SAFETY AUDIT REPORT

OF

PORUS LABORATORIES PVT. LIMITED,

Unit-VI

Plot No. 2A, APIIC SEZ-Atchutapuram,
Moturupalem Village, Rambilli Mandal,
Visakhapatnam -531011
Andhra Pradesh

JUNE, 2018

Prepared By
Dr.Sudhir Kumar Mittal
EHS & Fire Safety Consultant

M-09703211130
E mail: mittalsr@rediffmail.com, mittalsr56@gmail.com

INDEX

PORUS LABORATORIES PVT. LIMITED,
Unit-VI

Plot No. 2A, APIIC SEZ-Atchutapuram,
Moturupalem Village, Rambilli Mandal,
Visakhapatnam -531011
Andhra Pradesh

SAFETY AUDIT REPORT- JUNE, 2018

1.0 INTRODUCTION

Porus Laboratories Pvt. Ltd is a new "Specialty Chemicals" Manufacturing Plant, situated at Plot No.2A, APIIC, SEZ-Atchutapuram, Moturupalem Village, Rambilli Mandal, Visakhapatnam - 531011 in Andhra Pradesh.

The Company has Corporate EHS Policy.

As Hazardous chemicals & processes are handled at site, the Management of the Industry has initiated a discrete Safety Audit of its manufacturing Unit located at SEZ-Atchutapuram, Moturupalem Village, Rambilli Mandal, Visakhapatnam -531011 in Andhra Pradesh as a proactive measure & approach. Moreover, the Management has initiated this Safety Audit in order to fulfill the regulatory requirements under Sections 7A & 7B of Chapter IV A of Factories Act 1948 as amended in 1987; Manufacture, Storage & Import of Hazardous Chemicals Rules 1989 and Environment Protection Act 1986.

2.0 SAFETY AUDIT METHODOLOGY

The Methodology for carrying out the Safety Audit:

2.1 Site Tour of the areas/facilities

2.2 Interaction with staff/ supervisors/ chemists/ workmen/ technicians about understanding of safety procedures being used for various operations at shop floor.

2.3 Identification of Safety & Occupational Health Hazards during walk round of plant.

2.4 Observations shall be made with respect to proposed /existing Material Handling practices & hazards, Hazardous Chemicals handling safe practices & associated hazards, proposed fire protection measures & fire prevention methods/ measures, Safety Permit system, safety awareness level of workmen & staff and prevailing unsafe conditions & unsafe acts at site

2.5 Review of the existing Safety Management systems with reference to SOP, Occupational Health, Safety Committee, Safety Organisation, Accident/Incident Investigation System, Work Permit System etc pertaining to various elements of safety audit system as per IS 14489 to the extent which were made available to the auditor by the Management/ Organisation during audit period.

2.6 Recommendations for identified Safety & Occupational Health Hazards for enhancing the integrity and reliability of operations & site.

While every minute point cannot be observed by the Auditor, every effort is made to identify safety & health related deficiencies with reference to the system approach as per IS 14489. It is a sample Safety Audit. The observations made in one area should be viewed globally for other areas also.

The audit report is to be read in conjunction with Hazard Analysis and Risk Assessment studies and HAZOPS conducted earlier by the Organization, if any.

Safety Audit is limited to geographical areas of plant facilities only. The Scope of the Safety Audit is limited to facility, hence the safety audit if facility oriented and not subjected to specific product/ process.

3.0 AUDITING AGENCY & AUDIT SCHEDULE

Dr. Sudhir Kumar Mittal- EHS & Fire Safety Consultant was assigned the work of carrying out Safety Audit as per IS 14489 of the company.

Based on the discussion with Plant Manager, Sr. Manager-Projects, GM-Corporate EHS, concerned Warehouse In Charge, Production In charges, Head-Maintenance & also based on the information provided & furnished by the company regarding the storage practices, manufacturing process, proposed safety practices & Safety Management System, Fire safety measures etc., this Audit Report has been prepared in accordance with IS 14489 Standard.

The Safety Audit was conducted on 19.06-2018.

4.0 ABOUT THE PROJECT

4.1 PLANT FACILITIES

4.1.1 GENERAL

- Admin Block
- Admin & Canteen (Ground Floor)

- QC & QA (First Floor)
- Security, Safety & OHC Building
- Toilet Block

4.1.2 UTILITIES

- Utility Block
- Main PCC Panel Room
- Boiler Shed
- Coal Storage Shed
- Crusher House

UTILITIES			
Sr. No.	Description	Qty/No.	Capacity
1.0	**Generator**		
1.1	Generator	01	1000 KVA
1.2	Generator	01	500 KVA
2.0	Air Compressor	02	95 CFM each
3.0	Nitrogen Plant	01	200 Nm3/hour
4.0	Boiler , FBC , 10.4 Kg/cm2 pressure	01	10 TPH
5.0	Hot Oil Unit	01	One Lakh cal/hour
6.0	Transformer	01	1600 KVA
7.0	Brine Plant, +5 Deg C, Freon Gas- Refrigerant	01	511 TR
8.0	**Cooling Towers**		
8.1	A Block	01	800 TR
8.2	B Block	01	500 TR
8.3	Solvent Recovery Plant	01	800 TR
8.4	Utility	01	1000 TR
9.0	**DM Water Plant**	03	15 m3.hour
10.0	Power Supply	01	
10.1	Power Supply-HT Yard	01	11 KVA, 415 Volts
10.3	Connected Load		4882 KW
11.0	**UPS Back Up**		
11.1	QC Block	02	10 KVA each, 20 minutes
11.2	Panel	Each panel	06 KVA- Lighting & Instruments, 20 minutes

