

# EMERGENCY RESPONSE PLAN FOR TRANSPORTING ACTIVE PHARMACEUTICAL INGREDIENTS

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**Abstract:** The main purpose of this manuscript is to help the first responders effectively tackle the by setting proper instructions and procedures with the help of an Emergency Response plan for transportation of Active Pharmaceutical Ingredients The Emergency Response Plan is to limit the impact severity and to respond to the condition with a minimum expense. By this method, a proactive approach to a transport emergency is developed to control the impact of an incident with minimum time delay. Further, the outcome of this study will be containing vital information regarding the consequence of transport incidents involving fire, containing the spill, and Exposure to the dangerous pharma intermediates. This paper also contains specific exposure band values and dos and don'ts for handling, storage, and transport of pharma products.

**Keywords:** Transport, Emergency Response, Vehicle

## 1.INTRODUCTION

The main purpose of this Guideline is to help the responders to effectively tackle the incidents related to transporting of APIs by setting proper procedures to save lives, limit the impact severity and to respond the condition with a minimum of expense. As a proactive method of approach, an effective preparedness plan to a transport emergency is very much required to control the impact of an incident with minimum time delay.

The impact of the COVID-19 pandemic has forced pharmaceutical companies to re-evaluate their supply chains including reshoring manufacturing of APIs, intermediates, and other products. Logistics and transport are the biggest concern for companies with pipeline and marketed drugs.

A well-defined Workplace Transport Emergency Preparedness Plan takes us one step ahead by,

- Helping us to contain the loss of human life, property and provide speedy and effective remedial measures
- Anticipating the actions and initiatives that need to be drafted and developed before any such incident.

This plan would usually entail the following information's: Incident/Accident Appraisal format, Vehicle type and dimensions, Vehicle inspection Checklist, Possible emergency conditions, Response and Recovery planning, Roles and responsibilities. The Technical rescue procedures were developed for the possible incidents in the Piramal to make the responders handle the situation comfortably.

An effective transport emergency response plan requires a well-defined emergency policy and Guidelines which is a combined extract of several factors such as,

- The People involved (Responders),
- Knowledge (Regarding the Emergency Condition),
- Vehicle,
- Proper equipment

Responders: The key personnel involved in the Emergency response situation shall be able to carry out the following things,

- Should be able to implement the TERP Plan efficiently.
- They shall know the Hazards and risks associated with any activity regarding the rescue.

- Should have a clear knowledge regarding the emergencies and be able to anticipate the consequences developing from the particular emergency condition.
- Should have the practical knowledge to address the condition by using the engineering.

controls, Hazardous material handling procedures and sometimes by the use of new techniques to counter the situations.

- They shall be responsible for providing the emergency medical response to the responders on the scene.
- They should have the capability on when to decide the termination procedure.

**Vehicle:** A Rescue vehicle covers figuring out and choosing the most appropriate automobile to respond to the emergencies. It is also Dependent on the vehicle by which the emergency is being caused and hence it is highly required for the transport emergency plan (TERP) to hold all possible information related to the type of the vehicle, the purpose for what it is being used, weight and dimension of the vehicle.

**Knowledge:** This portion gives complete guidance on the possible emergency condition to the responders having relevant knowledge and experience or can benefit those through training.

General duties of the employer in Developing the Transport emergency response are:

- Establishing the written policy on Transport Emergency service.
- Assessing the risk to the safety and health of any individuals affected by the activities carried out During responding to an accident.
- Ensuring the sound arrangements in the TERP for making effective planning, managing, Mitigating and reviewing the Control measures identified by the risk assessment.
- Ensuring the employees are instructed, trained and supervised on the associated health and safety issues during the Transport Emergency Response Phase.

A transport Emergency response is a safety issue which requires proper and quick response to contain the further adverse effect. It is highly needed to develop a Transport Emergency response plan in the Piramal Pharma Limited – Ennore, Since the industrial environment consist of various transport vehicles ranging from Light to Heavy vehicles which also includes hazardous category vehicles such as solvents, Reactive chemicals, Cold storage and Pharma Intermediates.

Although the TERP is an essential characteristic of the transportation infrastructure, Its Procedures are not still well defined. The guidance has been produced by this report is to help the management to effectively deal with the emergencies regarding the transport systems by Providing the responders with maximum knowledge on the emergency conditions, hence it would help them to make quick and correct decisions on the Field. As far now the transport emergency handling is a confusing state with no clear Responsibilities, guidelines, and other information required to handle the Transport Emergency.

## **2. LITERATURE REVIEW**

This Study addresses various Common components required for creating a well-defined emergency Response plan for transportation of active pharma Intermediates. The components include following: the key responsibilities of the responders, Risk assessment in two main ways general and the on-scene risk assessment, Written procedures describing the steps and the protective measures that are required to be carried out, Education and training to the responders, situation appraisal and investigation techniques, Emergency medical response and first aid.

1. The Piramal Global Standard defines the need and requirement of emergency preparedness and response plan in the clause twelve, this standard state that a TERP (Transport emergency response plan) shall be developed additionally under the existing Workplace Emergency preparedness and response plan (EPRP). i.e., this plan shall address the procedures for remedial actions to be followed during an emergency which would also include whom to report and whom to call for help This framework attempts to give correspondence among emergency vehicle and different gadgets, for example, traffic signals.
2. Guidance from the Advisory Committee on the Transport of Dangerous Goods (Australia) and Regulation 14.5 road transport Reform-1997, addresses that a TERP shall have a plan activation mechanism that has grouped into three major sections such as the internal and external alerting mechanisms, the Situation appraisal for collecting the required information for easy decision making, the authority and the resources available.
3. The guidance on the Common issues in the TERP developed by the U.S Department of transportation federal highway Administration reports that a responder attending a transport emergency scene should be able to focus on two important issues, the first thing is minimizing the time of initial response and the second thing is maximizing the mass of the population moved from the vicinity without being affected by the other dangers.
4. This guidance also addresses the importance of a policy in the transport emergency and response system and the need for the Safety Data Sheet containing the information on the hazardous materials that are listed under sixteen different

sections. The policy should cover the funding, evacuation planning, mutual coordination, periodicity of review and the procedure for forecasting the abnormalities in the scene.

