RISK ASSESSMENT &

DISASTER MANAGEMENT PLAN

FOR

Active Pharmaceutical Ingredients (API),

Intermediates & KSM Manufacturing Facility

(Production capacity 100 TPM)

At

Plot No. N-26, MIDC additional Patalganga Industrial Estate,

Taluka- Panvel, District- Raigad,

State-Maharashtra, India.

Project Proponent

M/s. Cogent Lifescience Pvt. Ltd.,

Prepared By

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CHAPTER 1. INTRODUCTION

1.0. Introduction:

M/s. Cogent Life Science Private Limited has proposed a new establishment for manufacturing various APIs, KSM and intermediates with Quality Control facility having a production capacity of 100 TPM.

Increased chances of occurrence of fatal accidents during Transportation, Handling, Operation, Process due to increased use of hazardous chemicals as raw materials, intermediates and finished products has attracted attention of government and the public at large. Therefore, it has prompted Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, to make risk assessment mandatory to all industries. Also, industries are now paying more attention to safety in the light of serious nature of the accidents which cause damage to plant, personnel and public in direct impact area and also to effectively manage operations involving hazardous material.

1.1. Risk Assessment

Risk assessment is the determination of quantitative and qualitative value of risk related to a concrete situation and a recognized threat. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

It is mandatory for the industries handling hazardous chemical to maintain specified safety standards and generate an on-site emergency plan and keep it linked with off-site emergency plan.

1.2. Detail of the manufacturing Activities:

The proposed project is to establish facility to manufacture various APIs, intermediates and KSM products with Quality Control facility with a production capacity of 100 TPM.

Typical Process Flow for Active Pharmaceutical Ingredients (APIs), KSM and Intermediates: Technology for manufacturing of proposed products are available with the company as all

proposed products are permitted with enhanced quantities. The proponent shall implement the improved technologies of In-house R&D for the safe, cost effective & environmentally friendly practices.

1.3. Objective of the Plan:

The purpose of this risk assessment study includes; identification and assessment of potential hazards & risks arising from the proposed activities connected to the manufacturing, marketing terminal that requires management to comply with regulatory requirements; and to reduce or eliminate to As Low As Reasonably Practical (ALARP) in terms of risk to environment, human health, risk of injury/damage to plant, equipment and business interruption etc.

The main purpose of this study report is identification, quantification and taking preventive measures for reduction of potential risks that might arise during manufacturing of proposed and storage of raw materials since production of bulk drugs involves many chemicals which are hazardous and toxic in nature. Apart from having utility in production, these chemicals have inherent properties and hazards. It is to be noted that some of these chemicals can be flammable, toxic, corrosive or explosive etc.

Taking into consideration above mentioned following aspects and areas are covered in the study:

- Identification of major risk areas.
- Hazard identification / Identification of representative failure cases.
- Consequential analysis of probable risks / failure cases;
- Furnish the recommendations on the minimization of the worst accident possibilities
- Preparation of Disaster Management Plan
- Emergency Plan, which includes Occupational and Health Safety Plan;
- Establishment and implementation of a safety management system

CHAPTER 2. RISK ASSESSMENT AND MITIGATION MEASURES

2.0. Risk Assessment

Preliminary risk analysis or hazard analysis a qualitative technique which involves a disciplined analysis of the event sequences which could transform a potential hazard into an accident. In Qualitative Risk Assessment, risk has been analysed using methodology called HIRA Hazards Identification & Risk Assessment. In HIRA, major manual activities carried out by plant personnel as well as contract labours have been considered. For each undesirable events or hazards, possible improvements, or preventive measures are then formulated.

2.1. Risks envisaged

During entire activity being taken up at site the risks envisaged can be classified in two various categories depending upon nature of activity viz. Construction or Operation. Followings are major risks envisaged in the duration

2.1.1. Risk during Construction Phase

It is to be noted the risks arising during the construction phase are temporary and are mainly due to temporary structures constructed. Following are the activities which might pose threat of incident occurrence:

- Excavation and back filing
- Construction Activities such as construction of high rise structures such as stacks
- Material Handling (Loading and Un loading);
- Cutting and Welding
- Installation of Machineries

2.1.2. Risk during Operational Phase

Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

2.1.2.1. On-site

a. Exposure to fugitive dust, noise, and other emissions.
b. Explosion
c. Housekeeping practices requiring contact with solid and liquid wastes.
d. Emission/ spillage due to instrument failure, leakages
e. Emission/ spillage due to human error
f. Emission/spillage etc. from storage and handling.

2.1.2.2. Off-site

a. Exposure to pollutants released from offsite/ storage/related activities
b. Contamination due to accidental releases or normal release in combination with natural hazard.
c. Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences

2.2. Risk Analysis and Mitigation during Construction Phase

Risk and mitigation measures during the construction phase is given in below

Table 2.1. Risk and Mitigation Measures during the Construction

Sr. No.	Hazard Identification	Typical Areas / Activities	Possible Causes	Safety Control / Mitigation Measures Required	Probable Risks
i.	Fall from height	➢ Working at height > 2m ➢ Formwork ➢ Ramps ➢ Unprotected sides and edges ➢ Roofing ➢ Overhead brick laying	➢ Untrained workers ➢ Wearing loose clothes ➢ No safety gear	➢ Fall protection ➢ guardrail ➢ safety net/PPEs ➢ harness ➢ warning lines ➢ appropriate clothes ➢ supervision to identify hazards	➢ Accidental injury (personal)
ii.	Motor vehicle accidents	➢ Ramps, excavation sites, roads	➢ Untrained reckless drivers	➢ Vehicles with ➢ service, emergency and parking brake ➢ hooter system ➢ windows, wipers, lights, rear window ➢ mirrors, reflectors	➢ Accidental injury (personal)
iii.	Excavation accidents	➢ Foundation	➢ Unidentified cables & utilities ➢ Caving in of soil ➢ Falling from edge	➢ Notify prior to starting excavation Check oxygen levels ➢ Design safe access	➢ Accidental injury (personal)

Sr. No.	Hazard Identification	Typical Areas / Activities	Possible Causes	Safety Control / Mitigation Measures Required	Probable Risks
				➢ Barricade the excavation area	
iv.	Electrocution	➢ Entire site	➢ Temporary connections ➢ Cables running across site	➢ Supervision to identify hazards	➢ Accidental injury (personal)
v.	Struck by falling objects	➢ Entire site	➢ walking below loading or working ➢ equipment	➢ Supervision ➢ Warning ribbons and signs	➢ Accidental injury (personal)
vi.	Dust Generation	➢ Entire site	➢ excavation	➢ Dust mask	➢ Injury personal
vii.	Noise exposure	➢ Entire plant	➢ Construction & erection activities	➢ Ear Muffs/plugs ➢ oiling and greasing Vibration dampening	➢ Personal injury(noise induced hearing loss)

Table 2.2. Hazards related to construction activity

Activity	Hazards	Risk	Mitigation Measures
Site Leveling	➢ Due to heavy vehicle movement accident may happen. ➢ Snakes/Insect bites to workers.	➢ Physical injury ➢ Life loss and organ damage	➢ Providing PPEs to workers ➢ Appointing the qualified persons for the particular job.

Activity	Hazards	Risk	Mitigation Measures
			➢ Speed limit control ➢ Providing Training ➢ Maintain clean environment
Construction of Road	➢ Loading and Unloading of material may cause accident. ➢ Heavy Vehicle movement may cause accident. ➢ Hot material cause burn injury.	➢ Physical Injury ➢ Life loss Burn	➢ Providing PPEs to workers ➢ Appointing the qualified persons for the particular job. ➢ Valid license for Heavy vehicle operator will be mandatory. ➢ Speed limit control ➢ Providing Training
Excavation	➢ Excavation collapses ➢ Excavated material ➢ Falling objects or objects near an excavation ➢ Powered mobile equipment ➢ Slips, trips, and falls ➢ Hazardous atmospheres ➢ Flooding/water hazards ➢ Underground facilities	➢ Property Loss ➢ Physical injury ➢ Life loss	➢ Work Permit System will be followed. ➢ Only experienced person will assist to team. ➢ Excavated material will be stacked safely. ➢ Area will be barricaded. ➢ Training will be Provided to all workers ➢ PPEs will be provided. ➢ Unauthorized person entry will be banned.

Activity	Hazards	Risk	Mitigation Measures
Construction of building	➢ Heavy Material may fall down during loading and unloading ➢ Structure may fall down if poor practice done ➢ Waste stored in open may cause cut in feet ➢ Storage of fuel may cause fire ➢ Workers may fall down from the height.	➢ Physical Injury ➢ Life loss ➢ Physically handicapped ➢ Property Loss	➢ Work permit system will be adopted. ➢ PPEs will be provided to all workers. ➢ IS code will be followed for Building construction. ➢ Fuel will be stored separately and area will be isolated from ingenious material. ➢ Fire extinguisher will be provided ➢ Height work permit will be issued to the person. ➢ Safety belt will be provided to workers working on height above 1.8 m. ➢ Adequate trainings will be provided for specific job works.
Commissioning of high-rise structure (i.e. 30-m height Stack);	➢ Material may fall down ➢ Fall Hazards	➢ Physical injury ➢ Life loss	➢ High rise structure will be constructed as per detailed engineering drawing. ➢ Safety belt will be provided to workers working on height above 1.8 m. ➢ Height work permit will be implemented ➢ Proper training will be provided for erection of scaffolding. ➢ PPEs will be provided.

