

# Emergency Response & Disaster Management for Oil Refineries

<sup>1</sup>Deepak Guru

<sup>1</sup> Reference from : Indian Oil Refinery

## ABSTRACT

*Emergency Planning is an essential part of the loss prevention strategy. This is a preplan to handle any emergency situation effectively. Emergency planning is an integral part of the overall loss control program and is essential for any organization. The same is important for effective management of an accident /incident to minimize losses to people and property, both in and around the facility. The important aspect in emergency management is to prevent by technical and organizational measures, the unintentional escape and ignition of hazardous materials out of the facility and minimize accidents and losses. Not only unrecognized hazardous conditions which could aggravate an emergency situation be discovered, the emergency planning process also brings to light deficiencies such as lack of resources necessary for effective emergency response. Emergency planning also demonstrates the organization's commitment to the safety of employees and increases the organization's safety awareness.*

**Keyword :** - *Emergency Management for Oil Refinery Emergency, Safe Handling of Hydrocarbons, Disaster Management in Oil Refineries, Strategy During Emergency Response*

---

## 1. Emergency Management for Oil Refineries:

This study would be helpful for technological upgradation of effective emergency management & effective containment of the situation by proper mitigating action at the place of occurrence, cautioning people in adjoining affected localities, prompt rescue and medical aid to affected persons and communication to civil authorities for rushing in help from outside. All concerned are hereby requested to carefully study and thoroughly familiarize themselves with it, in order to ensure its effectiveness in times of emergency. It is essential that responders at the time of disaster are fully informed on their respective roles and are properly trained in fields relevant to the potential effects of the accident. They should undertake routine rehearsals at periodic intervals.

**Eg1:** As per, Petroleum & Natural Gas Regulatory Board that effective emergency management should be based on the criticality of hazardous processes, affected people & available mitigation resources during catastrophic failure.

**Eg 2:** It is reported that technological resources & competent management will reduce the impact of emergency.

### 1.1 Technological Upgradation for Emergency Equipment

*There are many advanced technology upgraded in the emergency equipment but the effective utilization, expertise to operate those equipment during emergency is very important. In India there are many fire reported in the oil refineries, but still advanced upgraded technology like big flow water pump & monitors with firefighting media for full surface tank fire are not recommended. Many refineries have more inventory of oil product but for protection & mitigation measure are missing due to lack of situational awareness.*

### 1.2 Competency for Emergency Handling:

Emergency response team members should be thoroughly trained for potential crises and physically capable of carrying out their duties. Team members need to know about toxic hazards in the workplace and be able to judge when to evacuate personnel or when to rely on outside help (e.g., when a fire is too large to handle). One or more teams must be trained in:

- Use of various types of fire extinguishers.

- First aid, including cardiopulmonary resuscitation (CPR) and self-contained breathing apparatus (SCBA).
- Requirements of the OSHA bloodborne pathogens standard.
- Shutdown procedures.
- Chemical spill control procedures.
- Search and emergency rescue procedures.
- Hazardous materials emergency response.

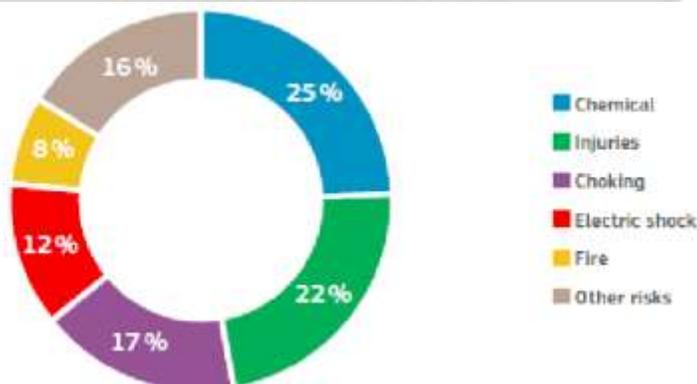


## 2. Safe Handling of Hydrocarbons

To handle hydrocarbons is a big challenge to the oil refineries. Probability of a problem, such as refrige safety can be managed very well, as long as service technicians follow their training and the rules for handling hydrocarbons. Safety can also be ensured by conducting regular risk assessments, creating safe zones free of ignition sources, ensuring the presence of fire extinguishers and monitoring the area with hydrocarbon detectors.

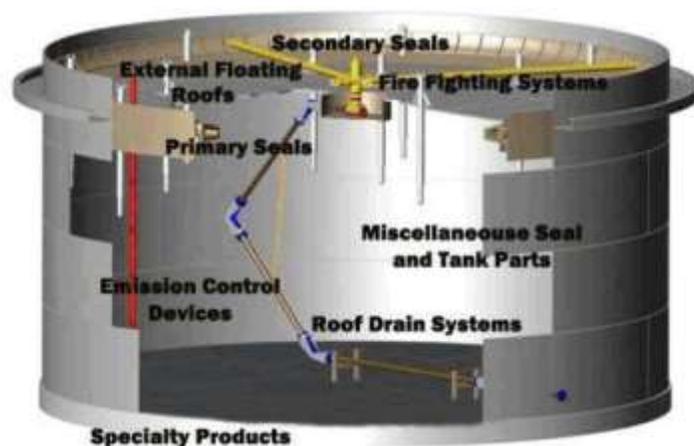
Flammable Liquids Storage, **Chemical Safety**. Hazardous **chemicals** can destroy health, cause severe injury, harm the environment and damage property. Training on the safe **handling** of **chemicals** is key for any teams who work with, supply, or store hazardous materials.

