ANNEXURE

6. 1. Project Proponent & Background

Somaiya group is one of the old and well-established industrial houses in India with diversified interests in:

a. Sugar (white and refined)
b. Alcohol and Bulk Organic Chemicals
c. Specialty Chemicals
d. Printing and Publishing
e. Education & Social welfare

a. Sugar and its by Products

i) The Godavari Sugar Mills Limited

Sugar Plant

Location:

Sameerwadi, Dist. Bagalkot, State: Karnataka

Capacity: 7,500 TCD and propose to expand to 15,000 TCD

Average Sugar production 1,60,000 MT per annum at present and shall be 3,20,000 MT per annum after expansion.

Co-generation Power plant (Renewable Energy)

Location:

Sameerwadi, Tal Mudhol, Dist. Bagalkot, State: Karnataka

Installed Capacity: 24 MW (1^{st} stage) and 40 MW (II^{nd} Stage). Total capacity after expansion is 64 MW.

ii) K.J. Somaiya Institute of Applied Agricultural Research (KIAAR).

Location : Sameerwadi, Dist. Bagalkot, State : Karnataka.

Established with the objective of doing basic research in promoting early maturing & high yielding sugarcane varieties and propagating modern and scientific agricultural practices.

b. Alcohol and Bulk organic chemicals

i. Somaiya Organo Chemicals.

(A Unit of The Godawari Sugar Mills Ltd.)

Location :

Sakarwadi, Tal Kopargaon, Dist. Ahmednagar, State: Maharashtra

Distillery :

Capacity: Industrial Alcohol 30,000 KL per annum

Organic Chemical Plant

Capacity :

Acetic Acid	:	22,000	MT per annum
Ethyl Acetate	:	30,000	MT per annum
Crotonaldehyde	:	5,000	MT per annum
Paraldehyde	:	600	MT per annum
Crotonic Acid	:	150	MT per annum
Crotonic Anhydride	:	50	MT per annum

Location :

Sameerwadi, Tal Mudhol, Dist. Bagalkot, State : Karnataka

Distillery :

Capacity :

Ethyl Alcohol/Rectified Spirit	:	20,000 KL per annum (Existing) 60,000 KL per Annum after expansion
Ethanol (Absolute Alcohol)	:	16,500 KL per annum (Existing) 50,000 KL Annum after expansion.
Extra Neutral Alcohol (ENA)	:	12,000 KL per annum
Ethyl Lactate	:	500 MT per annum
Bhoomi Labh (An organic Manure)	:	15,000 MT per annum (Existing) 45,000 MT per annum after expansion

Registered Office :

Somaiya Bhavan, 45-47 , M.G. Road, PO Box No. 384, Fort, Mumbai – 400 001.

Phone : (022) 22048272/61702100

d. Printing and Publishing

i) Book Center Ltd.

It has a large, well-equipped printing press in Mumbai to cater services of Graphic Communication under one roof. Being in the industry for last 30 years and with the team of professionals, it has expertise of executing any assignment of clients (Multicolor & B/W) of any size with secrecy and of course integrity of product.

ii) Somaiya Publications Pvt. Ltd.,

Specializes in publication of nob-fictional and educational books of high standard. Also Publishes books on topics which have bearing on economics, philosophy, management, indian culture and heritage.

e. Education & Social welfare

i) Somaiya Vidyavihar

Founded in 1959, Somaiya Vidyavihar has come to encompass the entire educational spectrum from kindergarten to post graduate education, providing education to around 26,000 students every year, and has a faculty strength of over 1500 teachers. It comprises of 34 institutes including Jr. & Sr. Colleges in Arts, Science & Commerce, a polytechnic, Engineering College, Sanskriti peetham, Buddhist Centre, Management Institute and a "Kendriya Sanskrit Vidyapeeth", each having well equipped laboratories, libraries and hostel arrangements.

ii) Somaiya Ayurvihar

Somaiya Ayurvihar is committed to offering an integrated package of general and Specialized health care services. It comprises of a Medical College, a Nursing School, a 550 bed Hospital with a Blood Bank and an HIV Treatment Centre, a Research Centre complex and an Institute of Paramedical Studies –a College of Physiotherapy.

iii) Shri Girivanavasi Pragati Mandal

In order to bring neglected brethren living in the forest and hilly regions to the mainstream of our national life, Shri Girivanavasi Pragati Mandal was formed in 1974. The Mandal held 7 (seven) annual Eye-cum-Medical Camps in different States from 1975 to 1981 and treated 1,85,417 people in these Camps held in the interior far away from the rail head or bus stops to reach out to people living in the remotest part. The Mandal has since established a 40 bed Eye- cum-General Hospital and a permanent Experimental Farm, a Dairy, an Agricultural Training Centre, and a free Boarding School at Nareshwadi, near Dahanu, in Thane District, Maharashtra, about 120 kms away from Mumbai for the welfare of the Tribals right in the midst of the Tribal Area.

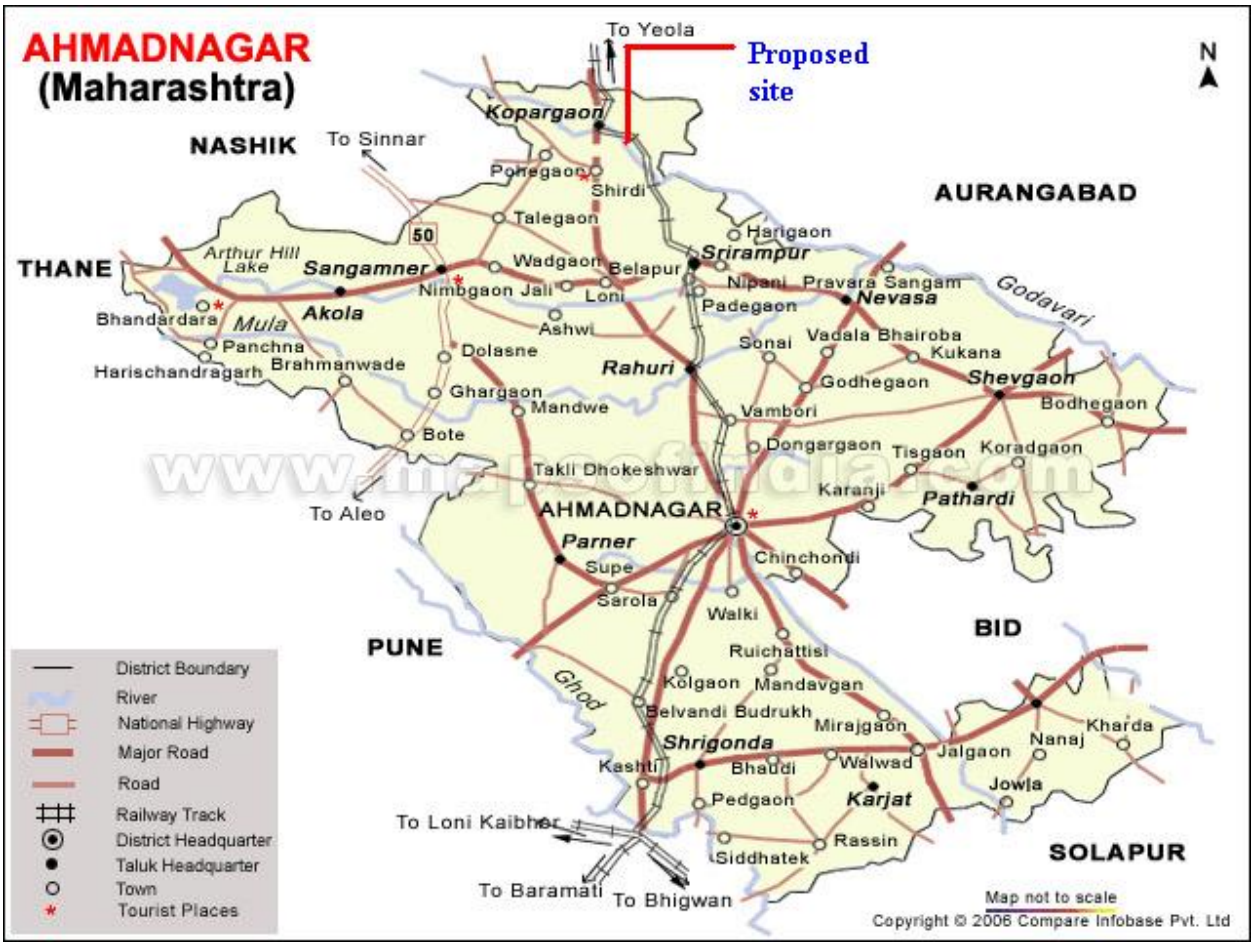
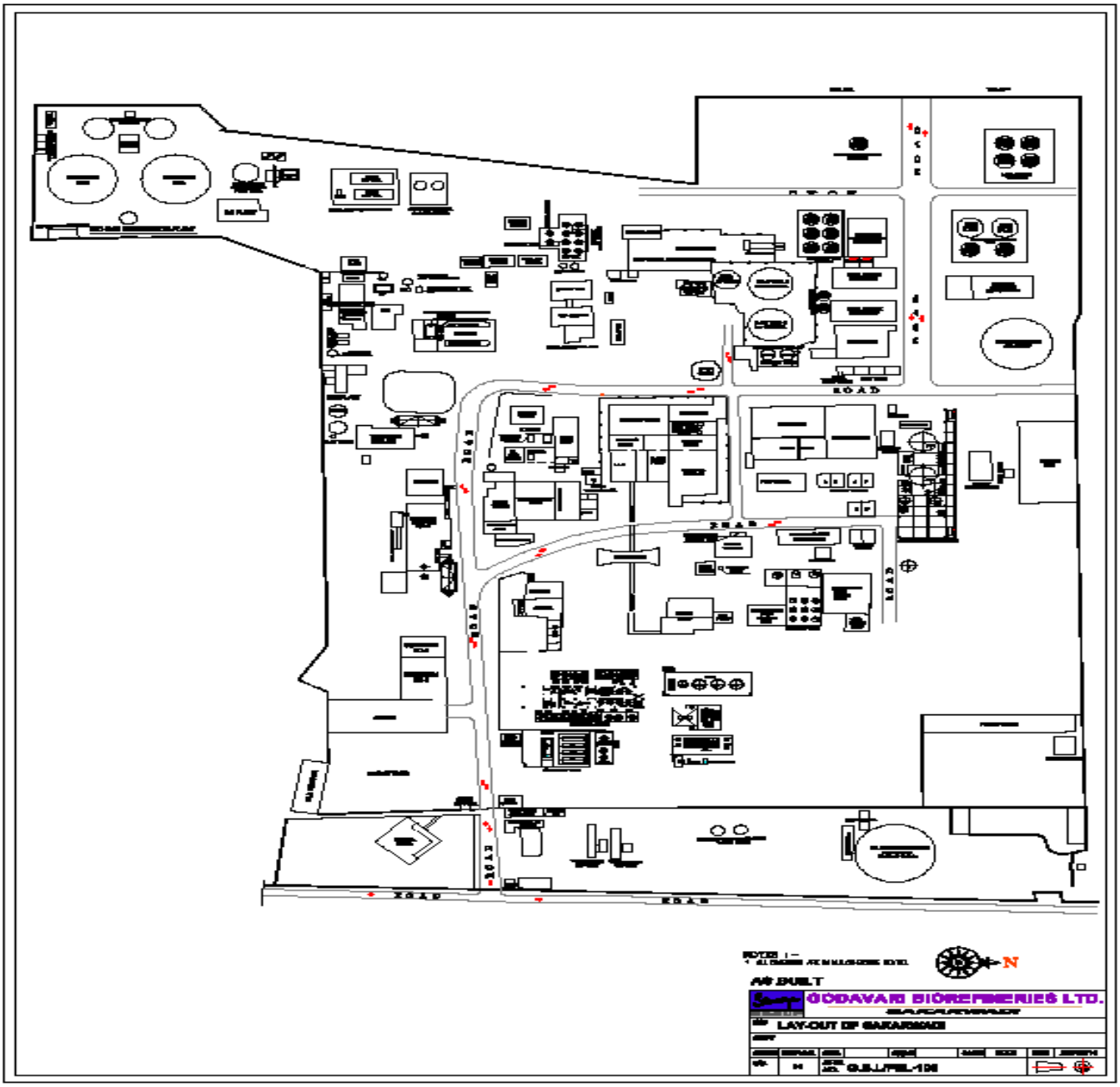