Activity	Hazards	Risk	Mitigation Measures
Material Handling (Loading and Un loading)	➢ Extra weight lifting can cause strain in body muscles	➢ Physical Injury	➢ Material will lift as per safety norms. ➢ PPEs will be provided.
Cutting and Welding	➢ Welding, cutting, and allied processes produce molten metal, sparks, slag, and hot work surfaces can cause fire or explosion if precautionary measures are not followed. ➢ Electric shock from electrical welding and cutting equipment can result in death or severe burns. ➢ Gas cylinder can cause fire accident.	➢ Physical Injury ➢ Burn Injury ➢ Property loss ➢ Life loss	➢ Hot work permit will follow. ➢ Standards Work Procedure will be developed. ➢ Training will be provided ➢ Job will be assigned to only comptent person ➢ Proper PPEs will be provided. ➢ Loose connection will be avoided. ➢ Area will be barricaded ➢ Gas cylinder will be stored as per guidelines ➢ Fire extinguishers of appropriate type will be made available at vantage points
Installation of Machineries.	➢ Due to over load lifting belt break out ➢ Un authorized operator of Lifting and Crain can create an emergency ➢ During placement of machinery structure may collapse	➢ Property loss ➢ Physical Injury ➢ Life loss	➢ Only authorized person will operate the machine ➢ Appropriate Belt will be used for lifting of material ➢ During lifting and placing of material area will be man free.

Activity	Hazards	Risk	Mitigation Measures
			➢ Appropriate platform will be designed as per the load bearing calculation.

2.2.2. Additional Risk control Measures

- Detailed Construction Hazard Identification Risk Assessment study will be done and accordingly safety manual will be prepared.
- First aid facility will be provided.
- 24 hours Ambulance facilities will be provided.
- Safety Gate meeting will be conducted.
- Experienced and contractor will be selected.
- Safety officer will be appointed.
- Training to the workers will be provided.
- Top to bottom safety culture will be developed.
- Safety slogan and instruction will be pasted at appropriate location.
- Emergency control Numbers will be provided inside the project site at various locations.
- All safety instruction will also be provided to all contractors.

2.3. Methodology to identify Risk Associate during operation and process

- Collection of data/information with respect to facility, process, hazardous chemicals etc.
- Qualitative hazard analysis including: preliminary process hazard, hazard associated with construction & operation activity, material storage, process, plant machineries etc.

2.3.1. Quantitative risk/hazard analysis consisting with the following:

- Identification of hazardous chemicals as per the „MSIHC" (Manufacture, Storage and Import of Hazardous Chemicals) Amendment Rules -2000.
- Screening of hazardous nature of each chemical and confirmation with Fire Diamond.
- Tabulation of chemical as well as physical properties and storage details for each hazardous chemical.
- Identification of release type and determine release rates.

2.3.2. Qualitative Risk Assessment

In Qualitative Risk Assessment, risk has been analysed using methodology called HIRA-Hazards Identification & Risk Assessment. In HIRA, major manual activities carried out by plant personnel as well as contract labours have been considered

2.3.3. Hazard Identification & Risk Assessment (HAZID-HIRA)

The hazard identification and risk analysis are used to identify possible accidents and estimate their frequency and consequences. While identifying hazards only those areas of plants having potential risk are used further for risk analysis. Hazard is considered as characteristic of system/plant/process that presents potential for an accident. Hence, all the components of a system/plant/process are thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

2.4. Hazard Identification and Risk Assessment (HIRA)

The drugs and chemical manufacturing industry are intensive and uses large scale and potentially hazardous manufacturing processes. Some examples of such hazards likely to occur in proposed project activity includes uncontrolled reaction in the reaction vessel, during operation are given below.

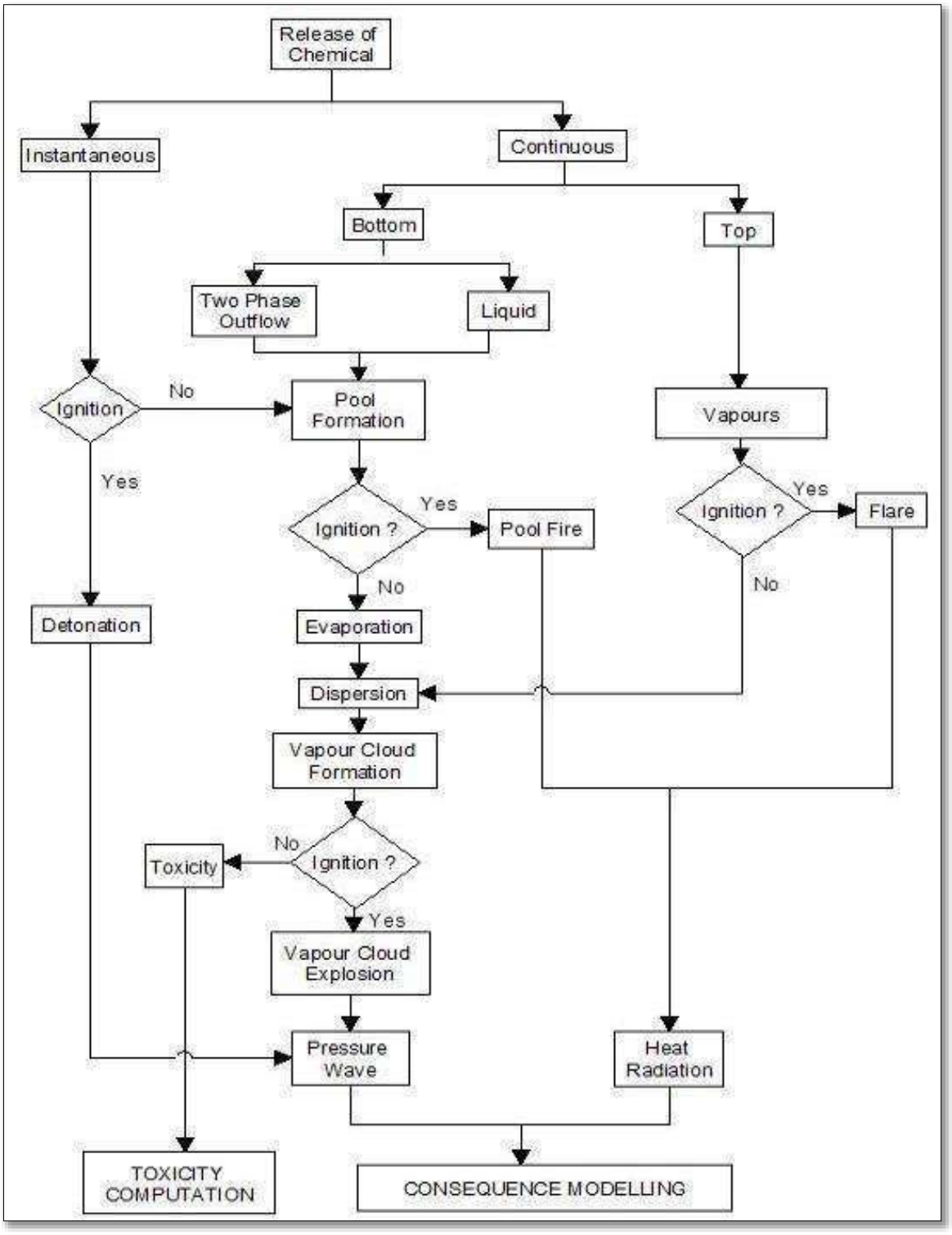

Figure 2.1. HIRA Process Flow

Table 2.3. Probable Hazardous Locations at Site

Sr. No.	Hazardous Area	Likely Accident Details
i.	Chemical storage, storage yard / warehouse	➢ Toxic, flammable, fire & explosion ➢ Accidental spillage or leak of hazardous (flammable, toxic) chemicals & gases ➢ Contact with flammable toxic chemicals and gases ➢ Loading/ unloading failures, sliding material fall ➢ Overflowing or leakage from storage tanks
ii.	Acid / solvent storage	➢ Toxic, reactive, flammable, spillage or leak ➢ Overflowing or leakage from storage tanks ➢ Failure of hose connection during unloading operation
iii.	Reaction vessel	➢ Fire, explosion, spillage, ➢ Operation failures, run-away reaction ➢ Release from safety valves
iv.	Fuel storage	➢ Fire, explosion / spillage ➢ Leakage and overflow
v.	Electrical substation & cable area	➢ Fire and electrocution ➢ Cable flash

These mainly impact those working within the production facility, although health hazards can also impact on local communities. Few selected possible hazards are summarized below. As well as Qualitative Hazards Analysis & Related Safety Control/ Mitigation Measures are given in

2.4.1. Physical Hazards Onsite

- Accident due to Conveyor feeding system
- Slip/Trip/ Fall due to improper stacking of material

2.4.1.1. Loading/Unloading operation/ Storage Area

- Approach of heavy good vehicles for unloading material

- Cleaning of overflows
- Unauthorized passages, travelling over transportation system
- Unclean platforms causing staggering and falls
- Unloading hose connection failure

2.4.1.2. D.G Set area

- Fire in Oil HSD storage yard
- Contact with Equipment resulting burns or electric shock
- Leaking fuel causing fire or slipping hazard
- Burns from contact with hot engine Air exhaust

2.4.1.3. Reaction vessel area

- Uncontrolled Reaction/Exothermic Runaway reaction
- Thermal Run-away reaction may occur
- Explosion due to high Temperature, Pressure or vacuum & Reaction

2.4.1.4. Chemical Exposure

Standard System for the Identification of the Hazards of Materials for Emergency Response" is a standard maintained by the U.S.-based National Fire Protection Association. "Fire diamond" used by emergency personnel to quickly and easily identify the risks posed by hazardous materials. The four divisions are typically color-coded with red indicating flammability, blue indicating level of health hazard, yellow for chemical reactivity, and white containing codes for special hazards. Each of health, flammability and reactivity is rated on a scale from 0 (no hazard) to 4 (severe risk). The numeric values in the first column are designated in the standard by "Degree of Hazard" using Arabic numerals (0, 1, 2, 3, and 4).

