential		

Remark

Chem process is unable to run the plant with designed capacity due to chocking problem in press filter so plant run in batch mode in place of continuous operation. Chem process is planned to install new press filters to run the plant continuously & designed capacity.



**ADEQUACY ASSESMENT REPORT
OF EFFLUENT TREATMENT PLANTS
FOR
140 KLPD DISTILLERY PLANT BASED ON
MOLASSES
&
60 KLPD DISTILLERY PLANT BASED ON GRAIN
OF
RADICO NV DISTILLERIES MAHARASHTRA LTD.,
D-192 TO D-195, MIDC SHENDRA FIVE STAR
INDUSTRIAL AREA, AURANGABAD-431201
(MAHARASHTRA STATE)**

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NOVEMBER 2021



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**ADEQUACY ASSESMENT REPORT
OF EFFLUENT TREATMENT PLANTS
FOR
140 KLPD MOLASSES BASED DISTILLERY
AND 60 KLPD GRAIN BASED DISTILLERY
OF
RADICO NV DISTILLERIES MAHARASHTRA LTD,
MIDC SHENDRA, AURANGABAD (M.S.)**

1. INTRODUCTION:

Radico NV Distilleries Maharashtra Limited (RNVDML) is one of the oldest and the largest manufacturers of alcohol in the state of Maharashtra. Earlier known as Shetkari Baliraja Sugar Ltd, commenced its operations in 2008 and over the years emerged as a major bulk spirits supplier and bottler to other IMFL manufacturers. Radico NV Distilleries Maharashtra Limited has come a long way in its exceptional journey of growth. It is one of the few companies in Maharashtra to have developed its entire portfolio of alcohol.

RNVDML is one of the largest companies in the country having capacity to produce 46.20 million liters of Extra Neutral Alcohol (ENA) from molasses and 20 million liters of grain ENA per annum (Considering 330 working days/annum). RNVDML also manufacturer of various brands of Indian Made Foreign Liquor (IMFL) and Country Liquor (CL) meeting domestic requirement and sale IMFL brands out of country.

The RNVDML has established 140 KLPD molasses based distillery plant based on Continuous/ Fed-batch fermentation with multi-pressure distillation in the year 2008 to produce rectified spirit or ENA and 60 KLPD fuel ethanol plant based on Molecular Sieve Dehydration (MSDH) technology for production of fuel ethanol from rectified spirit. The distillery and fuel ethanol plants are supplied by M/s. Praj Industries Ltd, Pune & commissioned in 2008 & 2015 respectively.

For treatment and disposal of spent wash generation from molasses based distillery plant and achieving "Zero Liquid Discharge" (ZLD) as per directions of CPCB/MPCB, RNVDML has installed Biogas plant as primary treatment system,



followed by standalone biomethanated spent wash evaporation plant as a secondary effluent treatment system followed by biocomposting as final treatment system. Process condensate generated from evaporation plant and spent lees from distillation plant are treated and recycled to fermentation process and cooling towers make-up.

RNVDML has also established and commissioned 60 KLPD grain based distillery plant based on Fed-batch/batch fermentation with multipressure distillation in the year 2009 to produce Extra Neutral Alcohol. The grain based distillery plant was supplied by M/s. Praj Industries Ltd, Pune.

The whole stillage (effluent) generated from grain based distillery plant is separated in thin slope and wet cake in decantation as primary treatment system followed by evaporation of thin stillage to syrup as secondary effluent treatment system and finally wet cake and syrup are mixed together to produce Distillers Wet Grains with Solubles (DWGS) as tertiary effluent treatment system.

RNVDML has purchased B-Hy molasses/C-Hy molasses as well as press-mud from nearby sugar mills and Grains (Maize and sorghum) from local market.

RNVDML has assigned the work for preparation of Adequacy Assessment Report of its 140 KLPD molasses and 60 KLPD grain based distillery effluent treatment plants to Vasantdada Sugar Institute (VSI), Pune through email dated 7th October 2021. Accordingly VSI team comprising of Mr. Y.S. Kadam, Asst. Prof. & Joint Technical Adviser and Mr. S. A. Patil, Alcohol Technologist of Department of Alcohol Technology and Biofuels, visited RNVDML distillery and effluent treatment plants from 25th October 2021 to 27th October 2021 for Adequacy Assessments of distillery ETPs. **Both distilleries and effluent treatment plants were in operation during the visit of VSI team.**

Technical team of VSI had elaborate discussion with Mr. Ashish Kapoor, Senior Vice President, Mr. Sunil Rana, Joint General Manager (Process), Mr. Sushil Saroha, DGM (ETP), Mr. Sandip Navale, Production Manager, Mr. Jitendra Sonwane, Jr, Manager (ETP), Mr. Abhijit Pawar, Sr. Executive (Grain plant) and other technical staff about the performance of both distilleries and effluent treatment plants during the previous and current season.

Joint visit paid by VSI team & technical staff of the RNVDML to molasses and grain storage facilities, Molasses & grain handling, milling & Liquefaction, yeast



propagation, Fermentation, Distillation sections, Decantation, Biomethanation plant, evaporation, Process condensate treatment plant and Biocompost site.

During the visit, inspection of various sections, observations on operations and performance of each unit were made and discussed with the technical staff of the distillery plant.

The detail plant capacities are mentioned below-

Rectified spirit - 140 KLPD (Molasses based)

Extra Neutral Alcohol - 140 KLPD (Molasses based)

- 60 KLPD (Grain based)

Ethanol plant - 60 KLPD (R.S. based)

CO₂ plant - 60 MTPD

2 Consent to operate:

RNVDML has obtained 'consent to operate' for water & air vide letter no. Format 1.0/CAC/UAN No. MPCB CONSENT-0000067583/CO-2003000692, dated 12-03-2020 is attached herewith as annexure -I. The consent to operate is valid for the period from 12-03-2020 to 31-08-2023 for both water & air. The conditions stipulated for treatment and disposal of effluents are as under,

**Specific conditions for Water as per the consent provided by MPCB-
No. Format 1.0/CAC/UAN No. MPCB CONSENT-0000067583/CO-2003000692,
dated 12th March 2020 and action taken by RNVDML**

Sr. No.	Directions	Compliance status	Remarks
1	Water consent is valid for license capacity for molasses base R.S or ENA- 4200 KL/Month for Grain spirit- 1800 KL/Month Ethanol from R.S. only- 1800 KL/Month For CO ₂ -2460 MT/Month	Complied	RNVDML has kept its alcohol production below these limits. (Refer annexure- II & XII)
2	As per consent trade effluent capacity permitted is 1461 CMD	Complied	The trade effluent generation capacity is below the permitted volume (Refer annexure- III)
3	Unit shall provide effluent treatment plant at capacity 1200 M ³ /day for treatment of	Complied	RNVDML has installed Effluent treatment plant- Biodigester as primary ETP



	generated effluent in plants		followed by SMEE as secondary ETP for reduction of volume followed by Biocomposting as Tertiary ETP for achieving zero liquid discharge (ZLD)
4	Unit shall be insured Zero Liquid Discharge- recycle the condensate, spent lees and blow down water after treatment	Complied	RNVDML are treating evaporation condensate & spent lees by chemical treatment and after treatment recycle to cooling towers and fermentation process, Blow downs of cooling towers, boiler and WTP reject water treated in PCTP and recycled to cooling towers and fermentation process
5	Unit shall ensure availability of adequate filler material such PMC, agricultural residue, biological waste for effective biocomposting system as per CPCB & MPCB	Complied	RNVDML is using press mud: concentrated biomethanated average spent wash at a ratio of 1:1.6 and has provided documentary proof for procurement/ availability of press mud, Sale of biocompost and biocompost quality every month to CPCB & MPCB (Refer Annexure-VIII)
6	Unit shall comply with the provisions of the water (Prevention and control of Pollution) Act 1974, by installing water meters	Complied	RNVDML has installed 1 No. of water meter and maintained the records as per norms.
7	Unit must maintain online connectivity of flow meter and web camera connected with server of CPCB & MPCB	Complied	RNVDML has installed online monitoring system with web camera (3 Nos.) and mass flow meters (2Nos.) connected the same to CPCB & MPCB server. (Refer Annexure-XV)
8	All the data regarding rain water harvesting and ground water level from piezometer shall be provided to MPCB	Complied	RNVDML has installed rain harvesting system & Piezometers (7Nos.) and data provided to the CPCB & MPCB.
9	Unit shall maintain records of flow meters installed at inlet & outlet of SMEE	Complied	RNVDML has maintained the records of out let of mass flow meter and reports are sent



			every month to CPCB & MPCB. (Refer annexure- VI)
10	Unit shall ensure the proper operation & maintenance of online monitoring system and maintain the records and ensure the connectivity to the servers of CPCB & MPCB.	Complied	RNVDML has taken proper operation & maintenance precaution of online monitoring system and has maintained the records and ensured the connectivity to the servers of CPCB & MPCB.