Fig 1: Location map



Layout Map of Factory Premises

Aerial Photographs of the Factory

Manufacturing Process

A) Ethyl Acetate Plant:-

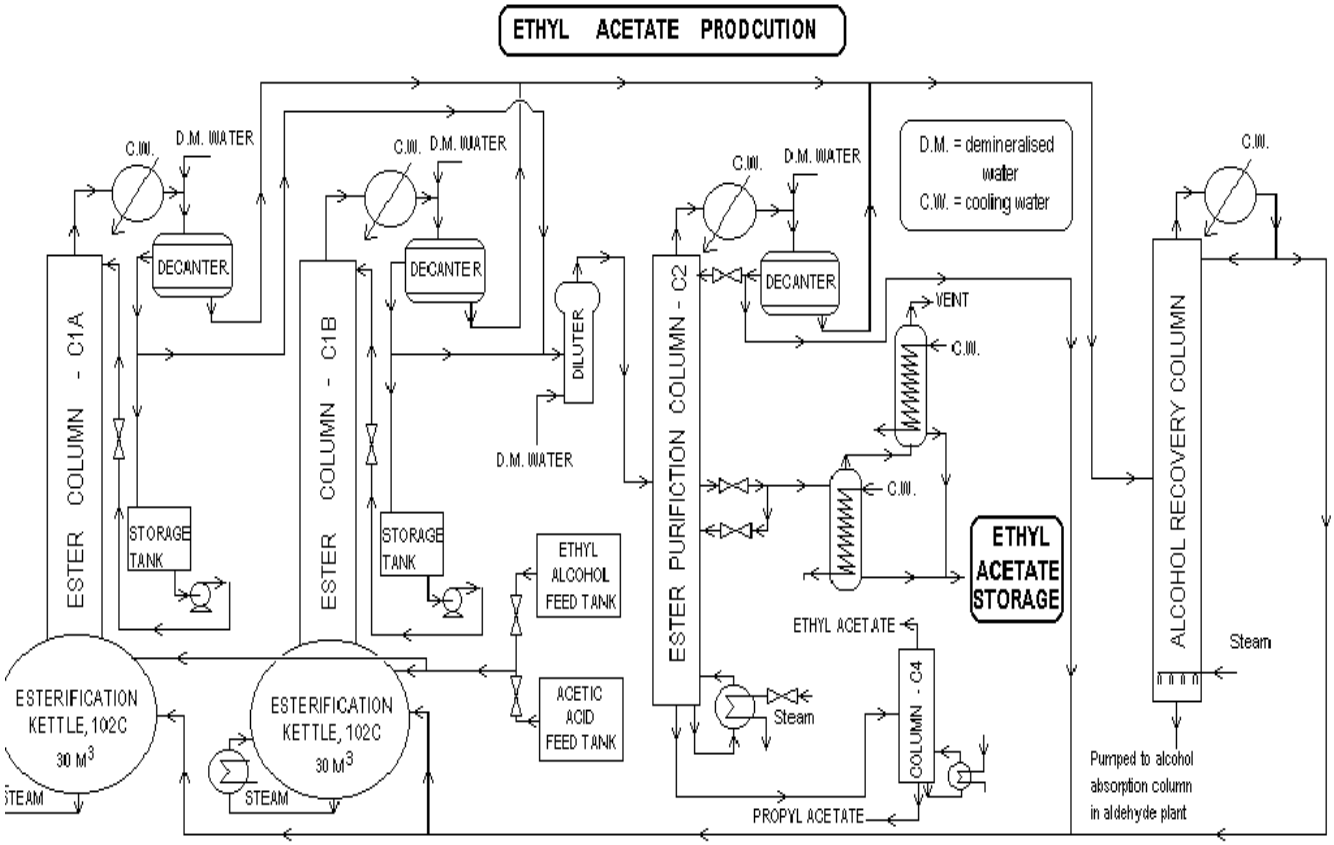
a) Process Discreption

Ethyl acetate is produced by esterification of acetic acid and ethanol in presence of Para Toluene Sulphonic Acid as catalyst.

$$CH_3COOH + C_2H_5OH \xrightarrow{PTSA} CH_3COOC_2H_5 + H_2O$$

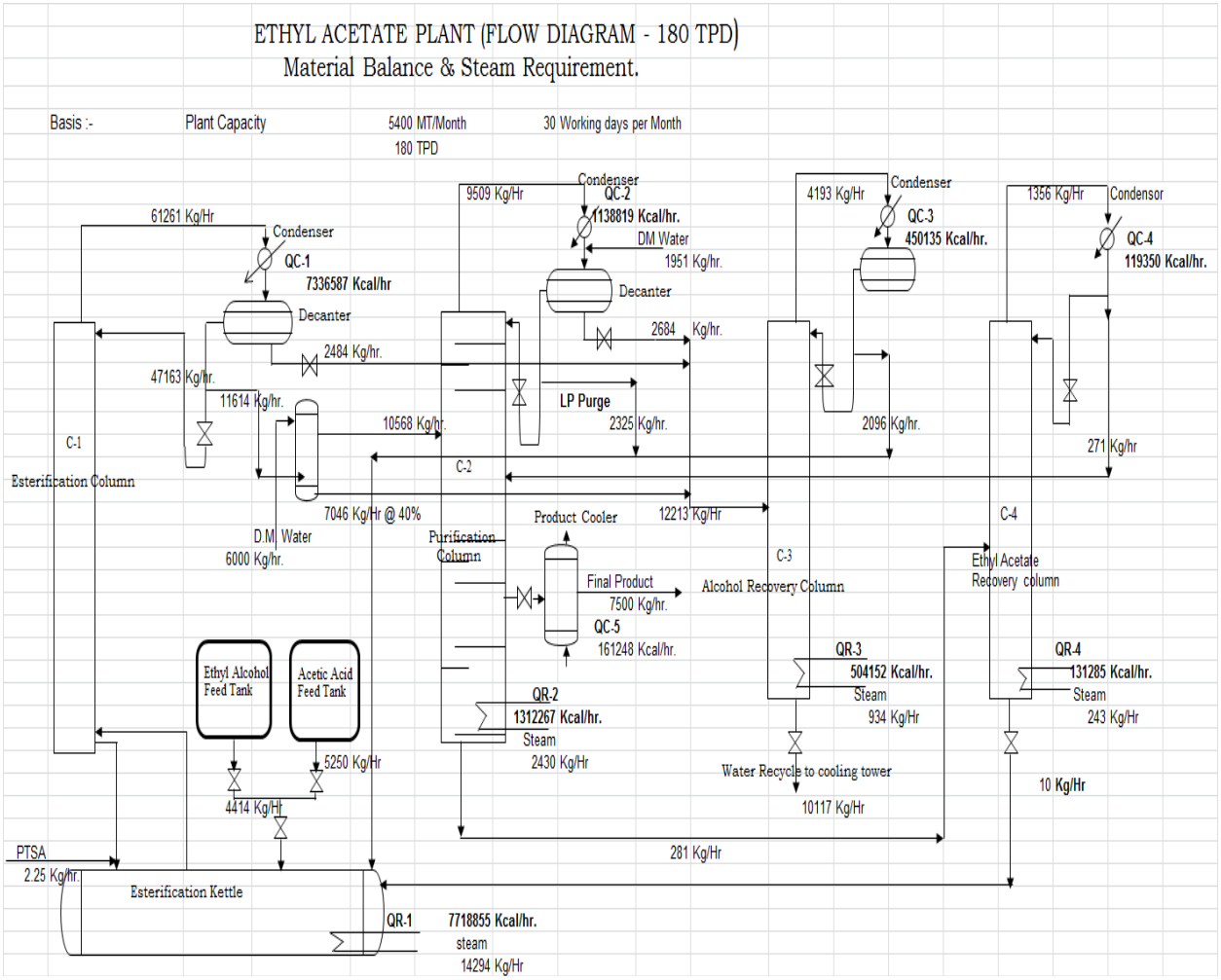
Glacial acetic acid, 95% ethanol and 1% PTSA are mixed and continuously feed into the esterification kettle. Suitable amount of ternary azeotrope is withdrawn from the top of the esterification column, by maintaining optimum top temperature and is then fed into the decanter. Fresh De-mineralized water is also fed in to the decanter to separate 94% ester as upper heterogeneous phase. This ester is fed to the drying (Ester Purification) column where the ternary distillation (water-ethanol-ethyl acetate) occurs. Final pure ethyl acetate is drawn continuously from the middle of the distillation column, cooled in the product cooler and sent to storage tank. The product purity is 99.5% to 99.9% pure. The top vapour outlet is again mixed with excess water is fed to another decanter. Small amount of ester separated is refluxed to the column. The bottom product of the two decanters is sent to the alcohol recovery column. From it the recovered vapor is sent to the reaction kettle.

b) Process Flow sheet



c) Material Balance

Existing Ethyl Acetate Plant



Water Balance (Consumption & generation break-up) :-

Process Water :-	7950	Kg/Hr	
Reaction water generated :-	1575	Kg/Hr	
Water in R.S. feed :-	353	Kg/Hr	
Total net water effluent generated :-	10117	Kg/Hr	(Drain of C-3 column)
Total waste water Generated :-	243	m3/day	

(Note :- Water effluent generated from system is being recycled to cooling tower as cooling tower makeup water, hence there is zero effluent dischange from the plant.)

