AUROBINDO PHARMA LIMITED, UNIT - XI

SY.NO. 52,53,58,59,61,62,63,64,65,66,67,68, 69,70,71,72,73,74, 75,76,77 and 78 (PYDIBHIMAVARAM VILLAGE), SY. NO. 2,4,5,6,7,8,9 & 11 (CHITTIVALASA VILLAGE), RANASTHALAM MANDAL, SRIKAKULAM DISTRICT, ANDHRA PRADESH

EXECUTIVE SUMMARY

SUBMITTED TO
ANDHRA PRADESH POLLUTION CONTROL BOARD,
REGIONAL OFFICE, VIZIANAGARAM

EXECUTIVE SUMMARY

Introduction

Among the largest ' Vertically Integrated ' pharmaceutical companies in India, Aurobindo has robust product portfolio spread over major product areas encompassing CVS, CNS, Anti-Retroviral, Antibiotics, Gastroenterologicals, Anti-Diabetics and Anti-Allergic with approved manufacturing facilities by USFDA, UKMHRA, WHO, MCC-SA, ANVISA-Brazil for both APIs & Formulations.

Aurobindo Pharma Limited established in 1986 with a single unit manufacturing Semi-Synthetic Penicillin (SSP) and now a well integrated pharma company, Aurobindo Pharma features among the top 10 companies in India in terms of consolidated revenues. Aurobindo exports to over 125 countries across the globe with more than 70% of its revenues derived out of international operations.

M/s. Aurobindo Pharma Limited, Unit XI obtained Environment Clearance Vide file no. F. No. J-1011/48/2001-IA II (I) dated: 23.05.2002 and F. No. J-1011/83/2004-IA II (I) dated: 21.06.2005 for expansion. It is proposed to expand the API manufacturing capacity from 583.31 TPM to 1518.3 TPM and captive power plant to 8.85 MW in existing site area of 165 acres. The capital cost for expansion is Rs. 250 crores. The cost estimate form environment management is 32.77 crores and annual recurring expenditure is 8.84 crores. The expansion involves additional production blocks, utilities and enhancement of treatment facilities, storages and additional equipment to enhance the capacity, at the existing site in Sy. Nos. 52, 53, 58, 59, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77 and 78 of Pydibhimavaram Village, 2, 4, 5, 6, 7, 8, 9 & 11 of Chittivalasa Village, Ranasthalam Mandal, Srikakulam District, Andhra Pradesh. Prior environmental clearance is mandated by Ministry of Environment and Forests, vide SO 1533, dated September 14, 2006, for synthetic organic chemicals manufacturing activity. The terms of reference for the environmental impact assessment studies was obtained from MoEF&CC vide letter no. F. No. J-11011/153/2017-IA II (I) dated 31.05.2017 as part of environmental clearance process. The certified compliance letter from the regional office of MoEFCC, Bangalore is obtained vide letter no. F. No. EP /12.1/324/AP dated 16.12.2013.

Location of the Project:

The project site is located at Sy. Nos. 52, 53, 58, 59, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77 and 78 of Pydibhimavaram Village, 2, 4, 5, 6, 7, 8, 9 & 11 of Chittivalasa Village, Ranasthalam Mandal, Srikakulam District, Andhra Pradesh. The site is situated at the intersection of $18^0$08'07" (N) latitude and $83^0$37'22" (E) longitude. The site elevation above mean sea level (MSL) is in the range of 18-30 m. The plant site is connected by NH 5 in north direction, NH 5 to Chittivalasa village road in east direction, Kandivalasa gedda, a seasonal stream in south direction and open agricultural lands in west direction. The nearest habitation from the plant is Chittivalasa village located at a distance of 0.5 km in east direction. The main approach road AH45 (NH-5) is adjacent to the site in north direction. The nearest town Vizianagaram is at a distance of 20 km in west direction. The nearest railway station Garvidi is at a distance of 16 km in northwest direction and nearest airport is Visakhapatnam located at a distance of 60 km in southwest direction. Kandivalasa gedda a seasonal stream is flowing from northwest to southeast direction at a distance of 0.2 km in southwest direction. Kumili RF is at a distance of 2.1 km in northwest direction. There are no National Parks, sanctuaries, critically polluted area and interstate boundary within the impact area of 10 km surrounding the site.