3 Specific conditions for Air as per the consent provided by MPCB-

No. Format 1.0/CAC/UAN No. MPCB CONSENT-0000067583/CO-2003000692,

dated 12th March 2020 and action taken by RNVDML

Sr. No.	Directions	Compliance status	Remarks
1	Air consent is valid for license capacity for molasses base R.S or ENA- 4200 KL/Month for Grain spirit- 1800 KL/Month Ethanol from R.S. only- 1800 KL/Month For CO ₂ -2460 MT/Month	Complied	RNVDML has kept its alcohol production below these limits. (Refer annexure- II & XII)
2	Height of stack should be 50 Mtr. For 30 TPH boiler under Act, 1981 for Air emission	Complied	RNVDML has installed stack in RCC and maintained height 50 Mtr.
3	Unit shall install 24x7 continuous emission monitoring system at process stack to monitor stack emission with respect to std. prescribed in Environment (Protection) Rules, 1986 and connected to CPCB & MPCB online servers and calibrate the system from time to time	Complied	RNVDML has installed continuous emission online monitoring system and connected it to CPCB & MPCB server. (Refer annexure- XIV)

4 Distillery plant (140 KLPD) based on molasses, technical details are as follows-

- Plant capacity 120 KLPD Commissioning in 2008
- Expansion from 120 KLPD to 140 KLPD in 2015-16



- Licensed capacity of distillery: 462 lakh bulk liters of alcohol /annum
- Name of plant Supplier- M/s. Praj Industries Ltd, Pune
- Fermentation Technology – Continuous /Fed-batch type
- Distillation Technology –Multi-pressure distillation to produce R.S. and ENA
- Fuel ethanol Technology- 60 KLPD Molecular Sieve Dehydration Technology (MSDH)
- Steam for Distillation-Independent conventional boiler (30 TPH, 65 Kg/cm², Make- Thermax Ltd., Pune) based on bagasse cum biogas. The steam is passed through a turbine (3 MW) to produce power and 3.5 Kg/cm²(g) pressure available at steam header of distillery plant.
- Culture vessels – 4 Nos.
- Pre-fermenters capacity – 2 Nos. capacity 125 M³ each
- Fermenters - 4 Nos. (Cap. 700 M³ each)
- Wash holding tank- 1 No. (Cap. 700 M³)
- Pre fermentation, fermentation section and distillation plant capacities are adequate to produce 140 KLPD Rectified spirit or Extra Neutral Alcohol and R.S. to Fuel alcohol plant capacity is 60 KLPD.
- Number of columns in distillation section- 5 Nos. for rectified spirit (R.S.) (Analyzer cum degasser column -2 Nos., Pre-rectifier column, rectifier column, ED column, Simmering and Recovery column).
- Last five years performance of distillery plant is given in table 1.0.

Table: 1 - Last five years performance of distillery plant

Sr. No.	Particulars	Year				
		2016-17	2017-18	2018-19	2019-20	2020-21
1	Number of working days/annum	323	318	320	322	320
2	Alcohol production (Lakh Lits.)					
	Rectified spirit	130.03	56.69	165.63	205.86	143.97
	ENA	286.48	336.13	254.32	204.44	266.29
	Impure spirit	3.43	6.27	0.0	0.81	2.22
	Total Alcohol production, (Lakh Lits./Annum)	419.94	399.09	419.95	411.11	412.48
	Average Alcohol	1.30	1.25	1.31	1.28	1.29



	production, (Lakh Lits./day)					
3	Total purchase molasses consumption (MT)	1,48,226	1,47,171	1,56,658	1,54,442	1,49,066
4	Recovery (Lit./MT)	283.31	271.18	268.07	266.19	276.72
5	Fermentation efficiency (%)	91.50	91.50	91.50	91.50	91.50
6	Distillation efficiency (%)	98.50	98.50	98.50	98.50	98.50
7	Capacity utilization (%)	90.90	86.38	90.89	88.98	89.28
8	Spent wash generated (Lakh Lits./ annum)	3023.56	2833.54	2981.64	2960.00	2928.60
9	Spent wash generation, (Lits./Lit. of alcohol)	7.20	7.10	7.10	7.20	7.10
10	Average spent wash generated (M ³ /day)	936.0	891.05	931.76	919.25	915.19

Above performance data was collected during visit of our team to RNVDML Distillery division. Based on the production figures collected, the capacity utilization of distillery plant in 2020-21 was 89.28%. The data collected from the fermentation log book and MPR distillation plant log book is attached herewith as annexure – IV and annexure – V respectively.

The alcohol percent in fermented wash as noted from the log book was found to be in the range of 10.00-10.50 % (v/v), which validates the generation of spent wash of about 7.10-7.20 liter/liter of alcohol.

The 140 KLPD distillery plant performance for the month of October 2021 is given in table 2.

Table: 2 –Performance of Distillery plant for month of October 2021

Sr. No.	Particulars	Unit	Month
1	Total Alcohol production	B.L.	37,37,524
	a) Rectified spirit	B.L.	---
	b) ENA		---
	c) Fuel ethanol		---
	d) Impure spirit		---
2	Total BH & C-Hy Molasses distilled	MT	13,168.00
	1. Own molasses		---
	2. Purchased molasses	MT	13,168.00
3	Recovery of alcohol	Lit./MT	284.00
4	Fermentation Efficiency	%	89.80
5	Distillation Efficiency	%	98.20



6	Overall Efficiency	%	88.18
7	Capacity utilization	%	88.43
8	Average raw spent wash generated	(Lakh Lits./Month)	302.0
9	Average raw spent wash generated per of alcohol produced	(Lits./Lit. of alcohol production)	8.00
10	Average raw spent wash after sludge removal	(Lakh Lits./Month)	286.0
11	Average raw spent wash after sludge removal	(M ³ /Day)	922.58

Performance parameters of Molasses based Distillery plant for month of October 2021 is attached as annexure- II.

5 UTILITIES:

Technical specification for Conventional Boiler

- Name of boiler supplier - M/s. Thermax Ltd. Pune
- Capacity - 30 TPH
- Working pressure - 65 Kg/cm²
- Temperature - 480⁰C
- Type of Fuel - Bagasse plus Biogas
- Quantity of fuel consumed - 9 to 10 TPH Bagasse + about 1600-1700 NM³ / hr Biogas
- Equipment used for monitoring stack emission norms – Opacity Meter for SPM, Model DCEM-2100-209 RCU
- Height & Diameter of chimney - Height 50 M, Dia. 2.467M, MOC – RCC
- Flue gas generation and its temperature - 31.1 M³/Sec. @ 160⁰C
- Boiler dust collection system - 3 Field ESP
- Quantity of ash generated - 2.5 TPD /Day
- Disposal of boiler ash - Used as filler material for Biocomposting process

Technical specification for Turbine -

- Name of supplier - M/s. Man Energy Solution Ltd., Bangalore
- Capacity - 3.0 MW
- Type - Straight back pressure Impulse Turbine

Technical specification for resin based WTP -

- D.M. water plant capacity- 800 M³/day
- Soft water plant capacity - 1500 M³ /day



6. Primary Effluent Treatment system-Biomethanation plant (Anaerobic digestion): -

The average raw spent wash generation in the month of Oct. 2021 (26 days) was 921 M³/day from 140 KLPD distillery plant. The raw spent wash is sent to decanters (3 Nos.) for separation of sludge. After removal of sludge, the raw spent wash is fed to the biogas plant through a raw spent wash (RSW) magnetic flow meter with totalizer. As per the data collected, the inlet average COD and brix of raw spent wash was noted to be 1,10,000 -1,18,000 ppm and 10-12⁰ brix respectively. It was also noted that during biomethanation, the COD of the raw spent wash is reduced by about 68-69 % and final brix of biomethanated spent wash was around 5-6⁰ brix. Biogas generation will be 0.58 M³/kg of COD reduction i.e. around 1849 Nm³/hr and gas supplied to boiler as a fuel and digester outlet biomethanated spent wash transfer to the spent wash storage tanks (2Nos.) capacity 500M³ each.

Table: 3 –Performance of Decanter (Average from 1st Oct. to 26th Oct. 2021)

Sr. No.	Particulars	Unit	Test Values
1	Raw spent wash feed to Decanter	M ³ /day	974.00
2	Raw spent wash out let of Decanter	M ³ /day	921.00
3	Sludge separated from Decanter	M ³ /day	53.00

Separated sludge is used for biocomposting as filler material. Biogas produced is burnt in the 30 TPH capacity (65 Kg/cm² (g)) dual fuel distillery boiler with bagasse as a supplementary fuel to generate steam. The steam generated in the distillery mill boiler is supplied to the PRDS and out let from PRDS with reduced steam pressure of 3.5 Kg/cm² (g) is used in operations of distillery and ETPs.