Energy balance :-

Column	C1	Unit	C2	Unit	C3	Unit	C4	Unit	Total Heat Load	
Total Evaporation Load	61261	Kg/hr.	9509	Kg/hr.	4193	Kg/hr.	1356	Kg/hr.		
Reflux Ratio	4:01		3:01		1:01		4:01			
Avg.Latent Heat	120	Kcal/Kg.	120	Kcal/Kg.	107	Kcal/Kg.	88	Kcal/Kg.		
Condenser/cooler Load QC	7336587	Kcal/hr.(QC-1)	1138819	Kcal/hr.(QC-2)	450135	Kcal/hr.(QC-3)	119350	Kcal/hr.(QC-4)	9206141	Kcal/hr.(QC)
			161248	Kcal/hr.(QC-5)						
Reboiler load	7336587	Kcal/hr.	1138819	Kcal/hr.	450135	Kcal/hr.	119350	Kcal/hr.		
Excess duty due to Low Feed temp	382268	Kcal/hr.	173448	Kcal/hr.	54016	Kcal/hr.	11935	Kcal/hr.		
Total Reboiler Duty QR	7718855	Kcal/hr.(QR-1)	1312267	Kcal/hr.(QR-2)	504152	Kcal/hr.(QR-3)	131285	Kcal/hr.(QR-4)	9666559	Kcal/hr.(QR)
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540	
Steam Consumption	14294	Kg/hr.	2430	Kg/hr.	934	Kg/hr.	243	Kg/hr.	17901	

		2.39	Ton/ Ton EA
Chiller Load	497828	Kcal/hr	165 TR
Steam Consumption for Chiller	0.12	Ton/ Ton EA	
	2.50	**Ton/ Ton EA**	
Steam Condensate :-	18766	Kg/Hr	(Recycle to boiler as hot water)

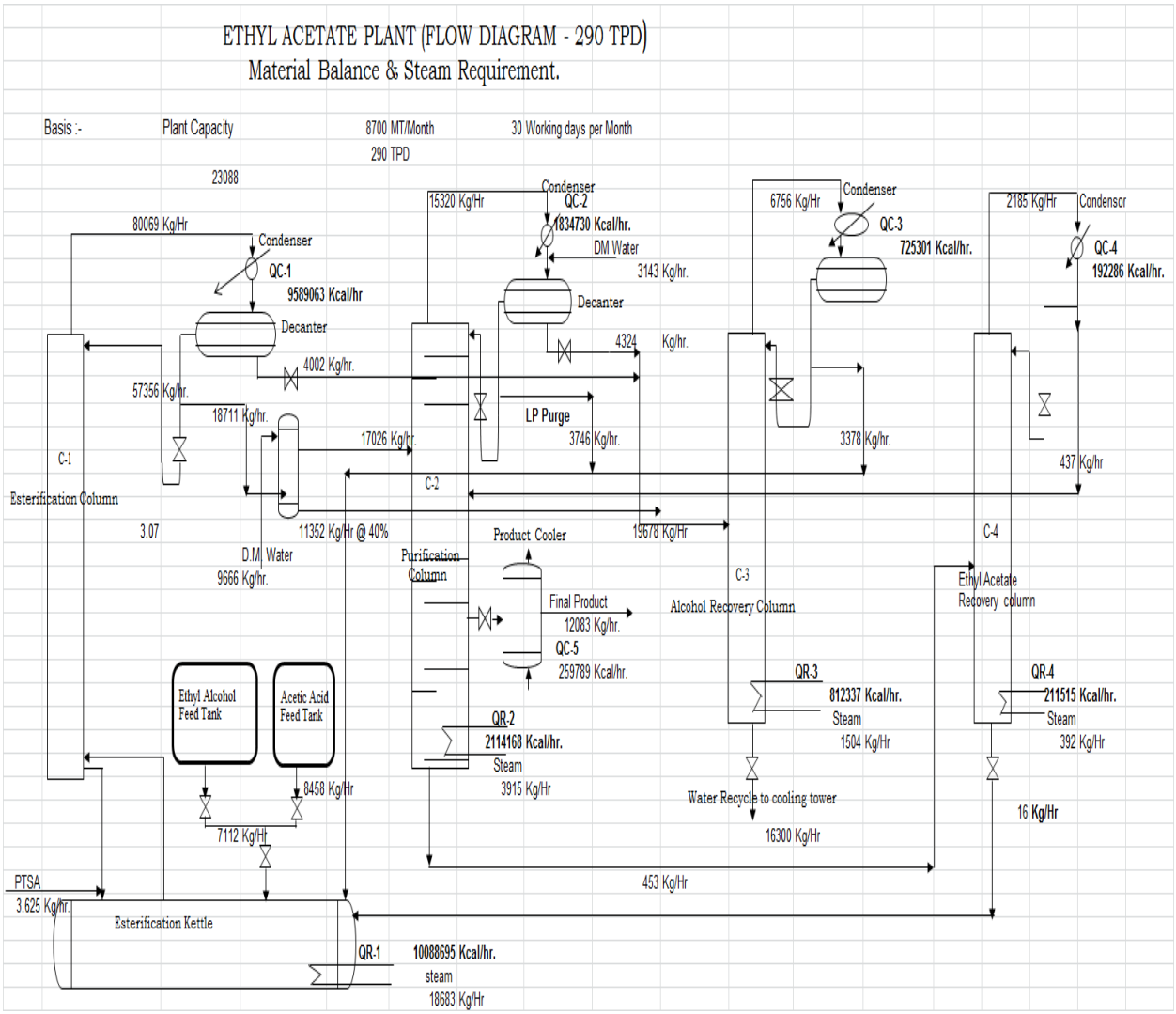
Cooling Water requirement :-

Cooling Tower Capacity :-	2200	m3/hr.
Cooling water drift loss :-	478.4	m3/day
Cooling Tower Blow Down water :-	26.84	m3/day
Required Cooling Tower make-up water:-	505	m3/day
Water recycle from process drain :-	243	m3/day
Actual Cooling Tower make-up water Required:-	262	m3/day
Required make-up water for Boiler:-	45	m3/day
Actual water Required:-	307	m3/day
Say :-	**307**	**m3/day**

Water Consumption Statement

Process water	191	m3/day
Utility water	307	m3/day

Proposed Ethyl Acetate Plant



Water Balance (Consumption & generation break-up) :-

Process Water :-	12809 Kg/Hr	
Reaction water generated :-	2538 Kg/Hr	
Water in R.S. feed :-	569 Kg/Hr	
Total net water effluent generated :-	16300 Kg/Hr	(Drain of C-3 column)
Total waste water Generated :-	391 m3/day	
Total net waste water recycle to cooling tower:-	391 m3/day	

(Note :- Water effluent generated from system is being recycled to cooling tower as cooling tower makeup water, hence there is zero effluent dischange from the plant.)

Energy balance :-

Column	C1	Unit	C2	Unit	C3	Unit	C4	Unit	Total Heat Load		
Total Evaporation Load	80069	Kg/hr.	15320	Kg/hr.	6756	Kg/hr.	2185	Kg/hr.			
Reflux Ratio	4:01		3:01		1:01		4:01				
Avg.Latent Heat	120	Kcal/Kg.	120	Kcal/Kg.	107	Kcal/Kg.	88	Kcal/Kg.			
Condenser/cooler Load QC	9589063	Kcal/hr.(QC-1)	1834730	Kcal/hr.(QC-2)	725301	Kcal/hr.(QC-3)	192286	Kcal/hr.(QC-4)	12601170	Kcal/hr.(QC)	
			259789	Kcal/hr.(QC-5)							
Reboiler load	9589063	Kcal/hr.	1834730	Kcal/hr.	725301	Kcal/hr.	192286	Kcal/hr.			
Excess duty due to Low Feed temp	499631	Kcal/hr.	279439	Kcal/hr.	87036	Kcal/hr.	19229	Kcal/hr.			
Total Reboiler Duty QR	10088695	Kcal/hr.(QR-1)	2114168	Kcal/hr.(QR-2)	812337	Kcal/hr.(QR-3)	211515	Kcal/hr.(QR-4)	13226715	Kcal/hr.(QR)	
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540		
Steam Consumption	18683	Kg/hr.	3915	Kg/hr.	1504	Kg/hr.	392	Kg/hr.	24494	Kg/Hr	
									2.03	Ton/ Ton EA	
								Chiller Load	681176	Kcal/hr	225 TR
							Steam Consumption for Chiller		0.10	Ton/ Ton EA	
									2.1	**Ton/ Ton EA**	
								Steam Condensate :-	25678	Kg/Hr	(Recycle to boiler as hot water)

Cooling Water requirement :-

Cooling Tower Capacity :-	2500 m3/hr.
Cooling water drift loss :-	531 m3/day
Cooling Tower Blow Down water :-	25 m3/day
Required Cooling Tower make-up water:-	556 m3/day
Water recycle from process drain :-	391 m3/day
Water from RO permeate :-	76 m3/day
Actual Cooling Tower make-up water Required:-	89 m3/day
Required make-up water for Boiler:-	62 m3/day
Actual water Required:-	150 m3/day
Say :-	**150 m3/day**

Water Consumption Statement

Process water	307 m3/day
Utility water	150 m3/day

B) **Acetaldehyde Plant**

a) <u>Process Description</u>

Acetaldehyde is manufactured by vapour phase oxidation of alcohol with air in presence of silver catalyst. The reaction is presented as follows.

$$\underset{46}{C_2H_5OH} + \tfrac{1}{2}\ \underset{16}{O_2} \longrightarrow \underset{44}{CH_3CHO} + \underset{18}{H_2O}$$

The ethanol vapours from alcohol recovery column are fed into the carburetor filter at a temperature of 68^0C. The mixture of alcohol vapours air of required composition coming out from the carburetor is fed to the reactor. The reaction starts in presence of Silver catalyst [the temperature of which is maintained around 500^0C]. This reaction is highly exothermic and the reaction heat is recovered and utilized for distillation of Acetaldehyde. This reactor is designed and used as vapour generator.

The reaction mixture coming out from the reactor, mainly consist of unconverted ethanol, water vapour and acetaldehyde formed in the reaction is sent to cooler condenser. The unreacted ethanol and water vapour is mostly condensed and separated in the cooler condenser. The acetaldehyde vapour is scrubbed in Aldehyde scrubber, first with process liquid and subsequently with water before venting into atmosphere. The Scrubber is connected with 3 coolers in process liquid section and one cooler in water section for removing heat of absorption.

The absorbate from the absorber and the condensate from cooler condensers after preheating in heat exchanger is fed to Aldehyde distillation column. The acetaldehyde is drawn from the top of the column by keeping the top temperature at 55 ^{0}C. The extra alcohol, water, mixture at the bottom of the distillation column is fed to the alcohol recovery columns. The distillation is generally done under 65 PSI pressure. Acetaldehyde is cooled and stored in the storage tank under pressure and nitrogen blanket.

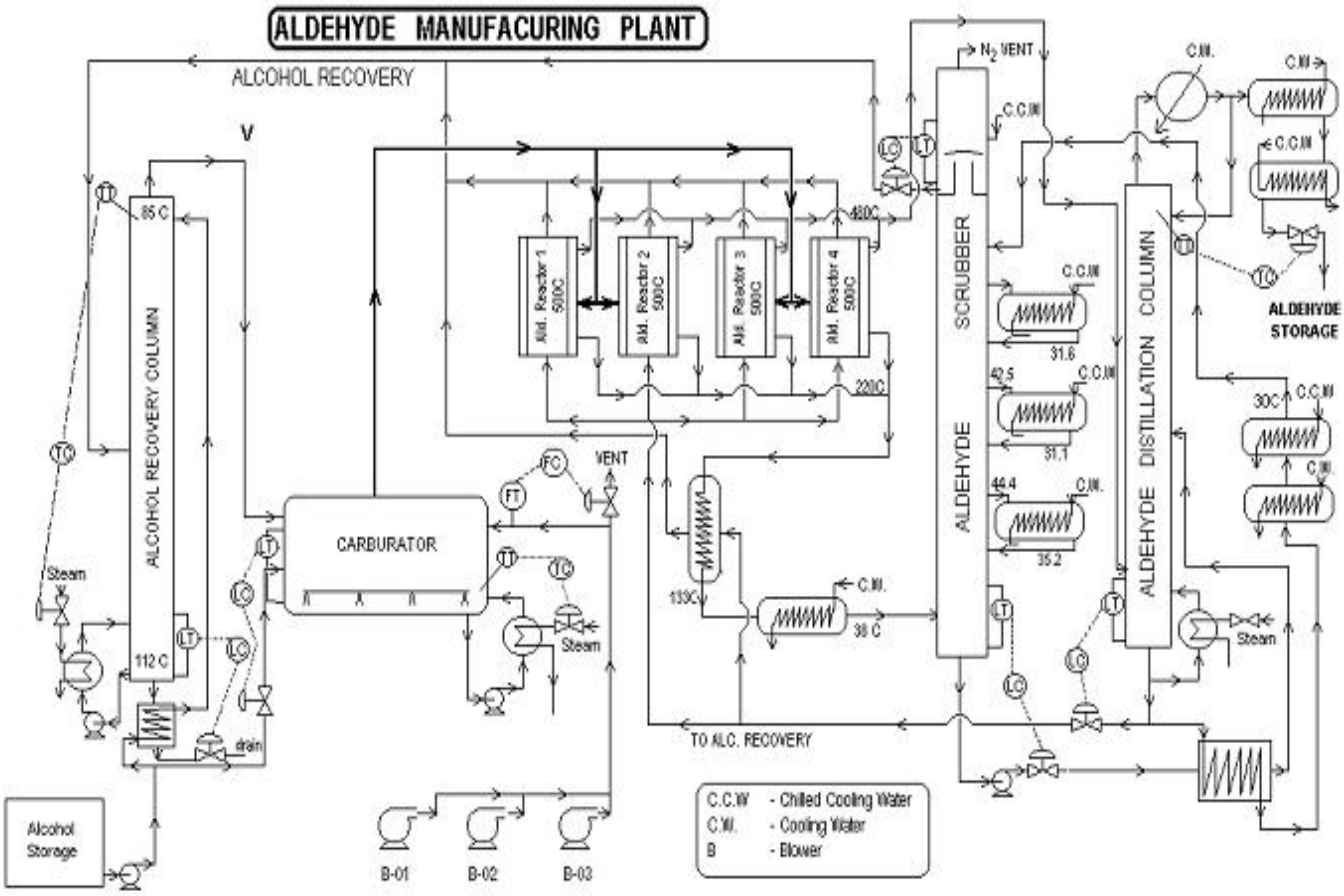
Raw Material Consumption For Acetaldehyde:-
Basis :- 1.0 Ton of Acetaldehyde

