THE ANDHRA SUGARS LIMITED

(CHEMICALS AND FERTILIZERS DIVISION)
SY. NO. 132, 133, 134 AND 137, SAGGONDA VILLAGE,
GOPALAPURAM MANDAL, WEST GODAVARI DISTRICT,
ANDHRA PRADESH

EXECUTIVE SUMMARY

SUBMITTED TO
ANDHRA PRADESH STATE POLLUTION CONTROL BOARD,
REGIONAL OFFICE, ELURU

EXECUTIVE SUMMARY

Introduction

The Andhra Sugars Limited located at Survey No. 132, 133, 134 and 137 Saggonda village, Gopalapuram mandal, West Godavari district, Andhra Pradesh obtained environmental clearance for caustic soda manufacturing Vide Letter no J-11011/245/2005- IA II (I) dated 08.02.2006 and renewed its consent to operate vide Letter No. APPCB/VSP/RJY/449/CFO/HO/2015 dated 20.11.2015 valid till 30.11.2019. I t is proposed to expand the manufacturing capacity of chlor-alkali and include synthetic organic chemicals mainly chloromethanes manufacturing within the existing site area of 320 acres. The capital cost for expansion is Rs. 800 crores. The cost estimate for environment management is Rs. 24 crores with annual recurring expenditure of Rs. 12 crores. Prior environmental clearance is mandated for chlor-alkali and synthetic organic chemical manufacturing activity vide SO 1533, dated September 14, 2006 issued by Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. The terms of reference for the environmental impact assessment studies was obtained from MoEFCC, vide letter no. F.No. J-11011/83/2017-IA II (I) dated 31.05.2017 as part of environmental clearance process. The certified compliance letter from the regional office of MoEFCC, Chennai is obtained vide letter F.No. EP/12.1/455/AP/1377 dated 27.08.2018.

Location of the Project:

The plant site is located at Survey No. 132, 133, 134 and 137 Saggonda village, Gopalapuram mandal, West Godavari district, Andhra Pradesh. The site is situated at the intersection of latitude $17^0$10'49"N and longitude $81^0$37'8"E. The site elevation above mean sea level (MSL) is in the range of 25-48 m, mainly due to a hillock used for greenery on site. The site is surrounded by open lands in north, South and east directions and coal based thermal power plant belonging to sister concern is located in the west side of the site. The nearest habitation from the plant is Gopavaram village located at a distance of 2.7 km in southwest direction. The main approach road Hukumpeta to Gopavaram is 2.7 km in southwest direction. The nearest Town and Railway station Kovvuru is at a distance of 22 km in southeast direction and nearest airport is Rajahmundry located at a

distance of 23 km in southeast direction. Godavari River is flowing from northeast to southeast direction at a distance of 3.7 km in east direction; Kovvada canal is flowing from northeast to southeast direction at a distance of 4.2 km in north direction. There are four reserved forests in the study area, Polavaram RF is at a distance of 7.4 km in northwest direction, Polavaram Protected Forest is at a distance of 9 km in north direction, Vinjaram RF is at a distance of 8.9 km in northwest direction, Purushottapatnam RF is at a distance of 9 km in northeast direction. There is no National Park, sanctuary, critically polluted area and interstate boundary within the impact area of 10 km surrounding the site.

Product Profile

The manufacturing capacity is presented in below table;

Manufacturing Capacity

S.No.	Product Name	Capacity (TPD)		
		Existing	Proposed	Total after expansion
I. Chlor-Alkali Plant				
1	Caustic Soda	400	400	800
2	Caustic Soda Flakes	140	140	280
3	Caustic Potash	--	100	100
4	Liquid Chlorine	240	4	244
5	Hydrogen Gas (bottling)	2.83	1	3.83
6	Liquid Hydrogen	1	1	2
II. Chloromethanes				
1	Methyl Chloride		10	10
2	Methylene Chloride		61	61
3	Chloroform		56	56
III. Synthetic Organic Chemicals				
1	Mono Chloro Acetic Acid	--	20	20
2	Chlorinated Paraffin Wax (52%)	--	20	20
IV. Non – EC Products				
1	Sulphuric Acid	300	--	300
2	Poly Aluminum Chloride	90	--	90
By-Products				
I. Chlor-Alkali Plant				
1	Hydrochloric Acid (33%)	600	400	1000
2	Sodium Hypochlorite	20	20	40
3	Sodium Chlorate	--	60	60
II. Chloromethanes				
1	Carbon tetrachloride*		7.6	7.6
2	Hydrochloric Acid		65.8	65.8
III. Synthetic Organic Chemicals				
1	Hydrochloric Acid (33%)	--	30	30

	from Chlorinated Paraffin Wax (52%)			
2	Hydrochloric Acid (33%) from Monochloro Acetic Acid	--	33	33