Technical details of biogas plant installed are given below-

- Name of biogas plant supplier- M/s. Aqua Tech, Thailand
- Biogas plant installation year –2008, No. of digesters-3 Nos.
- Type of Technology-Thermophilic
- Digester capacities – Digester No. 1– Total capacity 10,500 M³
 Digester No. 2– Total capacity 10,500 M³
 Digester No. 3– Total capacity 10,500 M³
 (Dia.- 30M & Ht -8.5M each digester)



- Design Raw spent wash feed to the digester- Max. 1200 M³/day
- Design Hydraulic Retention Time – 26 to 30 days
- Average raw spent wash feed to the digester- 900 -950 M³/day
- Other plant & machinery of biomethanation plant- Neutralization tank, degasser, lamella clarifier, blowers, pumps & motors, safety devices, MCC, gas flare and instrumentations etc.
- The characteristic of raw and biomethanated spent wash is given in table 4.0.

Table: 4 - Characteristic of raw and biomethanated spent wash

Sr. No.	Parameter	Distillery Effluent (Raw spent wash) characteristics	Characteristics of Biomethanated Spent wash
1	Raw spent wash feed to digester	900-950 M ³ /day	900-950 M ³ /day
2	Brix of spent wash	10-12 ⁰	5-6 ⁰
3	Colour	Dark brown	Greenish brown
4	Temperature	35-37 ⁰ C	30-35 ⁰ C
5	pH	4.0 - 4.5	7.50-7.80
6	C.O.D. (PPM)	1,10,000-1,18,000	37,000 -38,000
7	B.O.D. (PPM)	55,000-60,000	12,800-14,000

Based on data collected from 1st Oct. to 26th Oct. 2021 Performance of Biogas plant is given in table no. 5.

Table: 5 - Performance of Biogas plant (Average from 1st Oct. to 26th Oct. 2021)

Sr. No.	Particulars	Unit	Performance result
1	RSW feed to Digester	M ³ /day	921.00
2	COD of Inlet feed	PPM	1,13,000
3	COD of digester out let	PPM	36,068
4	COD reduction	%	68.08
5	Biogas generation	M ³ /day	44,377
6	Biogas generation per kg COD reduction	M ³ /kg	0.58

- Based on designed retention time, biomethanation plant capacity seems to be adequate for 140 KLPD distillery plant raw spent wash generation and its treatment.

Biogas plant was in operation during visit of VSI team and the performance of biogas plant was found satisfactory. RNVDML is operating the molasses based



distillery plant throughout the year and therefore, are not faced any problem of restart of the digesters.

From the performance observed during the visit & data for the month of October 2021 (attached as annexure-III), it is concluded that the combined capacities of digesters, organic loading rate and hydraulic retention time are adequate to treat raw spent wash discharged from analyser column of molasses based distillery.

7. Secondary Standalone biomethanated spent wash evaporation plant (SMEE)

for concentration of biomethanated spent wash (from 5-6% T.S. to 30% T.S.) :-

RNVDML has installed standalone seven effect falling film evaporation plant in 2013 for concentration of biomethanated spent wash from 5-6% total solids to 30% total solids. A magnetic flow meter with totalizer has been installed at inlet of SMEE plant for measurement of biomethanated spent. The steam from boiler is used as heating source for the evaporation. The biomethanated spent wash from feed tank (Capacity-25M³) is fed to 7th evaporator body (reverse feed) and concentrated BMSW transferred to 6th then 5th, 4th, 1st, 2nd and 3rd evaporator body. The mass flow is installed and connected to the server of CPCB & MPCB for concentrated spent wash outlet of SMEE plant. The concentrated BMSW from 3rd evaporator body @30% total solids is then transferred to spent wash storage tank at biocompost site (Shendra) for further treatment. The water vapors from all evaporator body condensate in surface condenser and the condensate is recycled for molasses dilution and cooling tower for make-up after chemical treatment.

The SMEE plant technical details are as given below,

- Name of SMEE plant supplier: Praj Industries Ltd., Pune
- SMEE plant commissioning year : 2013
- Designed biomethanated spent wash feed to the SMEE: 1200 M³/day
- Steam requirement: Dry saturated exhaust steam at 3.2 kg/cm²(g)
- Plant & Machinery: Evaporators (7 Nos.) falling film type, Pre-heaters, VLS, Surface condenser, Tanks, TVR, Instrumentations, pumps & motors, safety devices, MCC etc.
- Magnetic flow meter is installed for biomethanated spent wash feed to SMEE
- Mass flow meter is installed for measurement of concentrated spent wash outlet from SMEE and connected to MPCB/CPCB server.



- MOC of SMEE plant: SS-304

Performance of SMEE plant during the visit:

During our visit the spent wash feed to SMEE plant was 35.83 M³/hr at 5% total solids and concentrated spent wash generation was 5.97 M³/hr at 30% total solids. Water evaporation duty was 29.86 M³/hr. As per our two days observation we found that the spent wash fed to SMEE plant at average 860 M³/day and concentrated quantity is generated at average 143 M³/day. The total solids concentration in the concentrate was in the range of 30 to 32 %. Therefore, the performance of standalone multiple effect evaporation plant was found satisfactory. Evaporation log book is attached as annexure- VI.

Table 6: – Performance of SMEE plant

Sr. No.	Parameters	Unit	Value
1.	Biomethanated spent wash feed	M ³ /day	921.0
2.	Feed rate @ Sp. Gr. 1.020	Kg/hr	39,142
3.	Brix of feed	%	5.0
4.	Water evaporation rate	Kg/hr	28,979
5.	Concentrate biomethanated spent wash output from SMEE plant @ Sp. Gr. 1.120	Kg/hr	7163
6.	Concentrate biomethanated spent wash output from SMEE plant	MT/day	172
7.	Total solids in concentrated spent wash	%	30
8.	Steam required for water evaporation	Kg/hr	5,300
9.	Steam Economy (Kg of water evaporated per Kg of steam consumption)	Kg	5.46

Based on our observations and data collected, the performance of SMEE plant was found to be adequate and satisfactory.

8. Final Effluent Treatment system- Biocomposting

RNVDML biocompost yard no.-1 (Shendra site)

RNVDML distillery has constructed total 16 acres of impervious brick-on-edge biocompost yard with HDPE sheet lining as per CREP norms. Out of that 6.0 acres are covered with 200 GCM Poly film sheet and 10 acres uncovered biocompost yard. Out of total biocompost yard area about 14 acres is used for biocomposting & 2 acres area is allocated for storage of press mud procured from nearby sugar mills and for stacking of ready biocompost.



The concentrated biomethanated spent wash from SMEE plant about 150-160 M³/day is pumped to impervious RCC spent wash storage tanks (Cap. 20 & 16 M³) constructed as per CREP guidelines.

Biocompost yard no.- 2 (Takali site)

RNVDML distillery has also constructed total 6 acres of impervious brick-on-edge biocompost yard with HDPE sheet lining as per CREP norms at Takali site. The total 6.0 acres are covered with 200 GCM Poly film sheet.

The concentrated biomethanated spent wash from SMEE plant is transported by tankers to Takali site for biocomposting process. Impervious RCC spent wash storage tanks (Cap. 1000 M³) constructed as per CREP guidelines.

The mixing of press-mud (50-60% moisture) and biomethanated spent wash is carried out in windrows with the help of homogenous auto spraying and mixing machine (3 Nos.). Spraying of biomethanated spent wash is done with the help of homogenous auto spraying and mixing machine. PMC to biomethanated spent wash ratio is 1:1.23. At present liquid culture is added in biocomposting process.

Based on the visit, inspection of biocompost yard and discussion with the technical staff and biocompost plant operators, the performance of biocompost system is as given below,

Performance of biocompost process of RNVDML distillery plant based on the average per day:

- a) Concentrated biomethanated generation: Average 153 M³/day
- b) Working days of distillery plant: 330 days per annum (Year 2020-21)
- c) Biomethanated spent wash from biogas plant and raw spent wash: 153 M³/day X 330 days = 50,490 M³/annum
- d) Available purchase PMC during 2020-21: 44,759 MT
- e) PMC consumption during 2020-21: 41,143 MT
- f) Average biomethanated spent wash to press mud ratio: 1:1.23
- g) Biocompost cycle duration: 60 days
- h) No. of biocompost cycles per year: 5 Nos.
- i) Culture required for biocomposting: 2 Lits. / MT of press mud.



j) Total 20 acres impervious brick-on-edge biocompost yard with leachate collection gutter and leachate collection sump well has been constructed and being used by RNVDML.

k) Actual biocompost area requirement:

- Total filler material available:
- Area required for biocomposting = $\frac{41,143}{850 \times 5} = 9.68$ acres

(i.e. 850 MT filler material/acre & 5 cycles per annum)

l) Sludge from decanter is drying in sludge drying bed and selling with bio-compost

m) **Pizometers for water level and quality record**

RNVDML distillery has installed 3 Nos. of pizometers at biocomposting yard at Shendra site and 4Nos. of Pizometers installed at biocomposting yard at Takali site.