Sr.No.	Component	Norms	Unit of Measure
1.	Ethyl Alcohol	1.5	KL

Product :-

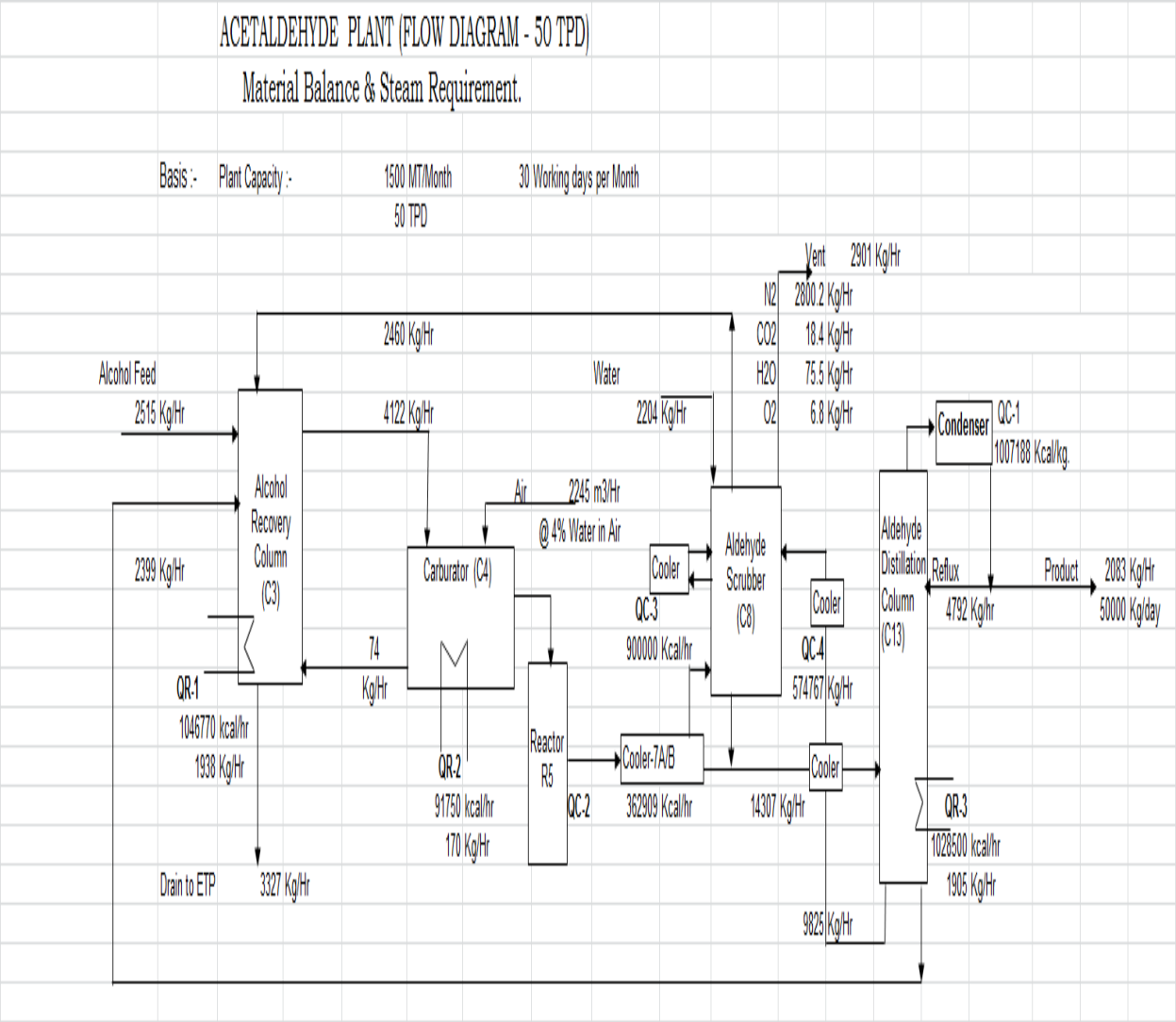
Sr.No.	**Component**	**Norms**	**Unit of Measure**
1.	Acetaldehyde	1.0	Ton

b) **Process Flow sheet**



C)Material Balance

Existing Acetaldehyde Unit



Water Balance (Consumption & generation break-up) :-

Process Water :-	2204	Kg/Hr	
Reaction water generated :-	905	Kg/Hr	
Water in R.S. feed :-	201	Kg/Hr	
Total net water effluent generated :-	3327	Kg/Hr	(Drain of C-3 column)
Total Effluent Generated :-	80	m3/day	(@ 2.8% A/A & 0.1% Alc.)
Say	**80**	**m3/day**	

Energy balance :-

Column	Carburator (C4)	Unit	Alcohol Recovery Column (C3)	Unit	Aldehyde Dist. Column (C13)	Unit	Total Heat Load	
Total Evaporation Load	-	Kg/hr.	4122	Kg/hr.	6875	Kg/hr.		
Reflux Ratio			-		2.5:01			
Avg.Latent Heat	-	Kcal/Kg.	231	Kcal/Kg.	136	Kcal/Kg.		
Condenser/cooler Load QC	-	Kcal/hr.(QC)	0	Kcal/hr	1007188	Kcal/hr.(QC-1)	2844863	Kcal/hr.(QC)
			362909	Kcal/hr.(QC-2)				
			900000	Kcal/hr.(QC-3)				
			574767	Kcal/hr.(QC-4)				
Reboiler load	70486	Kcal/hr.	951610	Kcal/hr.	935000	Kcal/hr.		
Excess duty due to Low Feed temp	21264	Kcal/hr.	95161	Kcal/hr.	93500	Kcal/hr.		
Total Reboiler Duty QR	91750	Kcal/hr.(QR-2)	1046771	Kcal/hr.(QR-1)	1028500	Kcal/hr.(QR-3)	2167022	Kcal/hr.(QR)
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540	
Steam Consumption	170	Kg/hr.	1938	Kg/hr.	1905	Kg/hr.	4013	

		1.93	Ton/ Ton Acetaldehyde
Chiller Load		86681	Kcal/hr 29 TR
Steam Consumption for Chiller		0.07	Ton/ Ton Acetaldehyde
		2.00	**Ton/ Ton Acetaldehyde**
Steam Condensate :-		4164	Kg/Hr (Recycle to boiler as hot water)

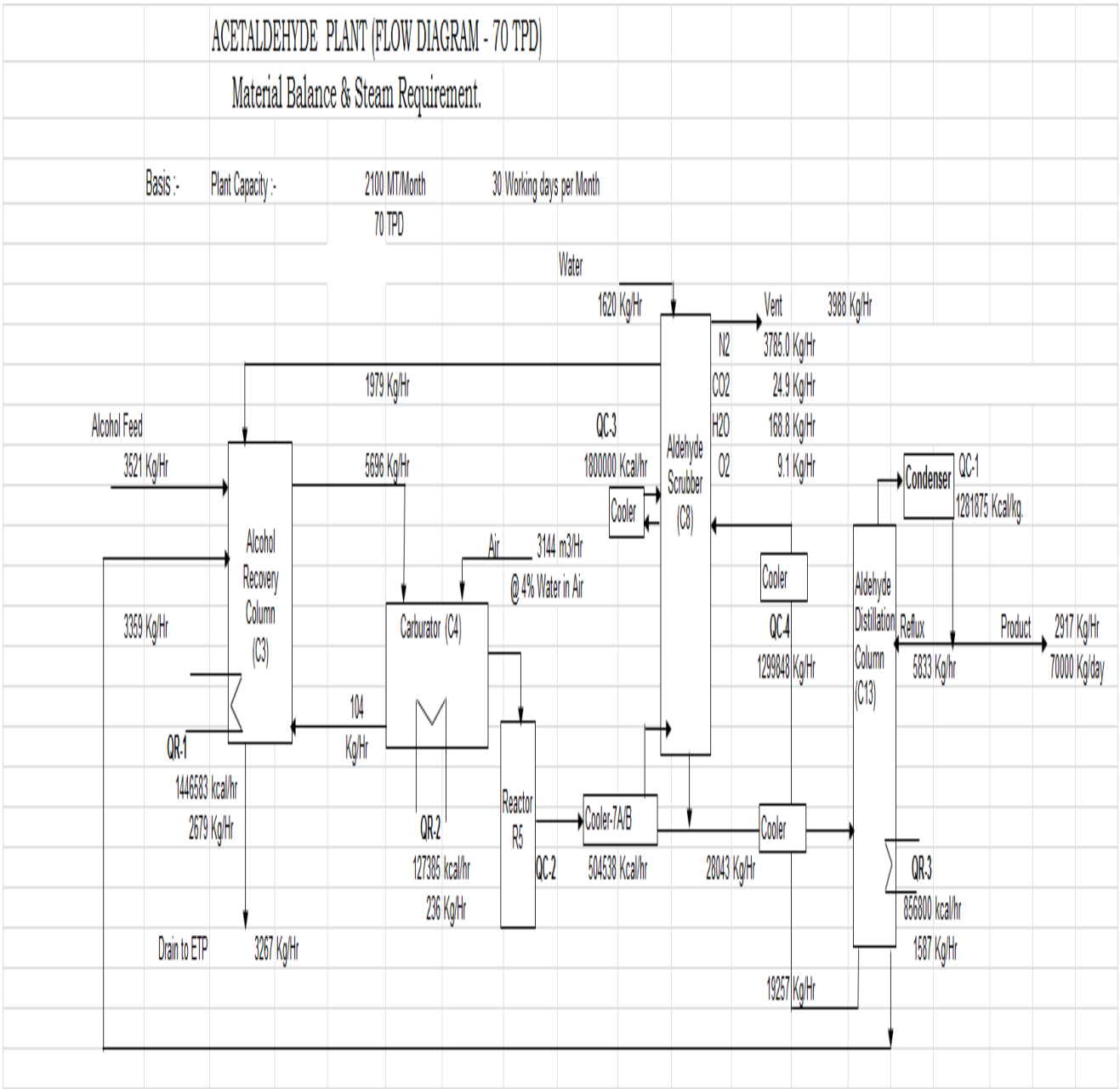
Cooling Water requirement :-

Cooling Tower Capacity :-	750	m3/hr.
Cooling water drift loss :-	172	m3/day
Cooling Tower Blow Down water :-	7.5	m3/day
Required Cooling Tower make-up water:-	180	m3/day
Actual Cooling Tower make-up water Required:-	100	m3/day
Required make-up water for Boiler:-	10	m3/day
Actual water Required:-	110	m3/day
Say :-	**110**	**m3/day**