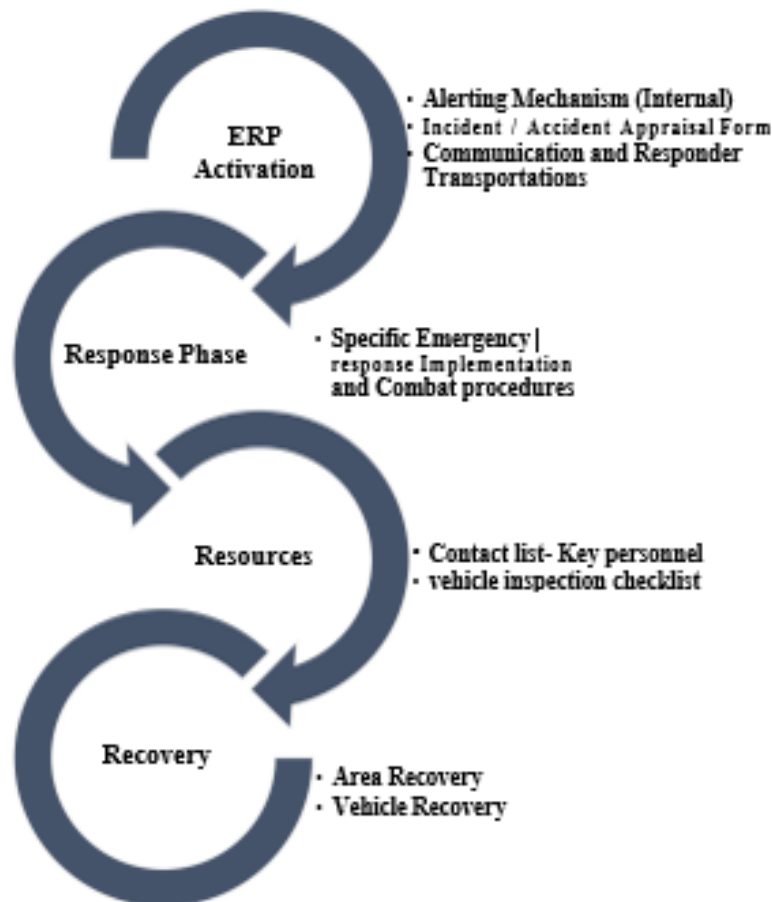
5. The Indian standard: IS 9435:2004 defines the various possible dimensions of the vehicle such as vehicle length, Vehicle Width, front overhang, rear overhang, minimum ground clearance, the overhang of the attachment.

6. The guidance developed by the AIGA in house members clearly defines the implementation of recovery operation after announcing the end to an emergency response to bring back the situation to normal condition. This guideline has segregated the after-math recovery system into two categories such as Area Recovery and Vehicle Recovery. The area recovery plan shall be focusing on nullifying the environmental degradation effects which sustain even after the emergency. While the vehicle recovery plan shall be concerned on the remedial measures that are to be taken for bringing the vehicle back to normal operating condition, this also includes the proper use of tools and equipment.

7. The Piramal global Standard: The standard for Material lifting and operations (Cranes and Hoists) Provides the Information and guidance on Lifting the materials using the mobile crane. This guidance includes the information related to the main boom length, the Working Radius, load weight and its dimensions and also the weight of the hook block and rigging weight [10]. The publication from the glove box edition gives the information which is very much likely to be considered while towing the vehicle. They collectively include many factors such as the minimum breaking strength of the toe straps and chains used, the fire of the strap, angle of towing.

### 3. METHODOLOGY

A Transport emergency response framework in the workplace is a safety issue because of the extensive emergencies. It is an undeniable fact that all the top organizations are much focusing on the plan and responding to the emergencies in a systemized way considering the challenging risk environments, policies and the available emergency technologies. Therefore, a well-defined, applicable and efficient emergency preparedness plan can be drafted by following and considering



*Figure 4.1. Transport Emergency Response Plan- Methodology*

## 4. TRANSPORT EMERGENCY RESPONSE PLANNING

### 4.1. ERP ACTIVATION

#### 4.1.1. Alerting Mechanism

Site Controller	Mr. Uday Joshi (Unit Head)	81240*****
Alternate Site Controller	Mr. Kalaiselvan (Operational Head)	81240*****
	Mr. Chandra Mohan (MPP1 Shift In charge)	94433*****
Incident Controller	Mr. Venkatesh (Supply Chain Management)	88895*****
	Mr. Ramana (Mech)	94433*****
	Mr. Srinivasan (FG)	94433*****
	Mr. Prem (MPP II Shift In charge)	98874*****
Emergency Controller	Mr. Selvakumar (EHS)	94433*****

*Table.4.1 Internal Contact details for reporting Transport Emergencies*

On receipt of information, one among the four incident controller to whom the incident is reported will have to rush to the situation, assess the situation and will make a spot decision to decide whether external assistance is required for responding to that particular emergency. He shall also be accountable for calling emergency assistance through the Communication team or self, as the first call to 101, as a second call to the number as described in the Material Safety Data Sheet, Providing complete information as much as possible. Then he informs the Site Main Controller and on the instruction of the Site Main Controller, he instructs the central control room to raise the siren and also to pass over the information to concerned personnel.