Log sheet of spent wash generation and consumption for biocompost is attached as annexure -VII

Following machinery is available with the unit for biocomposting process

- Windrow turning machines (3 Nos.) for homogenous mixing of PMC and auto spraying biomethanated spent wash.
- Hydraulic Tractors trolleys 5 nos. for unloading, transportation etc. of press mud and biocompost
- JCB excavator cum loader machines-3 nos.

The biocomposting yard area plus biocompost storage area is sufficient to achieve Zero Spent Wash Discharge (ZLD) even at 140 KLPD capacity operation for 330 days.

- Biocompost screening machine with conveyor for bagging (2 Nos.) and weighing scale for bagging (3 Nos.)
- One online monitoring camera covering 30 days biomethanated spent wash storage tank and biocompost yard is installed and connected to server of MPCB/CPCB at Shendra site.
- One online monitoring camera covering 30 days biomethanated spent wash storage tank and biocompost yard is installed and not connected to server of MPCB/CPCB at Takali site.



- Matured biocompost is sold in baggage at the rate of Rs. 700/- per MT to farmers

During our visit we have also inspected the surrounding area for evidence of discharge of spent wash particularly the area near impervious spent wash storage tank and biocompost yard. No evidence of any kind of discharge was found. The log sheet of PMC purchase & biocompost production in the year 2020-21 enclosed herewith as annexure-VIII.

Table 7: Performance of Biocomposting Process (Nov.- 2020 to Sept. 2021)

Sr. No.	Particulars	Unit	Shendra Site	Takali Site	Total
1	Opening stock of Biocompost	MT	968.62	1203.20	2171.82
2	Production of Biocompost	MT	20428.86	8230.0	28658.86
3	Sale of Biocompost	MT	21325.89	9370.53	30696.42
4	Closing stock	MT	71.59	62.67	134.26

Based on our observations and data collected, the performance of Biocompost plant was found adequate and satisfactory.

9 Details of utilities (Water, Steam & Power) consumption:

Based on the discussion with technical staff of RNVDML distillery and the data collected, the current water balance considering fresh water consumption and recycled streams is given in table no. 8.0, Steam & power consumption for distillery, biomethanation plant and auxiliaries etc. are given in table no. 9.0. Water consumption bill of MIDC is attached as annexure-XVI

Table: 8 – Water balance of molasses based plant during the visit

Sr. No.	Particulars	Quantity
	Water consumption,	M³/day
A	Process water	
	i) Fermentation & distillation	950
	ii) Pump sealing, fermenter & vessel cleaning, CO ₂ scrubber etc.	150
	Total process water (A)	1100
B	Soft water	
	i) Vacuum pump, decanter, scrubber for distillation & evaporation plant	144
	i) Pump seal (Ferm., Dist. & SMEE)	05



	ii) Cooling towers make-up water (Ferm., Dist. & SMEE)	553
	iii) Softener charging	10
	Total soft water (B)	712
C	D. M. water	
	i) Boiler (30TPH)	530
	ii) DM water R.S. dilution during ENA production	144
	iii) D.M. plant charging	80
	Total D.M. water (C)	754
D	Total water required A+B+C	2566
E	Recycle streams after treatment	
	i) Rectifier lees, PRC lees & FOC lees for fermenter	324
	ii) Evaporation condensate of SMEE plant recycle to fermentation process	395
	iii) Evaporation condensate of evaporation plant & Treated blown down water (PCTP) recycle to cooling towers makeup. (Ferm. Dist. & SMEE)	300+190
	iv) Treated blow down water recycle to fermentation process (PCTP)	110
	v) Steam condensate recycle to boiler	346
	Total	1665
F	Fresh water required (D-E)	901
	Water recycled, KL/KL of alcohol production	13.80
	Fresh water consumption, KL/KL of alcohol production	7.47

Table: 9 - Steam & Power consumption of molasses based plant

Sr. No.	Particulars	Quantity
A) Steam consumption, MT/day		
i)	Distillation (Wash to ENA mode)	394
ii)	MSDH	36
iii)	SMEE and Stripper column	146
	Total steam consumption	576
B) Power consumption, KWH/day		
i)	Fermentation	9312
ii)	Distillation	9420
iii)	SMEE	8280
iv)	Boiler	10440
iv)	MSDH	564
v)	Grain plant	13968
vi)	Biogas	2328
vii)	CPU	1512
viii)	Biocomposting	840
ix)	CO ₂ plant	9965
x)	Other miscellaneous	1680
	Total power consumption- KW /day	68,309
	Total power consumption- MW	2.85



Steam and power required for molasses based distillery, effluent treatment plants are generated from 30 TPH capacity (working pressure 65 Kg/cm² (g) bagasse cum biogas fired boiler and 3 MW capacity back pressure turbine.

10 Process Condensate Treatment plant (PCTP):-

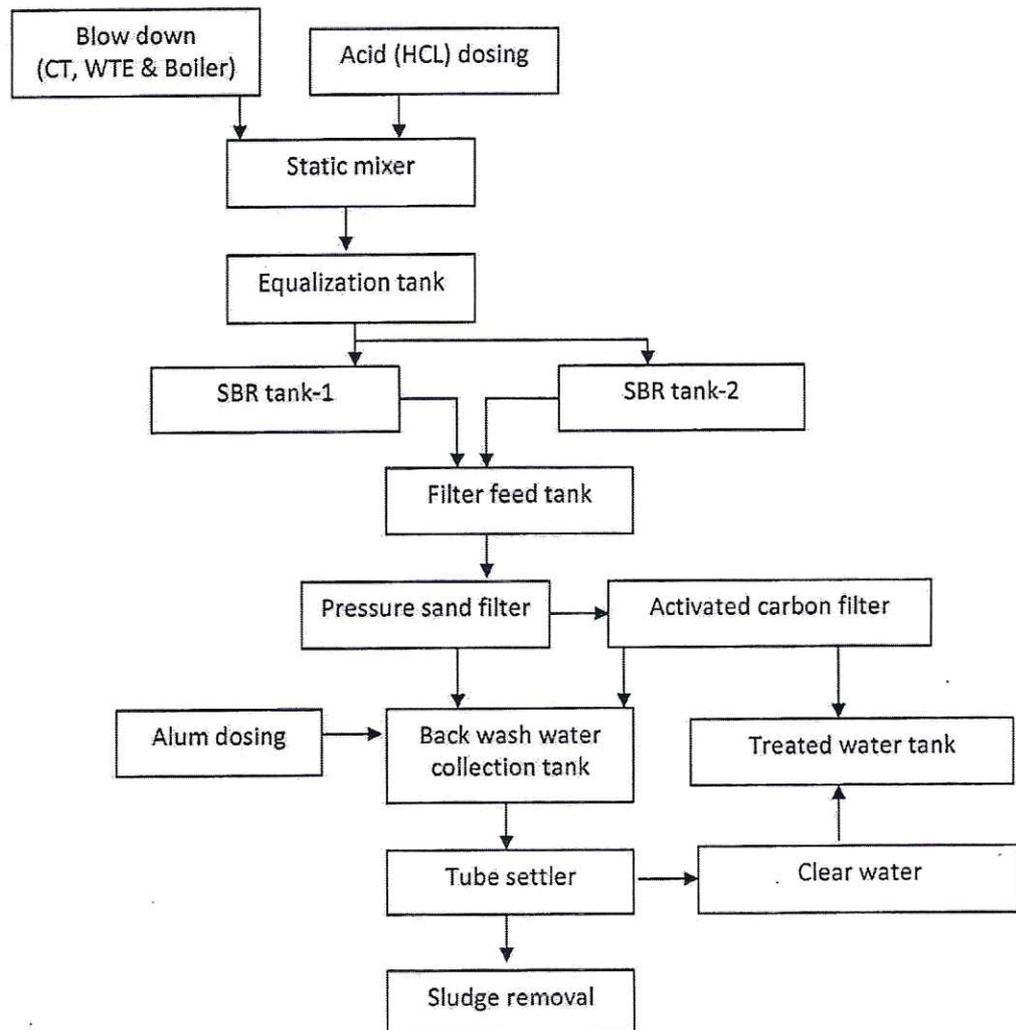
RNVDML distillery has installed Process condensate treatment plant for treatment of cooling tower blow down of both plants and WTP regeneration reject water. Total 320 M³/day fed to PCPT plant , after treatment 300 M³/day treated clear water recycled back to fermentation process and cooling tower make up and remaining sludge 20 M³/day transferred to sludge tank.