Water Consumption Statement

Process water	53	m3/day
	53	m3/day
Utility water	110	m3/day

Proposed Acetaldehyde Unit



Water Balance (Consumption & generation break-up) :-

Process Water :-	1620	Kg/Hr	
Reaction water generated :-	1267	Kg/Hr	
Water in R.S. feed :-	282	Kg/Hr	
Total net water effluent generated :-	3267	Kg/Hr	(Drain of C-3 column)
Total Effluent Generated :-	78	m3/day	
Say	**80**	**m3/day**	

Energy balance :-

Column	Carburator (C4)	Unit	Alcohol Recovery Column (C3)	Unit	Aldehyde Dist. Column (C13)	Unit	Total Heat Load	
Total Evaporation Load	-	Kg/hr.	5696	Kg/hr.	8750	Kg/hr.		
Reflux Ratio			-		2.0:01			
Avg.Latent Heat	-	Kcal/Kg.	231	Kcal/Kg.	136	Kcal/Kg.		
Condenser/cooler Load QC	-	Kcal/hr.(QC)	0	Kcal/hr	1281875	Kcal/hr.(QC-1)	4886260	Kcal/hr.(QC)
			504538	Kcal/hr.(QC-2)				
			1800000	Kcal/hr.(QC-3)				
			1299848	Kcal/hr.(QC-4)				
Reboiler load	97863	Kcal/hr.	1315075	Kcal/hr.	737800	Kcal/hr.		
Excess duty due to Low Feed temp	29522	Kcal/hr.	131508	Kcal/hr.	119000	Kcal/hr.		
Total Reboiler Duty QR	127385	Kcal/hr.(QR-2)	1446583	Kcal/hr.(QR-1)	856800	Kcal/hr.(QR-3)	2430768	Kcal/hr.(QR)
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	Kcal/Kg.	540	
Steam Consumption	236	Kg/hr.	2679	Kg/hr.	1587	Kg/hr.	4501	

		1.54	Ton/ Ton Acetaldehyde	
Chiller Load		97231	Kcal/hr	32 TR
Steam Consumption for Chiller		0.06	Ton/ Ton Acetaldehyde	
		1.60	**Ton/ Ton Acetaldehyde**	
Steam Condensate :-		4670	Kg/Hr	(Recycle to boiler as hot water)

Cooling Water requirement :-

Cooling Tower Capacity :-	850	m3/hr.
Cooling water drift loss :-	195.2	m3/day
Cooling Tower Blow Down water :-	8.5	m3/day
Required Cooling Tower make-up water:-	204	m3/day
Actual Cooling Tower make-up water:-	124	m3/day
Required make-up water for Boiler:-	11	m3/day
Actual water Required:-	135	m3/day
Say :-	**135**	**m3/day**

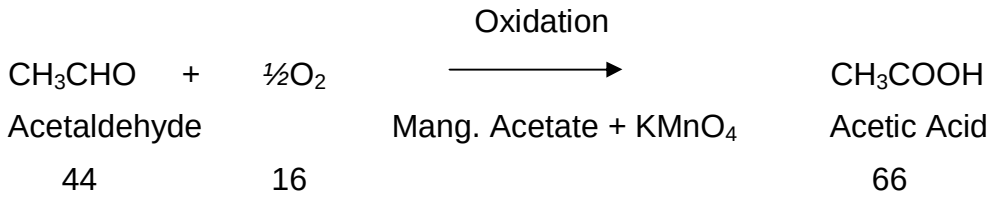
Water Consumption Statement :-

Process water	39	m3/day
	39	m3/day
Utility water	135	m3/day

C) Acetic Acid

a) Process Discription:-

Here Acetic acid is manufactured by liquid phase oxidation of acetaldehyde with air. The reaction is presented as follows: -



Acetaldehyde is fed to the reactor in which air under 65 PSIpressure, Air is uniformly distributed and dispatched from the bottom. The reaction proceeds in liquid phase and is exothermic. The catalyst Manganese Acetate and Potassium permanganate is present in dissolved form in the ratio of 0.1 % and 0.015 % respectively. The reactor has two coolers attached to remove the reaction heat continuously and maintain reactor temperature around 60 ^{0}C. The reactor mixture drawn out from the reactor consists of unreacted Aldehyde, acetic acid. It is put through a Vapour-Liquid Separator. The vapours coming out of the separator is fed directly to the top of Aldehyde stripper. The liquid portion is fed into the middle of the Aldehyde scrubber. The temperature of the scrubber is maintained in such way that all the Aldehyde separate out from the top which is further condensed and cooled and put back into the mixing tank as shown in the P&ID. The residual air mostly N_2 leaving the reactor is scrubbed with Aldehyde free acetic acid and then washed with water to recover traces of acetic acid before venting out to the atmosphere. The reactor and absorber system is maintained under 65 PSI pressure. The absorbate from the Aldehyde Absorber is fed back to the reactor. The bottom product of the Aldehyde scrubber is put into the acid distillation column. In this column, water along with traces of acid and other impurities are separated as a distillate (Dilute acid). The middle temperature of the column is maintained acetic acid in vapour form is removed continuously as bottom product through a condenser cooler and stored at ambient temperature.

Raw Material Consumption For Acetic Acid:-

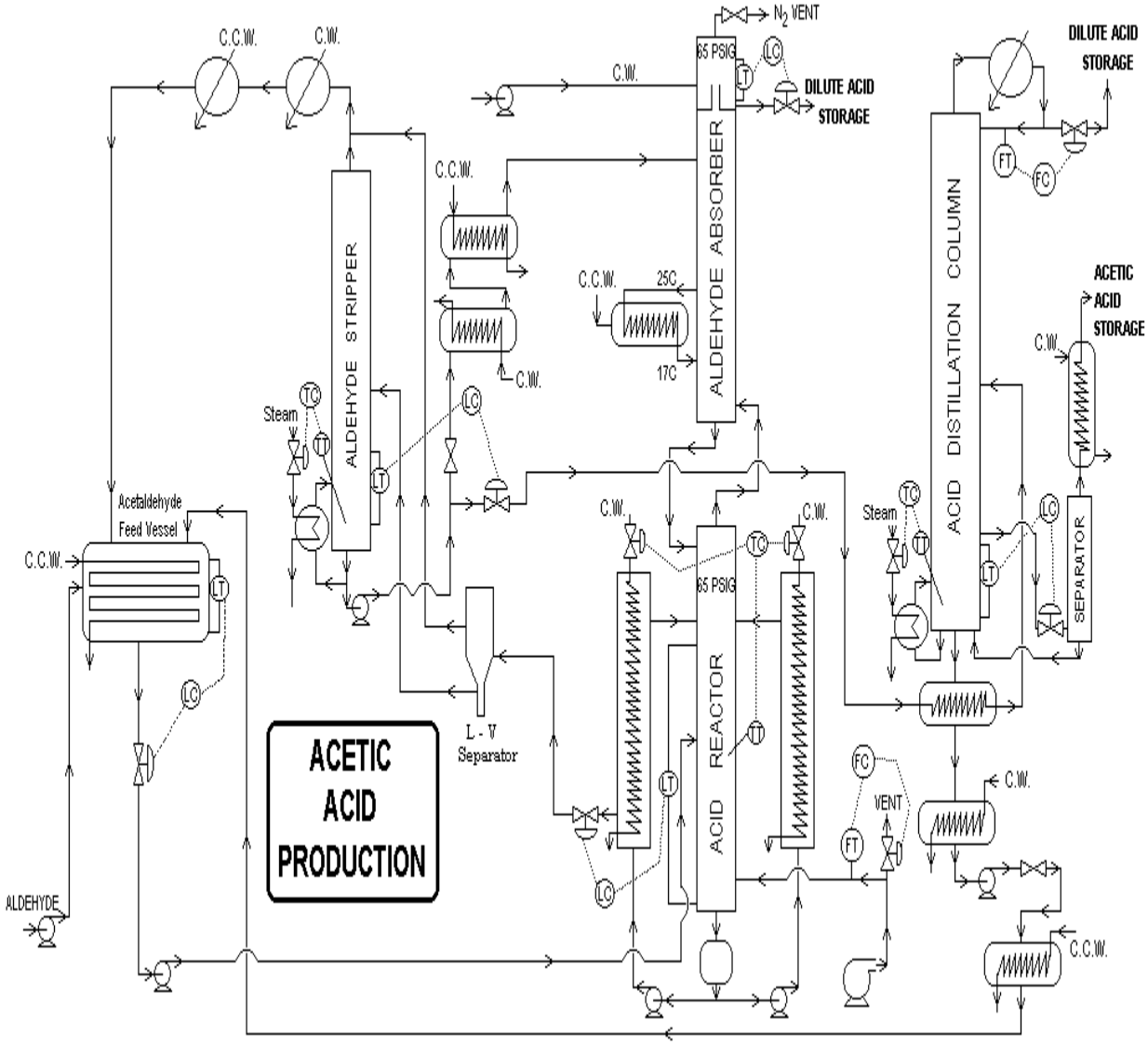
Basis :- 1.0 Ton of Acetic Acid

Sr.No.	Component	Norms	Unit of Measure
1.	Acetaldehyde	0.76	Ton

Product :-

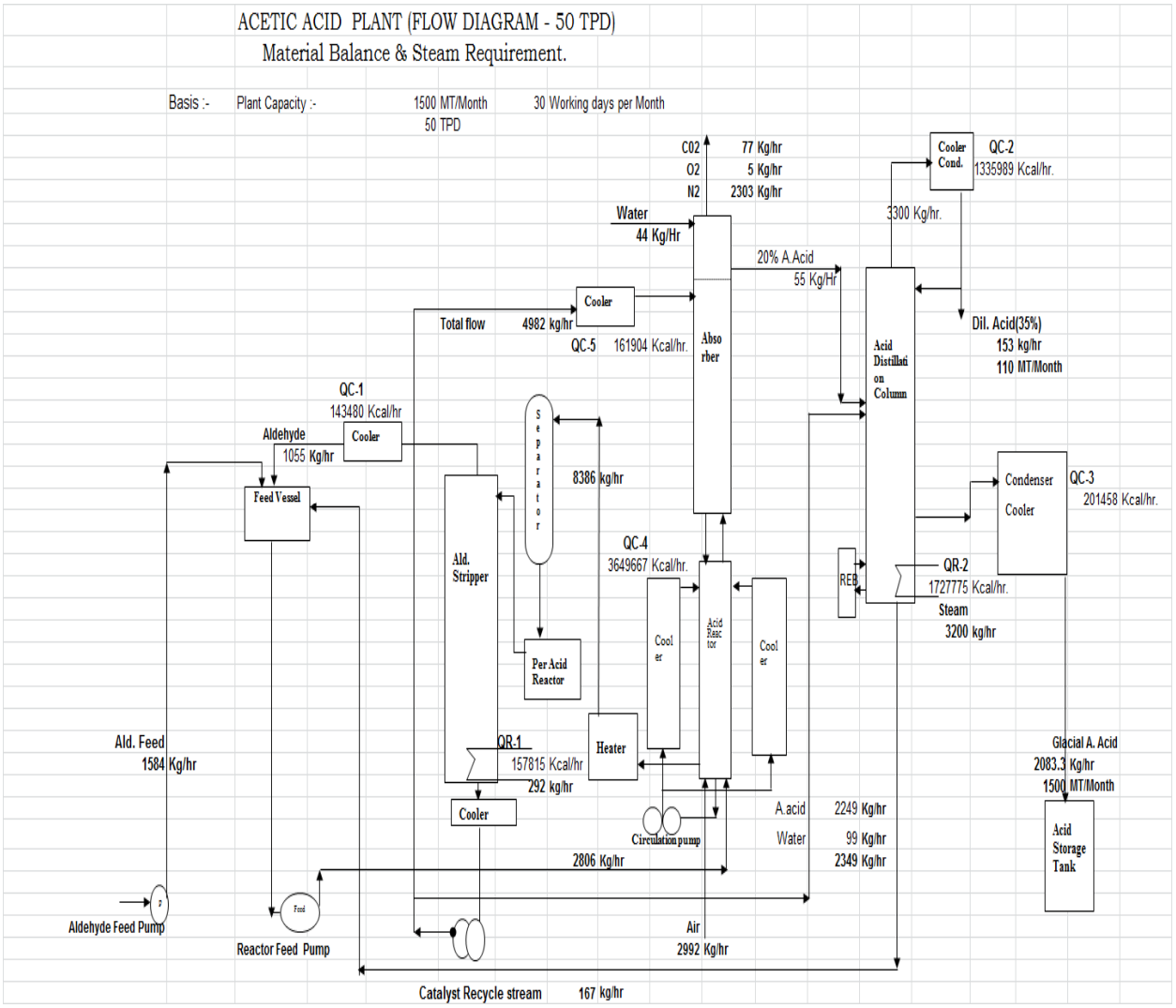
Sr.No.	Component	Norms	Unit of Measure
1.	Acetic Acid	1.0	Ton
2.	Dil. Acid(35%)	0.0734	Ton

b) Process Flow sheet



c) Material Balance

Existing Acetic Acid Plant



Water Balance (Consumption & generation break-up) :-

Process Water :- 44 Kg/Hr

(Note :- There is no liquid & solid waste effluent generation from the plant)