2.4.2. Natural and Manmade Calamities Which Can Lead To Emergency

Disaster refers to a serious disruption of the functioning of a society, causing widespread human, material, or environmental loss, which exceeds the ability of the affected society to cope using its own resources. To put it in other words, it is the occurrence of a sudden

mishap/calamity/grave occurrence that disrupts the basic fabric and normal functioning of a society (or community)

2.4.2.1. Storm

The contingency actions during storm shall be based on the weather forecasts obtained from meteorological stations and the local meteorological department. Some of the important actions to be carried out are as follows:

A. Prior to Storm:

- Communication with the local meteorological department.
- Maintain distances from storm in order to execute preparatory actions in a shorter time.
- Considering the consequences the emergency might have on operations and personnel and plan for safe shutdown of operations if needed.
- Review all operations carefully to ensure that systems in jeopardy are taken care of or shut down.
- Plan for safe evacuation of the operators and plant personnel.
- Ensure the readiness of first aiders, emergency vehicles, medical centre, medicines etc
- Metallic sheets, loose materials, empty drums and other light objects shall be properly secured.
- Flush the drainage systems

B. During Storm:

- Remain calm.
- Avoid going outdoors.
- Do not seal the office completely as the suction created by the difference in atmospheric pressure inside and outside can rip open a window or door by breaking window glass panes

C. After the Storm:

- Do not touch electric lines.
- Stay away from the disaster area.

- Take special precautions in driving vehicles since the under-pavement could cave in due to the weight of automobile.

2.5. Review of HIRA Study

- At least once in a year;
- Consider amendments / addition in legal requirements;
- Change in process or products handled;
- Internal and external audit results, including Specialized / Third Party Audits;
- Occurrence of accident, emergency;
- While initiating any corrective and preventive action;
- While purchasing and erecting any new equipment / machinery / building.

2.6. Potential Risk Area assessment in Plant

The potential risk area inside the plant is given in Table 2.4, List of raw material with storage and finished product are given in Table 2.5 and Table 2.6

Table 2.4. Potential Risk Area inside the Plant

Block/Area	Hazards Identification
Fuel Storage Area	Fire, Spontaneous Combustion, Dust emission
Boiler	Fire (mainly near oil burners), steam; Explosions
Fuel Storage Area	Fire
Finished Product Storage Area	Fire
Transformers and Electric Cable Gallery	Fire