Evaporation condensate from SMEE plant and spent lees from distillation plant app. 695 and 220 M³/day respectively are collected in intermediate tank after cooling through PHE and entire water recycled back to process and cooling tower make-up .

Process flow diagram is given in next page.



Process flow diagram of Process Condensate Treatment plant (PCPT)



11 Carbon Dioxide plant (CO₂ plant):-

RNVDML has tied-up with M/s. Punjab Carbonic Pvt. Ltd. for setting up of CO₂ plant at RNVDML distillery premises. M/s. PCPL has installed CO₂ plant of 60 TPD capacity in 2019.

During our visit, the CO₂ plant was in operation. The 140 KLPD distillery plant was operated on 123 KLPD and the CO₂ generated from molasses fermentation was about 93 MT and CO₂ generated in 40 KLPD grain based fermentation was about 30 MT /day. CO₂ generated in both plants was transferred to CO₂ recovery plant for



purification and after purification CO₂ purity was obtained about 98%. Pure CO₂ was produced in two forms i.e. liquid and compressed CO₂. During our visit, performance of CO₂ plant observed was as under.

Table: 10 – Performance of CO₂ plant during visit of VSI team

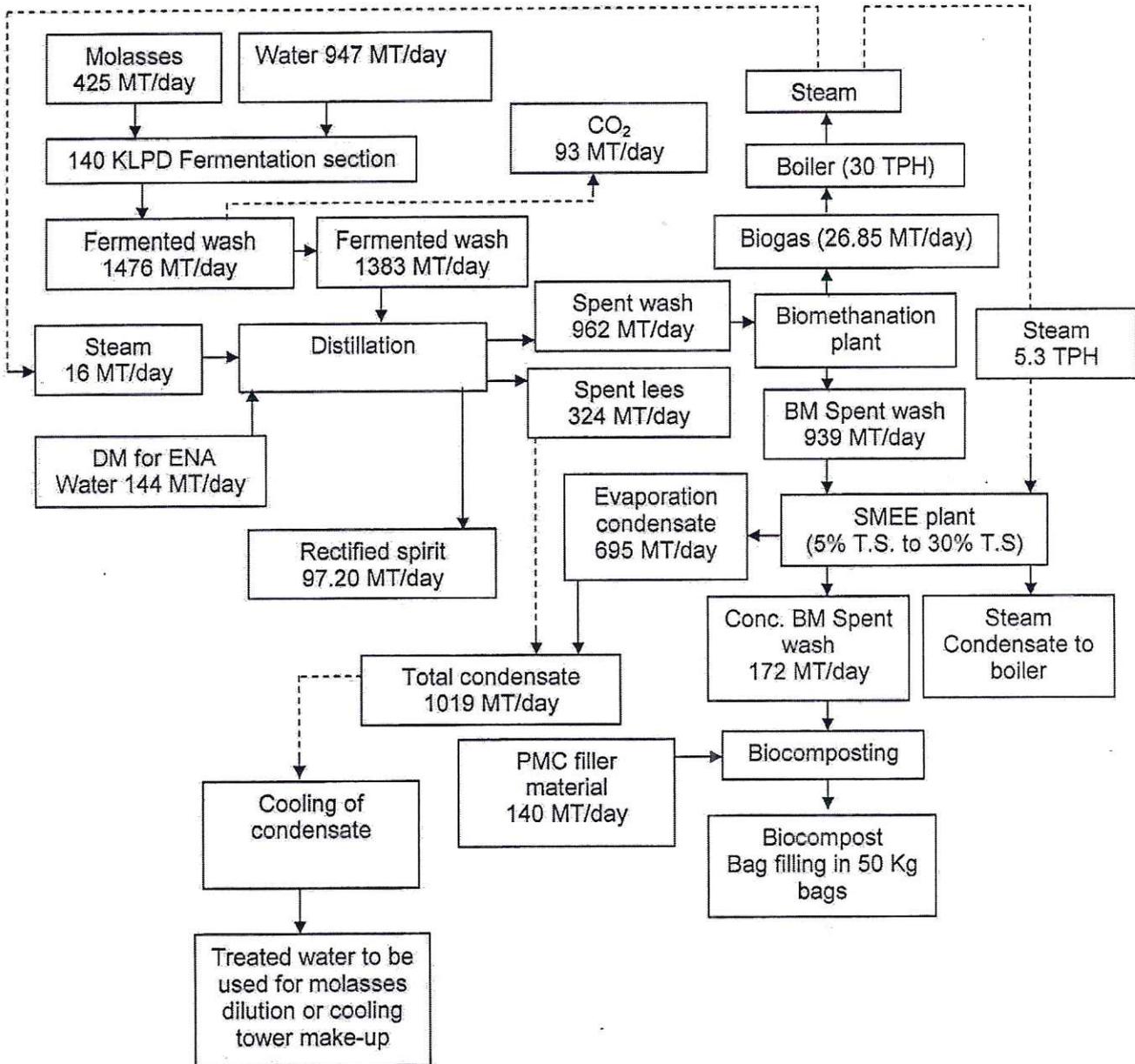
Sr. No	Date	Unit	Quantity
1	25-10- 2021	MT	43.27
2	26-10- 2021	MT	56.62
3	27-10- 2021	MT	46.81

CO₂ produced from CO₂ recovery plant is sold in Aurangabad and Malegaon industrial areas.

The memorandum of understanding for CO₂ plant between RNVDML and Punjab Carbonic Pvt. Ltd. is attached herewith as annexure-IX



12 Mass balance of 140 KLPD Molasses based Distillery plant





13 On-line monitoring system:

During the visit, one mass flow meter installed and connected to MPCB/ CPCB server at SMEE plant outlet for measurement of concentrated spent wash generation. Online two cameras are installed at both biocompost site which covers spent wash storage tank and biocompost yard. One camera at Shendra biocompost yard is connected to MPCB/CPCB server, second camera at Takali site was also installed but not connected to MPCB/CPCB server.

Stack monitoring system installed for boiler was in operation and connected to MPCB/CPCB server. Mass flow meter, camera and stack monitoring systems were working satisfactorily. (Refer annexure- XIV & XV).

The details of on-line monitoring system installed are given in table no. 11.

Table No. 11:- Details of Online monitoring system

Sr. No.	Particulars	Quantity	Remarks
1	Mass flow meter at outlet of SMEE plant for measurement of concentrated spent wash generation	1 No.	Installed and connected to MPCB/ CPCB server
2	Online camera at Biocompost Yard no.1, Radico NV (Shendra) site	1 No.	Installed and connected to MPCB/ CPCB server
3	Online camera at Biocompost Yard no. 2, Takali site	1 No.	Installed and not connected to MPCB/ CPCB server
4	On-line stack monitoring system for 30 TPH biogas cum bagasse fired boiler	1 No.	Installed and connected to MPCB/ CPCB server
5	Pizometers with digital water level recorder (DWLR)	a) 3 Nos. of pizometers at biocompost ing yard at Shendra site b) 4Nos. of Pizometers installed at biocompost ing yard at Takali site	Installed and not connected to MPCB/ CPCB server. RNVDMML submitting 3 rd party monthly analysis report to MPCB

It is advised to online camera installed at Biocompost Yard no. 2, Takali site should be connected to MPCB/ CPCB server.



14 Part B: Adequacy assessment of 60 KLPD grain based distillery plant

The 60 KLPD grain based distillery plant details are as follows,

- Capacity of grain based plant: 1800 KL/M with 100 MT/Day cattle feed (DWGS).
- Grain storage– Silos
- Mill Section – Pre-clarification and hammer mill
- Liquefaction & Fermentation Technology – Batch type
- Distillation Technology – MPR distillation to produce R.S. or ENA
- ETP scheme – Decantation followed by IMEE followed by mingler and CO₂ recovery plant.

During visit of VSI team for adequacy assessment of the 60 KLPD grain based distillery plant, the maize and sorghum mix feedstock was in use for alcohol production and the plant was operated at 40 KLPD capacity.

RNVDML has installed three (3 nos.) numbers of silos (Cap. 3000 MT each) with pre-cleaning and blower arrangements for storage of grain. The grain from silo is transferred to mill. Milling system of Bhuler make with pre-cleaning, de-stoner, magnetic separator and cyclone system for removal of foreign material & dust that comes along with grain has been installed. The grain is having stone and sand particles of 0.2 to 0.5 % of total grain used in process. Stones and sand particles are separated in de-stoner, collected in bags and used for land filling and road construction in distillery. The foreign materials of 1 – 1.5 % of total grain is removed in pre-cleaning system and used for boiler feed along with bagasse.