Energy balance :-

Column	Aldehyde Stripper (C36)	Unit	Acetic Acid Dist. C-25	Unit	Total Heat Load	
Total Evaporation Load	1055	Kg/hr.	3300	Kg/hr.		
Reflux Ratio			-			
Avg.Latent Heat	136	Kcal/Kg.	385	Kcal/Kg.		
Condenser/cooler Load QC	143480	Kcal/hr.(QC-1)	1335989	Kcal/hr.(QC-2)	5492498	Kcal/hr.(QC)
	3649667	Kcal/hr.(QC-4)	201458	Kcal/hr.(QC-3)		
	161904	Kcal/hr.(QC-5)				
Reboiler load	143480	Kcal/hr.	1537447	Kcal/hr.		
Excess duty due to Low Feed tem	14348	Kcal/hr.	190498	Kcal/hr.		
Total Reboiler Duty QR	157828	Kcal/hr.(QR-2)	1727945	Kcal/hr.(QR-1)	1885773	Kcal/hr.(QR)
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	
Steam Consumption	292	Kg/hr.	3200	Kg/hr.	3492	

1.68 Ton/ Ton Acetic Acid

Chiller steam Consumption 377155 Kcal/hr 125 TR

Steam Consumption for Chiller 0.31 Ton/ Ton Acetic Acid

2.0 Ton/ Ton Acetaldehyde

Steam Condensate :- 4148 Kg/Hr (Recycle to boiler as hot water)

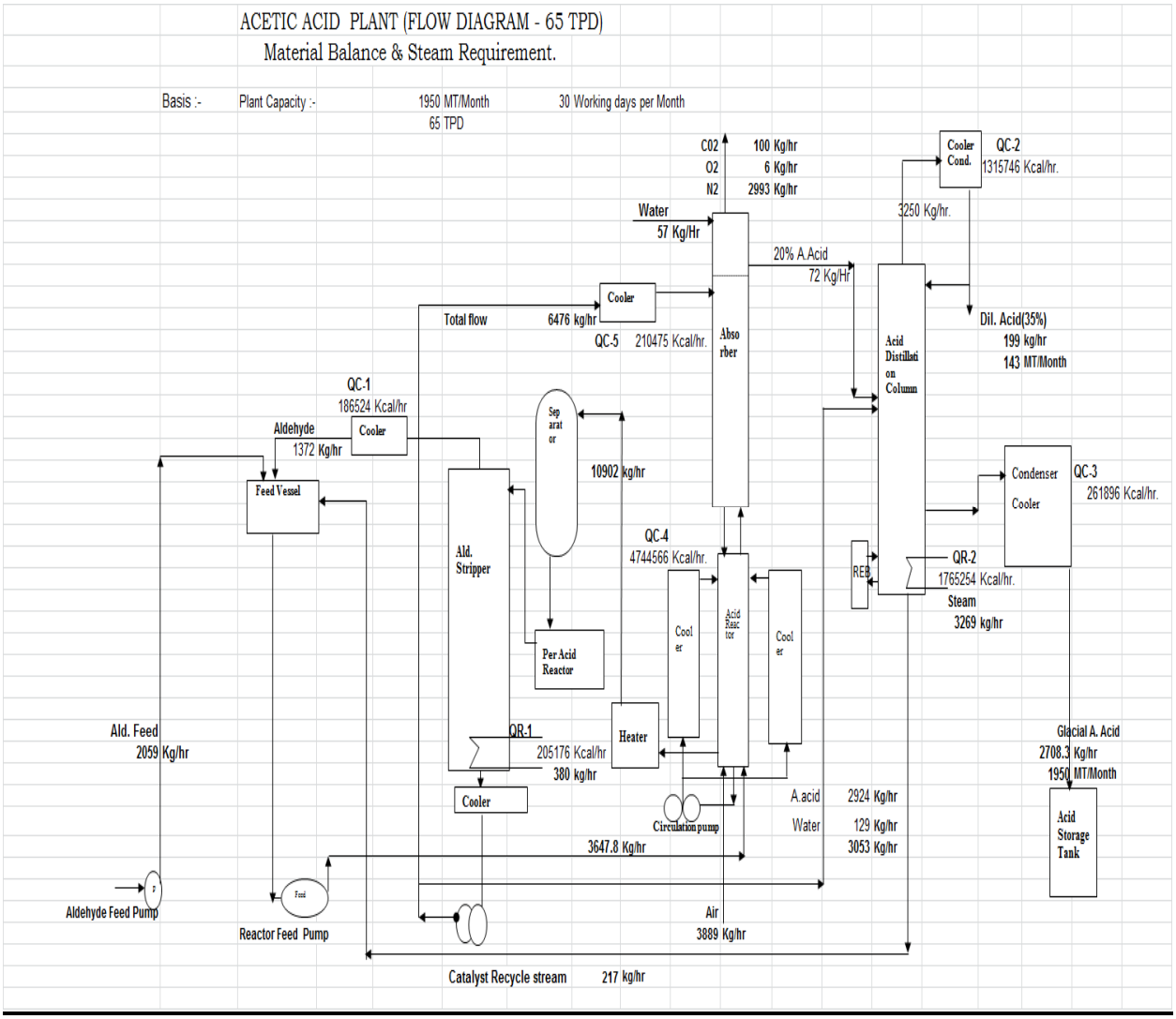
Cooling Water requirement :-

Cooling Tower Capacity :-	950	m3/hr.
Cooling water drift loss :-	221	m3/day
Cooling Tower Blow Down water :-	9.5	m3/day
Required Cooling Tower make-up water:-	230	m3/day
Required make-up water for Boiler:-	10	m3/day
Actual water Required:-	240	m3/day
Say :-	**240**	**m3/day**

Water Consumption Statement :-

Process water	1.1	m3/day
Utility water	240	m3/day

Proposed Acetic Acid Plant



Water Balance (Consumption & generation break-up) :-

Process Water :- 57 Kg/Hr

(Note :- There is no liquid & solid waste effluent generation from the plant)

Energy balance :-

Column	Aldehyde Stripper (C36)	Unit	Acetic Acid Dist. C-25	Unit	Total Heat Load	
Total Evaporation Load	1372	Kg/hr.	3250	Kg/hr.		
Reflux Ratio			-			
Avg.Latent Heat	136	Kcal/Kg.	385	Kcal/Kg.		
Condenser/cooler Load QC	186524	Kcal/hr.(QC-1)	1315746	Kcal/hr.(QC-2)	6719208	Kcal/hr.(QC)
	4744566	Kcal/hr.(QC-4)	261896	Kcal/hr.(QC-3)		
	210475	Kcal/hr.(QC-5)				
Reboiler load	186524	Kcal/hr.	1577642	Kcal/hr.		
Excess duty due to Low Feed tem	18652	Kcal/hr.	187612	Kcal/hr.		
Total Reboiler Duty QR	205176	Kcal/hr.(QR-2)	1765254	Kcal/hr.(QR-1)	1970430	Kcal/hr.(QR)
Enthalpy of steam	540	Kcal/Kg.	540	Kcal/Kg.	540	
Steam Consumption	380	Kg/hr.	3269	Kg/hr.	3649	

1.35 Ton/ Ton Acetic Acid

Chiller steam Consumption 394086 Kcal/hr 130 TR

Steam Consumption for Chiller 0.25 Ton/ Ton Acetic Acid

1.60 Ton/ Ton Acetaldehyde

Steam Condensate :- 4334 Kg/Hr (Recycle to boiler as hot water)

Cooling Water requirement :-

Cooling Tower Capacity :-	1050	m3/hr.
Cooling water drift loss :-	244	m3/day
Cooling Tower Blow Down water :-	11	m3/day
Required Cooling Tower make-up water:-	255	m3/day
Required make-up water for Boiler:-	10	m3/day
Actual water Required:-	265	m3/day
Say :-	**265**	**m3/day**

Water Consumption Statement :-

Process water	1.4	m3/day
Utility water	265	m3/day

Water Budget

Sr.No.	Station	Existing							Proposed						
		Net Fresh Water Consumption	Actual Water Input	Losses/ Evaporation	Recycling To cooling Tower	Blow down	Effluent	Remark	Net Fresh Water Consumption	Actual Water Input	Losses/ Evaporation	Recycling To cooling Tower	Blow down	Effluent	Remark
1	Process Cons.	245	245	0	243	0	80	78m3 Addition of Raw Material & React.water	348	348	0	391		80	123m3 Addition of Raw Material & React.water
	Total	245	245	0	243		80		348	348	0	391		80	
2	Cooling Tower	592	915 592m3 Fresh Water + 80m3 RO permeate + 243m3 Process drain	871	0	44	0	80m3 RO permeate + 243m3 Process drain recycled to cooling tower	471	1015 471m3 Fresh Water + 153m3 RO permeate + 391m3 Process drain	970	0	44	0	153m3 RO permeate & 391m3 Process drain recycled to cooling tower
3	Boiler	65	65	65		0	0		83	83	83	0	0	0	
4	Domestic	93	93	47	0	0	46		93	93	47	0	0	46	Existing workes will be used so there is no increase in man power
	Total	995	1318	983	243	44	126	78m3 Addition of Raw Material & React.water	995	1539	1101	391	44	126	123m3 Addition of Raw Material & React.water

Note :- All water quantity in m3/day otherwise specified

Energy Budget

Existing Plant

Sr.No.	Plant	Consent Capacity	No.of Working Days	Plant Capacity	Steam Consumption Norms	Net Steam Consumption	Power		
		MT/Month	Days	MTD	Ton/Ton	Tons/Day	Unit/Ton	Unit/Day	
1	Acetaldehyde	1500	30	50.0	2.0	100	184	9200	
2	Acetic Acid	1500	30	50	2.0	100	343		
3	Dilute Acid	110	30	3.67				17150	
4	Ethyl Acetate	5400	30	180	2.50	450	49	8820	
		.				650		35170	27.1 Tons/hr.
					Steam:Coal ratio	4.38 ton/ton(@ Raw coal GCV-4375Kcal/kg)			
					Coal consumption per day	149 Tons			6.19 Tons/hr.