Product Profile

The manufacturing capacity of proposed products after expansion is presented in the following table;

Manufacturing Capacity – After Expansion

S. No.	Name of Product	Capacity (TPM)
	Group A	
	Regular Products - I	
1	Abcavir	3.5
2	Alendronate Sodium	3
3	Atomoxitin HCl	2.2
4	Carisprodolol	6
5	Cefrozil	2
6	Celecoxib	7
7	Cilastatin Na	1
8	Ciprofloxacin	25
9	Clopidogrel Bisulfate	6
10	Colesavelan HCl	1
11	Darunavir propylene glycolate	1.5
12	Dextromethorpan	1

13	Didanosine	1
14	Divalproex Sodium	7
15	Dolutegravir sodium	15
16	Duloxitine HCl	15
17	Effavarenz	5
18	Emtricitabine Salycilate	3.5
19	Enrofloxacin	5
20	Esmoprazole Sodium	1
21	Esomeprazole Magnesium	2.5
22	Ethambutal HCl	10
23	Gabapentin Hydrochloride	50
24	Lacosamide	2.4
25	Lamotrigine	6
26	Lamovudine	35
27	Levetiracitam	40
28	Levofloxacin	20
29	Lopinavir	4
30	Metformin Hydrochloride	100
31	Methenamine Hippurate	7
32	Methyl Iodide	1
33	Naftopidil	1
34	Naproxen Sodium	10
35	Nevirapine	10
36	Olmesartan Medoxomil	1.5
37	Omeprazole	12
38	Pioglitazone HCl	1
39	Pregablin	6
40	Pyrazinamide	12
41	Quetiapine Fumerate	12
42	Raloxifine HCl	5
43	Ranolazine	1.3
44	Retanovir	1.2
45	Rosuvastatin Calcium	2
46	Sertraline Hydrochloride	30
47	Sevelamer Hydrochloride/Carbonate	15
48	Stavudine	1.4
49	Tenofovir	40
50	Tramadol HCl	5
51	Valacyclovir HCl	35
52	Valganocyclovir	1
53	Valsartan	15
54	Voriconazole	1
55	Zidovudine	20
	Total - I	**628**
Campaign Products - II		
1	Acetoxy compound	0.3
2	Apixaban	0.25
3	Atovaquone	0.25
4	Azilsartan Kamedoxomil	0.16

5	Bosentan	0.25
6	Canaglifozin	0.25
7	Cefachlor	0.5
8	Cinacelcet-HCl	0.3
9	Clarithromycin Carbopol	0.13
10	Clindamycin Palmiate HCl	0.75
11	Clobazam	0.25
12	Cobicistat	0.25
13	Dabigatran Etexilate Mesylate	0.63
14	Dalfampyridine	0.5
15	Darifenacin	0.1
16	Deferasirox	0.25
17	Desuen Lafaxine Succinate	0.25
18	Dexlansoprazole Anhydrous	0.25
19	Dimethyl Fumarate	0.25
20	Dronedarone Hydrochloride	0.5
21	Elvitegravir	0.25
22	Ezitimibe	0.3
23	Felodipine	0.04
24	Fudosteine	0.8
25	Galanthamine HBr	0.4
26	Ganciclovir	0.4
27	Hydralizin HCl	0.25
28	Ibandranote Sodium	0.04
29	Iron sucrose	0.34
30	Ledipasvir	0.25
31	Linagliptin	0.3
32	Lorcaserin Hydrochloride	0.1
33	Lurasidone Hydrochloride	0.4
34	Methohexital	0.5
35	Mirabegron	0.1
36	Montelukast	0.5
37	Nebivolol hcl	0.25
38	Neteglinide	0.39
39	Omeprazole Magnesium	0.5
40	Paliperidone	0.25
41	Penicillamine	0.25
42	Pitavastatin Ca	0.2
43	Prasugrel HCl	0.1
44	R&D products	0.5
45	Raltegravir Potassium	0.25
46	Repaglinide	0.25
47	Risedronate Sodium	0.8
48	Ritanovir	0.5
49	Rivaroxaban	0.1
50	Rizatriptan Benzoate	0.3
51	Roflumilast	0.25
52	Saxagliptan	0.05
53	Sildenafil Citrate	0.7