4.1.3 PRODUCTION FACILITIES

a. Production Block-A (Ground, First & Second Floor)
b. Production Block-B (Ground, First & Terrace Floor)
c. Solvent Recovery Plant
d. Block -A Tank Farm
e. Block- B Tank Farm

4.1.4 STORAGE & WAREHOUSE FACILITIES

a. Warehouse Building (Ground & First Floor)
b. Explosive Tank farm & Drum Shed

4.1.5 WASTE WATER TREATMENT FACILITY

ETP Storage tanks:

a. For Low TDS Effluent: Three Numbers, each 200 KL
b. For High TDS Effluent: One Number of 150 KL
c. For High TDS Effluent: One Number of 300 KL
d. For High TDS Effluent: One Number of 50 KL
e. Mixer –Two numbers, each of 20 KL
f. Filter Press-Two Numbers, 42 plates each
g. Final treated effluent collection tank- one number- 160 KL

4.2 LIST OF PRODUCTS FOR HARA STUDIES

S. No.	Product	T/Month
1.0	p-Phenolphthalein Bisphenol(or)2-Phenyl-3,3-Bis (4-HydroxyPhenyl Phthalimide (PPPBP)	230.0
2.0	4-Nitro-N-MethylPhthalimide (4-NPI)	400.0

4.3 LIST OF HAZRADOUS CHEMICALS/ RAW MATERIALS

S.No.	HAZRADOUS CHEMICALS/ RAW MATERIALS
01	Aniline
02	Chlorosulfonic Acid
03	Hydrochloric Acid (35%)
04	Methanol
05	Monomethylamine
06	Nitric Acid
07	Phenol
08	Phthalic Anhydride
09	Sodium Bisulfite
10	Sodium Hydroxide (48%)
11	Sulphuric Acid
12	Toluene
13	Zinc Chloride

5.0 ELEMENTS OF SAFETY AUDIT

The elements of safety audit include identification of possible loss-producing situations and recommendations to minimize the occurrence of such loss producing events. The Safety Audit is based on Occupational Health and Safety Audit system as envisaged in IS 14489.

Initial meeting was held with Plant Manager; Sr. Manager-Projects, Head-Maintenance along with GM-Corporate EHS & the scope of external audit was explained & agreed upon by the Senior Management Team.

During the Plant Visit and studies, Top Management specially Plant Manager, GM-Corporate EHS, respective Functional Heads & Employees have evinced well interest and cooperated in the effort. The Auditor would like to place on record sincere thanks for the cooperation rendered by all.

6.0 SAFETY AUDIT REPORT

The Safety Audit Report consists of observations in details and recommendation for each gap identified. Field observation would cover general safety, chemicals handling safety and fire safety aspects.

7.0 IDENTIFICATION OF SAFETY & OCCUPATIONAL HEALTH HAZARDS DURING WALK ROUND

The field observations are based on the Site visit along with Safety representative and the interaction with Head-Production, Head-Projects, Head-Maintenance and Electrical In-Charge & GM-Corporate EHS.

The Elements of Safety Management System as per IS 14489 were assessed.

WALK ROUND SURVEY			
Sr. No.	**Observations**	**Safety & Occupational Health Hazards**	**Recommendations**
1.0	**Production Block-A/B and Solvent Recovery Plant**		
1.1	Double static earthing is provided to all Reactors. The earthing strip is visible where it is connected to reactor		**R1**: Check the earth resistance as base value for each earth pit before commencing trail batches/ commercial production

1.2	Emergency Exits are provided for each floor at a distance less than 21 meters. There are four numbers external staircases which are designated as "Emergency Exits"		**R2:** Display: Auto Glow Type Emergency Exits Signages" **R3:** Provide "Emergency Light" having UPS Back up at 'Exits" points on each floor
1.3	Flame proof lightings, Lighting fixtures & flame proof electrical equipment have been provided in each production block and SRS Plant		**R4:** Check Integrity of Flame proof lightings, Lighting fixtures & flame proof electrical equipment by physical checking and record all such inspections/ checking
1.4	Flame proof light lamps/ bulkhead have been provided in two rows in the walkway area for each floor		**R5:** Arrange for a portable ladder of suitable Material o construction with hand railing & platform for carrying out maintenance & servicing of lamps
1.5	The capacity of each receiver is more than 1.0 KL. The General vent having a manual ball valve of each receiver is located close to receiver only. Solvent is also transferred from one receiver to another or to reactor by vacuum by applying vacuum to vent line of receiver	1.Probability of emission of solvent vapour from vent line of receivers 2.Probability of fire due to vapour & source of ignition 3.Probability of ingress of air which may cause fire hazard	**R6:** Provide flame arrester to vent line of receivers where flammable solvents are being handled inside the Production Block **R7:** Explore to connect vents of all receivers to a sub- cooler through a common vent header **R8:** Carry out work place monitoring for solvent vapour emission near receiver areas or carry out VOC monitoring near receivers area **R9:** Display instruction for releasing vacuum with Nitrogen whenever vacuum transfer of