**Carbon Tetrachloride (CCl_4) generated will be sold as a feed stack to Authorized users/excess will be incinerated*

Manufacturing Process

Membrane technology was implemented in establishing this plant and accordingly the expansion shall also utilise updated membrane technology which is considered as environment friendly. The by-products are hydrogen, chlorine and sodium hypo chloride. Hydrochloric acid is manufactured using H_2 and Cl_2 produced from cell house. Chloromethanes (CMS) are manufactured by hydro chlorination of methanol in vapor phase in presence of catalyst followed by thermal chlorination of methyl chloride in vapor phase with chlorine and rectification, azeotrope separation and dehydration of the mixed products. The manufacture of chlorinated parffin wax involves chlorination of paraffin wax. The manufacture of MCA involves the reaction of Chlorine and acetic acid in Chlorinators using a suitable catalyst under high temperature. The reaction mix leaving the Chlorinators will have 60 % to 80 % MCA.

Utilities

The proposed expansion requires additional steam for both process and proposed effluent treatment system. It is proposed to establish a coal/husk fired boiler of 1 x 25 TPH capacity in addition to existing husk fired boilers of capacity 1 x 15 TPH, 1 x 10 TPH and oil-fired boiler of 1 x 6 TPH capacity. The total power required after expansion will be 120 MW. The DG sets required for emergency power during load shut down is estimated at 7750kVA. No additional DG sets are proposed for expansion, existing DG sets of 1 x 4750 kVA and 3 x 1000 kVA will be in operation during load shut down period.

List of Utilities

S.No	Utility	Existing	Proposed	After Expansion
1	Husk Fired Boilers (TPH)	1 x 15 1 x 10	--	1 x 15 1 x 10
2	Coal/Husk Fired Boiler (TPH)		1 x 25	1 x 25
3	Oil Fired Boiler (TPH)	1 x 6	--	1 x 6
4	Waste Heat Recovery Boiler (TPH)	1 x 15	--	1 x 15
5	Incinerator (Kg/hr)	--	1 x 383	1 x 383
6	DG Sets (kVA)*	1 x 4750 3 x 1000	--	1 x 4750 3 x 1000

** DG sets will be used during load shut down by Transco.*

Water Requirement

Water requirement for process, washings, cooling tower makeup, steam generation and domestic purposes will increase to 8308 KLD from 3360 KLD. The required water is drawn from Godavari river. The fresh water consumption after expansion is optimized by reusing treated wastewater to an extent of 1356.5 KLD, thus reducing fresh water consumption to 6951.5 KLD during operation after expansion. The water balance for daily consumption is presented in below table;

Water Balance after expansion

Purpose	INPUT (KLD)		OUTPUT (KLD)	
	Fresh Water	Recycled Water	Loss	Effluent
Process & Washings	2449.5	380	2695	134.5
Cooling Towers	3602	894.5	3671.5	825
Boiler	510		445	65
DM Plant Regeneration	250			250
Domestic*	90		8	82
Gardening	50	82	132	
Gross Total	**6951.5**	**1356.5**	**6951.5**	**1356.5**
Total	**8308**		**8308**	

** Including colony*

Baseline Environmental Data

The baseline data was collected in the study area during March -May 2018. The baseline data includes collection of Samples of ground water, surface water and soil, monitoring of ambient air quality, noise levels, ecological status and meteorological parameters. The analytical results show that the values are within the prescribed limits for air quality. The ground water quality is observed to be above the limits for potable purpose when compared to the prescribed standards of IS: 10500 – 2012 at few locations.

Identification and Quantification of Impacts

The impact assessment report has identified various sources of pollution and quantified the pollution loads due to proposed project. The sources of pollution are air emissions from utilities and process; liquid effluents from process, utilities and domestic usage; solid wastes from process, treatment systems and utilities; and noise pollution from utilities, and process equipment. A detailed impact assessment was made using rapid impact assessment matrix method. The salient features are presented as follows.

Impacts on Air quality: The impacts on air quality shall be due to the emissions from, boilers and standby DG sets. The incremental concentrations are quantified using ISC-AERMOD model based on ISCST3 Algorithm. The results indicate marginal increase in ambient air quality concentration. The predicted values for SPM, PM_{10}, $PM_{2.5}$, SO_2 and NO_x are 2.55, 1.02, 0.46, 2.33 and 2.98µg/m^3 respectively and the maximum values are observed at a distance of 0.6 km from the center of plant site in northeast direction, and the cumulative values of baseline air quality combined with predicted values are found to be within the prescribed limits of National Ambient Air Quality Standards. The mitigative and control measures of air pollution shall ensure that the impact on air quality is local – within the site area and its surroundings.