Table 2.5. Raw Material Storage

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
1.	4-(3,4-Dichlorophenyl)-1-Tetralone	RM Warehouse (Ground Floor)	Solid	200	Bag (HDPE)
2.	Monomethyl Amine	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
3.	Methanol	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)
4.	Raney Nickel	RM Warehouse (Ground Floor)	Solid	25	Bag (HDPE)
5.	Hydrochloric Acid	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
6.	Sodium Hydroxide	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
7.	Mandelic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
8.	Isopropanol	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)
9.	Toluene	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)
10.	7-Chloro-2-Methyl Quinoline	RM Warehouse (Ground Floor)	Solid	200	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
11.	Isophthaldehyde	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
12.	Acetic Anhydride	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
13.	Ethyl Acetate	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
14.	Methyl Magnesium Bromide	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
15.	Acetic Acid	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
16.	Tetrahydrofuran (THF)	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)
17.	Sodium Bicarbonate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
18.	Manganese Oxide	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
19.	Methyl-2-(Iodomethyl) Benzoate	RM Warehouse (Ground Floor)	Solid	200	Bag (HDPE)
20.	Potassium Carbonate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
21.	Dimethylformamide (DMF)	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
22.	Chloodisopinocampheyborane (-) DIP Chloride	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
23.	Ammonium Chloride	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
24.	Acetone	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (SS)
25.	Methyl chloride	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
26.	Di isopropyl ethylamine (DIEPA)	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
27.	1-(Mercaptomethyl) Cyclopropylacetic Acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
28.	n-Butyl Lithium	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
29.	2-Acetyl Thiophenes	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
30.	Dimethyl Amine HCl	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
31.	Para Formaldehyde	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
32.	Sodium Tetrshydridoborate ($NaBH_4$)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
33.	Sodium Chloride	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
34.	Sodium Carbonate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
35.	Fluoro Naphthalene	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
36.	Tetrabutylammonium Bromide (TBAB)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
37.	Sodium Sulphate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
38.	Phenyl Acetate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
39.	Oxalic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
40.	Liquid. Ammonia	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
41.	Activated Carbon	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
42.	D-ribose	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
43.	2,2-Dimethoxypropane	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (SS)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
44.	Perchloric Acid	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
45.	Dichloromethane	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
46.	Tosyl Chloride	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
47.	Pyridine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
48.	Dimethyl Sulfoxide (DMSO)	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
49.	Hexane	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
50.	5-Fluoro Cytosine	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
51.	n-Phenyl Chloroformate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
52.	Hexamethyldisilazane (HMDS)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
53.	Sodium Carboxymethyl (CMS)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
54.	Trimethylsilyi Trifluoromethanesulfonate (TMST)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
55.	Acetonitrile	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
56.	Methyl-4-Amino-3-Methyl Benzoate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
57.	Butyric Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
58.	Thionyl Chloride	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
59.	Fuming Nitric Acid	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
60.	FeCl3	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
61.	Hydrazine Hydrate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
62.	Phosphoric Acid (PPA)	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
63.	Hyflo	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
64.	Dimethylacetamide (DMA)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
65.	Pot. Tert. Butoxide	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
66.	BMCB	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
67.	Tert. Butyl Methyl Ether	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
68.	Ethylene Glycol	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
69.	KOH	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
70.	2-Chloro Phenyl Acetic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
71.	Bromine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
72.	2-(Thiophen-2-yl) Ethan-1-Amine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
73.	L- Camphorsulfonic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
74.	3-(acetamidocyclopentyl) Methyl Acetate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
75.	Beryllium Hydroxide	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
76.	Amberlite IR400	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
77.	Ethanol	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
78.	Dibenzoyl-D-tartaric Acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
79.	Triethanolamine (TEA)	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
80.	Dimethylacetamide (DMA)	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
81.	Triethylorthoformate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
82.	Cyclopropylamine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
83.	Sulphuric Acid	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
84.	4-bromo-1-benzothiophene	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
85.	Piperazine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
86.	(2,2′-bis(diphenylphosphino)-1,1′-binaphthyl) (BINAP)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
87.	Pd2(dba3)	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
88.	7-(4-chlorobutoxyl) Quinoline-2(1H)-one	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
89.	NaI	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
90.	2-Chloro-5-Iodobenzoic Acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
91.	Oxalyl Chloride	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
92.	2-ethoxy-cyclohexa-1,3-diene	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
93.	AlCl3	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
94.	Polymethylhydrosiloxane (PMHS)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
95.	i-PrMgCl.LiCl	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
96.	n-Heptane	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
97.	Et3SiH	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
98.	BF3.Et2O	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
99.	Salicylic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
100.	Hexamethyldisilazane	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
101.	4-hydrazinobenzoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
102.	Trifluoroacetic acid (TFA)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
103.	Isovalaradehyde	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
104.	Diethyl malonate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
105.	Di-n-propylamine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
106.	Sodium cyanide	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
107.	2-((2S)-oxyran-2-yl-methyl)-1H-isoindole-1,3-(2H)-dione	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
108.	Methyl-(3-fluoro-4-(morpholin-4-yl)phenyl) carbamate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
109.	N-(5-(bromomethyl)-4-(4-fluorophenyl)-6-propan-2-yl)-N-methyl methanesulphonamide phosphonium salt	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
110.	Tert. Butyl-((4R,6S)-6-formyl-2,2-dimethyl-1,3-dioxane-4yl)	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
111.	Calcium acetate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
112.	Rifamycin O	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
113.	2-Amino-4-methyl pyridine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
114.	Ascorbic acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
115.	Iodine	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
116.	5-chloro-3-(methoxycarbonylmethylsulfamoyl)-thiophene-2-carboxylic acid methyl ester	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
117.	Sodium Methoxide	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
118.	Pyridine-2-amine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
119.	O-xylene	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
120.	Dioxane	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
121.	1-(2,4-dichlorophenyl-2-(1H-imidazole-1-yl)ethanol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
122.	3-bromomethyl-7-chlorobenzo (b)thiophenes	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
123.	2-chloro-3-methylthiophene	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
124.	Azobisisobutyronitrile	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
125.	1,3-dibromo-5,6-dimethyl hydantoin	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
126.	Chloroform	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
127.	1-(2,4-dichlorophenyl)-2-(1H-imidazol-1-yl)ethanol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
128.	2,4-difluoronitrobenzene	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
129.	Palladium Carbon	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
130.	Copper powder	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
131.	Trichloro acetic acid	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
132.	Isopropyl nitrite	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
133.	2-(5-bromo-2-methylbenzyl)-5-(4-fluorophenyl)thiophenes	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
134.	(3R,4S,5S,6R)-3,4,5-tris((trimethylsilyl)oxy)-6-((trimethylsilyl)oxy)methyl)tetrahydro-2H-pyran-2-one	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
135.	n-butyl lithium in hexane	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
136.	Methanesulfonic acid (MSA)	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
137.	Maleic anhydride	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
138.	Thiourea	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
139.	p-Toluenesulfonic Acid (PTSA)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
140.	2-deoxy-2-fluoro-2-C-methyl lutidine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
141.	Propane-2-yl(2S)-2-fluorophenoxyphenoxyphosphoryl amino proponate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
142.	Tert. Butyl magnesium chloride	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
143.	N-1S-(2-azabicyclo-2-methyl propylcarbamic acid methyl	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
144.	1-ethyl-3-(3-dimethylaminopropyl)	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
145.	2((methoxycarbonyl)amino)-3-methyl butanoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
146.	Butyl alcohol	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
147.	Bromobenzene	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
148.	5-methyl-1H-pyridin-2-one	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
149.	Copper Oxide	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
150.	4-amino-N-3-amino-2-hydroxy-4-phenylbutyl-N-isobutylbenzenesulfonamide	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
151.	Hexahydrofluoro-(2,3-b)furan-3-yl-4-nitrophenyl carbonate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
152.	N-methyl-2-pyrrolidone	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
153.	6-(benzyloxy)-9-((1S,3R,4S)-4-(benzyloxy)-3-(benzyloxy)-methyl)-2-methylenecyclopentyl)-9H-purin-2-amine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
154.	(1S)-1-phenyl-1,2,3,4-tetrahydroisoquinoline	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
155.	Ethyl Chloroformate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
156.	3-quinolidinol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
157.	NaH	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
158.	Succinic Acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
159.	(R)-5-bromo-((1-methylpyrrolidin-2-yl)methyl-1H-indole	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
160.	Phenyl vinyl sulphone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
161.	Tri-O-tolyl phosphate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
162.	Palladium Acetate	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
163.	47% HBr	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
164.	4-(phenylthio)benzyl alcohol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
165.	1-(2-(2,4-dichlorophenyl)-2-(1H-imidazol-1-yl)ethanol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
166.	2-bromo-1-cyclopropyl-2-(2-fluorophenyl)ethanone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
167.	5,6,7,7a-tetrahydrothieno(3,2C)pyridine-2-4H-one	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
168.	Potassium bicarbonate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
169.	Cyclohexane	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
170.	4-Dimethylaminopyridine (DMAP)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
171.	17-iodo-androsia-6,16-diene-3-beta-ol	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
172.	3-diethylboropyridine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
173.	Bis (triphenylphosphine)palladium(II)dichloride	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
174.	Acetyl Chloride	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
175.	6-methyl-N-1-(4-(pyridine-3-yl)pyrimidine-3-yl)benzene-1,3-diamine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
176.	4-((4-methylpierazin-1-yl)methyl)benzoyl chloride diHCl	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
177.	N-methylmorpholine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
178.	(2aR,4S,4aS,6R,8S,11S,12S,12aR,12bS)-12b-acetoxy-9-(((2R,3S)-3-((tert.butoxy carbonyl)amino)-3-phenyl-2-((triethylsillyl)oxy)propanoyl)oxy)-11-hydroxy-4,6-dimethoxy-4a,8,13-tetramethyl-5-oxo-2a,3,4,4a,5,6,9,10,11,12,12a,12b-dodecahydro-1H-7,11-methanocyclohexa(3,4)benzo benzoate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
179.	Hydrogen fluoride	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
180.	4-chloro-6-(3-chloropropoxyl)-7-methoxyquinazoline	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
181.	Morpholine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
182.	3-chloro-4-fluoro aniline	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
183.	6,7-bis(2-methoxy ethoxy)quinqzoline	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
184.	3-ethyleneaniline	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
185.	2-((6-Chloro-2-methylpyrimidine-4-yl)amino)-N-(2-chloro-8-methyl phenyl)thiazol-5-carboxamide	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
186.	1-(2-hydroxyethyl)Piperazine	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
187.	2,3-bipyridine-1H-one	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
188.	Phenyl Boronic Acid	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
189.	2-(1,3,2-dioxaborolan-2-yl)benzonitrile	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
190.	N-Bromosuccinimide (NBS)	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
191.	Triphenylphosphine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
192.	Copper iodide	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
193.	Copper acetate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
194.	5-methylisoxazole-4-carboxylic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
195.	4-(trifluoromethyl)aniline	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
196.	PCl_5	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
197.	3-nitrobenzene-1,2-dicarboxylic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
198.	3-aminopiperidine-2,6-dione hydrochloride	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
199.	2-(bromomethyl)-3-nitrobenzoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
200.	Aminopiperidine-2,6-dione HCl	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
201.	((Z)-7-(1R,2R,3R,5S)-5-hydroxy-2-(3R)-trimethylsilyloxy-5-(phenyl-1-pentyl)-3-trimethylsilyloxy)cyclopentyl)-5-heptanoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
202.	Isopropyl bromide	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
203.	Cesium carbonate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
204.	Potassium hydrogen sulphate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
205.	Thiophenol	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
206.	2-chloroethanol	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
207.	50% H_2O_2	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
208.	Acetophenone	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
209.	30%NaSH Sol	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
210.	$NaNO_2$	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
211.	3-Hydroxy Acetophenone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
212.	Benzoyl chloride	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
213.	Methyl isobutyl ketone (MIBK)	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)
214.	Liq. Bromine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
215.	Di isopropyl amine	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
216.	Diethyl sulphate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
217.	Mesityl oxide	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
218.	Sodium bisulfate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
219.	Furfural alcohol	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
220.	Sulphuryl Chloride	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
221.	Ethylene Dichloride (EDC)	Tank (Ground Floor)	Liquid	200	Drum/ Barrel (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
222.	Trifluoro Methyl Benzene	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
223.	3- Nitro Acetophenone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
224.	Phenol	Tank (Ground Floor)	Liquid	150	Drum/ Barrel (HDPE)
225.	4-methoxy aniline	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
226.	Ethyl-2-chloroacetoacetate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
227.	Sulfamic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
228.	Sodium Acetate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
229.	1-(4-nitrophenyl)piperidine-2-one	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
230.	Lithium Chloride	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
231.	Lithium Carbonate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
232.	Piperidin-2-one	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
233.	3-chloro-5, 6-dihydro-1(4-nitrophenyl)-2-1H-pyridinone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
234.	Dehydroeplandrosterone	RM Warehouse (Ground Floor)	Solid	50	Bag (HDPE)
235.	Sodium Thiosulphate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
236.	3-bromopyridine	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
237.	Ethyl Bromide	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
238.	Magnesium	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
239.	Diethylmethylborane in THF (50%)	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
240.	4-(pyridine-3-yl) benzaldehyde	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
241.	Tert. Butyl carbazate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
242.	Sodium Formate	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
243.	L-Tert-leucine	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
244.	Methyl Chloroformate	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
245.	(S)-Tert. Butyl-(4-chloro-3-oxo-1-phenylbutan-2-yl) carbamate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
246.	Di isopropyl azodicarboxylate	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
247.	4-nitrobenzoic Acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
248.	2-methoxyphenol	Tank (Ground Floor)	Liquid	100	Drum/ Barrel (HDPE)
249.	5-bromo-2-methyl benzoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
250.	(5-bromo-2-methylphenyl)(5-(4-fluorophenyl)thiphen-2-yl) methanone	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
251.	4-methylamino-3-nitro benzoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
252.	3-(pyridine-2-yl) amino propionic acid ethyl ester	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
253.	Zinc	RM Warehouse (Ground Floor)	Solid	100	Bag (HDPE)
254.	4-aminobenzonitrile	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

Sr. No.	Description of Raw materials	Storage location	Stage (Solid/Liquid)	Storage Capacity (Kg)	Storage type (Bag/ Tank/ Other)
255.	Chloroacetic Acid	Tank (Ground Floor)	Liquid	50	Drum/ Barrel (HDPE)
256.	Tert. Butyl((2S)-4-chloro-3-oxo-1-phenylbutan-2-yl) carbamate	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
257.	Salicylamide	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
258.	2-butyl-5-nitrobenzofuran	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)
259.	4-methoxybenzoic acid	RM Warehouse (Ground Floor)	Solid	150	Bag (HDPE)