Proposed Plant

Sr.No.	Plant	Consent Capacity	No.of Working Days	Plant Capacity	Steam Consumption Norms	Net Steam Consumption	Power		
		MT/Month	Days	MTD	Ton/Ton	Tons/Day	Unit/Ton	Unit/Day	
1	Acetaldehyde	2100	30	70.0	1.60	112	165	11550	
2	Acetic Acid	1950	30	65	1.60	104	293		
3	Dilute Acid	143	30	4.77				19045	
4	Ethyl Acetate	8700	30	290	2.1	616	45	13050	
		.				832		43645	34.7 Tons/hr.
					Steam:Coal ratio	5.60 ton/ton(@ Imported coal GCV-5600Kcal/kg)			
					Coal consumption per day	149 Tons			6.19 Tons/hr.

Environment Status of 10 KM Radius

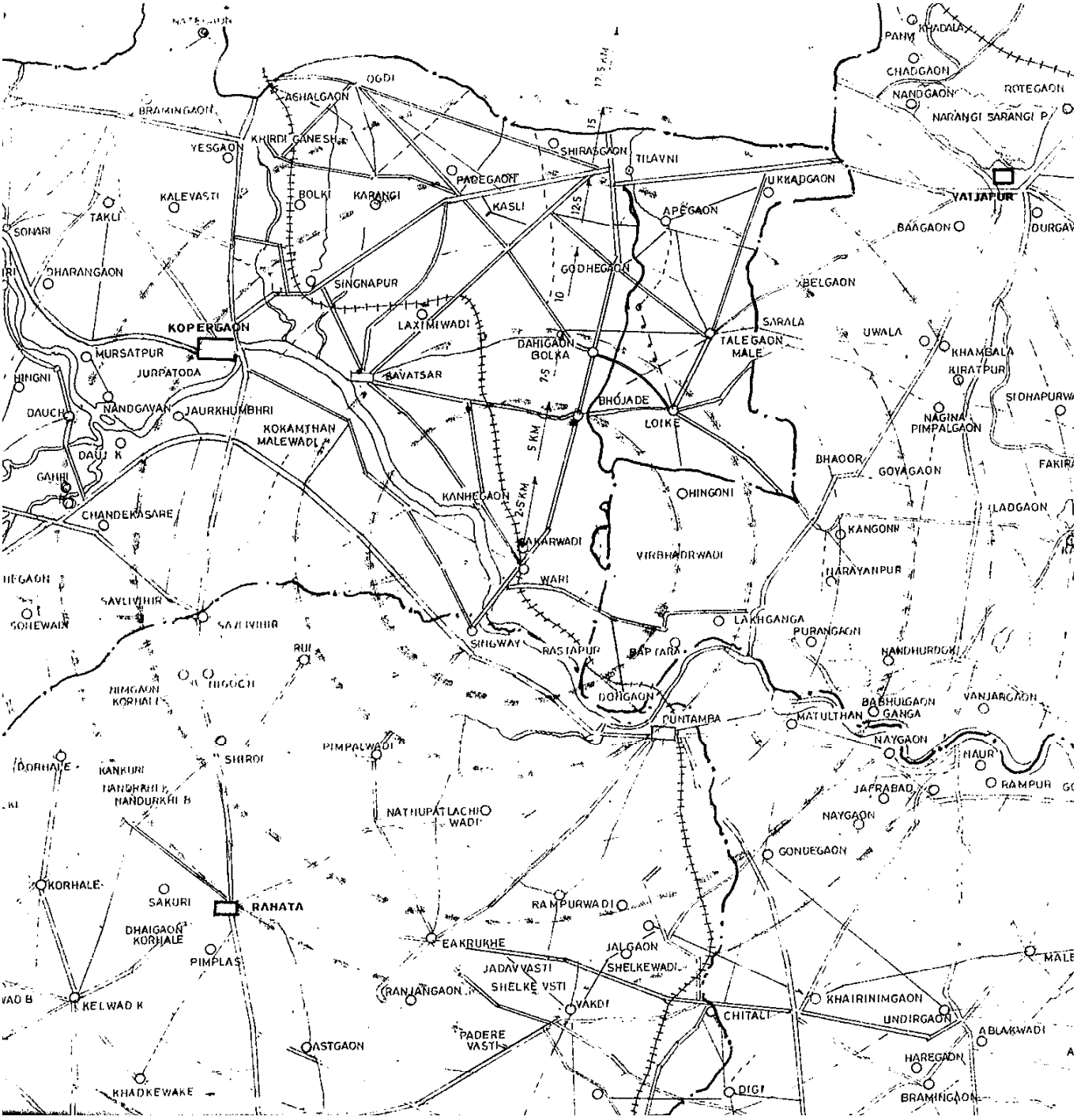


Fig 2: **10 km radius map**

ANALYSIS REPORT

MAHARASHTRA POLLUTION CONTROL BOARD
REGIONAL LABORATORY , NASHIK.

Tel. No. (0253) 2362820
Fax No. (0253) 2365150

Udyog Bhavan 1st Floor
Trimbak Road, Satpur,
NASHIK - 422007.
Date: 17.01.2014

To,

The Sub-Regional Officer,

M.P.C. Board, Ahmednagar

Lab. Report No.:-1552

Sample code No :- SRO/ANR/JVS/534/13

Date of Collection : 07.11.2013

Date of receipt : 12.11.2013

ANALYSIS REPORT

Particulars	1552
pH	5.63
B.O.D.(3 Days 27 °C)	7.5
COD	32.0
Suspended Solids	8.0
Total Dissolved Solids	390.0
Chloride	100.0
Sulphate	40.0
Sample collected by: Shri,	(Field Officer), Seal No. 171/223

Note :-

1) All results are expressed in ppm except pH.
2) N.A. indicates Not Analysed.
3) N.D. Indicates Not Detectable
4) BDL indicates Below Detectable Level.

(A. P. Kolhe)
Scientific Officer,
Regional Laboratory, Nashik.

F.S./JRE
n.a

Handover to F.Z. Shri Gharwal on 20/2/2014

74

20/2/2014

m/s Godawari Biorefinery Ltd,
A/p Kopargaon Tal - Kopargaon
Location - R.O. permeate

MAHARASHTRA POLLUTION CONTROL BOARD
Regional Laboratory, Nashik

1st floor, Udyog Bhavan, Near ITI, Trimbak Road, Satpur, NASHIK – 7. Tel.0253-2362820
Email : srnashiklab@mpcb.gov.in

Date :- 27/08/2013

To,
Sub-Regional Officer,
M.P.C. Board,
Ahmednagar

Stack (point source) Emission Report

Ref : Your letter No: -MPCB/ANR/TB/Camop of Nashik/2013 Dated-13/08/2013

Lab Report No. :- **S**-145
Sample Code No. :-SRO/ANR/JVS/Stack- 448
Type of Industry: -

Date of Collection :- 08 /08/2013
Date of Receipt:- 13./08/2013
Seal No. – 171

Sr.No	Parameters	Stack Details
1	Date of Sampling	08 /08/2013
2	Stack (Identity)	Boiler no.1
3	Stack height mts.	30
4	Stack area Sq.m.	1.884
5	Flue gas temperature °c	137
6	Exit gas velocity m/s.	11.75
7	Fuel Used	coal
8	Gas quantity Nm^3/hr	57923.00
9	Particulate matter emission mg/Nm^3	63.61
10	SO_2 (mg/Nm^3)	142.49

m/s Godawari Bio refinery
at Sakarwadi
Tal- Kopargaon --
A' Nagar

Boiler stack--
MR – 11163

(A. P. Kolhe)
Scientific Officer,
Regional Laboratory, Nashik

1

MAHARASHTRA POLLUTION CONTROL BOARD
Regional Laboratory, Nashik

1st floor, Udyog Bhavan, Near ITI, Trimbak Road, Satpur, NASHIK – 7. Tel.0253-2362820
Email : sronashiklab@mpcb.gov.in

Date :- 27/08/2013

To,
Sub-Regional Officer,
M.P.C. Board,
Ahmednagar

Stack (point source) Emission Report

Ref : Your letter No: -MPCB/ANR/TB/Camop of Nashik/2013 Dated-13/08/2013

Lab Report No. :- S-150 | Date of Collection :- 10/08/2013

Sample Code No. :-SRO/ANR/JVS/Stack- 459 | Date of Receipt:- 13/08/2013

Type of Industry: - | Seal No. – 171

Sr.No	Parameters	Stack Details
1	Date of Sampling	10/08/2013
2	Stack (Identity)	Boiler No. 2 GT 1895
3	Stack height mts.	30
4	Stack area Sq.m.	2.06154
5	Flue gas temperature ^{0}c	101
6	Exit gas velocity m/s.	10.25
7	Fuel Used	Coal
8	Gas quantity Nm^3/hr	60511.0
9	Particulate matter emission mg/Nm^3	73.77
10	SO_2 (mg/Nm^3)	117.76

(A. P. Kolhe)
Scientific Officer,
Regional Laboratory, Nashik

M/s Godawari Bio refinery
at Sakurwadi,
Tal.- Kopargaon
A'Nagar

6

Boiler Stack –
No. 2 –
GT – 1895

WATER AND WASTE WATER RESEARCH CENTER

Collaborators : International Schools in Environmental Management Studies
311, W. Calle-De-Ca-Ba-LL08, TEMPE, Arizona- 85284 ☎ (001)-(602)-6974732 Email : bsbhaskar@yahoo.com

Dt. 15/02/2014

STACK MONITORING REPORT

(Distillery Division)

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi

Date of Stack Monitoring : 28/12/2013

S. No	Parameter	Stack –I	Stack – II
1.	Stack Height (m)	30	31
2.	Stack Diameter (m)	1.20	1.6
3.	Boiler Capacity (T/hr.)	18.00	18.00
4.	Boiler	Thermax	TSGEC
5.	Furnace type	Spreader Stoker	
6.	Fuel Used	Coal, Bio-gas	Coal
7.	Flue Gas Temp. (°C)	142	121
8.	Flue Gas Velocity (m/sec.)	8.10	7.98
9.	P.M. (mg/Nm^3)	118.00	124
10.	NO_X (mg/Nm^3)	79.00	74.00
11.	SO_2 (mg/Nm^3)	84.00	88.00

Water And Waste Water
Research Centre

Partner

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E-Mail : bssubbarao@yahoo.com, bsharat@yahoo.com
Pan No. : AAAFW 1498C
STC No. : AAAFW 1498CST001

REGD. OFFICE : "ARUNDHATI"
Opp. Sahyognagar, Old Dhamni Road,
Vishrambag, Sangli - 416 415

WATER AND WASTE WATER RESEARCH CENTRE

COLLABORATORS : International Schools in Environment Management Studies
REGD. OFFICE : "ARUNDHATI" Opp. Sahayognagar, Old Dhamani Road, Vishrambag, Sangli - 416 415.