			solvent is done in receivers. **R10:** Provide vacuum gauge to all receivers since receivers are subjected to vacuum
1.6	There may be level difference at floor level or at ground level	Probability of trip & fall hazard due to level difference while walking on floor	**R11:** Provide Yellow-black zebra painting at starting point of level difference at floor level or at ground level
1.7	Flammable solvents, corrosive chemicals, toxic chemicals etc shall be received in day storage tanks & also receivers in production blocks	Probability of delay in response for suitable emergency actions since the hazard label is not displayed on storage tanks & receivers	**R12:** Display appropriate "Risk Labels" to Storage Tanks & Receivers/ Charge tanks etc so as to communicate hazards to operating personnel
1.8	Secondary containment for all Storage tanks of hazardous chemicals shall be provided.		**R13:** Ensure to provide Secondary containment of 110 % capacity of Secondary containment
1.9	Transfer pumps shall be provided for pumping hazardous chemicals		**R14:** Ensure that Transfer pumps for pumping hazardous chemicals shall be located outside the dyke area of Storage tanks and shall be provided with secondary containment
1.10	Hose Reel, Fire Hydrant point & Portable fire extinguishers are found provided at each floor area of Production Block-A & B		Not Applicable
1.11	High temperatures reactions are also proposed in reactors	Probability of severe hot burn injury due to exposure to uninsulated Hot surface –Top dish	**R15:** It has been proposed by the Management to provide suitable type thermal insulation to uninsulated Hot surface –Top dish end, Bottom dish end,

		end, Bottom dish end, vapour line or vapour column & hot mass transfer lines etc	vapour line or vapour column & hot mass transfer lines etc and these requirements have been captured in the P& ID also.
1.12	Electrical earthing is also provided to all electrical equipment such as motor, Junction Boxes, On Off Push Button, Sight lamp etc. Dedicated earth pit for electrical earthing is under constructions		Not Applicable
1.13	Natural ventilation shall be provided. Ventilators at ceiling heights are provided for each production Block. Sliding type's windows are proposed.		Not Applicable
1.14	Auto Modular Type ABC Fire Extinguishers are proposed over reactors where Toluene shall be handled		Not Applicable
1.15	Auto Operated Water sprinkler is also proposed for Production Blocks		Not Applicable
1.16	Hand railing shall be provided to staircase in each production Block		Not Applicable
1.17	Direct coupled motor drives for agitator of all reactors have been provided. Hence, rotating belt drive is eliminated.		Not Applicable
1.18	Heavy duty motors are installed for reactors. Permanent arrangement for lifting motors is not made on first & second floor.	Probability of accident if temporary lifting arrangement is used at site in production block for lifting heavy duty motors / reactors for maintenance purpose outside the factory	**R16:** Make a suitable arrangement such as Mono rail chain pulley block of appropriate SWL for lifting Heavy duty motors on first & second floor of each Production Block

		or even inside the factory	
1.19	New construction –Civil & mechanical-is being undertaken by the Project Team. Heavy equipment is being installed on civil structure. Construction is being done as per standard practices only.		**R17:** Obtain the Structural Stability Certificate from a Chartered Engineer or through a Competent Person/ Agency/ Authority before placing heavy equipment and also after placing all equipment in Production Block A & B also in SRS plant.
1.20	The design of Agitator guard to all reactors is providing zero access protection against rotating agitator.		Not Applicable
1.21	Platform with hand railing and toe board shall be provided for Mezzanine floor equipment		Not Applicable
1.22	Belt drive is protected from one side. The motor side portion of belt drive is not protected.	Probability of accident having high consequences, if body parts come in contact with un guarded portion of belt drive	**R18:** Provide 360 Degree Protection against rotating parts of Belt drive, wherever provided in Production Block A, B (For example- Scrubbers area-Blowers & Circulation pumps) and SRS plant
1.23	Body of all Heat exchangers are provided with double static earthing		Not Applicable
1.24	Wet riser & Hose reel is proposed at landing platform for each exit point at each floor in Production Blocks and SRS Plant		Not Applicable
1.25	Proposed to provide spill control kit on each floor of Production Blocks. Proposed to provide Sand Buckets on each floor of Production Blocks.		**R19:** Prepare safety inspection check list for inspection of each spill control kit at a predetermined frequency **R20:** Develop a SOP for spill control procedure for Hazardous