#### 4.1.2. Drivers Responsibility

Driver's responsibilities after the Incident/Accident:

1. Where the approach to the vehicle is applicable and safe, the driver of that particular vehicle shall attempt to arrest any further damage.
2. He shall make the necessary steps to clear and secure the incident area to protect the self and public.
3. In case if the dangerous goods are involved (Including MBV Stage 3 and Intermediate APIs), please refer the company provided MSDS and Transport Emergency Card.
4. Call and report the incident-related information to the company (Refer table 4.1. for contact details).
5. The driver is responsible to lead the incident immediately till the internal assistance arrive to the spot.

#### Drivers' responsibilities after the Break down:

1. Make the condition safe by switching on the hazard light and move the vehicle to the edge of the road where safe and possible.
2. Once the truck is moved off the road (Do not park on the blind corner), place the warning triangles both front and back of the vehicle.
3. Call and report the incident-related information to the company (Refer table 4.1. for contact details).
4. The drivers at any cost are not allowed to do maintenance work on the truck themselves unless the assistance (Internal/External) reaches the spot.

#### 4.1.3. Incident / Accident Appraisal

In the case of the incident/ accident involving the transport systems that require the Transport Emergency response, the Incident/ Accident Appraisal form as specified in the Table.4.2, 4.3 or 4.4 is to be completed and forwarded to the Site Incident Controller. The submission of this report shall not extend beyond 24 hours of the incident/ accident.

On receipt of the Appraisal form, the Site controller shall form a team for investigating, such team shall involve members having relevant experience regarding the emergency type. The Investigation team shall thoroughly analyse the root cause for the reported emergency by using a proper investigation technique. In addition to the investigation, they shall be also

responsible for analysing the other possibilities of such conditions through Event tree analysis or Fault tree Analysis. The investigation team shall make additional control measures containing practical solutions for the developing emergency and also for the anticipated conditions.


### Transport Emergency Situation Appraisal Form- Accident

### Transport Emergency Situation Appraisal Form- Accident



INFORMATION			
Date of Accident		Time of Accident	
Name of the driver		Weather Condition	
Vehicle Description			
Outbound Location		Load Carried	
Inbound location		Speed (Company vehicle/ other party Vehicle)	
Accident Location			
OTHER PARTY DETAILS			
Name of the Driver 1		Contact number:	
License Number		Expiry Date:	
Vehicle Description			
Insurance company		Policy number	
Name of the Driver 2		Contact number:	
License Number		Expiry Date:	
Vehicle Description			
Insurance company		Policy number	
WITNESS DETAILS			
Name of the witness			
Contact Details (Phone)			
Police Details (Name/Station)			
Whether police attended the scene? (Yes / No)		Contact Number	
INJURED PERSON			
Name of the injured person			
Details of the injury			
Is an Ambulance required? (Yes/No)			
Details of the Accident:			

Table.4.2. Accident Situation Appraisal Form (Page-1)

Sketch of the accident: <div style="text-align: right; margin-top: 10px;">             N         </div>	
Provide a Brief Description of damage to other property :	
Driver's Signature	Date of Report

**Table.4.3. Accident Situation Appraisal Form (Page-2)**



**PIRAMAL PHARMA LIMITED**

**Transport Emergency Situation Appraisal Form-Incident**

Location:			
Name of the personnel involved			
Vehicle Description:			
Date and time of the Incident			
Describe where the incident occurred:			
Describe How the incident Occurred:			
Describe What the Employee was doing at the time of the incident:			
List reasons for this incident:			
Recommendations/Preventions			
What are the Existing Control measures to prevent this kind of accident?			
What additional control measures can be done to prevent this kind of incidents in the future?			
Name of the investigator:		Designation	
Date of report:		Signature	

**Table.4.4. Incident Situation Appraisal Form**

## 4.2. RESPONSE PHASE

### 4.2.1. Implementation of emergency combat Procedures

In this portion, appropriate procedures were described for responding to various anticipated emergency conditions which have the possibility to occur during the transportation of Active pharma ingredients. On hearing the siren/information over the phone, all key personnel would assemble at the emergency control centre and take orders from the site Main controller and play their roles as defined. In connection with the Emergency Operations to be carried out in an orderly and sequential manner, the following teams (Refer Table.4.9 to identify the key personnel) have been formed to assist the coordinators to restore the normalcy at the earliest.

- I. Logistics and Supply Chain
- II. Fire Team
- III. Communication Team
- IV. Rescue Team
- V. First Aid Team
- VI. Observer

### 4.2.2. Guidelines on Towing the vehicle

In the case of towing the vehicle, the observer team should rush to the spot and ensure that the zone is safe and secure to perform the towing operation. The observer team shall approve the towing operation only if the checklist in the Table.4.6 satisfies the Answer „Yes“. On the Guidance of the Site incident controller, the Emergency controller shall act as the towing commander (TC) and all persons from the rescue team (the Towing Crew) would take orders from Towing Commander and play their role as defined.

Towing is always preferred only when the tow truck is available. But in case if the tow truck is not available and it is a necessary condition that a vehicle is towed or pulled, The Towing commander shall consider the following guidelines and perform the operation accordingly.