54	Silodosin	0.25
55	Sitagliptan	0.8
56	Sodium Ferric Gluconate	0.25
57	Sofosbuvir	0.25
58	Solifenacin	0.25
59	Teriflunamide	0.25
60	Zipresidone HCl	0.7
61	Zolimitriptan	0.1
	Total - II - Worst Case 20 Products on Campaign Basis	**11.11**
	Total (I+II) - Group A	**639.1**
	Group B	
1	7-AVNA	2
2	Amoxycillin	400
3	Amoxycillin Dane Salt	100
4	Amoxycillin Trihydrate	10
5	Ampicillin	100
6	Ampicillin Dane Salt	100
7	Ampilillin Trihydrate	10
8	Bacampicillin	0.5
9	Cefdoxime Proxitil	10
10	Cefidinir	2
11	Cefixime	15
12	Cephalexin	15
13	Cephalexin(Modified Route)	60
14	Cloxacillin	10
15	Cloxacillin Derivatives	35
16	DBDO (6-6- Dibromopencillanic Acid 1, 1- Dioxide)	3.7
17	Flucloxacillin Mg	0.5
18	Sutamicillin Tosylate	2
19	Tazobactam	3.5
	Total Group B	**879.20**
	Grand Total (Group A + Group B)	**1518.3**
	Captive Power Plant	**8.85 MW**

Manufacturing Process

Chemical synthesis produces majority of API's currently in the market. Chemical synthesis consists of four steps - reaction, separation, purification, and drying. Large volumes of solvents are used during chemical syntheses, extractions, and solvent interchanges. The manufacturing process of the above mentioned molecules involve various types of reactions like acetylyzation, protection, deprotection, hydrolysis etc. The manufacturing process of all the compounds, reactions involved, material balance are presented in chapter 2 of EIA report.

Utilities

The proposed expansion requires additional steam for both process and effluent treatment system. It is proposed to establish coal fired boiler of 1 x 35 TPH capacity in addition to existing 1 x 35 TPH, 1 x 25 TPH and 1 x 20 TPH coal fired boilers, while keeping the existing 1 x 6 TPH oil fired boiler as standby. The DG sets required for emergency power during load shut down is estimated at 16630 KVA and accordingly 6 x 1500 kVA, 5x 1010 kVA, 2 x 1000 kVA, 1 x 380 kVA and 1 x 200 kVA DG sets are proposed in place of exiting 1 x 1000 kVA, 1 x 350 kVA and 1 x 125 kVA DG sets. The list of utilities is presented in following table;

List of Utilities

S.No	Utility	Permitted	Proposed	After Expansion
1	Coal Fired Boilers (TPH)	1 x 35 1 x 25 1 x 20	1 x 35	2 x 35 1 x 25 1 x 20
2	Oil Fired Boiler (TPH)	1 x 6		1 x 6*
3	DG Sets (kVA)**	1 x 1000# 1 x 350# 1 x 125#	6 x 1500 5 x 1010 2 x 1000 1 x 380 1 x 200	6 x 1500 5 x 1010 2 x 1000 1 x 380 1 x 200

** Standby*

***DG sets will be used during load shut down by AP TRANSCO.* *# Will be dismantled after expansion*

11.6 Water Requirement

Water is required for process, scrubbers, washing, cooling tower makeup, steam generation and domestic purposes. The total water requirement after expansion increased from 1588.6 KLD to 4043 KLD. The required water shall be drawn from ground water and Thotapalli reservoir in addition to reuse of treated wastewater. The water balance for daily consumption is presented in following table;