Graph indicates the maximum accident reported in 2017-18 due to mishandling of the hazardous chemicals.



**Chart -1:** Hazardous Chemical Accident Analysis

Advanced featured floating roof tanks for storage of volatile hydrocarbons to avoid fire & explosion due to formation of vapor space.



**Fig.-1: Safety Features for Floating Roof Petroleum Storage Tank**

**2.1 Containment of Hazardous Chemicals:**

- Develop procedures for working with hydrocarbons and follow them on every job, keeping in mind the flammable nature of these refrigerants.
- Because hydrocarbon refrigerants do not have an odorant, a quality combustible gas leak detector is mandatory for service work.
- Pass the combustible gas detector through every work site you enter.
- Ensure there is a fire protection as per the inventory of hydrocarbons.

**Table -1**

Petroleum Products	Recommended Storage Tank
Furnace oil, High viscous oil	Fixed Roof Tank
Naphtha, Gasoline	External Roof Storage Tank
Vacuum Gas Oil	Internal Storage Tank
LPG Gas, Hydrogen Gas	Spheres
Isomer products	Dome Roof Tank

**2.2 Handling of Petroleum Products**

Many common household products contain chemicals that can cause injury or death if they are not handled, stored, or used properly. Some of the household products that contain hazardous chemicals are oven cleaners, tile cleaners, toilet-bowl cleaners, liquid drain openers, antifreeze, chrome-wheel cleaners, rust removers, gasoline, motor oil, lead paint, turpentine, lacquer thinner, and muriatic acid.

- Storage Tank for Flammable Liquid - 1
- Storage tanks for Toxic chemicals - 2
- Spheres for Flammable Gases- 3
- FRP tanks for Acidic storage chemicals- 4

### 3. Disaster Management Plan:

Emergency planning is very essential tool during catastrophic failure, which needs to localize any accidents that may occur and, Its main objective is to reduce the probability of serious loss / damage to people, machinery, equipment, important documents, etc. The loss can be measured in terms of both human and monetary. If the effective action is taken in time, the full potential loss can be avoided. The action can be effective only when there is an existence of preplanned and practiced procedure for handling major emergencies utilizing the combined resources of the industry and outside services like Government Agencies, Fire Brigade, Medical, Police, Mutual aid members, etc.

Thus “Emergency Response and Disaster Management Plan” (ERDMP) is prepared with the objective of defining the functions and responsibilities of all concerned – Operations, Maintenance and Support Services Department Personnel with respect to detection of possible emergencies and effective implementation of the action plan.

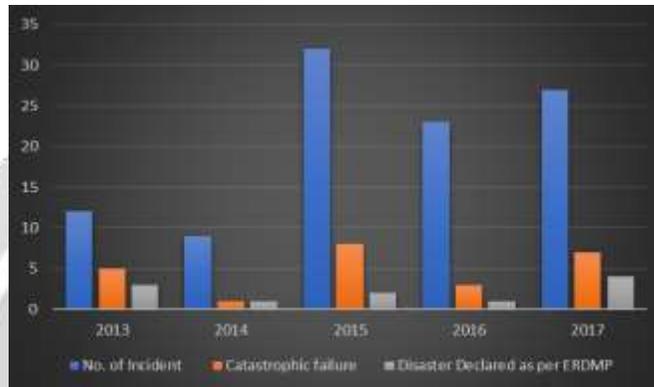


Chart -2: Oil Refineries Incident : Disaster Incident Chart

#### 3.1 : Emergency Strategy Planning

An **emergency management plan** is a course of action developed to mitigate the damage of potential events that could endanger an organization's ability to function. Such a **plan** should include measures that provide for the safety of personnel and, if possible, property and facilities.

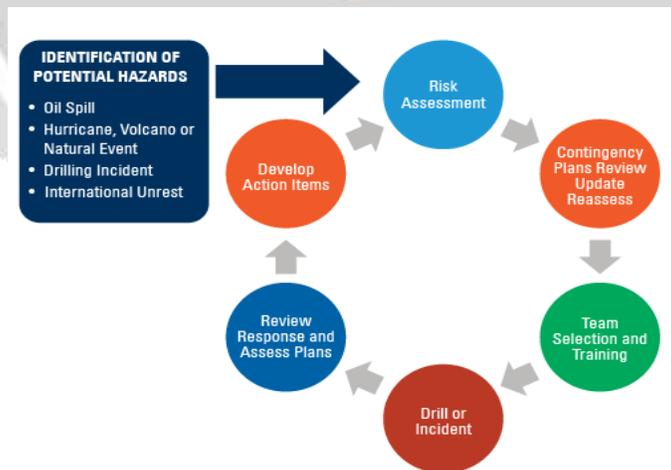


Fig -2: Emergency Response Strategy

#### 4. CONCLUSIONS

Safe design and operation of installations with advanced technological upgradation are basic obligations. I have emphasized more on technological upgradation of emergency resources for specifically full surface tank fire of oil refineries & strategic approach during emergency. Management and staff must have expertise to deal oil refinery emergencies to protect human life and health, and the environment. The oil industry processes, stores and distributes large quantities of flammable materials, including gasoline which is classified as highly flammable, and liquefied petroleum gases are very hazardous & proper strategy with technical expertise based on the international standard like NFPA11, API2021 essential.

#### 5. REFERENCES

- [1]. Refinery Manual
- [2]. OISD Data
- [3]. PNGRB 2013