- Check the gross vehicle weight (Refer Table.4.5 or Vehicle identification and information plate on the driver's door as shown in Figure.4.2) and the additional load weight on the vehicle.
- Never use the lighter vehicle to tow/ pull the heavier vehicle.
- Always use only the recovery straps for towing/pulling the vehicle. The recovery straps should necessarily contain the loops.
- Never attach the loops into the vehicles weak portions such as the bumpers, or other protrusions like ball hitches, pull bars.
- The Recovery straps should only be attached to the load rated components such as tow hooks, shackles which are connected with the vehicle frame.
- The recovery straps and the attachments into which it is being fitted should be checked for its Minimum breaking strength (as shown in figure.4.3) and Working load limit (as shown in figure 4.3)

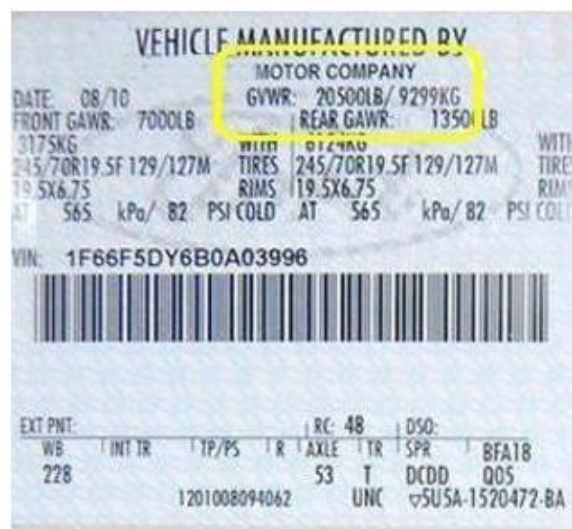


Figure.4.2. Vehicle Identification and information plate

- While choosing the recovery strap, always take MBS into consideration so that the chosen recovery strap shall be rated at least 2-3 times higher than the total weight of the truck. i.e. if the rating of the strap is less- there is a high chance for the strap to snap and if the rating is high then the elasticity would reduce the pulling effort.



Figure 4.3. Minimum breaking strength of the Recovery strap and Workload limit of shackles

- Incase if the strap is not labelled with MBS then assume that the width of the strap adds 4500 kgs (Approx.) of MBS (i.e. The 5-inch-wide strap would have an MBS of  $5 \times 4500 = 22,500$  kgs).
- The tow hooks or shackles should always have a higher rating than the straps.
- While hooking the straps to the vehicle, align the vehicles in a straight line (Maximum of 10-degree deviation from the straight line may be permissible).
- Clear the sand, mud or other obstruction in the direction of pull and ensure the swing zone of the tires are free.
- Once after setting the above things, ensure that the middle of the straps is draped by a blanket to resist any backlash.
- Deploy a traffic marshal on the scene to assist and communicate instructions between two drivers. Such traffic marshal should be subjected to training on how to hand signal.
- The fire zone/ the backlash zone of the strap used is 2 times the length of the strap perpendicular to the line of pulling (as shown in Figure 4.4).

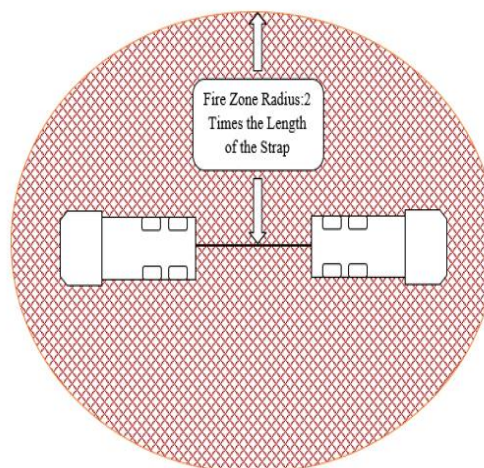


Figure 4.4. Fire zone of the strap used for towing

- Ensure that the pulling/ towing is done only after complying with the above guidelines.
- While pulling/ towing the vehicle, ensure that the vehicle which is pulling the other accelerates slowly to create a tension in the straps. High acceleration of the pulling vehicle would create an impact pull which would have the potential to snap the straps.



Description	YES	NO
Have you verified the gross vehicle weight, including loads of both vehicles?		
Is the total weight of the recovery vehicle close to or greater than the total weight of the stuck vehicle?		
Is the recovery strap minimum breaking strength (MBS) two to three times the total weight of the stuck vehicle?		
Is there an engineered attachment point on both vehicles?		
Do all connection points have a working load limit (WLL) greater than that of the recovery strap?		
Can the recovery vehicle line up with the stuck vehicle?		
Is the recovery route free of any obstacles or hazards (e.g., trees or boulders)?		
Are there provisions made for a traffic control system?		
Is there clear communication between the two drivers?		
Do both drivers understand the correct procedure for the recovery attempt?		
Do bystanders know the dangers and are they outside a perimeter two times the distance of the recovery strap?		
Do all involved understand that after three failed attempts, a tow truck must be called in?		
Do all involved understand the hazards of a recovery attempt, especially the danger of recoil should any components fail?		
Are there other possible hazards presented by the situation?		
Have the risks to personal safety and equipment damage been assessed to be at an acceptable level?		
<b>Employee Name:</b>		
<b>Employee Sign:</b>		
<b>Time &amp; Date:</b>		

### Check list for Towing the Vehicle






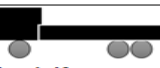


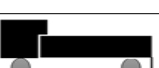











VEHICLE IDENTIFICATION CHART			
CLASS A - HEAVY DUTY			
 Length: 5.50 m Width: 2.50 m No of Axles: 2 Tonnes: 15	 Length: 7.20 m Width: 2.50 m No of Axles: 2 Tonnes: 8.48	 Length: 8.20 m Width: 2.30 m No of Axles: 2 Tonnes: 20.20	 Length: 7.20 m Width: 2.60 m No of Axles: 3 Tonnes: 25
 Length: 5.90 m Width: 2.50 m No of Axles: 2 Tonnes: 25	 Length: 10 m Width: 3 m No of Axles: 3 Tonnes: 19	 Length: 10.5 m Width: 3 m No of Axles: 4 Tonnes: 25	 Length: 12.5 m Width: 3 m No of Axles: 5 Tonnes: 35
 Length: 8 m Width: 3 m No of Axles: 2 Tonnes: 10	 Length: 10 m Width: 3 m No of Axles: 4 Tonnes: 27	 Length: 13.5 m Width: 3 m No of Axles: 5 Tonnes: 35	 Length: 15 m Width: 3 m No of Axles: 6 Tonnes: 40
CLASS B - MEDIUM DUTY			
 Length: 3.40 m Width: 1.70 m No of Axles: 2 Tonnes: 2.90	 Length: 4.50 m Width: 1.50 m No of Axles: 2 Tonnes: 7.30	 Length: 4.40 m Width: 1.60 m No of Axles: 2 Tonnes: 2.25	 Length: 7.10 m Width: 2.10 m No of Axles: 2 Tonnes: 6.05
CLASS C - LIGHT DUTY			
 Length: 4.60 m Width: 1.80 m No of Axles: 2 Tonnes: 2.30	 Length: 4.00 m Width: 1.70 m No of Axles: 2 Tonnes: 1.34	 Length: 5.40 m Width: 1.90 m No of Axles: 2 Tonnes: 5.25	 Length: 2.33 m Width: 1.51 m No of Axles: 2 Tonnes: 1.55