			Chemicals **R21:** Impart training for Spill control procedure for Hazardous Chemicals to Emergency Response Team (ERT) members
1.26	Bonding/Jumpers shall be provided to all flange joints on Flammable solvent transfer lines in Production Blocks & SRS plant		**R22:** Ensure Bonding/Jumpers are also provided to all flange joints on vapour column lines & reflux lines for flammable solvents in Production Blocks & SRS plant
1.27	Flanges of Glass vapour column is not provided with Bonding/ jumpers where flammable solvents are being distilled out or reflux is being done	Probability of fire hazard due to static charges	**R23:** Provide continuous bonding from one flange to another to all flanges on glass vapour column, if provided in Production Blocks, where flammable solvents are being distilled out or reflux is being done **R24:** Provide suitable protection such as SS Wire mesh jali around glass vapour column of reactors
1.28	Charging of solid RMs shall be done through hopper which would be provided to reactor side nozzle or directly from the manhole of reactor	Probability of emission of dust during charging solid RMs through hopper to provided to reactor side nozzle or directly from the manhole of reactor	**R25:** Explore to provide a suitable Local Exhaust Ventilation (LEV) over manhole of reactor during charging solid RMs through hopper to reactor side nozzle or directly from the manhole of reactor so as to minimise air borne emission in the work place
1.29	RD/SRV of suitable pressure rating is planned for		**R26:** Provide test tag indicating

	reactors where probability of over pressurisation is possible. Emergency vents from RD/SRVs are planned to connect to a suitably designed Dump Tank or Containment Tank which would be located outside the Production Blocks	Test date, due date & pressure rating for each SRV **R27**: Provide inspection date & due date and Pressure rating for each RD **R28:** Provide flame arrester to vent of Dump Tank or Containment Tank which are located outside the Production Blocks **R29**: Prepare a SOP for cleaning of RD which are provided to reactors
1.30	Heating is done for Phenol Tank. Steam cut off valve is also planned for Phenol Storage tank	Not Applicable
1.31	SRV is also planned for reactor jacket side and Pressure gauge is also planned to reactor jacket	Not Applicable
1.32	Vent of reactors where Hazardous emission is possible is connected to a suitably designed two stage scrubber	Not Applicable
1.33	Scrubbers have been planned for Production Block A & Production Block B	Not Applicable
1.34	Hazardous Chemicals such as CS Lye/ HCl/ Chlorosulphonic Acid etc shall be used and transferred by Pumps. Probability of leakages from flange joints due to gasket failure	**R30**: Provide "Splash Guards' to flange joints on transfer lines of Hazardous Chemicals such as CS Lye/ HCl/ Chlorosulphonic Acid etc especially near personnel movement area.
2.0	**MCC / PCC PANEL Rooms**	
2.1	Double earthing is provided to each panel with dedicated earth pits	Not Applicable
2.2	Electrical Shock Treatment Boards in Three Languages	Not Applicable

	(Local, Hindi & English) shall be provided to each Electrical Panel room	
2.3	Planned to provide CO2 Type Fire Extinguisher near each electrical panel & Panel room	Not Applicable
2.4	Planned to provide rubber mat having good quality non conductor in front & back portion of each PCC & MCC Panel also in front of each operating panels	**R31**: Obtain certificate for "Non Conductor of Electricity or For Electrical Resistance" from the suppliers of Rubber mats for electrical Panels.
2.5	Identification Labeling shall be done permanently for each Panel	Not Applicable
2.6	Each Panel is having "Lock Out" arrangement /provision for " LOTO" permit requirements	Not Applicable
2.7	"ELCB" of 30 milli amps shall be provided to each panel	Not Applicable
3.0	**SOLVENT TANKS NEAR PRODUCTION BLOCKS**	
3.1	Planned to provide Nitrogen Breather Valve with flame arrester to vent line of each Solvent tank	Not Applicable
3.2	Double static earthing to each tank for solvent tank with dedicated earth pit shall be provided.	Not Applicable
3.3	Staircase with hand railing at top of above ground solvent storage tanks & hazardous chemicals storage tanks have been provided, thereby minimizing fall of a person from height.	Not Applicable
3.4	Planned to provide auto operated water sprinkler system for above ground tanks for Toluene & Methanol which are located near Production Blocks	Not Applicable
3.5	Planned to provide Foam Monitors (Two Numbers) near boundary walls for Storage tanks for Toluene & Methanol near Production Blocks	Not Applicable
3.6	Planned to provide dedicated dyke for each for Storage tanks for Toluene & Methanol and also for each storage tank for hazardous chemicals near	Not Applicable

	Production Blocks		
4.0	**BOILER**		
4.1	Coal fired FBC boiler of Thermax Make is under installation. Design Pressure would be 10.4 kg/cm2 Auto operation of boiler is planned.		Not Applicable
4.2	SRVs of suitable pressure rating shall be provided to Boiler		Not Applicable
4.3	Auto operated Blow down arrangement based on TDS shall be made		Not Applicable
4.4	Top of Chimney shall be provided with Aviation lamp and Lightening arrester		Not Applicable
4.5	Belt drive for FD & ID fan shall be provided with guard	The Motor side portion of Belt drives for FD & ID fan is not provided with belt guard-probability of accident of high consequences due to exposure to rotating parts of belt drive	**R32:** Provide belt guard to motor side portion of belts for FD & ID Fans for Boiler **R33**: Provide zero access guards to coupling shaft of FD/ID Fan motors so as to provide 360 Degree protection.
4.6	Eye wash fountain & Body shower is not planned in Boiler area.	Coals unloading from trucks, feeding to furnace, removal of hot ash, handling of water treatment chemicals etc activities are carried out. Probability of accident/injury.	**R34:** Provide Eye wash fountain/ body shower near boiler area.
4.6	Covered shed for Coal storage shed is planned.		Not Applicable
4.7	Fire Hydrant point shall be provided near coal storage shed		Not Applicable