**Quantity of chemicals proposed to be stored is less than the threshold limit specified in The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 & subsequent amendments.*

Table 2.6. Product & Production Capacity

Sr. No.	Name of the Product	Production Capacity	
		Kg/Month	MT/Month
1	Sertraline	50	0.6
2	Montelukast Sodium	50	0.6
3	Duloxetine	50	0.6
4	Capecitabine	50	0.6
5	Telmisartan	60	0.72
6	Clopidogrel	60	0.72
7	Abacavir Sulphate	100	1.2
8	Brexpiperazole	180	2.1
9	Dapagliflozin	200	2.4
10	Deferasirox	200	2.4
11	Pregabalin	60	0.72
12	Linezolid	60	0.72
13	Rosuvastatin Calcium	60	0.72
14	Refaximin	60	0.72
15	Lornoxicam	60	0.72
16	Sertaconazole Nitrate	60	0.72
17	Tioconazole	60	0.72
18	Flubiprofen	60	0.72
19	Canagliflozin Hemihydrate	60	0.72
20	Dimethyl Fumarate	60	0.72
21	Sofosbuvir	60	0.72
22	Ledipasvir	60	0.72
23	Pirfenidone	60	0.72
24	Atazanavir Sulphate	60	0.72
25	Darunavir Ethanolate	60	0.72
26	Entecavir	60	0.72
27	Solifenacine Succinate	60	0.72

Sr. No.	Name of the Product	Production Capacity	
		Kg/Month	MT/Month
28	Eletriptan Hydrobromide	60	0.72
29	Fenticonazole Nitrate	60	0.72
30	Prasugrel Hydrochloride	60	0.72
31	Ablraterone Acetate	60	0.72
32	Imatinib Mesylate	60	0.72
33	Cabazitaxel	60	0.72
34	Gefitinib	60	0.72
35	Erlotinib	60	0.72
36	Dasatinib	60	0.72
37	Perampanel	60	0.72
38	Teriflunomide	60	0.72
39	Pomalidomide	60	0.72
40	Lenalidomide	60	0.72
41	Latanoprost	60	0.72
42	Ethyl Chloro[(4-methoxyphenyl)hydrazono acetate	60	0.72
43	3-chloro-5,6-dihydro-1-(4-nitrophenyl)-2(1H)-pyridinone	60	0.72
44	3-morpholin-4-yl-5,6-dihydro-1H-pyridin-2-one	60	0.72
45	3-(4-morpholinyl)-1-(4-nitrophenyl)-5,6-dihydro-2(1H)-pyridinone	60	0.72
46	3-(Diethylboryl)pyridine	60	0.72
47	N'-(4-pyridin-2-yl-benzyl)-hydrazine carboxylic acid butyl ester	60	0.72
48	Methoxycarbonyl-L-tert-leucine	60	0.72
49	Tert-butyl-{(1S)-1-[(2R)-oxiran-2-yl]-2-phenylethyl]-carbamate	60	0.72

Sr. No.	Name of the Product	Production Capacity	
		Kg/Month	MT/Month
50	N, N-dimethyl-3-(2-methylphenoxy)-3-phenyl-propan-1-amine oxalate	60	0.72
51	Methyl-5-bromo-2-methyl-benzoate	60	0.72
52	[(5-bromo-2-methylphenyl)methyl]-5-(4-fluorophenyl) thiophene	60	0.72
53	3-[(3-amino-4-methylamino-benzoyl)-pyridin-2-yl-amino]-propionic acid ethyl ester	60	0.72
54	N-(4-cyanophenyl)-glycine	60	0.72
55	(2S,3S)-1,2-epoxy-3-(Boc-amino)-4-phenyl butane	60	0.72
56	2-(2-hydroxyphenyl)-4H-benzo[e] [1,3]-oxazin-4-one	60	0.72
57	(2,butyl-5-nitrobenzofuran-3-yl)(4-hydroxyphenyl) methanone	60	0.72
58	(5-bromo-1H-indol-3-yl)[(2R)-1-methyl pyrrolidin-2-yl] methanone	60	0.72
59	Phenyl Vinyl Sulfone	200	2.4
60	3- Hydroxy Acetophenone	12000	144
61	Maap Sulphate	60	0.72
62	Diisopropyl ethylamine	8000	96
63	Total of any product out of 63 products on campaign basis at any point of time.		

2.7. Fire Hazard

The gas/liquid released in the vicinity of the storage area may be as a result of rupture in cylinders, mechanical defect and external interference, which might result in fire hazard.

Since, in the plant site under consideration, no flammable product shall be stored at beyond the threshold capacity of their respective petroleum class. Hence, fire damage modelling exercise

has not been taken up. However adequate precautions to handle any fire that may arise shall be adopted at the plant:

a. Evacuation routes will be planned such that alternate route is available from any corner in more than one direction.
b. Extra precautions will be taken in loading/ unloading of flammable/toxic chemicals.
c. Firefighting arrangements shall be provided as per the guidelines of Oil Industry Safety Directorate (OISD).
d. Barrel/Tank Storage: Separate Isolated Storage area will be designed and constructed to comply with directives of controller of explosive.

CHAPTER 3. DISASTER MANAGEMENT PLAN

3.0. Introduction

The term "Disaster" refers to extensive damage of property and serious disruption both inside, outside the work system and its surrounding that can be natural or human interfered. Emergency may be caused by a number of different factors, e.g. plant failure it will normally manifest itself in three basic forms viz fire, explosion or toxic release and requires the assistance of emergency control services to handle mass devastation effectively.

A major emergency in an activity/project is one which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the activity/project. It would normally require the assistance of emergency services to handle it effectively.

3.0.1. Need of Disaster Management

The aim of Disaster management plan is concerned with preventing accidents through following guidelines of good design practice, operation, maintenance and inspection, by which it is possible to reduce the risk of an accident. It is well known that it is not possible to eliminate entire risk since, absolute safety is not achievable. After assessing the possible scenarios, consequence analysis approach to emergency preparedness and emergency planning form the basis for developing the Disaster Management Plan for both on- site and off-site. These plans are needed to be used to handle any disaster that may occur.

3.0.2. Scope

An important element of mitigation is emergency planning, i.e. identifying accident possibility, assessing the consequences of such accidents and deciding on the emergency procedures, both on site and off site that would need to be implemented in the event of an emergency.

Emergency planning is just one aspect of safety and cannot be considered in isolation from the proposed project and hence before starting to prepare the plan, works management will ensure that the necessary standards, appropriate to safety legislation, are in place.

3.0.3. Objective

The objective of Disaster Management plan is to give a broad framed layout to tackle emergency situation that may lead to a hazardous situation. It defines detail organizational responsibilities, actions, reporting requirements, broad and specific key roles and responsibilities of personal with Organograms and Organisation charts. The overall objectives of the emergency plan will be:

- Ensure safety of people, protect the environment
- To ensure localization of risk
- To minimize and reduce the effects of the accident on people and property
- Immediate response to emergency scene with effective communication network and organized procedures
- To obtain and mitigate early warning of emergency conditions so as to prevent IMPACT on personnel, assets and environment
- To prevent injuries by following proper onsite, offsite emergency plans that can protect personnel from the hazard

3.0.4. Identification of Hazards

Following hazards are envisaged during operational phase of plant under consideration

Table 3.1. Hazards during operational phase

Sr. No.	Name of possible Hazard	Source and Reasons	Effect on Persons And Environment	Place of Effect
1	Fire	Transformer Transfer oil short circuit etc.	➢ Electrical power failure ➢ Production interruption ➢ Loss of transformer ➢ Explosion or spread of fire	Transformer near power control centre and nearby areas
2	Fire & Toxic chemical spillage	Natural Disaster, Earthquakes, Lightening, War, improper practices during loading/unloading operation	➢ Production interruption ➢ Trapping under debris, death Chemical burn ➢ Toxic chemical spillage ➢ Asphyxiation due to chemical fumes or gases	Whole factory & neighbourhood
3	Fire & smoke	Fire in storage tank	➢ Burns ➢ Storage tank catching fire ➢ Production interruption ➢ Explosion ➢ Release of toxic fumes	Storage area and neighbourhood.
4	Leakages	Storage tank	➢ Can enter water stream if not controlled ➢ Damages to environment.	Storage area and neighbourhood.

3.0.5. Phases of Disaster

There are various phases of disaster including pre and post Management of Hazardous Event that may or have occurred

A. Warning Phase

Emergencies /disasters are generally preceded by warnings during which preventive measures may be initiated. For example uncontrollable build-up of pressure in process equipment, weather forecast give warning about cloud burst, equipment failure etc.

B. Period of Impact Phase

This is the phase when emergency /disaster actually strike and preventive measures could hardly be taken. However, control measures to minimise the effects may be taken through a well-planned and ready-to-act disaster management plan already prepared by organization. The duration may be from seconds to days.

C. Rescue Phase

This is the phase when impact is almost over and efforts are concentrated on rescue and relief measures.

D. Relief Phase

In this phase, apart from organization and relief measures internally, depending on severity of the disaster, external help are also to be summoned to provide relief measures (like evacuations to a safe place and providing medical help, food clothing etc.). This phase will continue till normalcy is restored.