Impacts on Water: Water is essentially used for brine make-up, utilities and domestic purposes. The required water is drawn from Godavari river/reuse of stored runoff in the order of 6947 KLD in addition to reuse of treated wastewater in the order of 1352 KLD. No impact on water quality is expected due to discharge of effluents as zero liquid discharge is envisaged, which ensures reuse of treated wastewater for cooling towers makeup and brine saturation. There is no usage of treated wastewater for on land irrigation.

Impacts on Noise quality: The noise levels may increase due to motors, compressors, DG set and other activities which emit noise levels of above110 dB (A) at a reference distance of 1m from the source. The predicted cumulative noise levels (as calculated by the logarithmic model without noise attenuation) ranged between 57 and 89 dB (A) at

distances of 25 to 105 m. The increase in noise levels shall have impact restricted to the site area.

Impacts on Soil: The solid wastes generated from brine preparation, utilities and effluent treatment plant may have significant negative impacts if disposed indiscriminately. The brine sludge will be sent to secured land fill within plant premises after recovery of barium sulfate from sludge. The operational phase impacts observed to be negative, shall be neutral after mitigation due to effective implementation of management measures in handling, storing and transferring of solid wastes, effluents and chemicals, and development of green belt.

Impacts on Flora and Fauna: There are no endangered species of flora and fauna in the impact area. The impact on biotic environment is neutral with the effect confined mainly to the site area.

Environmental Monitoring Programme

It is proposed to monitor Ambient Air Quality (AAQ) for PM_{10}, $PM_{2.5}$, SO_2 and NO_X, work room for chlorine, HCl and VOC concentrations, stack emissions for boiler and DG sets, noise levels on quarterly basis. Water and treated wastewater are monitored on daily basis, while soil analysis is done once in a year.

Alternatives

The proposal is for expanding the existing unit, and the land area available for expansion is sufficient and hence there is no requirement of alternative site or additional site area.

Additional Studies - Risk Assessment

Risk assessment was conducted and the toxic dispersion damage distance due to rupture of 400mm and 500mm chlorine lines are 82 and 104 m, and the same is within the plant premises. Heat radiation damage distances of pool fire in the proposed tank farm of chloromethanes was limited to 25 m for a heat radiation of 4 KW/m^2, and the same was within the plant premises.

Project Benefits

There is a potential for direct/indirect employment of about 100-200 people during construction phase and 200-300 during operation phase due to the proposed expansion. The proposed project will also generate indirect employment to the locals during construction phase. The project shall have positive impact on socioeconomic environment due to provision of employment both direct and indirect and proposed CER activities.

Environment Management Plan

The management plan is drawn in consultation with project proponents and technical consultants after evaluating various mitigation and control measures to address the impacts identified, predicted and monitored. The impacts during construction stage are temporary and less significant, the management plan for impacts identified during operation stage is described as follows;

Liquid Effluents

The main sources of effluent generation from the plant are from process, floor washings, blow downs from boiler and cooling tower and domestic wastewater. The total wastewater generation shall increase from 292 KLD to 1356.5 KLD**.** Effluents from process, washings, utility blow downs of Chlor-Alkali and chloromethanes plants will be sent to the effluent treatment system followed by RO. RO permeate is reused for cooling towers make-up, while rejects are sent to brine saturation of chlor-alkali plant. Wash effluent from monochloro acetic acid (MCA) is sent to de-chlorination plant followed by air stripping, forced evaporation and rotary vacuum dryer (RVD). Condensate from forced evaporation and RVD is reused for cooling towers make-up. Salts from dryer are sent to secured land fill within plant premises. Total Effluent generated and mode of treatment is presented in below table;

4 Total Effluent Generated and Mode of Treatment after expansion

Description	Quantity (KLD)	Mode of Treatment
Process and washings	125	Sent to effluent treatment plant of Chlor alkali division, followed by ultra-filtration and RO. Permeate reused for process and rejects sent for brine saturation.
Cooling towers blow down	825	
Boiler blow down	65	
DM regeneration	250	
Washings from MCA Plant	9.5	Sent to de-chlorination plant followed by air stripping, forced evaporation and rotary vacuum dryer (RVD). Condensate from forced evaporation and RVD reused for cooling towers make-up. Salts from dryer sent to secured land fill.
Domestic	82	Sent to Sewage treatment plant and treated wastewater reused for greenbelt development.
Total	**1356.5**	

Air Pollution

The sources of air pollution from the proposed expansion is coal/husk fired boiler of 1 x 25 TPH capacity while the sources in the existing plant are husk fired boilers of capacity 1 x 15 TPH, 1 x 10 TPH and oil-fired boiler of 1 x 6 TPH capacity and DG sets of 1 x 4750 kVA and 3 x 1000 kVA. The proposed air pollution control equipment for 1 x 25 TPH coal/husk fired boiler is bag filter. The husk fired boilers are provided with wet scrubbing system as air pollution control equipment. The emissions are ultimately released into atmosphere through a 30 m chimney. The chimney heights are in accordance with the prescribed CPCB formula.