Water Balance

S. No.	Description	Quantity (KLD)		
		Group A	Group B	Total
1	Process	400	350	750
2	Reactor & Floor Washings	125	125	250
3	Personnel Hygiene (Hand wash, Head Bath, etc) in operations areas	15	20	35
4	Scrubbers	45	35	80
5	QC and R & D Laboratory	30	20	50
6	PD Laboratory	10	8	18
7	Solvent Recovery Processes	90	65	155
8	Garment washing	40	35	75

9	DM/Softener Regeneration	35	30	65
10	RO Back Wash	35	30	65
11	Ash handling(water sprinklers)	45		45
12	Decontamination of Barrels, Liners, etc.	25	20	45
13	Cooling	950	425	1375
14	Boiler (including Power Plants) make up	600		600
15	Domestic	180	125	305
16	Gardening	75	55	130
	Total	**2700**	**1343**	**4043**

Baseline Environmental Data

The baseline data was collected in the study area during March to May 2017. 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 expansion. It has also identified the technologies to be adopted for the mitigation and control of the same. 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.

Impacts on Air quality: The impacts on air quality shall be due to the emissions from, Coal Fired 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 6.79, 2.71, 1.24, 14.57 and 16.52 $\mu g/m^3$ respectively and the maximum values are observed at a distance of 2.4 km from the center of plant site in southwest 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. The fugitive and

diffuse emissions were quantified and a box model was used to predict air borne concentrations, and the results indicate the work room concentrations less than threshold limit values (TLV) for various solvents.

Impacts on Water: Water is essentially used for process and utilities and domestic purposes. The total fresh water required of quantity 4043 KLD after expansion. No impact on water quality is expected due to the discharge of effluents, as treated effluent will be disposed to sea by using marine outfall system.

Impacts on Noise quality: The noise levels may increase due to turbines, motors, compressors, DG set and other activities. The major source of noise generation is turbine which emit noise levels of above 100 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 55 and 75 dB (A) at distances of 87 to 165m. The increase in noise levels shall have neutral impact, restricted to within site area.

Impacts on Soil: The solid wastes generated from process, utilities and effluent treatment plant may have significant negative impacts if disposed indiscriminately. The total solid waste will be stored separately in Hazardous storage area. Solid waste will be sent to cements plants for co-incineration based on calorific value or sent to TSDF. The operational phase impacts shall be neutral due to effective implementation of mitigative measures in handling, storing and transferring of solid wastes, effluents and chemicals, and development of green belt.

Impacts on Ecology: There are no endangered species of flora and fauna in the impact area. The impact on biological 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 VOC concentrations, stack emissions for boiler and DG sets, noise levels on quarterly basis. Water, treated wastewater on daily basis, Soil analysis will be done once in a year.

Additional Studies

Risk assessment was conducted and the heat radiation damage distances of pool fire in the tank farm was limited to 13m for a heat radiation of 4 KW/m^2, and the same was within the plant premises.

Project Benefits

The proposed expansion will provide employment to 600 people. The proposed project will also generate indirect employment to the locals during construction phase in the order of 120 people for a period of 18-24 months. The project shall have positive impact on socioeconomic environment due to provision of employment both direct and indirect in addition to proposed CSR activities and taxes accrued to local body and state governement.

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 effluent generated from the proposed expansion is mainly from process, separation techniques and during purification contain organic residues and inorganic raw materials, solvents, and products. Hence the effluents contain both organic and inorganic salts in various quantities leading to high COD and TDS levels respectively. Effluents from process, washings, Scrubbing media, and utility blow downs will be sent to the effluent treatment system. The treated effluent will be disposed to sea by using marine outfall system. Domestic wastewater sent to sewage treatment plant and treated wastewater reused for greenbelt development. Total Effluent generated and mode of treatment before and after expansion is presented in following table;