5.0	ELECTRICAL SAFETY	
5.1	Molded Cage Circuit Breakers (MCCB) is planned for Incoming HT lines in Panels.	Not Applicable
5.2	Motor Protection Circuit Breaker (MPCB) shall be provided for Motors in Panels	Not Applicable
5.3	Adequate Numbers of Earth (About 75 Numbers) are planned for the entire project site as below: a. Static earth Pits for Reactors/ receivers/ storage tanks etc for Body earthing. Copper Strips shall be used b. Earth Pits for Lightening arrester- Copper strips shall be used c. Earth Pits for UPS - Copper strips shall be used d. Electrical earthing-Earth Pits- GI Strips shall be used	Not Applicable
5.4	Two Numbers earth flat is provided to each cable tray inside the Production Blocks & SRS Plant	Not Applicable
5.5	Structures also provided with earth Strip with non conductive contact parts	Not Applicable
5.6	11 KVA resistance hand gloves shall be provided for use.	**R35:** Provide Electrical safety shoes to all electricians
5.7	Planned to provide Lightening Arresters on top of Boiler Chimney & SRS Plant	**R36:** Carry out mapping on site lay out plant for ensuring that the proposed Lightening Arresters on top of Boiler Chimney & SRS Plant are protecting all Buildings & structures/ Installations at site.
5.8	LT Cables shall be laid underground for road crossing area for Street lightings	**R37:** Provide LT Cable marker for identification purpose as well as for warning purpose while carrying out any excavation works

6.0	**EMERGENCY LIGHTING**	
6.1	UPS Back up of 20 minutes duration has been provided for emergency lighting in Production Blocks, SRS, ETP etc	**R38:** Provide distinct color code for identification of all Emergency Lightings
6.2	Emergency Lighting for Fire Hydrant Pump House and Utility Block is not planned.	**R39:** Provide Emergency Lighting for Fire Hydrant Pump House and Utility Block also
6.3	UPS lighting for all staircases has been planned.	Not Applicable
7.0	**FIRE HYDRANT SYSTEM**	
7.1	Planned to provide net work for Fire Hydrant Lines across the site covering production blocks, SRS plant, Utility Block, Boiler etc	Not Applicable
7.2	Planned to provide three pumps- Jockey Pump, Main Fire Pump & Diesel Driven Engine Pump	Not Applicable
7.3	Planned to provide Fire Hydrant Points for all areas of the site	Not Applicable
7.4	Planned to provide Wet Risers & Hose Reels for all multistoried buildings such as Production Blocks, SRS Plant etc	Not Applicable
7.5	Static Water storage tank of 1050 KL capacity is proposed for Fire Fighting purpose	Not Applicable
7.6	Air Release valves are not planned	**R40:** Provide Air Release Valves at top most height such as SRS Plant & Production block and at the furthermost point from the pump house.
8.0	**WATER SPRINKLER SYSYEM**	
8.1	Planned to provide auto operated water sprinkler system for Solvent Tanks & warehouse	Not Applicable
9.0	**EMERGENCY COMMUNICATION SYSTEM**	
9.1	Fire Alarm system has been planned	Not Applicable
9.2	Electrical siren is not planned.	**R41:** Provide electrical siren for communication of a major

		emergency **R42:** Provide two numbers Mega phone and two numbers hand operated manual siren for communication of an emergency, in case of power failure **R43:** Provide UPS back up to Electrical siren
10.0	**CHILLING PLANT**	
10.1	Freon gas shall be used as Refrigerant.	Not Applicable
11.0	**NITROGEN PLANT**	
11.1	One number Nitrogen Plant of 200Nm3 capacity is planned for catering needs of Inertisation in reactors & Solvent storage tanks	Not Applicable
11.2	Nitrogen Plant shall be designated as "High Noise" Area and "Caution Notice" shall be displayed.	Not Applicable
11.3	Ear defenders such as Ear Plug & Ear Muff shall be provided to Utility Personnel	Not Applicable
11.4	Pre-employment Audiometric examination is not planned for Utility Operators	**R44:** Ensure Pre -employment Audiometric examination is planned for Utility Operators
12.0	**AIR COMPRESSORS**	
12.1	Belt drive is located inside an enclosed body for air compressors, thereby avoiding contact with rotating parts	Not Applicable
13.0	**NITROGEN INERTISATION**	
13.1	Nitrogen Inertisation shall be provided to the following equipments: a. Reactors handling flammable solvents b. Receivers handling flammable solvents c. Pusher Centrifuge d. Paddle Dryer	Not Applicable