The liquefaction process is operated on high dissolved solids (about 30 to 32%) which help to reduce the dilution water and better separation of solids in decantation system. The fermentation process was simultaneous saccharification and high gravity fermentation, which leads to high alcohol percentage (12 to 13%) in the fermented wash. The log sheet of liquefaction & fermentation section is attached as annexure - X. The high alcohol percentage in fermented wash helps to reduce the effluent generation and energy (steam) consumption in distillation. The CO₂ produced in fermentation process is sent to CO₂ recovery plant, installed in same distillery complex. The distillation system is multi pressure type with heat integration consisting of seven columns system.



to produce potable grade rectified spirit and extra neutral alcohol. The log sheet of distillation section is attached as annexure –XI.

The whole stillage generated after distillation is subjected to decantation and thin stillage generated after decantation is evaporated in IMEE plant. The wet cake from decantation and thick syrup are mixed in Ribbon Mixer (Mingler) to produce Distillers' Wet Grain with Solubles (DWGS). DWGS is sold to farmers as cattle feed through agency.

The distillation column lees, vacuum pump water and sealing water of pumps is collected in sump and recycled in liquefaction section for slurry preparation. The blow downs of cooling towers in grain based distillery plant are transferred to the process condensate treatment plant (PCTP).

The 60 KLPD grain based distillery plant technical details are as follows,

- Plant capacity 60 KLPD and Commissioning in 2009
- Licensed capacity of distillery: 198 lakh bulk liters of alcohol /annum
- Name of plant Supplier- M/s. Praj Industries Ltd, Pune
- Grain handling & storage system – Pre-cleaning and 3 nos. silos for storage of grains
- Mill section – Buhler make hammer mill with 7.5 MT/hr capacity
- Liquefaction – Slurry preparation and liquefaction with Jet-cooker
- Fermentation Technology – Batch /Fed-batch type
- Distillation Technology –Multi-pressure distillation to produce R.S. and ENA
- Evaporation Technology – Integrated evaporation – falling film type – 3 Nos.
- Steam for Distillation-Independent conventional boiler (30 TPH, 65 Kg/cm², Make- Thermax Ltd., Pune) based on bagasse cum biogas. The steam is passed through a turbine (3 MW) to produce power and 3.5 Kg/cm² (g) pressure available at steam header of distillery plant.
- Pre-fermenters capacity – 1 No, capacity 50 M³
- Fermenters - 3 Nos. (Cap. 325 M³ each)
- Beer well- 1 No. (Cap. 325 M³)
- Pre fermentation, fermentation section and distillation plant capacities are adequate to produce 60 KLPD Rectified spirit or Extra Neutral Alcohol.



- Number of columns in distillation section- 5 Nos. for rectified spirit (R.S.) and additional 2 nos. of columns for ENA production (Analyzer cum degasser column, Pre-rectifier column, rectifier column, ED column, Simmering and Recovery column).
- Last five years performance of grain based distillery plant is given in table 12.

Table: 12 - Last five years performance of 60 KLPD grain based distillery plant

Sr. No.	Particulars	Year				
		2016-17	2017-18	2018-19	2019-20	2020-21
1	Number of working days/annum	298	312	318	320	309
2	Alcohol production (Lakh Lits./Annum)					
	Rectified spirit	96.98	0.03	3.31	19.63	2.01
	ENA	11.94	115.74	132.02	124.32	119.73
	Impure spirit	1.75	1.65	1.28	1.27	1.01
	Total Alcohol production, (Lakh Lits./Annum)	110.67	117.42	136.61	145.22	122.75
	Average Alcohol production (KLPD)	37.14	37.63	42.96	45.38	39.72
3	Grain used (MT)	28,859	30,743	35,318	36,078	31,231
4	Avg. starch (%)	58.70	59.40	59.70	61.48	59.92
5	Alcohol Recovery (Lits./MT)	383.75	382.39	386.75	403.00	393.00
6	Saccharification efficiency (%)	98.00	98.00	98.00	98.00	98.00
7	Fermentation efficiency (%)	91.70	91.90	92.30	92.60	92.50
8	Distillation efficiency (%)	98.25	98.50	98.50	98.48	98.50
9	Capacity utilization (%)	55.89	59.30	68.99	73.34	61.99

Above performance data was collected during visit of VSI team to RNVDML Distillery division. Based on the production figures collected, the capacity utilization of grain based distillery plant in 2020-21 was 61.99% and average alcohol production was 39.72 KLPD against 60 KLPD capacity. The data collected from the fermentation log book and MPR distillation plant log book.

The alcohol percent in fermented wash as noted from the log book was found to be in the range of 13.00-13.50 % (v/v).



The 60 KLPD grain based distillery plant performance for the month of October 2021 is given in table 13.

Table: 13 – Performance of distillery plant for month of October 2021

Sr. No.	Particulars	Unit	Month
1	Total Alcohol production	B.L.	11,46,095
	a) Rectified spirit	B.L.	1,75,556
	b) ENA	B.L.	9,70,539
	c) Fuel ethanol	B.L.	---
	d) Impure spirit	B.L.	---
2	Total Grain distilled	MT	2930
	1. Total Sorghum used	MT	1770
	2. Total Maize used	MT	1160
3	Recovery of alcohol	Lit./MT	391.15
4	Fermentation Efficiency	%	92.72
5	Distillation Efficiency	%	98.47
6	Overall Efficiency	%	91.30
7	Capacity utilization	%	63.67
8	Average whole stillage generated	Lakh Lits./Month	81.00
9	Average whole stillage generated	Lits./Lit. of alcohol production	7.06
10	Average thin slop after removal of wet cake in decantation	Lits./Lit. of alcohol production	5.57
11	Average thin slop after removal of flash tank	Lits./Lit. of alcohol production	4.55
12	Thick syrup generation after IMEE	Lits./Lit. of alcohol production	0.80

Performance parameters of grain based distillery plant for month of October 2021 is attached as Annexure- XII.

15 Primary Effluent Treatment system- Decantation of Whole Stillage

Whole stillage generated from analyzer column bottom @ 265 - 280 M³/day with 6- 7 % total solids is subjected to decantation. Thin slop generated after decantation (in the range of 210 to 230 M³/day) with 3.50 – 4.0% total solids is sent to flash tank followed by integrated multiple effect evaporation (IMEE) where it get concentrated to 28 to 30 % total solids. The wet cake generation is in the range of 60 - 65 MT/day. Two Alfa Laval make decanters (Cap. 12 M³/hr) have been installed for separation of wet



cake from whole stillage. During operations, one decanter is in operation and second is standby.

The thin stillage after flash tank of 160- 200 M³/day with 4.0 – 4.5 % is pumped to IMEE plant for concentration to thick syrup.

Table: 14 - Characteristics of whole stillage observed

Sr. No.	Parameter	Stillage characteristics
1	Whole stillage generation	App. 270 M ³ /day (277 MT/day)
2	Colour	Pale yellow
3	Temperature	75-80°C
4	pH	3.8 – 4.0
5	C.O.D.	65,000 (mg/lit.)
6	B.O.D	26,000 (mg/lit.)
7	Total solids	6.0– 7.0 %

16 Secondary Effluent Treatment - Integrated Evaporation plant for concentration of thin stillage (from 4.0 – 4.5 % Total solids to 28-30 % Total solids) :-

The IMEE plant details are as given below-

- RNVDMML has installed integrated multi effect (three effect) falling film evaporator for concentration of thin slop from 4.0 to 4.5 % total solids to 28 to 30 % total solids. The analyzer vapours are used as heating source for the IMEE plant. Therefore, no additional steam is required for concentration of thin slop.
- Mass flow meter is installed at outlet of IMEE plant for measurement of concentrated thick syrup generation.

Performance of Integrated Multiple Effect Thin Slop Evaporation plant (IMEE) during the month of October 2021

- The average thin stillage generation after flash tank as per log sheet in month of October 2021 was around 7.38 MT/hr or 177 MT per day (i. e. 174 M³/day). Data sheet attached as annexure - XIII
- The average concentrated thick syrup generation was 1.165 M³/hr or 27.96 M³/day in the month of October 2021. The water evaporation rate of 6.07 M³/hr or 146 M³/day was achieved. Thus, the thin stillage volume gets reduced from 174 M³/day to 27.96 M³/day (about 28 % T.S.).
- The performance of the grain based IMEE plant in month of October 2021 is given in table 15 on next page
- The IMEE plant was in operation during visit of plant.



Table: 15 - Performance of the IMEE plant in month of October 2021 for concentration of thin stillage feed.

Sr. No.	Parameters	Unit	Value
1	Thin stillage feed rate	M ³ /day	174
2	Thin stillage feed rate	M ³ /hr	7.25
3	Total solids in feed	%	4.5
4	Process condensate generation	M ³ /day	146.04
5	Water evaporation rate	Kg/hr	6071
6	Total concentrated thick syrup output	M ³ /day	27.96
7	Concentrated thick syrup output	Lit./hr	1165
8	Total Solids in concentrated thick syrup	%	28
9	Steam required for water evaporation	MT/hr	NA(Integrated)
10	Steam Economy (Kg of water evaporated per Kg of steam consumption)	Kg	NA(Integrated)

Based on the data collected for the month of October 2021 and one day actual observations during the visit, the design basis of IMEE of grain based plant is adequate and performance was found satisfactory.