In chloro-alkali plant the gaseous emissions are chlorine and hydrogen chloride vapors. Due to advancement of control checks and due to membrane cell electrolysis, possibility of chlorine emission to atmosphere is negligible. Scrubbing systems are provided to neutralize sniff gases effectively. Even dilute chlorine is also being converted to sodium hypochlorite after neutralization with caustic soda at control temperature leading to value addition. To avoid emissions in the plant, tail gas vents are connected to a venturi scrubber and the lean acid formed is used for absorption of Hydrogen chloride gas in absorber.

The gaseous emission from Chloromethanes plant is hydrogen chloride vapours. HCl gas produced from thermal chlorination unit is used to produce methyl chloride. Excess HCl

available is absorbed in HCl absorber to produce 33% HCl. To avoid emissions from HCl absorber, tail gas vents are connected to a tail gas tower followed by air stripper to remove organics.

Solid Waste

Sludge is generated during brine purification stage. Barium sulfate is recovered from brine sludge and is sold as by product. Sludge containing mostly inorganics, generated from effluent treatment plant will be disposed to landfill within plant premises. The quantity of sludge generated depends on composition of salt used. Waste oil and used batteries from the DG sets are sent to authorized recyclers. Other solid wastes expected from the unit are containers, empty drums which are returned to the product seller or sold to authorized buyers after detoxification. Ash from boilers is sold to brick manufacturers.

Noise Pollution

Noise is anticipated from motors, compressors, centrifuges and DG sets. DG sets shall be provided with acoustic enclosure. Engineering controls like acoustic enclosures, barriers, shields, and anti-vibrating pads are provided to ensure reduction of noise levels and vibration. Employees working in noise generating areas shall be provided with appropriate personnel protective equipment.

Occupational Safety and Health

Direct exposure to chemicals or its raw materials may affect health of employees. Direct exposure to hazardous materials is eliminated by providing closed handling facilities. Personal Protective Equipment (PPE)i.e., hand gloves, safety goggles, safety shoes, safety helmets, respiratory masks etc. are provided to all the employees working in the plant. Company has a policy of providing PPEs to all personnel including contract workers. Periodic medical checkup in addition to checkup during recruitment is adopted to monitor health status of employees. Online chlorine, HCl sensors will be installed to monitor the ambient air quality and work room air quality, while chlorine sensors are also used for identifying potential hazard areas.

Prevention, maintenance and operation of Environment Control Systems

The pollution control equipment, and the effluent treatment system is monitored periodically to estimate their efficiency and performance potential as part of adoptive management. Proactive maintenance and monitoring program for all equipment and machinery is adopted to identify the problems/under performance of the equipment. Necessary measures will be adopted to rectify the identified problems/defects. The management agrees that the results of monitoring will be reviewed periodically to adopt new measures if necessary, for efficient pollution control as part of adaptive environmental management.

Transport systems

All the raw materials and finished products are transported by road. Dedicated parking facility is provided in an area of 3 acres for transport vehicles. There will be 140 additional truck trip per day to the factory for transporting raw materials and products. Traffic signs will be placed in the battery limit. The drivers of vehicles will be provided with TREM cards of chemicals and materials to be transported, and will be explained the measure to be adopted during various emergencies.

Reduce, Recycle and Reuse

A number of measures are proposed to achieve high yields and reduce generation of wastes. Barium sulfate recovered from sludge is sold as by-product. It shall be endeavor of the R&D team to improve yields through constant research and development activities. Treated effluent is reused for brine make-up and process. Proposed rainwater harvesting system shall have a storage capacity of 12000 KL, and the stored run off will be used for plant operation.

Green Belt Development

The management developed green belt in 33% of the site area covering the boundary of the site as part of environment management plan and proposed to increase density to enhance environmental quality through mitigation of fugitive emissions, attenuation of noise levels, balancing eco-environment, prevention of soil erosion, and creation of aesthetic environment.

Corporate Environment Responsibility

The ministry of Environment, Forest and Climate Change issued an office memorandum mandating corporate environment responsibility expenditure contingent on the capital cost of the project, in addition to the expenditure on environmental management. The management proposed to spent 0.5% of the expansion capital cost i.e., Rs. 4crores towards corporate environment responsibility. Activities are identified to be implemented by the project proponent in consultation with local public representatives and revenue authorities

Environment Management Department

The Environment Management Cell of the project headed by the executive director, chief chemical engineer, assistant chemical engineer, environment engineer, safety officer followed by Jr. engineers, Junior executives, Chemists and fitters.