Total Effluent Generated and Mode of Treatment

S.No	Description	Quantity (KLD)			Mode of Treatment/Disposal
		Permitted	After Expansion		
			Group A*	Group B	
I	**High TDS and High COD**				
1	Process	642.71	360	297	Effluent is stripped in a steam stripper to remove organics and then concentrated in Multiple Effect Evaporators (MEE) followed by drying in Agitated Thin Film Dryer (ATFD). Stripper condensate will be sent to cement plants for Co-Incineration. Solid waste from ATFD is sent to secured land fill. Distillate from MEE and ATFD is sent for further treatment in biological treatment plant.
2	Scrubbers		50	30	
	Total – I	**642.71**	**410**	**327**	
II	**Low TDS and High COD**				
3	Solvent Recovery Process		90	65	Effluent is stripped in a standalone steam stripper to remove organics. Stripper condensate will be sent to cement plants for Co-Incineration. Stripper bottom is further treated with Stream I effluent.
	Total – II		**90**	**65**	
III	**High TDS and Low COD**				
4	Boiler Blow downs		85		Sent to RO. RO permeate reused for cooling towers and rejects sent to Guard ponds followed by Marine outfall system
5	DM/Softener regeneration		65		
6	Utility Cooling tower blow downs		90	60	
7	Garment Washings		40	35	
	Total – III		**280**	**95**	
IV	**Low TDS and Low COD**				
8	Process	136	90	60	Sent to Biological effluent treatment plant followed by Membrane Bio Reactor (MBR), Guard ponds and Marine outfall system.
9	Reactor and Floor Washings		125	125	
10	Personnel Hygiene (Hand wash, Head Bath, etc) in operations areas		15	20	
11	QC and R&D Laboratory		30	20	
12	Process Development (PD) Laboratory		10	8	
13	RO Back Wash		35	30	
14	Process Cooling Tower Blow downs		75	60	
15	Wastewater from		25	20	

	Decontamination of Barrels, Liners				
	Total – IV	**136**	**405**	**343**	
V	**Domestic Wastewater**				
16	Domestic	15	180	125	Sent to Sewage Treatment Plant and treated wastewater is used for on land irrigation for greenbelt development.
	Total –V		**180**	**125**	
Grand Total (I+II+III+IV+V)		**778.71**	**1365**	**955**	

* *Including permitted capacity*

Effluent Treatment System

The effluents are segregated into four streams; high COD/ TDS, Low COD/TDS, high COD and Low TDS and high TDS stream. The segregation is at source and is stream wise. Effluent from process and scrubbers are considered as high TDS an high COD; Effluent from solvent recovery system is considered as low TDS and high COD; Boiler, cooling tower blow downs and DM/softener rejects are considered as high TDS and low COD; Effluent from process, reactor and floor washings, personnel hygiene, QC and R&D, PD laboratory, RO back wash, process cooling tower blow downs and wastewater from decontamination of barrels and liners are considered as low TDS and low COD stream. The effluent treatment system shall be developed in modules at the same location for ease of operation

I. High TDS and high COD Effluents

Effluents from process and scrubbers are considered as High TDS and high COD. The treatment system for treating these effluents consists of Equalization, Neutralization, Flash Mixer, Clarifier, Plate and Frame Filter, Stripper, Multiple Effect Evaporator (MEE) followed by Agitated Thin Film Dryer (ATFD). The organic distillate from the stripper is sent to cement plants for co-incineration and aqueous bottom from stripper is sent to MEE followed by ATFD for evaporation. The condensate from the MEE and ATFD are sent to ETP (Biological). Salts from ATFD are disposed to TSDF.

II. Low TDS and High COD Effluents

Effluent from solvent recovery process considered as low TDS and high COD. These are sent to standalone stripper. The organic distillate from the stripper is sent to cement plants

for co-incineration and aqueous bottom from stripper is sent to further treatment with stream I effluents after stripping.

III. High TDS and Low COD Effluents

Utility blow downs and wastewater from garment washings are considered as high TDS and low COD. These are sent to RO. RO permeate reused for cooling towers and rejects sent to Guard ponds followed by Marine outfall system.

IV. Low TDS and Low COD Effluents

Effluents from process, reactor and floor washings, personnel hygiene, QC and R&D, PD laboratory, RO back wash, process cooling tower blow downs and wastewater from decontamination of barrels and liners are considered as low TDS and low COD. These effluents along with condensate from MEE and ATFD are subjected to biological treatment system and membrane bio reactor (MBR). The total effluent after MBR will be stored in Guard ponds and sent to marine disposal after meeting the standards in bioassay test.