E. Rehabilitation Phase

This is the final and longest phase, during which measures required to put the situation back to normal as far as possible are taken. Checking the systems, estimating the damages, repair of equipment's and putting them again into service are taken up. Help from revenue/insurance authorities need to be obtained to assess the damage, quantum of compensation to be paid etc.

3.0.6. Key Elements

A. Emergency Planning and Response Procedure

The Emergency Response Plan is plan for dealing with emergencies and it is implemented immediately whenever there is emergency such as fire, explosion, or release of a hazardous substance that threatens human health or the environment. The emergency response plan is reviewed and immediately amended whenever:

- The plan fails in an emergency
- The list of emergency contacts change
- There is changes in the facility as consequence of changes in its design, construction, operation, maintenance, or other circumstances in a way that increases the potential for fire, explosions, or release of a hazardous substance
- As part of learnings from mock drill.

B. Incident Response Plan

It is the frame work of addressing the emergency situation that arise due to failure scenario.

- Incident Response Plan (IRP) and Emergency Preparedness Plan
- Incident Response Team (IRT)
- Emergency Response Team (ERT)
- Crisis Management Team (CMT)

3.1. Onsite Emergency Management Plan

This ONSEP lays down the code of conduct of all personnel in the Plants and the procedures to be adopted by them in the event of an "Emergency". These procedures have been prepared taking into account the minimum strength of manpower available at all times in the premises. The individuals under the direction of the respective Team Leaders shall carry out the responsibilities assigned. The emergency procedures outlined are suitable for round the clock coverage including holidays. These emergency procedures shall be followed as outlined in the ONSEP during all shifts.

3.1.1. Objectives of Onsite Emergency Management Plan

It is very much necessary to have well laid onsite emergency plan in order to minimize the damage caused due to incident and contain the disaster or else the incident might turn into major emergency. Hence the objectives of this ONSEP are:

A. During Emergency:

- To localize the emergency and if possible eliminate it
- To minimize the consequences of an emergency
- To prevent spreading of the damage to other areas
- To give necessary warning to plant personnel and neighbourhood
- To maximize resource utilization and combined efforts towards the emergency operations
- To mobilize internal resources and utilize them in the most effective way
- To arrange for rescue of persons, transport and treatment of causalities
- To seek necessary help from industries in neighbourhood or local authorities
- To provide information to government agencies and to provide information to public as necessary.

B. During Normal Time:

- To keep the required emergency equipment available at right places and ensure their working condition;
- To keep the concerned personnel fully trained in the use of emergency equipment;
- Preserving records, evidence of situation for subsequent emergency etc.

3.1.2. Scope of ONSEP

This ONSEP is prepared for industrial emergencies like fires, explosions, toxic releases, asphyxia and does not cover natural calamities and societal disturbances related emergencies (like strikes, bomb threats, civil Commissions etc). Also, the scope of this ONSEP is limited to onsite emergencies and does not include measures for offsite Emergency Management. Necessary information with regards to Off Site Emergency Management will be furnished to district authorities.

3.1.3. Methodology of Developing ONSEP

The consideration in preparing this Emergency Plan includes the following steps:

- Identification and assessment of hazards and risks
- Identifying, appointment of personnel & Assignment of Responsibilities
- Identification and equipping Emergency Control Center
- Identification of Assembly, Rescue points, Medical Facilities
- Formulation of plan and of emergency resources
- Training, Rehearsal & Evaluation
- Action on Site.

Earlier, a detailed Hazard Analysis and Risk Assessment were carried out for the plant facilities and the hazards are assessed. The likely locations of hazards and consequences are evaluated, duly following the standard procedure.

3.1.4. Elements of Onsite Emergency Plan

Important elements considered in this plan are:

- Identification of emergencies
- Emergency facilities
- Emergency procedures
- Communications during emergency
- Rescue, Transport and Rehabilitation
- Roles and responsibilities of key personnel and essential employees
- Mutual aid

3.1.4.1. Emergencies Identified

- Fire near storage, DG set, and Transformers
- Acid/ Alkali Spillage/ Leakage
- Fire due to electric short circuit
- Hazard of leakage due to rupture/ failure of valves in pipeline/ instrument

3.1.4.2. Emergency Facilities

A. Emergency Control Centre (ECC)

It is a location where all key personnel like Chief Coordinator, Emergency controller, maintenance coordinator can assemble and monitor aspects related to emergency and take decisions related to emergency. The Plant Control Office is designated as ECC. In case if this area is affected, zone security room is designated as alternative ECC.

a. The following information and facilities would be maintained at the ECC:

- Latest copy of Onsite Emergency Plan and Offsite Emergency Plan (representative for plant and District Emergency plan as provided by the district authority)
- Intercom Telephone
- P& T Telephone
- Telephone directories (internal and P&T) including the mobile numbers of the key personnel
- Factory Layout, site plan
- P&I diagrams, electrical connections plans indicating locations of hazardous inventories, sources of safety equipment, hydrant layout, location of pump house, road plan, assembly points, vulnerable zones, escape routes
- Hazard chart
- Emergency shutdown procedures for generators and fuel supply system
- Nominal roll of employees
- List and addresses of key personnel
- List and addresses of emergency coordinators
- List and addresses of first aid providers
- List and addresses of employees trained in firefighting
- List and addresses of qualified trained persons
- Material safety data sheets of all chemicals at site.
- Duties of key personnel
- Important addresses and telephone numbers including those of fuel supplying company, government agencies, neighbouring industries and other sources of help, outs side experts

b. The following emergency equipment is made available at alternate ECC (Security point):

- Fire proximity suit/Gloves/Helmets
- Hand tools suitable for pipe lines (non sparking type)
- Teflon tape
- Gas Explosimeter
- Flame proof torches/batteries
- 1/2 crow bar
- Spade
- Manila rope
- Spark arrestor
- Spare fan belt for truck
- First aid box
- Special firefighting information related to Hydrocarbon fuels
- Public address megaphone
- Hand bell, Emergency torch.
- Gas masks and suits.

B. Assembly points

Project Control Room is identified as Assembly point and is in a low intensity fire affected zone. Additionally the following places in plan are designated as safe assembly points:

- Green belt
- Security Cabin of respective zone shall be primary assembly point at all times

The locations of assembly points would be reviewed later.

C. Firefighting Facilities

A comprehensive fire hydrant line in provided throughout the plant along with fire monitors at appropriate location. Additionally hand held fire extinguishers will be provided at easily accessible locations along with ECC. Further chemical storage area will be equipped with appropriate hand held fire extinguishers along with smoke detectors having automatic fire sprinklers.

D. Location of First aid Boxes

The first aid boxes will be located at the following places

- Reactor area
- Administrative office
- Time office
- Zone wise Security cabin

First aid department will be under the charge of security coordinator.

E. Emergency siren

Emergency siren will be provided with 0.5 km range of audibility and the location will be time office. The siren will operate on electricity and also will have provision for emergency electrical supply. Shift electrical engineer of plant on receipt of information from shift-in-charge, is authorized to operate the siren.

F. Emergency escapes

Emergency escape routes in the plant area and floor wise emergency escapes will be conspicuously marked to be visible even in case of failure of electrical supply.

G. Wind sock

Wind socks to observe the wind directions will be installed on the top of Turbine Plant house.

3.1.4.3. Emergency Procedures

A. Procedure for Raising Emergency alarm

Whenever and whoever notices an emergency or a situation with a potential emergency should forthwith raise alarm by calling on the available communication network or shouting or approaching the shift-in-charge, furnishing details. Anybody noticing fire should inform the plant control room immediately. The shift electrical engineer at control room is to the site controller.

B. Control Room staff

If an emergency is reported then plant control room staff must, request for the location, nature and severity of emergency and obtain the caller's name, location, and inform the shift-in-charge or site controller who ever are available in the shift.

C. Emergency communication

The following communications will be used during emergencies

- P&T Telephones
- Intercom
- Walkie-talkies
- Personal Cell Phones of Officers at ECC as may be designated by Site Incident Controller
- Hand bell and siren.

If any or all of the equipment's fail, runners would be engaged to send the communication\

D. Warning/Alarm Communication of emergency

Emergency siren would be operated to alert all other employees on the orders of manager (electrical). The emergency is communicated by the Emergency siren mode of wailing for 3 minutes. When the emergency has been brought under control, the Emergency controller will direct plant control staff giving an 'all clear signal', by way of normal siren (continuously for 3 minutes).

E. Rescue, Transport and Rehabilitation

Emergency vehicle will be made available round the clock under the charge of emergency coordinator. Security personnel are trained in rescue operations. Persons rescued would be taken to First aid centre for further medical attention or Safe Assembly Points as per the condition of the rescued person.

The transport vehicles and vehicles with materials would immediately withdraw to outside the factory. Security guard of the shift is responsible for this. Transport vehicles would wait at the security at the main entrance to provide emergency transport. This is ensured by security coordinator.

3.1.4.4. Roles and responsibilities of key personnel and essential employees

A. Site Incident controller (SIC)

The Unit Head shall have overall responsibility for the factory and its personnel. In absence of Unit Head, EHS officer shall assume the responsibility of Site Controller.