17 Tertiary Effluent Treatments- Mingler

The wet cake (63 MT/day) from decantation is mixed with and thick syrup (31 MT/day) in mingler to produce 94 MT/day Distillers' Wet Grain with Solubles (DWGS). DWGS is sold to farmers as cattle feed through agency.

18 Details of utilities (Water, Steam & Power) consumption of grain based plant:

Based the actual working for one day during the visit, the water balance considering fresh water consumption and recycled streams is given in table no. 16.

Table: 16 – Water balance of grain based plant during the visit

Sr. No.	Particulars	Quantity
	Water consumption, M³/day	
A	Process water	
	i) For slurry preparation	175
	ii) Pump sealing	6
	iii) CO ₂ scrubber	12
	iv) Fermenter washing, laboratory & floor washing	30
	v) Domestic & Gardening	10
	Total (A)	233



B	Soft water	
1	Vacuum pump of distillation	12
2	Vacuum pump of IME Evaporation	12
3	Alcohol scrubber	5
4	Make up water for FO decanter	17
5	Cooling Tower make-up	
	i) Fermentation	28
	ii) Distillation	30
	iii) Liquefaction	32
	iv) IME Evaporation plant	25
6	Water requirement for softener charging	10
	Total (B)	171
C	DM water	
	i) For boiler (Steam utilized in grain base plant)	140
	ii) Purifier column	61
	iii) Regeneration & washing	10
	Total (C)	211
	Total (A+ B + C)	615
	Water requirement Lit./Lit. of alcohol production	15.37
D	Recycled Streams	
1	Vacuum pump, sealing water for slurry preparation	24
2	Spent lees/ Process condensate etc.	
	i) PRC spent lees –used for slurry preparation	40
	ii) FOC spent lees – used for slurry preparation	17
	iii) Process condensate recycled for slurry preparation	50
	iv) Steam condensate recycled to boiler as feed water	115
	v) Rectifier spent lees –used for cooling tower make up	50
	vi) Process condensate recycled for cooling tower make up	96
	vii) Cleaning and washings of fermenter to beer well	05
	Total (D)	397
	Water recycled, Lit./Lit. of alcohol production	9.92
E	Actual fresh water consumption	218
	Actual fresh water consumption, KL/KL of alcohol production	5.45

Steam & power consumption for grain based plant, evaporation plant, boiler & auxiliaries observed during the visit are given in table no. 17.0

Table: 17- Steam & Power consumption of grain based plant during the visit

Sr. No.	Particulars	Quantity
A	Steam consumption, MT/day	
	i) For liquefaction & saccharification	18
	ii) For wash to ENA	130
	Total steam consumption (MT/day)	148
B	Power consumption, KWH/day	
	i) Grain handling section	100
	ii) Milling section	2000



	iii) Liquefaction	800
	iv) Fermentation section	2300
	v) Distillation section	2000
	vi) Evaporation section including CT	2250
	vii) Cooling towers	3300
	viii) DWGS section	1200
	ix) Boiler and turbine	2400
	x) Office & street light	150
	Total power consumption (KWH/day)	16500

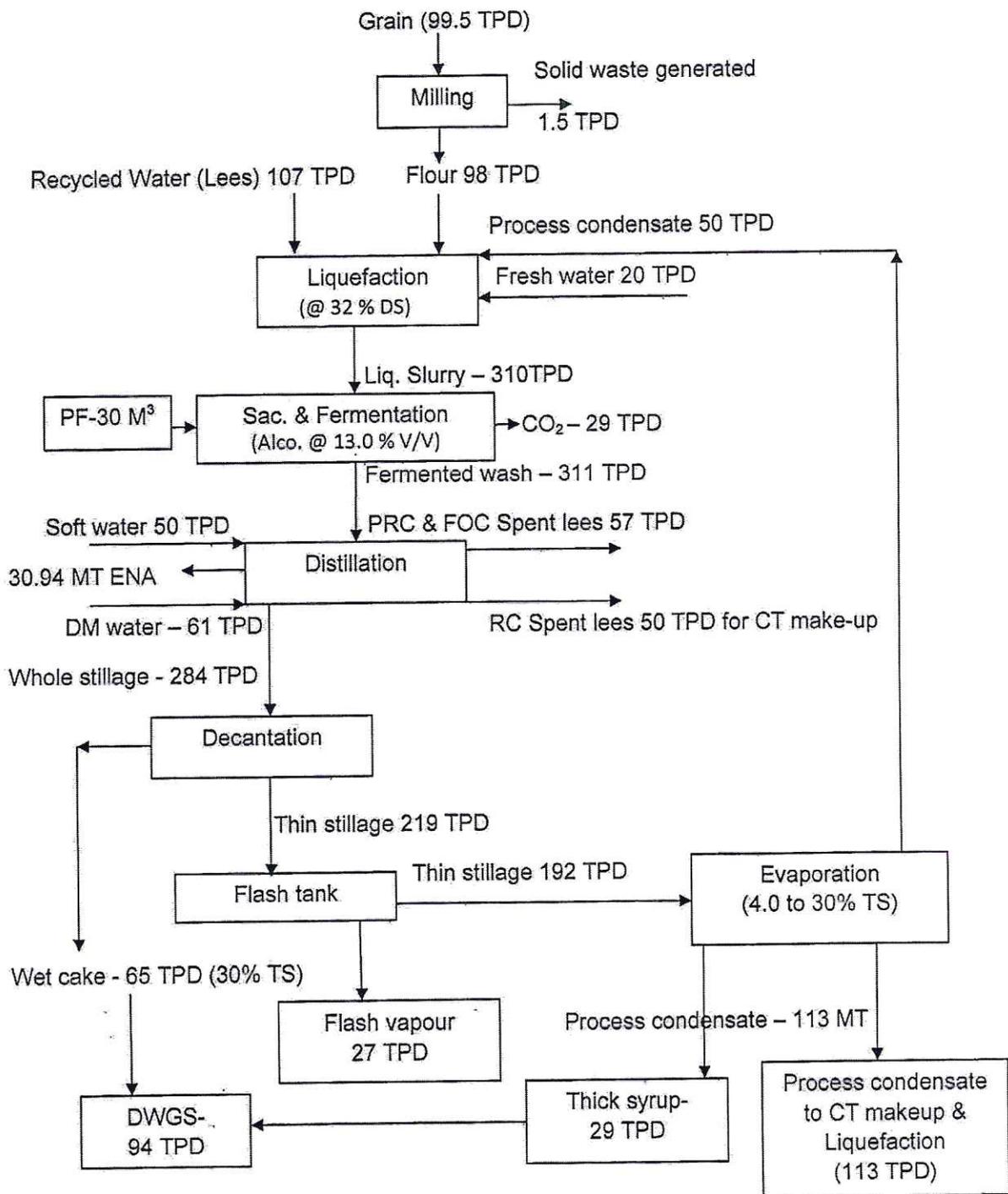
19 Details of flow meters installed at grain base distillery plant:

Table 18: Details of flow meters installed at grain based unit

Sr. No.	Particulars	Quantity	Remarks
1	Magnetic flow meter at Decanter inlet for whole stillage generation	1No.	Installed & working satisfactorily
2	Magnetic flow meter at IMEE inlet for thin stillage generation	1 No.	Installed & working satisfactorily
3	Mass flow meter at IMEE outlet for thick syrup generation	1No.	Installed & working satisfactorily but not connected to MPCB/ CPCB server



20. The Mass Balance of 40 KLPD Grain Based Plant of RNVDML, Aurangabad during the month of October 2021





Conclusions:

- i) The designed capacities of effluent treatment plants i.e. Biomethanation as primary effluent treatment system followed by Standalone multiple effect biomethanated spent wash evaporation plant as secondary treatment system followed by biocomposting as final treatment are adequate for molasses based distillery plant. Performance of RNVDML effluent treatment plants were found satisfactory during the visit. RNVDML should analyze the raw material and all ETP samples regularly from NABL accredited laboratory.
- ii) The deigned capacities and performance of RNVDML grain based plant and effluent treatment plants was found satisfactory considering the thin slop generation and the treatment scheme adopted.
- iii) The biocompost area of two biocompost yards is total 22 acres. Out of total biocompost yard area, 12 acres of biocompost yard area is covered. Therefore, the unit is able to continue biocomposting process during rainy season also. Total biocompost yard area of 22 acres (12 acres covered plus 10 acres uncovered biocompost yard area) is adequate and sufficient for biocompost.
- iv) The online stack monitoring systems installed for 30 TPH biogas cum bagasse fired boiler and are connected to CPCB/MPCB server and was working satisfactorily during our visit.
- v) At Takali site biocomposting yard on-line camera is not connected to server of MPCB and CPCB.
- vi) Pizometers (3 Nos.) are installed at biocompost yard No. 1 (Shendra site) and Pizometers (4 Nos.) are installed at biocompost yard No. 2 (Takli site). All pizometers are not online connected. RNVDML has been submitting 3rd party monthly analysis report to MPCB/CPCB.
- vii) The gross storage capacity of concentrated spent wash (30% total solids) impervious storage tanks is 20,000 M³ and 16,000 M³ (working volume 85 % of gross capacity) is used for storage of concentrated spent wash and is sufficient for 30 days concentrated spent wash generation.
- viii) As suggested by MPCB/CPCB, the unit has installed magnetic flow meter at the inlet & Mass flow meter at the outlet of SMEE plant of molasses based distillery



plant. Mass flow meter at SMEE out let are connected to CPCB/MPCB servers and are operational.