	e.SRS Plant equipment f. Underground Main Storage Tanks for Methanol & Toluene g. Above ground Storage Tanks for Methanol near Production Blocks	
14.0	**WIND SACKS**	
14.1	Wind Sacks are proposed over top of SRS Column, Production Block A Top floor & Main gate security Building top	Not Applicable
15.0	**ASSEMBLY POINT**	
15.1	Two Numbers Assembly Points have been proposed- At Security Gate 1 & Security Gate-2	Not Applicable
16.0	**FIRE SUPPRESSION SYSTEM**	
16.1	Fire Hydrant system is proposed for the entire site	Not Applicable
16.2	Foam Trolley -3 Numbers each of 100 Liters is proposed for Solvent Tanks Yard area	Not Applicable
16.3	Water sprinkler system is proposed for Solvent Storage tanks & Warehouse	Not Applicable
16.4	Portable Fire Extinguishers of varying capacities & Types have been proposed for deployment at various places based on the nature of hazards	Not Applicable
16.5	AFFF Foam compound-about 500 Liters is planned near Solvent storage tanks area	Not Applicable
17.0	**DRENCHING FACILITY**	
17.1	Eye Wash Fountain & Body w have been proposed for installation at various places such as Production Blocks. SRS plant, warehouse, Utility Block, QC lab etc	Not Applicable
18.0	**WAREHOUSE**	
18.1	Eye wash fountain/ emergency shower shall be provided outside of warehouse	Not Applicable
18.2	Storage of Solid RMs shall be done without rack system, but safe height for piles shall be determined	Not Applicable

18.3	Emergency Exits are planned for warehouse		Not Applicable
18.4	Flame proof electrical fittings have been planned		Not Applicable
19.0	**QC Lab**		
19.1	Solvents & acid bottles shall be kept on rack with PVC tray as secondary containment.		Not Applicable
19.2	Shower/ eye wash fountain shall be provided in the passage outside the QC Rooms		**R45:** Display Signage for "Way to Eye wash fountain/ emergency shower" in QC Rooms
19.3	HPLC waste is planned to collect in a glass bottle without secondary containment		**R46:** Provide secondary containment as small Bucket or tub for keeping the HPLC waste glass bottle
19.4	Hydrogen gas is used for GC instruments. Hydrogen leak sensor is not planned	High consequences of fire hazard due to leakage of Hydrogen in GC lab since all electrical equipment are non-flame proof.	**R47:** Provide Hydrogen leak detector near Hydrogen feed area to GC instruments.
19.5	Emergency Exit with signage is planned for QC Lab. Two External staircases have been planned		Not Applicable
19.6	Hydrogen, Nitrogen, Zero air, Helium etc cylinders shall be stored at ground floor under weather shed.		Not Applicable
19.7	Do's & Don'ts' for Gas cylinders is not prepared		**R48:** Display safety instructions in local language & English for Do's & Don'ts' for QC Gas cylinders Battery area
20.0	**ETP STORAGE TANKS**		
20.1	All pumps in ETP area shall be provided with guards.	The proposed guards do not prevent access to rotating couplings of pumps.	**R49:** Provide zero access guards to all coupling of pumps in ETP plant
20.2	Hand railing with toe guard for platform is planned		Not Applicable

	for all storage tanks		
21.0	**UNDERGROUND SOLVENT STORAG TANKS YARD**		
21.1	There are 06 Numbers UG solvent storage tank for Toluene & Methanol. Sand bed over all tanks shall be provided. Level indicator for each tank is proposed.		Not Applicable
21.2	Earthing with U clamp to flange on tank shall be provided		Not Applicable
21.3	Vent lines of all tanks shall be provided with Nitrogen breather valve cum flame arrester		Not Applicable
21.4	100 liter Foam Fire extinguisher, Fire Hydrant point, Hose reel, Water monitor etc are proposed surrounding UG tanks		Not Applicable
21.5	Unloading of solvent tanker shall be done by using crocodile earth to road tanker. Safety instructions board describing the safety measures to be taken during unloading of solvent from road tanker to UG tank not planned.	Probability of fire hazard due to static charges caused by faulty earth clamps to road tanker	**R50:** Provide Smart Ground earth detector during unloading of solvent from road tanker to UG tank so as to give indication with alarm if earthing has not taken place. **R51:** Display safety instructions for unloading of solvent from road tanker to UG ground solvent tanks.
22.0	**OCCUPATIONAL HEALTH CENTRE**		
a.	There shall be storage & usages of Toxic/hazardous chemicals However, antidote requirements not identified. Moreover, the list of Antidote not displayed in the OHC		**R52:** Identify the types of antidote for toxic chemicals & prepare a list of antidote and ensure availability in the OHC. **R53:** Keep Antidote such as Atropine Sulphate (05 Nos. Vials), Snake Anti Venom (One Vial) etc.