Table.4.5. Vehicle Identification chart

Table.4.6. Check list for towing the Vehicle

#### **4.2.3. Guidelines on Stabilizing and Lifting the Toppled vehicle**

In case of lifting or stabilizing the vehicle, The Site incident controller shall Deploy a Crane Champion (CC) and form a Rescue team. Such rescue team shall hold a lifting supervisor, lifting equipment operator. Crane Champion is ultimately responsible for:

- Complete responsibility and following of proper lifting techniques.
- Proper lifting plan is made considering the type and dimension of the vehicle with only 75% of the Safe working load.
- Ensuring the lift is correlated with respect to the plan.
- Ensuring that lifting equipment operators are trained as well as the equipment are certified.
- Ensuring that the load rigging is done in the presence of competent person.
- Ensuring that during each and every tackling the lifting devices and equipment are inspected and certified.
- Ensuring that cranes are risk assessed before assembly and disassembly (if possible).

The observer team shall act as the issuing authorities of the work permits associated with the vehicle Lifting/ stabilizing operations. The members of the observer team are responsible for:

- Ensuring that the Lift Plan / Lift Study is studied properly by a competent person with respect to the complexity and hazards of the lift approval is provided.
- Verifying that person going to operate the lifting equipment is trained and certified for that equipment.
- Verifying those devices and equipment used for lifting are certified and inspected properly.
- Verifying that load is rigged properly under the guidance of the competent person.

The site incident controller shall identify a Barricading/ Exclusion Zone In-charge to assist the isolation of persons from the vehicle lifting or stabilizing operations. He shall be responsible for ensuring that:

- Lifting zone must be barricaded and ensure that workforce members who are not dealing with the lift must be restricted from that place.
- After the lifting operation is started no personnel involved in lifting is allowed to work or walk under the load.

The authorized lifting supervisor shall:

- The vehicle lifting activities must be coordinated with respect to the lifting plan.
- All lifting team members must be given a brief explanation on risk assessment, lifting plan and safe lifting procedure.
- Ensure that riggers, crane operators and signalmen are properly registered.
- Ensure that the place where the lifting operation to be done the ground conditions are proper.
- Ensure that all the lifting operations are in sight with the operator with respect to the lifting tackle.
- Indicate any unsafe condition to the Crane Champion so that suitable measures may be developed and the lifting operations can be conducted safely.

The appointed lifting equipment operator shall:

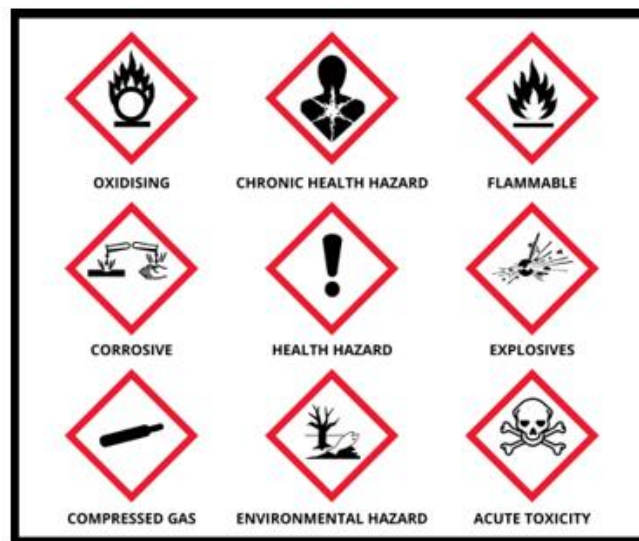
- Inspect for abnormalities prior use of the lifting equipment.
- Lifting operation to be carried out with respect to the manufacture instruction and lifting plan created.
- Check the load radius indicator and other safety devices are functioning properly.
- Carryout the lifting or stabilizing operation only when the lifting supervisor is present.
- Disengage from any manoeuvre that is dangerous.
- Report any defects immediately to the lifting supervisor.

The Crane Champion shall nominate an authorized signalman to assist the vehicle operator throughout the lifting operation. The appointed signalman shall:

- Proper attornment must be provided for signalman in such a way he can be identified.
- Ensure that the load is rigged properly prior any lifting action is taken.
- For safe manoeuvre of vehicle from lift to point of destination proper signalling to be provided for lifting equipment operator.
- Proper communication to be maintained properly with the lifting operator until the work is completed.
- Lift control must be maintained properly during the time of operation.
- Ensure that areas immediately present with respect to lift/ stabilizing are clear and free from any hazards during the manoeuvre.

The Crane Champion shall consider the following guidelines and perform the operation accordingly.