He will be responsible for:

- To assess the magnitude of the situation and decide if employees need to be evacuated from assembly points.
- To give necessary instructions to Liaison Officer, HOD(HR&A) regarding the help to be obtained from outside agencies like Fire Brigade, police and Medical
- To advise Liaison Officer to pass on necessary information about the incident to News Media and ensure that the evidences are preserved for enquiry to be conducted by statutory authorities.

B. Incident Controller(IC)

The HOD of affected department shall have overall responsibility for controlling the incident and directing the personnel. Section In charge of the affected department shall assume the responsibility of Incident Controller (IC) in the absence of HOD of affected department.

He will be responsible for:

- To inform Communication Officer about the emergency, Control Center & Assembly point.
- To direct all operations` within the affected area with priorities for safety of personnel, to minimize damage to the Plant and environment and to minimize loss of material.
- To act as Site Controller till the later arrives.
- To advise and provide information to Fire Squad, Security Officer and Local Fire Services when they arrive.
- To ensure that all non-essential persons are sent to the assembly point.

C. Liaison Officer

HOD (HR&A) shall be the Liaison officer.

He will be responsible for:

- To contact Fire Brigade, Police, and Medical facilities on intimation from Site Controller & arrange for the rescue operation.
- To ensure that the casualties receive attention.
- To inform relatives of the affected employee at the earliest.
- To arrange for additional transport if required.
- To arrange for relief of personnel & organize refreshment/catering facility, in case the duration of emergency is prolonged.
- To issue authorized statements to news media and ensure that evidence is preserved for enquiry to be conducted.
- To inform neighbouring factories and authorities if located in MIDC or such clusters

D. Engineering / Technical Personnel's Team

The main responsibility of this team is to provide technical support during the emergency.

They will be responsible for:

- Prepare elaborated plans for providing a continuity of emergency supplies and services such as fire, water, electric power, emergency lighting, and other required utilities.
- Suggest optional strategies for conducting emergency isolation operations of damaged process equipment's, the emergency transfer of materials to safe vessels, and all other process-related emergency operations.
- Assess damages and provide technical assistance to determine the operability of damaged units.
- Carry out or assist the accident investigation.
- Act as the main technical advisory team during the emergency.

E. Safety Officer / EHS Officer

He shall be responsible for:

- Co-ordinate with the Incident Controller and assume overall responsibility of the firefighting operation. Advice the Site Incident Controller if additional fire tanker/firefighting equipment's /materials / aid from other agencies is required.

- Rush to the emergency operation center. Report to the Incident Controller and advice suitably on mitigation measures, keeping in mind the type of emergency and the chemical involved.
- Assist First-aiders.
- Liaise with the utilities and arrange for external Water supply.
- Liaise with all external agencies, which could render assistance for firefighting.
- Keep all vehicles and drivers in readiness and maintain continuous contact with the Main Controller / Medical Officer / Security In- charge and dispatch the vehicles as per their needs.
- Keep a minimum of two cars, as standby, at the factory for the emergency use. Do not use the cars for any purpose other than trips in the factory and for transporting critically injured to hospital.

F. In Charge (Medical)

He will be responsible for:

- On receiving the information, he will reach first aid centre immediately and take following actions:
- He will keep necessary first aid medicines and artificial respiration equipment ready. Inform doctors at other places to be ready, for attending serious injury, burn cases and food Poisoning

G. Observer

He will be responsible for:

- During Mock Drill for Emergency Situations they shall be placed at different locations in plant to note down the movement and action taken by people and give feed back to the Site Controller.

H. Communication Officer

In-Charge (Safety) shall act as Communication officer. He shall work from Control Centre and maintain communication between relevant personnel.

He will be responsible for:

- To apprise the site controller of the situation, based on the information received, suggest the evacuation of personnel from assembly points, if needed.
- To arrange for suitable persons to act as runners/messengers in case of failure of communication system.
- To carry out any other works as assigned by Site Controller/Incident Controller

I. Incharge - Security

He will be responsible for:

- The In-charge (Security) shall guide the crew, according to the condition of emergency site, for the actions required to handle the emergency i.e. for firefighting, removal of debris, arresting of dust, removal of oil soaked earth etc. He shall give instructions to Security Guards to cordon off areas as required by Incident Controller. He shall render all help to incident controller to handle the emergency and carry out the work as assigned to him
- He shall be responsible for ensuring the discipline at control points and for preventing the entry of unauthorized persons inside the affected area as well as inside the factory during emergency.

J. Shift Incharge – Security

He will be responsible for:

- To arrange the necessary help as requested by Primary Controller.
- To inform Incharge (Security).
- To blow emergency siren, if instructed by the HOD (HR&A)/Incident Controller.
- To send Ambulance near accident area.
- To rush to the accident site with fire brigade along with available trained security persons.

K. Trained Fire Fighting Person

The employees trained in firefighting will take the following steps in the event of fire apart from following the instructions of security coordinator apart from;

- Protects self
- Raises alarm

- Attempts to put out the fire using fire extinguishers.
- If necessary, operates fixed firefighting equipment.
- Stands by in safety for further instructions.

3.1.5. Mock Drill

For reviewing and assessing the level of preparedness, In-charge (Safety) shall conduct Mock trials twice in a year (one in each half) simulating the covered emergencies and will maintain records of the trials. The team of Prime & Deputy Responsible persons will review the records and events of the emergency preparedness trials along with the observations taken by the observer and report shall be put forward to the Site Controller. Corrective and Preventive measures, if suggested/directed, will be initiated and relevant records of the same are maintained. Fire drills will be exercised once in every six months under the leadership of Incharge (Security). The records of Fire drill will be recorded & maintained.

The findings of the mock drills shall be used for improvements in preparedness and response and the emergency preparedness plans will be revised accordingly. All team leaders shall be responsible for implementing the suggestions based on mock drill findings within reasonable time frame.

3.1.6. Evacuation Plan

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape when required. Additionally to use available fire appliances provided for controlling or extinguishing fire and safeguarding of human life.

Facility staff will be notified of evacuation by one or more of the following method(s): Verbal

- Intercom, Portable Radio, Alarm, Other Notification to emergency services to ECC
- Staff will follow predetermined evacuation routes and assemble at designated areas. Evacuation maps must be displayed throughout the facility.
- Individuals responsible for coordinating evacuations must confirm the process

3.1.7. Basic Action in Emergencies

Immediate action is the most important factor in emergency control because the first few seconds count, as fires develop and spread very quickly unless prompt and efficient action is taken.

- Take immediate steps to stop leakage/fire and raise alarm simultaneously.
- Initiate action as per fire organization plan or disaster management plan, based on gravity of the emergency.
- Stop all operations and ensure closure and isolation of valves.
- All effort must be made to contain leakage/fire.
- Saving of human life shall get priority in comparison to stocks/assets.
- Plant personnel with specific duties should assemble at the nominated place.
- All vehicles except those required for emergency use should be moved away from the operating area, in an orderly manner by the predetermined route.
- Electrical system except for control supplies, utilities, lighting and fire fighting system should be isolated.
- If the feed to the fire cannot be cut off, the fire must be controlled and not extinguished.
- Start water spray system at areas involved or exposed to fire risks to avoid domino effects.
- In case of leakage of chemicals without fire and inability to stop the flow, take all precautions to avoid source of ignition and contain the spill.
- Block all roads in the adjacent area and enlist police support for the purpose if warranted.

3.1.8. Fire Fighting Operations

- Enlist support of local fire brigade and neighboring industries.
- Firefighting personnel working in or close to unignited vapor clouds or close to fire must wear protective clothing and equipment including safety harness and manned lifeline. They must be protected continuously by water sprays. Water protection for fire fighters should never be shut off even though the flames appear to have been extinguished until all personnel are safely out of the danger area.

- Exercise care to ensure that static charge is not generated in vapor cloud. For this purpose solid jet of water must be avoided, instead fog nozzles must be used.
- Fire fighters should advance towards a fire in down wind direction.
- If the only valve that can be used to stop the leakage is surrounded by fire, then attempt may be made to close it manually. The attempt should be directed by trained persons only. The person attempting closure should be continuously protected by means of water spraying (thorough fog nozzles), fire entry suit, water jet blanket or any other approved equipment. The person must be equipped with a safety harness and manned lifeline.
- Any rapid increase in pressure or noise level of should be treated as a warning of over pressurization. In such cases, immediate remedial action may be taken.
- In case of any emergency situation, it is of paramount importance to avoid endangering human life in the event of fire, involving or seriously exposing plant equipment.

3.2. Off-Site Emergency Planning

The off-site emergency plan is an integral part of any emergency planning system. It is based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans therefore complement each other.

Further, the Off Site Emergency Plan is prepared to supplement the District Emergency Plan, assessed and authorised by DM, which considers and develops mechanism to combat any situation arising due to incident that happened in any industry lying in the jurisdiction of DM or any unpleasant disturbance/ incident occurred due to natural calamity like earthquake or cyclone or manmade disaster like bombing incident or war.

The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will rest with local authority. Schematic representation of various organisation involved during emergency is shown below.

A. Organization

Organizational details of command structure, warning systems, implementation procedures, emergency control centers include name and appointments of incident controller, site main controller, their deputies and other key personnel involved during emergency.

B. Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

C. Special Emergency Equipment

Details of availability and location of heavy lifting gear, specified fire-fighting equipment, fireboats etc.