V. Domestic Wastewater

Wastewater from domestic usage sent to Sewage Treatment Plant and treated wastewater is used for on land irrigation for greenbelt development.

Air Pollution

The sources of air pollution are proposed 1 x 35 TPH and existing 1 x 35 TPH, 1 x 25 TPH, 1 x 20 TPH coal fired boilers and 1 x 6 TPH oil fired boiler. 1 x 6 TPH oil fired boiler will be kept as standby after expansion. It is proposed to establish backup DG sets of 6 x 1500, 5 x 1010, 2 x 1000, 1 x380 and 1 x200 kVA capacity in place of existing DG sets to cater energy requirement during load shut downs. The proposed air pollution control equipment for 1 x 35 TPH coal fired boiler is electrostatic precipitator (ESP). DG sets shall be provided with effective stack height based on the CPCB formula.

The process emissions contain Ammonia, Carbondioxide, cabon monoxide, Hydrogen, Nitrogen, nitrous oxide, Oxygen, Hydrogen chloride, and Sulfur dioxide. Ammonia, Hydrogen chloride and Sulphur dioxide are sent to scrubber in series. The resultant solutions after scrubbing i.e., Sodium chloride from Hydrogen chloride, ammonium

chloride from ammonia, sodium sulphate from sulfur dioxide scrubbing are sent to ETP. Carbon dioxide, cabon monoxide, Nitrogen, nitrous oxide and Oxygen are let out into atmosphere following a standard operating procedure, while Hydrogen gas is let out into atmosphere through a water column.

Emissions are also released from various operations of manufacturing like centrifuge, drying, distillation, extraction etc. These emissions mainly contain volatile contents of the material used for processing. It is proposed to provide vent condensers in series to reactors, distillation columns, driers and centrifuge etc. to mitigate VOC emissions release. Other vents are connected to common headers and scrubbers.

Solvent Use and Recycle

Solvents are used for extraction of products and as reaction medium. Used solvents are recovered by distillation, for reuse. Residues from distillation columns and mixed solvents shall be sent to TSDF for incineration or cement plants for co-incineration. If any of the distilled spent solvents are not reused due to statutory reasons the same shall be sold to end users.

Solid Waste

Solid wastes are generated from process, solvent distillation, effluent treatment system, DG sets and boilers. Stripper distillate, process residue and solvent residue are sent to cement plants for co-incineration based on acceptability as the same contain significant calorific value and are predominantly organic in nature. If these wastes are not suitable for co-incineration, the same are sent to TSDF facility. The evaporation salts from ATFD , and sludge from ETP are sent to TSDF for landfill. 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. Coal ash from boiler is sold to brick manufacturers.

Noise Pollution

Noise is anticipated from turbines, motors, compressors, centrifuges and DG sets. DG set shall be provided with acoustic enclosure. Noise absorbing walls are proposed for turbine room and the control room shall be acoustically enclosed. 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.

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.

Transport systems

All the raw materials and finished products are transported by road. Dedicated parking facility is provided for transport vehicles. There will be 25-30 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. It shall be endeavor of the R&D team to improve yields through constant research

and development activities. The solvents shall be recycled for reuse in the process after distillation. Mother liquors from the first crop shall be reused for process. The steam condensate shall be reused for boiler feed. Treated wastewater from sewage treatment plant is reused for greenbelt development. It is also proposed to explore recovery of various salts from MEE salts, and from process effluents to reduce effluent loads, and quantity of solid waste.

Green Belt Development

The management developed green belt in a total area of 55 acres 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

Post Project Monitoring

Environmental monitoring for water, air, noise and solid waste quality will be conducted periodically either by proponent or third party. The frequency of monitoring and the quality parameters shall be as suggested by the Ministry of Environment and Forests and Climate Change, Government of India.

Environment Management Department

The Environment Management Cell of the project is headed by the President, Srenior vice president, vice president operations, DGM- EHS, followed by manager, assistant manager, Dy. Manager and technicians/fitters.