- When the vehicle is resting on its side, it is more prone to the fire since there are chances for the vehicle to have a burst fuel tank. Hence the priority is to be given to discharge the fuel from the tank using the proper equipment or ensure that there is no leakage and the tank is having sound mechanical integrity.
- Look for the battery, if the access to the battery is safe and applicable then disconnect the battery from the vehicle.
- Look for the persons inside the vehicle cabin. If there are people struck inside the truck cabin, then at this type of the incident open the Vehicle roof by cutting the pillars/ post of the roof structure and fold it down. Always cut the seat belt first before the pillars/posts are being cut.
- This will allow you to access the victims and get them out safely.
- The load in the vehicle is to be considered before tilting the vehicle back to its normal state, as the vehicle's point of the balance is very largely dependent on the load it is carrying.
- The packed loads in the truck are to be removed from the truck manually.
- For active pharma ingredients and Hazardous goods. Refer the GHS Labelling in the vehicle and act accordingly. Refer Figure 4.5 for Globally Harmonized System of Classification and Labelling of Chemicals.



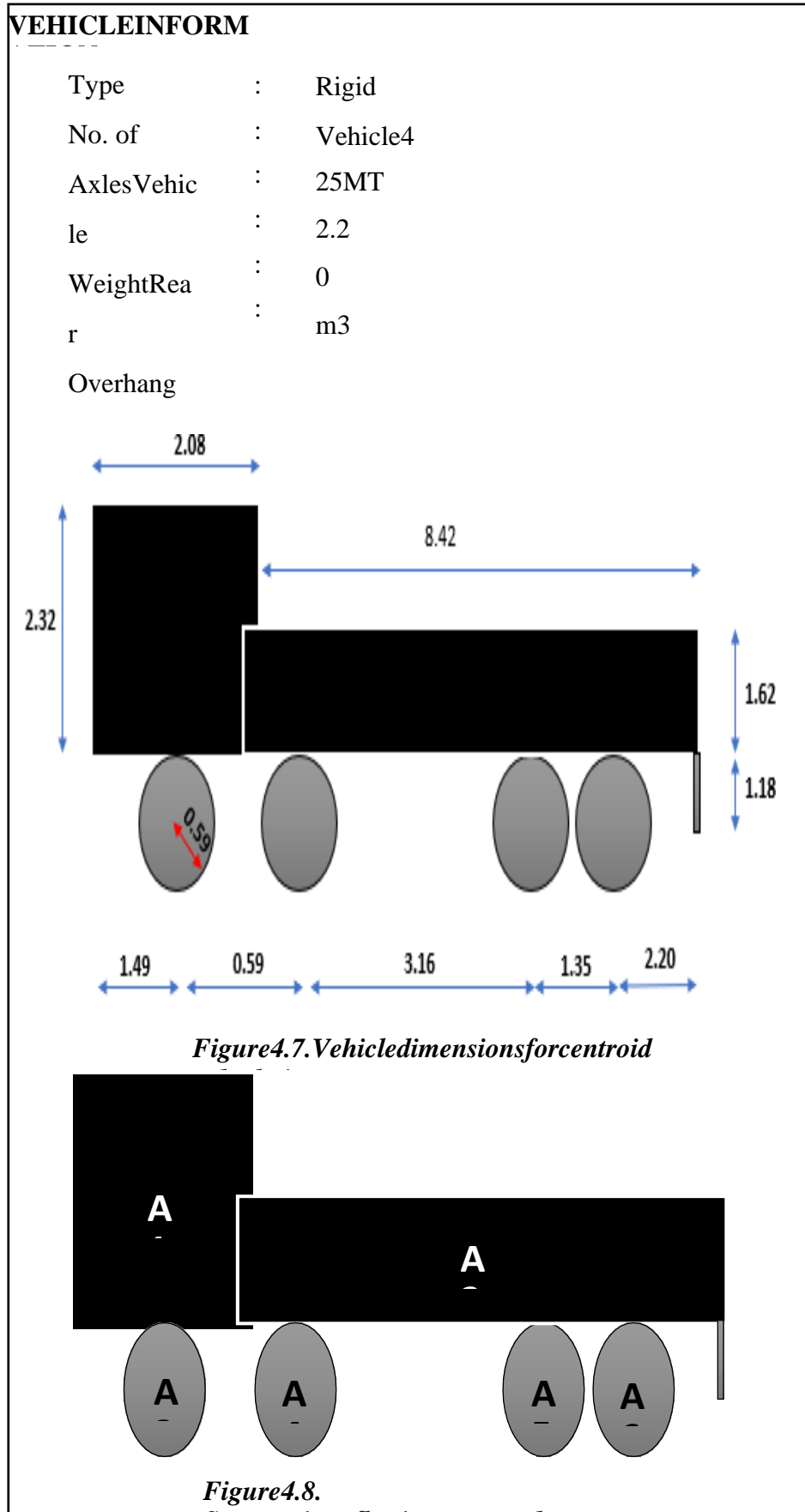
*Figure.4.5. Globally Harmonized System of Classification and Labelling of Chemicals*

- Once the truck is emptied follow the pulling technique to the vehicle on its side and tilt the vehicle slowly. Ensure that the wheels on the ground are hooked to the ground by means of rigid links/assemblies to avoid further toppling during lifting. The trucks are prone to toppling as low as the angle of 15 degrees to the floor.