D. Voluntary Organizations

Details of Voluntary organizations, telephone numbers nearby of hospitals, Emergency helpline, resources etc that are available with chief authorities.

E. Non-governmental Organizations (NGO)

NGO"s could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process. Evacuation of personnel from the affected area Arrangements at rallying points, parking yards and rehabilitation of evacuated persons

F. Chemical information

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them will be made available at respective site.

G. Meteorological information

There is to be arrangements for obtaining details of weather conditions prevailing at the time of accident and weather forecasts updates.

H. Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

I. Role of Police

- The police is to assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.
- Co-ordination with the transport authorities, civil defence and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication centre with easy contact with ECC

J. Public Information

Dealing with the media-press office Informing relatives, etc.

K. Assessment

Collecting information on the causes of the emergency Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

L. Role of local authority

Local Authorities like Panchayat, Sabha, Samity, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

M. Role of Fire Brigade

The fire brigade shall be organized to put out fires and provide assistance as required during emergency.

N. Role Of Health Care Authorities

Hospitals and doctors shall be ready to treat all type of injuries to causalities during emergency. Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipment's Securing assistance of medical and paramedical personnel from nearby hospitals/institutions Temporary mortuary and identification of dead bodies

3.3. Standard Operating Procedure (SOP)

Sr. No.	Focus Area	SOP Description
1	Loading and Unloading	❖ Prior to loading/unloading ➢ Visually check all hoses for leaks and wet spots. ➢ Verify that sufficient space is available in the storage tank or truck. ➢ Secure the tank vehicle with wheel chocks and interlocks. ➢ Verify that the vehicle's parking brakes are set. ➢ Verify proper alignment of valves and proper functioning of the pumping system. ➢ Establish adequate bonding/grounding prior to connecting to the fuel transfer point. ❖ During Loading/Unloading ➢ Driver must stay with the vehicle at all times during loading/unloading activities. ➢ Facility manager or designee should observe the delivery driver during loading/unloading. ➢ Periodically inspect all systems, hoses and connections. ➢ When loading, keep internal and external valves on the receiving tank open along with the pressure relief valves. ➢ When making a connection, shut off the vehicle engine. When transferring class 3 materials, shut off the vehicle engine unless it is used to operate a pump. ➢ Maintain communication with the pumping and receiving stations. ➢ Monitor the liquid level in the receiving tank to prevent overflow. ➢ Monitor flow meters to determine rate of flow. ➢ When topping off the tank, reduce flow rate to prevent overflow.

Sr. No.	Focus Area	SOP Description
		❖ After Loading/Unloading ➢ Make sure the transfer operation is completed. ➢ Close all tank and loading valves before disconnecting. ➢ Securely close all vehicle internal, external, and dome cover valves before disconnecting. ➢ Secure all hatches. ➢ Disconnect grounding/bonding wires. ➢ Make sure the hoses are drained to remove the remaining material before moving them away from the connection. Use a drip pan. ➢ Cap the end of the hose and other connecting devices before moving them to prevent uncontrolled leakage. ➢ Remove wheel chocks and interlocks. ➢ Inspect the lowermost drain and all outlets on tank truck prior to departure. If necessary, tighten, adjust, or replace caps, valves, or other equipment to prevent leaking while in transit.
2	Reactor:	➢ Select a vessel which has the capacity, pressure rating, corrosion resistance and design features that are suitable for its intended use. ➢ Operate the vessel within the set points of the safety devices and controllers ➢ Establish training procedures to ensure that any person handling the equipment knows how to use it properly. ➢ Maintain the equipment in good condition, and test periodically as per the vendor's instructions and statutory requirement to ensure that the vessel remains structurally sound and safe for operations. ➢ Complete a hazard assessment before initiating the operations, including:

Sr. No.	Focus Area	SOP Description
		➢ Assessment of any intermediates, side-products and products that may form and their behavior within the vessel, including their corrosive nature and their tendency to violently decompose at elevated temperature and pressure. ➢ Determination of maximum temperature and pressure limits expected, taking into account the energetics of the reaction being conducted and any pathways that might cause the reaction to run out of control. ➢ Maintain adequate ventilation. This can be achieved by installing the reactor within a fume hood, attaching tubing to the rupture disk that extends to an appropriate exhaust such as the interior of a fume hood, or by ensuring that the lab area as a whole has adequate ventilation and that the reactor is installed near an exhaust fan (in the case of larger reactors). ➢ Run preliminary experiments using small quantities of reactants when starting work with new or unfamiliar materials. ➢ Use appropriate PPE, including safety glasses, chemical resistant gloves, a lab coat, and also a face shield for operations that present particular hazards. ➢ Keep a log of usage for each vessel. Information on the log should include temperature, pressure, reagents/solvents used, and any inspections and tests it has undergone
3	Handling of Chemicals	➢ Wash thoroughly after handling. ➢ Remove contaminated clothing and wash before reuse. ➢ Ground and bond containers when transferring material (i.e., if in a metal container). For safety reasons, transfer from glass to glass container using proper techniques (often purged with nitrogen). ➢ Never add water to this product. ➢ Avoid shock and friction.

Sr. No.	Focus Area	SOP Description
		➢ Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. ➢ Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. ➢ Keep container tightly closed. ➢ Do not ingest or inhale. ➢ Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. ➢ Keep away from heat, sparks and flame. ➢ Use only with adequate ventilation or respiratory protection
4	Storage of Chemicals/Raw Materials/Products	➢ Keep storage area clean and free from leakages and spillages. ➢ Keep storage area dry condition all time. ➢ Keep away from heat, sparks & flame. ➢ Keep away from sources of ignition. ➢ Keep away from acids and moisture. ➢ Do not store in direct sunlight or strong incandescent light. ➢ Storage under a nitrogen blanket has been recommended OR inside a glove box (under inert atmosphere). ➢ Isolate from oxidizing materials and acids. ➢ Use spill trays where ever possible.
5	Spills/Leaks	➢ Remove all sources of ignition. ➢ Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. ➢ Do not use combustible materials such as sawdust. ➢ Do not get water inside containers.

Sr. No.	Focus Area	SOP Description
		➢ Approach spill from upwind (if outdoors). ➢ Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures. ➢ Control runoff and isolate discharged material for proper disposal (if outdoors).

3.4. Typical Check List for Safety Inspection

This checklist should be reviewed & revised from time to time by the Plant Manager:

Field Visit Review Questions		Yes	No	N.A.
1.0	**HOUSEKEEPING**			
1.1	Is the overall condition of the area neat / items not out where they present a hazard?			
1.2	Are cabinet tops free of stored items?			
1.3	Are heavier items are stored at bottoms of shelves or at "thigh height" where they can be more easily lifted?			
1.4	Are emergency exits are free from obstruction?			
1.5	Are floors free from slip/trip hazards?			
1.6	Are cabinets/shelves are secure/anchored to prevent tipping or falling materials?			
2.0	**ELECTRICAL SAFETY**			
2.1	Are electrical plugs, outlets, and cords are in good condition and are not missing covers, taped or broken?			

2.2	If "power strips" are used, they are not overloaded or "daisy-chained?" (e.g., a power strip plugged into another power strip)			
3.0	**FIRE SAFETY**			
3.1	Fire exits and escape routes are clear/free from any obstruction.			
3.2	Has a fire mock drill been conducted (documented) this calendar year? If so, what was the date?			
3.3	All portable fire extinguishers have been inspected (accessible and fully charged) and inspection documented?			
4.0	**ERGONOMICS/MATERIAL HANDLING**			
4.1	Are obvious ergonomic hazards observed? (awkward postures)			
4.2	Dollies/carts are available for handling/moving heavy			
5.0	**EMERGENCY PREPAREDNESS**			
5.1	Does the receptionist have a list of currently trained first responders? Is an adequate number of trained responder in first aid/CPR			
5.2	An adequately stocked first-aid kit is available in a prominent location?			
5.3	Is an office "evacuation" map prominently posted and includes emergency phone numbers?			
5.4	Emergency Exit signs functioning properly?			
5.5	Are office Emergency and Contingency plans available/posted			
5.6	Are the contact telephone numbers updated			

Overview and approval			
Date of Inspection:		**Office:**	
Department Head:	**HOD EHS department:**	**Plant Manager:**	

Other observations Photos / Additional comments (including positive observations):

FINDINGS ACTION PLAN			
Findings	**Corrective Action**	**Responsible**	**Target date**

3.5. Post Disaster Analyses and Evaluation

When an emergency is over, it is desirable to carry out a detailed analysis of the causes of accidents to evaluate the influence of various factors involved and to propose methods to eliminate or minimize them in future. Simultaneously, the adequacy of the disaster preparedness plan can be evaluated and any shortcomings can be rectified.

3.6. Conclusion

Although, it can be observed in above sections, the proposed new project does not pose many significant risk. It is ensured that on-site and off-site safety will be maintained through appropriate safety measures.

However, the management of **M/s. Cogent Life sciences** commit to review the safety procedures in place on a regular periodic interval and update the same as appriopriate.

Further, it is also ensured that in case of any disasters event the emergency planning procedures will be executed without deferring to any condition to ensure minimum impact on Property, Personals and Environment at on-site or Off site location.