- ix) During the visit all on-line monitoring systems were working satisfactorily
- x) During the visit, the VSI team also inspected the area surrounding impervious spent wash storage tanks and biocompost. The team did not notice any evidence of effluent discharge from the distillery complex of RNVDM, Aurangabad.

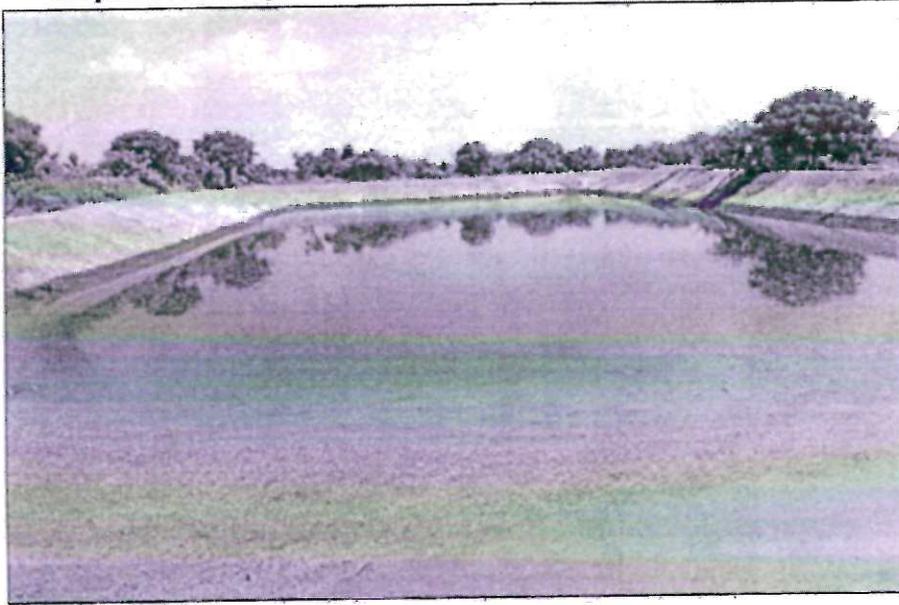
Suggestion:

- On-line monitoring systems (Camera) at biocompost yard (Takali site) should be connected to the server of CPCB/MPCB server.
- Mass flow meter with totalizer of IMEE of Grain based distillery should be connected to CPCB/MPCB server.


(Prof. S. V. Patil)
Head and Technical Adviser
Dept. of Alcohol Technology & Biofuels,
Vasantdada Sugar Institute, Manjari (BK), Pune-412307.



Impervious spent wash storage tank at Takali site



Impervious spent wash storage tank at Shendra site

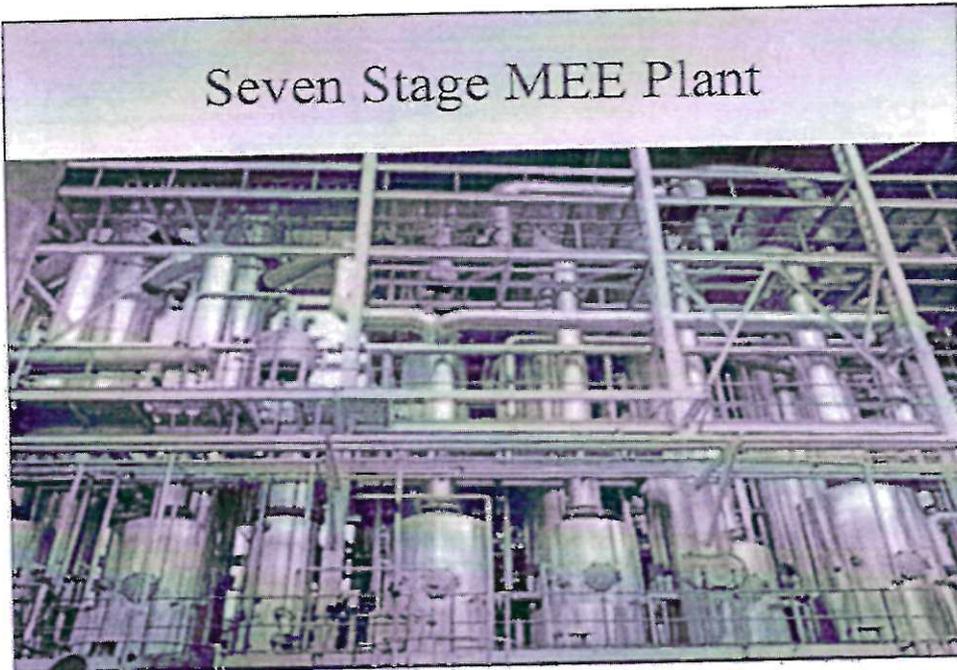




Biomethanation plant



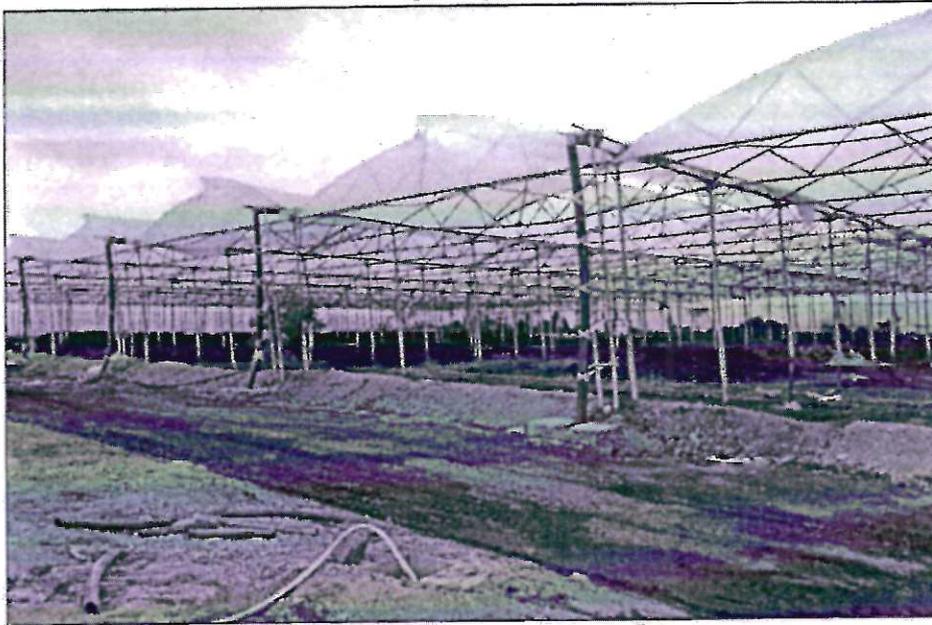
Seven Stage MEE Plant



Biocompost yard at Takali site



Covered biocompost yard at Shendra site



Screening machine at Shendra site





Covered biocompost yard at Takali site



Process condensate treatment plant





Piezometer at Takali site



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Ref.: VSI/Alc. Tech. & Biofuels/2021-22/ 5275

Date: 29/11/2021

SPEED POST

To,

Mr. Ashish Kapoor,
 Senior vice president,
 Radico NV Distilleries Maharashtra Ltd.,
 D-192 to D-195, MIDC Shendra five star Industrial Area,
 Aurangbad – 431201,
 (Maharashtra State).

Subject: Adequacy assessment report for your distillery ETP

Dear Sir,

This has reference to the telephonic discussion you had with our Mr. Y. S. Kadam, Assitant Prof. & Joint Technical Adviser, on 26th November 2021 regarding above mentioned subject. We are enclosing herewith the adequacy assesment report of your distillery ETP.

Thanking you,

Yours sincerely,

f. S. Patil
 29/11/2021

(Prof. S. V. Patil)

Technical Advisor and Head,
 Dept. of Alcohol Technology & Biofuels