**Figure.4.6. The Vehicle point of Balance-Oscillating**

- Use mud, sand to raise the level as they would act as a damping material and would absorb the impact force of the truck during tilting, thus it would additionally help us avoid jerk during the tilting operations.
- In case if the vehicle structure is of articulated type then never entertain lifting or tilting such vehicle without removing the trailer from the vehicle, and consider lifting the vehicle with truck portion separately and trailer portion separately.
- Refer the Figure 4.10, Figure 4.11 and Figure 4.12 while creating a lifting plan



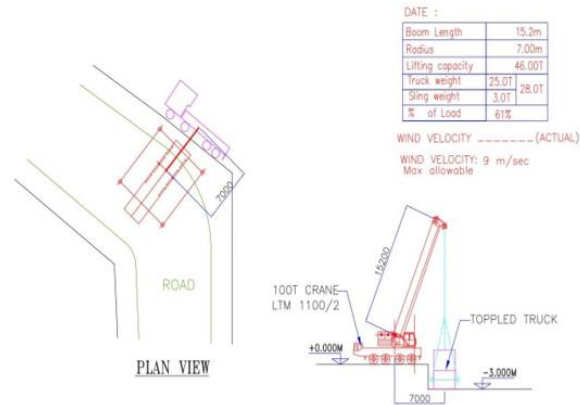


Figure.4.9. Lifting Plan for rigid truck (dimension 10.5m X 3m) 3m down the floor level

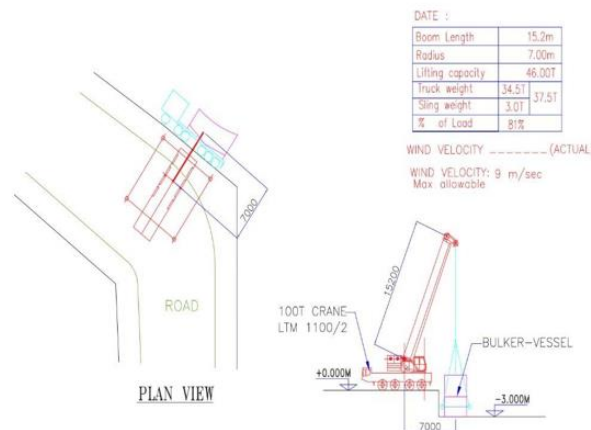


Figure.4.10. Lifting plan for Bulker vessel (7.25m X 3m - Articulated type) 3m down the floor

#### 4.2.4. Guidelines on responding to the Fire incidents:

The use of flammable materials at the Facility results in the potential for fires and/or explosions.

The Vehicles taken into consideration are the Methanol Solvent tanker (8000 Litre tanker) for production of pharmaceuticals. The consequences taken into the account is BLEVE as this is possible accident scenario in the plant. The fire incidents can be controlled through the following tactical approaches,

1. The Site Incident Controller shall immediately Organize the firefighting team and assemble with the available resources. The Site Incident Controller shall decide if complete evacuation is needed or not. Immediately after the decision of evacuation had been made, the Emergency Coordinator shall ensure that the order for evacuation is provided.
2. Alternate Site Incident Controller is to be appointed to take up the position of Site Incident Controller under his absence for taking up the overall emergency operation. Emergency controller is to be designated under the absence of Site Incident Controller as well as Alternate Site Incident Controller.

#### 3. The Salvage team shall,

- All means of egress are to be familiarized from the particular area, designated gathering areas and the Theoretical safe evacuation distance (Refer figure.4.13).
- lead employees (within the impact zone) to the safe zone, and by making an immediate visual sweep it must be assured that all the employees have been evacuated from the particular area before exiting the building.
- Ensure that all employees have evacuated the impact zone and gather all employees at the designated area.

#### 4. Head Count Team shall,

- Head count must be taken and the relay count to be ensured to their manager and/or area supervisor in the gathering area.

- Insist the supervisor and/or manager to make a visual sweep for missing personnel.
- Report the head count and missing personnel (if any) to the Site incident controller.
- Not re-enter the area.

**5. The Observer Team shall,**

- Type of incident such as fire or spill or both at same time must be ascertained.
- Using a binocular from safe distance try to identify if any warnings or placards and product number or name on the tractor or trailer is available.
- Information to be obtained from the people in the vicinity may be driver or any eyewitnesses.
- Scope of the incident must be identified with respect to the number of vehicles involved and people affected.
- Determine the best scene to enter the area.
- Identify the way for water providence.
- Concern to be taken for the parts of exposure. Unexposed part of tractor or multi units are important contact for exposure which if necessary must be disconnected immediately.
- providing an embankment around the vehicle or developing a drainage like structure will limit running spill fire.
- Firefighting team must be insisted in order to attack from high ground level with the wind at the back and ensuring no overhead lines are present.
- Report the condition to the Site incident controller.

6. In assumption that there are at least four fire service personnel in the premises the Fire Fighting Team will perform the activities as mentioned below. If lesser number of personnel all the task must be performed with respect to prior proper planning.

- On arrival of pumpers it should be parked at least fifty feet from the vehicle that is burning in order to prevent the firefighters from vehicular traffic.
- Firefighters (FF1 and FF2) and Firefighting team leader (FFTL) shall wear full PPE and SCBA.
- 360-degree size up is performed by the FFTL in order to determine if there are any trapped occupants or injured civilian as well as to identify hazards. Fire fighters are to be directed by the FFTL until the complete extinguishment.
- The firefighters shall stretch an attack line from the first arriving pumper.
- The officer shall advise the firefighters of any observed hazards, victims, etc.
- FF3 shall take in charge of attack line with respect to release of water and foam additives from the water tank fixed with pumpers.
- FF1 shall open the nozzle's bale and adjusts the stream of the nozzle. FF1 advances toward the vehicle with a wide pattern (60° fog -if the driver is present inside the cabin, 30° fog -if the driver is off the truck) from uphill/upwind if possible, approaching toward one of the vehicles corner or the side of the vehicle, but not from the front or rear of the vehicle. The main priority of FF1 is to protect anyone who may be trapped in the vehicle.
- FF2 or the officer should necessarily ensure that the wheels are choked in order to prevent rolling (only if the Approach to the tires are safe).
- FFTL shall move around the vehicle to ensure that all the visible fire is extinguished with respect to the attack line to access all burning areas of the vehicle.