23.0	**DG Set**		
23.1	One diesel feed tank of 900 liter diesel with Glass tube as Level Indicator is planned for each DG set. Secondary containment is not planned for diesel tank. Earthing is not provided to diesel tank.	Possibility of leakage /spillage of diesel from the PVC tube & also from Diesel feed tank due to overflow	**R54:** Provide secondary containment for diesel feed tank.
23.2	The DG room shall be designated as High Noise area with display of "Caution Board"		Not Applicable
23.3	Acoustic Enclosures shall be provided for both DG sets		Not Applicable
24.0	**11 KVA Transformer Yard**		
24.1	Fencing & door of Transformer yard not earthed	Electrical shock having very high consequences	**R55:** Provide earthing to fence & door of Transformer yard
24.2	Double earthing to Transformer & Panel shall be provided for meeting the Statutory requirements		Not Applicable
24.3	Transformer oil testing shall be done by an external agency once in a year.		Not Applicable
24.4	Danger Board -11000 Volts shall be displayed to fencing of 11 KVA Transformer Yard		Not Applicable
24.5	Fire extinguishers & sand Buckets are planned		Not Applicable
25.0	**Emergency Control centre (ECC)**		
25.1	A dedicated ECC shall be established by the Management		Not Applicable
25.2	Two sets of SCBA are planned		Not Applicable
25.3	List of ERT members shall be displayed.		Not Applicable

8.0 Review of Safety Management System as per IS 14489

	Review of Safety Documents & General Safety Management System	
	Observations	**Recommendations**
1.0	**EHS Policy**	
a.	Corporate EHS Policy is prepared. It covers the management Intentions & support for compliance. It is signed by the Managing Director.	Not Applicable
b.	EHS Policy shall be displayed at strategic locations in Plant and to each block also.	Not Applicable
2.0	**EHS Organisation**	
a.	Qualified, experienced EHS- Head has been identified & shall be appointed shortly. He reports to Site Head and also to GM-Corporate EHS.	Not Applicable
b.	EHS - Head is having about 5-6 year experience & holding M Tech (Chem) qualification. He is also holding DIS Diploma.	Not Applicable
c.	Site EHS-Head is supported by a safety person having 2 to 3 year experience.	Not Applicable
3.0	**Safety Committee**	
a.	Safety Committee shall be constituted with 50 % Management & 50 % Employees participation. Cross functional representation from all departments is part of SCM. Representation from Operators is also part of SCM. Contractors (Civil, Fabrication, Electrical, and House Keeping) & contract workmen also participate in safety committee meeting.	**R56:** Conduct First SCM immediately after the commencement of Trials & Commercial Production
b.	The frequency of Safety Committee Meeting is Quarterly	Not Applicable
c.	Tenure of SCM shall be for 2 years	Not Applicable
4.0	**Safety Promotional Activities**	
a.	Safety Signages, Safety Slogans & safety Instructions Boards shall be displayed across the site.	Not Applicable
5.0	**Safety Budget**	
a.	Safety budgeted for financial Year 2018-2019 is approx. Rs.3.0 Crores for Scrubbers, Fire Hydrant, Spill Kits, RD & SRV, Safety showers, SCBA, Oxygen Analyser, LEL	Not Applicable

	Meter, Fire extinguishers etc. However, there is no constraint for Safety Budget	
6.0	**Hazard Identification & Risk Assessment**	
a.	HAZOPS have been conducted for both the products	Not Applicable
7.0	**Safety Training**	
a.	SOP is in place for Training needs identification, Feed Back, Training Evaluation and Training Calendars etc.	Not Applicable
b.	Induction Training for New Employee is done. Refresher Training shall be done for every month. On the Job Training also imparted.	Not Applicable
c.	Safety Training is being conducted every month.	Not Applicable
d.	Safety training is documents in Attendance sheet & also in Individual training card	Not Applicable
e.	Training shall be conducted at shop floor for Job Specific Training at initial stage.	Not Applicable
8.0	**Work Place Inspection**	
a.	Safety inspection of safety equipment such as Fire Extinguishers, Eye wash fountain/ Body shower etc shall be carried out regularly at a predetermined frequency by the Safety Department once all safety equipment are placed & being used.	Not Applicable
9.0	**Contractor safety**	
a.	Various safety training programmes are being conducted for contract workmen at regular interval being a project site.	Not Applicable
10.0	**Safety SOP**	
a.	Various Safety SOP are being prepared by GM-Corporate EHS	Not Applicable
11.0	**Onsite Emergency Plan & Mock Drill**	
a.	Evacuation route maps hall be provided at strategic location in the site.	Not Applicable
b.	The direction for way to emergency exits shall be displayed at many places.	Not Applicable
c.	Mock Drill Schedule shall be prepared. Mock drill shall be conducted quarterly once commercial production starts	Not Applicable
d.	On –Site Emergency Plan -2018 is prepared & available	Not Applicable
12.0	**Work Permit System**	
a.	Work Permit Format with Check list for Electrical Permit,	Not Applicable