Dt. 23/04/2014

ANALYSIS REPORT

Name of the Factory : Gadhwari Biorefineries Ltd., Sakarwadi.
Date of sampling : 28/03/2014.
Sample Description: **Ground Water Samples.**

Sr.No.	Parameter	Unit	Well Near Dispensary Well Water
1.	Color	--	Colorless
2.	Odor	--	Odorless
3.	pH	-	7.78
4.	Turbidity	NTU	0.4
5.	Total Dissolved Solids	mg/l	2112
6.	Electrical Conductivity	µmhos/cm	2920
7.	Total Hardness (as $CaCO_3$)	mg/l	1800
8.	Calcium Hardness (as $CaCO_3$)	mg/l	1638
9.	Magnesium Hardness (as $CaCO_3$)	mg/l	262
10.	Calcium (as Ca)	mg/l	654
11.	Magnesium (as Mg)	mg/l	62
12.	Total Alkalinity (as $CaCO_3$)	mg/l	425
13.	Chlorides (as Cl)	mg/l	1051
14.	Sulphate (as SO_4)	mg/l	68
15.	Total Nitrate (as NO_3)	mg/l	7.62
16.	Total Nitrogen (as N)	mg/l	< 0.5
17.	Total Phosphate (as PO_4)	mg/l	<0.01
18.	Ammonical Nitrogen (as N)	mg/l	< 0.01

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Sr.No.	Parameter	Unit	Well Near Dispensary Well Water
19.	Copper (as Cu)	mg/l	< 0.01
20.	Manganese (as Mn)	mg/l	< 0.01
21.	Iron (as Fe)	mg/l	0.16
22.	Fluoride (as F)	mg/l	0.53
23.	Cyanide (as CN)	mg/l	Nil
24.	Phenolic Compounds (as C6H5OH)	mg/l	< 0.001
25.	Boron (as B)	mg/l	< 0.05
26.	Zinc (as Zn)	mg/l	< 5
27.	Aluminium (as Al)	mg/l	<0.03
28.	Cadmium (as Cd)	mg/l	< 0.002
29.	Lead (as Pb)	mg/l	< 0.01
30.	Nickel (as Ni)	mg/l	< 0.02
31.	Mercury (as Hg)	mg/l	< 0.001
32.	Arsenic (as As)	mg/l	< 0.001
33.	Selenium (as Se)	mg/l	< 0.01
34.	Sodium (as Na)	mg/l	196
35.	Potassium (as K)	mg/l	1.8
36.	Chemical Oxygen Demand	mg/l	288
37.	BOD 3days at 27oC	mg/	27
38.	Dissolved Oxygen	mg/l	< 8
39.	Total Coliform Organisms	Nos/100 ml	Absent
40.	Faecal Coliform Organisms	Nos/100 ml	Absent

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WATER AND WASTE WATER RESEARCH CENTRE

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Dt. 23/04/2014

ANALYSIS REPORT

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi.
Date of sampling : 28/03/2014.
Sample Description: **Ground Water Samples.**

Sr.No.	Parameter	Unit	Kanhegaon Railway Station Well Water
1.	Color	–	Colorless
2.	Odor	–	Odorless
3.	pH	-	7.78
4.	Turbidity	NTU	0.6
5.	Total Dissolved Solids	mg/l	1411
6.	Electrical Conductivity	µmhos/cm	1781
7.	Total Hardness (as $CaCO_3$)	mg/l	1353
8.	Calcium Hardness (as $CaCO_3$)	mg/l	1070
9.	Magnesium Hardness (as $CaCO_3$)	mg/l	283
10.	Calcium (as Ca)	mg/l	428
11.	Magnesium (as Mg)	mg/l	68
12.	Total Alkalinity (as $CaCO_3$)	mg/l	445
13.	Chlorides (as Cl)	mg/l	538
14.	Sulphate (as SO_4)	mg/l	57
15.	Total Nitrate (as NO_3)	mg/l	0.75
16.	Total Nitrogen (as N)	mg/l	<0.5
17.	Total Phosphate (as PO_4)	mg/l	<0.01
18.	Ammonical Nitrogen (as N)	mg/l	<0.01

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WATER AND WASTE WATER RESEARCH CENTRE

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Dt. 23/04/2014

ANALYSIS REPORT

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi.
Date of sampling : 28/03/2014.
Sample Description: **Ground Water Samples.**

Sr.No.	Parameter	Unit	Hanuman Gate Area Handpump Borewell Water
1.	Color	--	Colorless
2.	Odor	--	Odorless
3.	pH	-	8.10
4.	Turbidity	NTU	3.0
5.	Total Dissolved Solids	mg/l	866
6.	Electrical Conductivity	µmhos/cm	1079
7.	Total Hardness (as $CaCO_3$)	mg/l	595
8.	Calcium Hardness (as $CaCO_3$)	mg/l	595
9.	Magnesium Hardness (as $CaCO_3$)	mg/l	100
10.	Calcium (as Ca)	mg/l	238
11.	Magnesium (as Mg)	mg/l	24
12.	Total Alkalinity (as $CaCO_3$)	mg/l	232
13.	Chlorides (as Cl)	mg/l	161
14.	Sulphate (as SO_4)	mg/l	23
15.	Total Nitrate (as NO_3)	mg/l	0.83
16.	Total Nitrogen (as N)	mg/l	< 0.5
17.	Total Phosphate (as PO_4)	mg/l	<0.01
18.	Ammonical Nitrogen (as N)	mg/l	< 0.01

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Sr.No.	Parameter	Unit	Hanuman Gate Area Handpump Borewell Water
19.	Copper (as Cu)	mg/l	< 0.01
20.	Manganese (as Mn)	mg/l	< 0.01
21.	Iron (as Fe)	mg/l	0.07
22.	Fluoride (as F)	mg/l	0.28
23.	Cyanide (as CN)	mg/l	Nil
24.	Phenolic Compounds (as C6H5OH)	mg/l	< 0.001
25.	Boron (as B)	mg/l	< 0.05
26.	Zinc (as Zn)	mg/l	< 5
27.	Aluminium (as Al)	mg/l	<0.03
28.	Cadmium (as Cd)	mg/l	< 0.002
29.	Lead (as Pb)	mg/l	< 0.01
30.	Nickel (as Ni)	mg/l	< 0.02
31.	Mercury (as Hg)	mg/l	< 0.001
32.	Arsenic (as As)	mg/l	< 0.001
33.	Selenium (as Se)	mg/l	< 0.01
34.	Sodium (as Na)	mg/l	75
35.	Potassium (as K)	mg/l	0.9
36.	Chemical Oxygen Demand	mg/l	104
37.	BOD 3days at 27oC	mg/l	15
38.	Dissolved Oxygen	mg/l	6.1
39.	Total Coliform Organisms	Nos/100 ml	Absent
40.	Faecal Coliform Organisms	Nos/100 ml	Absent

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WATER AND WASTE WATER RESEARCH CENTRE

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REGD. OFFICE : "ARUNDHATI" Opp. Sahayognagar, Old Dhamani Road, Vishrambag, Sangli - 416 415.

Dt. 23/04/2014

AMBIENT AIR QUALITY REPORT

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi

Date of Ambient Air sampling : 28/03/2014

Sr. No.	Sampling Station	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	SPM ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)
1.	Main Gate	22	65	195	17.00	11.00
2.	Guest house	14	40	155	12.00	09.00

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WATER AND WASTE WATER RESEARCH CENTRE

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REGD. OFFICE : "ARUNDHATI" Opp. Sahayognagar, Old Dhamani Road, Vishrambag, Sangli - 416 415.

Dt. 23/04/2014

NOISE LEVEL MEASUREMENT REPORT

(OUTSIDE FACTORY)

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi.

Date of Noise level measurement : 28/03/2014.

Sr. No.	Location of recording Sound level	dB (A) Leq (Day time)	dB (A) Leq (Night time)
1	Main Gate	51.7	49.0
2	Main Gate (Road Side)	49.9	45.0
3	CD Type Colony	54.3	36.9
4	Survey No. 2	48.3	37.0
5	Back Side of Biogas Plant	49.9	35.0
6	Biogas Plant Gate	54.6	41.0
7	Guest House	36.2	32.9
8	Gandhi Maidan (Back side of Ganesh Stage)	36.6	32.9

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WATER AND WASTE WATER RESEARCH CENTRE

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REGD. OFFICE : "ARUNDHATI" Opp. Sahayognagar, Old Dhamani Road, Vishrambag, Sangli - 416 415.

Dt. 23/04/2014

ANALYSIS REPORT

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi.

(Distillery Unit)

Date of sampling : 28/03/2014.

Sample Description : **Soil Sample.**

Sr. No	Parameter	Unit	Rupali Sham Jadhav Gat No. 432/1 & 432/5 Wari, Tq.: Kopergaon, Dist: Ahmednagar
1.	pH	--	7.64
2.	Conductivity	mmhos/cm	0.852
3.	Ava. Nitrogen	kg/hectare	220
4.	Ava. Phosphorus	kg/hectare	68
5.	Ava. Potassium	kg/hectare	982
6.	Org. Carbon	%	1.02
7.	Sodium	%	0.090
8.	Calcium	%	0.460
9.	Magnesium	%	0.084
10	C.E.C	meq/100gm	29.28
11	Grade	--	B

Water And Waste Water Research Centre

Partner

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WATER AND WASTE WATER RESEARCH CENTRE

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Dt. 23/04/2014

ANALYSIS REPORT

Name of the Factory : Godawari Biorefineries Ltd., Sakarwadi.

(Distillery Unit)

Date of sampling : 28/03/2014.

Sample Description : **Soil Sample.**

Sr. No	Parameter	Unit	Subhash Anandrao Teke Gat No. 134/141 Doangoan/ Wari, Tq.: Kopergaon, Dist: Ahmednagar
1.	pH	--	8.14
2.	Conductivity	mmhos/cm	0.356
3.	Ava. Nitrogen	kg/hectare	198
4.	Ava. Phosphorus	kg/hectare	42
5.	Ava. Potassium	kg/hectare	248
6.	Org. Carbon	%	1.05
7.	Sodium	%	0.074
8.	Calcium	%	1.006
9.	Magnesium	%	0.116
10	C.E.C	meq/100gm	26.06
11	Grade	--	B

Water And Waste Water Research Centre

Partner

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4.SUMMARY

1. Godavari Biorefineries Limited is situated at Sakarwadi, Kopargaon (Tq), Ahmednagar (Dist). It has existing chemical units i.e. Acetaldehyde, Acetic Acid, Dilute Acetic Acid and Ethyl Acetate of following capacities i.e. Acetaldehyde= 1500MT/M, Acetic Acid= 1500MT/M, Dilute Acetic Acid = 110MT/M, Ethyl Acetate= 5400MT/M and it is proposed to De-bottle neck the capacity of these units i.e. Acetaldehyde= 2100MT/M, Acetic Acid= 1950MT/M, Dilute Acetic Acid = 143MT/M, Ethyl Acetate= 8700MT/M.
2. The industry provided the treatment of effluent of acetaldehyde based on Bio-methanation, followed by Reverse Osmosis & bio-composting. There is no effluent generated from Ethyl Acetate and Acetic Acid plants. The Dilute Acetic Acid from Acetic acid is sold in open market. It is proposed to follow the existing treatment plant method of anaerobic digestion followed by RO and Bio-composting even after expansion for the treatment of acetaldehyde effluent.
3. The industry has 194.0 hectares of land out of which 7.2 hectors is utilized for all plants.
4. The steam requirement for the expansion shall be met from the existing 2 nos. of Boiler of 18TPH each using Coal as fuel. At present 149T/day of indigenous coal is used. It is proposed to use imported coal as fuel for the generation of steam after expansion. The imported coal has calorific value of 5600Kcal/kg whereas the indigenous coal which is at present used has a calorific value of 4375Kacla/kg. **Thus the requirement of coal even after expansion would remain same.** Further, there would not be any increase in stack emissions and in fact the air emission will get reduced as the ash content in imported coal is not more than 12%, whereas in indigenous coal it varies from 30-35%. Thus there is overall improvement of Environment status of surrounding area.
5. There will not be any increase in water requirement as it is proposed to have a complete water recycle/arrangement system. The permeate of RO shall be used as make up water for cooling towers.
6. The existing effluent treatment plant facilities of anaerobic digester followed by Bio-composting shall be adequate as there is no increase in effluent quantity after expansion.

7. The manufacturing process of chemical plants are enclosed.
8. The water budget details are given.
9. The 10 km radius map of the surrounding villages is given, with the details of Environmental status.
10. The total project cost is estimated as 20.99 corers