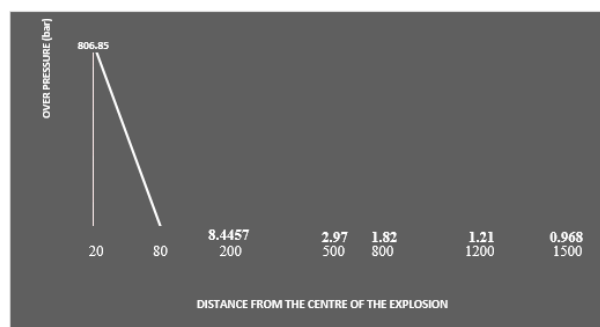


Figure.4.12. The Over pressure variation with distance from the center of explosion

The Pressure developed from the BLEVE explosion drops to atmospheric pressure only at a distance of 1500 meter as shown in figure.4.13

i.e.,

Evacuation Distance (For a Mobile Tanker Carrying 8000 Liters of Methanol) = 1.5 Km (approx.)

## 4.3. RESOURCES

### 4.3.1. Key personnel

Site Controller	Mr. Uday Joshi (Unit Head)	81240*****
Alternate Site Controller	Mr. Kalaiselvan (Operational Head)	81240*****
	Mr. Chandra Mohan (MPP1 Shift In charge)	94433*****
Incident Controller	Mr. Venkatesh (Supply Chain Management)	88895*****
	Mr. Ramana (Mech)	94433*****
	Mr. Srinivasan (FG)	94433*****
	Mr. Prem (MPP II Shift In charge)	99429*****
Emergency Controller	Mr. Selvakumar (EHS)	94433*****
Communication Team	Mr. Prasanna (Inst.)	90878*****
	Mr. Suresh G (Finance)	94433*****
	Mr. Ramakrishnan (HR)	98874*****
	Mr. Rajkumar (Admin)	95424*****

Fire Fighting Team	Mr. Suresh (Prod)	94864*****
	Mr. Raja Alexander (Prod)	95852*****
	Mr. Ram Mohan (Prod)	80728*****
	Mr. N. Subramanian (Mech)	95667*****
Rescue Team	Mr. Saravanan (QC)	94433*****
	Mr. Prabu (Pod)	94430*****
	Mr. Basheer Ahamed (Logistics)	94430*****
	Mr. Aravind Sharma (Ware House)	94430*****
	Mr. J. Manikandan (Elec.)	94890*****
	Mr. S. Manikandan (Account)	96295*****
	Mr. M. Palanivel (Mech)	94429*****
	Mr. K. Sivamani (Elec)	81443*****
Salvage Team	Mr. S. Nirmal Raj (Account)	95629*****
	Mr. R. Senthil Kumar (Account)	94437*****
	Mr. M. Sankar Reddy (Inst.)	99122*****
	Mr. P. Sundar (CPP)	94433*****
	Mr. KS. Senthil (HEMM)	94433*****
	Mr. D. Ravikumar (Admin)	94890*****
First Aid Team	Dr. P. Sundar (Medical)	94433*****
	Mr. S. Vadivel (Medical)	99439*****
	Mr. S. Kumaresan (Store)	94433*****
	Mr. P. Ramasamy (QC)	89034*****
Head Count Team	Mr. MG. Dhananjayan (ER)	81240*****
	Mr. A. Kamalakannan (ER)	94433*****
	Mr. K. Sivakumar (ER)	94433*****

## 5. CONCLUSION

This plan would additionally entail the following pieces of information such as Incident/Accident Appraisal format, Vehicle inspection Checklist, Possible emergency conditions, Response and Recovery planning. In this study, the Technical rescue procedures were developed for 20 different vehicles using the cement industrial premises ranging from 1.34 to 40 tons. The lifting plan with RT100 for the truck(10.5m X 3m) carrying packed cement bag is drafted using the CADD software, the plan assumed that the truck is positioned 3 m below the Normal ground level. It is also found that the Lifting capacity of the crane is 46 ton while the boom length for the presumed situation is 15.2 m, and the working radius is 7 m. The crane is found operating at safe workload condition with the operating load at only 61 %.

This study entails the structure of a TERP, Procedures on towing, fire fighting stabilizing and lifting the vehicle with high consideration to safety. As for as towing is concerned, this study includes calculation of the safe evacuation distance using Roberts equation and the methods for determining the Minimum Breaking Strength of the recovery straps, Working Load Limit of the Shackles and the vehicle weight were detailed. Various key factors are to be considered during the vehicle lifting, such as vehicle type(Rigid or Articulated), vehicle dimension, vehicle weight, the weight of the sling and hook, boom length, working radius, working load(in terms of percentage), Load capacity of the crane and hence the Transport emergency plan should not only hold the framework but also the specific procedures to handle the emergency conditions.

It is also required to review and update the procedures periodically or whenever a new kind of vehicle (those which are not described in the Vehicle identification chart) is being used in the factory premises (Refer table 4.10. emergency matrix while developing the emergency combat procedure)

Emergency condition \ Type of vehicles	AFR Vehicles	Cement Trucks	Gunsum Trucks	Coal Trucks	Flvash /Cement	Bull Dozers	Bucket Loaders	Car	Two-wheelers	Limestone/Clin	Boheat	TATA Arc	Trailers	Water Tanker	Diesel Tankers	Passenger Bus	Ambulance	Acid Tanker	Sweener	Tractor	Forklift
Dangerous Goods and fire involvement	X		X												X			X			
Electrical Emergencies involving vehicles	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
The topping of vehicles	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brake Failures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ignition Locking	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tire Blowout	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spillage at controllable/uncontrollable rate	X	X	X	X	X		X		X					X	X			X			X
Breakdown-Towing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X





the vehicle																					
Hydraulic failures	X			X	X			X	X									X	X	X	
Release of toxic gases	X		X															X		X	
Unsecured/unrestrained loads crashing into vehicle	X	X								X	X	X									X
Vehicle/vehicle loads fall into trench or excavation sites							X	X	X												
Welding failures				X							X	X						X	X		

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