	Hot work permit, Confined space permit, working at Height, General Work Permits & Unloading of solvents/ hazardous chemicals etc are being prepared by GM-Corporate EHS. Training on Work permit Procedure is being done on regular basis by GM-Corporate EHS.	
b.	Locks shall be procured for LOTO permit.	**R57:** Implement LOTO permit system.
13.0	**Accident/Incident Reporting Procedure**	
a.	Near Miss/Incident/Accident Reporting & Investigation Procedure is in place	Not Applicable
c.	Investigation is not being done using a structured check list	**R58:** Prepare a structured check list for investigation of Near Miss/Incident/Accident.
14.0	**Pressure Vessels (Fired & Unfired)**	
a.	All identified Pressure vessels are tested for Thickness by a competent agency. Records are also maintained in Form 8. Testing Tags are not provided at respective pressure vessels, being project site.	**R59:** Display Thickness test details at respective pressure vessels once project is over & ready for commercial production.
15.0	**Lifting machines & Tackles**	
a.	Chain pulley blocks at site also tested as per the statutory requirements & records are maintained in Form 38	Not Applicable
b.	Mono Rail system (SWL- One Tone) for jumbo bag charging station is provided and shall be tested before installation in Production block A	Not Applicable
16.0	**Mobile Equipment**	
a.	Battery operated Fork Lift of 2T SWL is planned and shall be tested before use	Not Applicable
b.	Battery operated Stacker of 2T SWL is planned and shall be tested before use	Not Applicable
c.	Material Lift of 2T SWL is planned for each production	Not Applicable

	block and shall be tested before use		
17.0	**Medical Examination**		
a.	An exhaustive "Employee Medical Examination Report" is being used for preparing Report.		Not Applicable
b.	Pre Employment Medical Examination is carried out for all employees.		Not Applicable
c.	Periodical Annual Medical Examination shall also be carried out on yearly basis. The Following tests are done: Blood profile, Urine Profile, ECG, X Ray, Audiometry Test, Vision Test, Colour Blindness test, ENT examination, LFT or PFT , Skin Examination, Physical examination etc.		Not Applicable
d.	Records of Medical Examination are maintained by HR department.		Not Applicable
18.0	**Ambulance**		
a.	Ambulance is by the Management. However, one vehicle with driver is available at site. However, Ambulance services from APSEZ-Atchutapuram which is about 5KM from the factory can also be used.		Not Applicable
19.0	**First Aiders & Fire Fighters at site**		
a.	There are 20 Trained Fire Fighters & 15 Trained First Aiders selected from all departments like Production, WH, Maintenance, QA, R&D, Safety, HR etc.		Not Applicable
20.0	**Static Electricity**		
a.	Earth pits have been provided. Earth Resistance shall be being checked at a predetermined frequency.	Identification of earth pit is not planned across the site.	**R60:** Provide identification number to each earth pit **R61:** Display Earth pit resistance value, test date & due date on each earth pit
21.0	**Access**		
a.	Road width of 8 meters for external road & 6 meter for Internal roads are provided		Not Applicable

9.0 CONCLUSIONS

9.1 The Management has proposed to install in built safety measures such as SRV, Dump tanks, safety Interlocks etc wherever needed.

9.2 The Management has proposed to provide Fire Hydrant System, water sprinkler system and Portable fire extinguishers of varying capacities & types covering the entire site.

9.3 Proper Inspection & maintenance of proposed in-built safety measures and compliances of the recommended safety measures would go a long way in reducing associated risks to acceptable level.

9.4 The observations are representative samples only which are made during the Audit and does not purport to cover the entire plant activities. However, the best efforts are made to collect representative samples.

9.5 The elements of Process Safety Management System must be reviewed whenever major changes in process/ equipment & RMs etc and the recommended must be implemented by the Management as & when applicable.

9.6 The Management is reviewing the existing safety measures & procedures periodically with reference to the best available technology and safety practices and creating awareness among employees about changes taking place.

10.0 DISCLAIMER

The Auditor/Consultant, based upon professional experience and training, will offer recommendations to abate unsafe conditions & unsafe acts and violations identified during the walk-through safety audit, but does not guarantee that all (and every), safety issues will be identified.

The Safety Audit of the Plant Premises and Operations are carried out based on generally accepted guidelines, Codes, standards and /or practices in the field of safety & health management.

The recommendations are based upon the field observations along with respective Section Head and information furnished/ provided by the Organisation wrt the existing Safety measures, Safety Practices & Safe Operating Procedures. M/s Porus Laboratories Pvt. Limited, Unit-VI, APSEZ- Atchutapuram in Rambilli Mandal, Visakhapatnam -531011, Andhra Pradesh, will hold the Auditor/Consultant, harmless for unsafe conditions & unsafe acts violations identified

but not cured; hazards/ violations not identified; or any claim, dispute or other form of controversy arising from or out of an actual or purported safety violation.

The undersigned auditor/consultant does not carry any liability of damage or risk incurred by the Organisation who sponsored this Safety Audit Study, by its own interpretation or review or consequential actions based on observations & recommendations.

M/s Porus Laboratories Pvt. Limited, Unit-VI SEZ-Atchutapuram in Rambilli Mandal, Visakhapatnam -531011, Andhra Pradesh, and remains required to comply with Factories' Acts & Rules, SMPV Rules and all applicable Standards under State and Central Codes. Consider other consultancy services that may be available from Director of Factories, DGFASLI, your insurance carrier, and other safety consultants.