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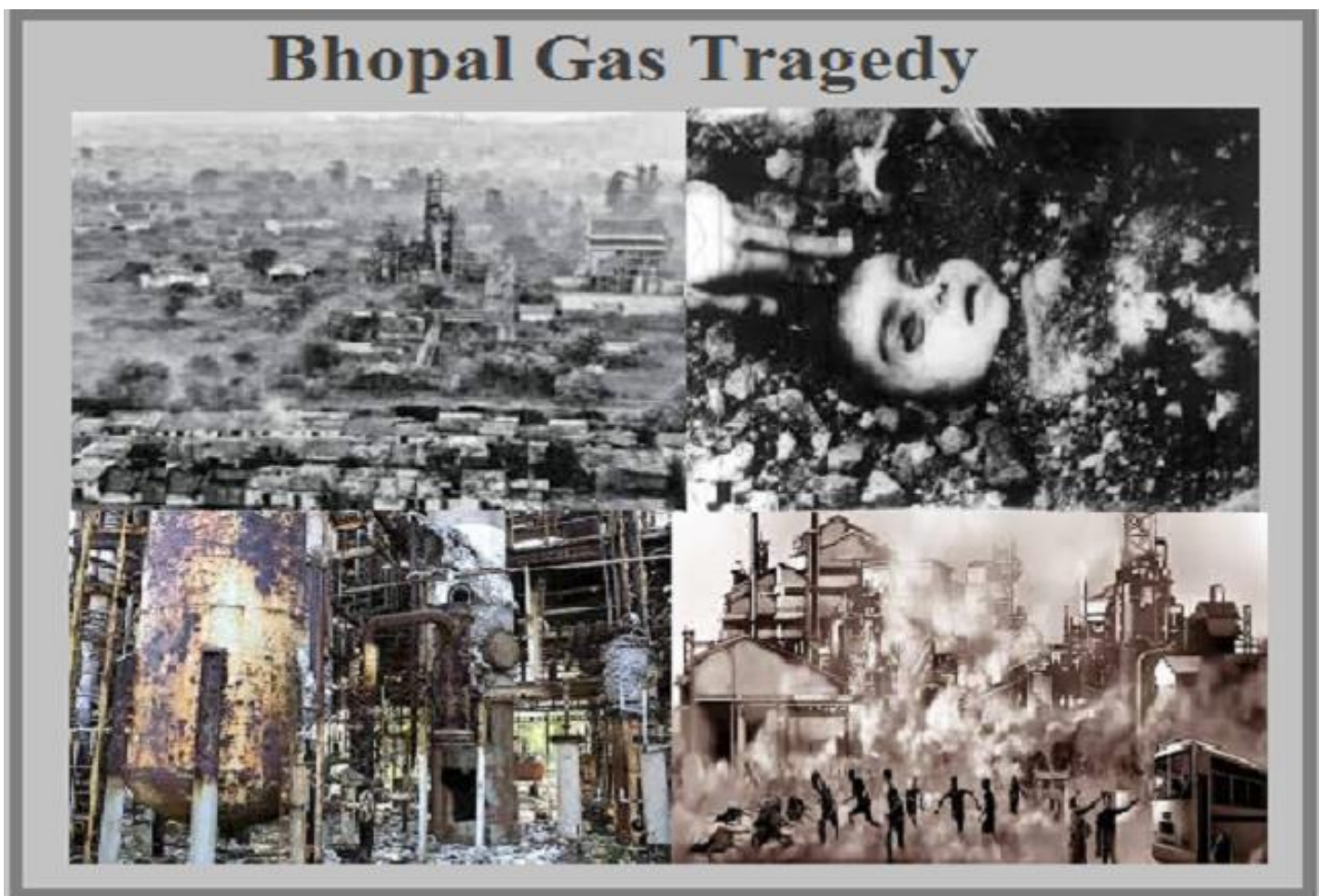
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Case study for Bhopal Gas Tragedy

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1.0 Introduction:

Bhopal disaster, chemical leak in 1984 in the city of Bhopal, Madhya Pradesh state, India. At the time, it was called the worst industrial accident in history. On December 3, 1984, about 45 tons of the dangerous gas methyl isocyanate escaped from an insecticide plant that was owned by the Indian subsidiary of the American firm Union Carbide Corporation. The gas drifted over the densely populated neighbourhoods around the plant, killing thousands of people immediately and creating a panic as tens of thousands of others attempted to flee Bhopal. The final death toll was estimated to be between 15,000 and 20,000.



Some half a million survivors suffered respiratory problems, eye irritation or blindness, and other maladies resulting from exposure to the toxic gas; many were awarded compensation of a few hundred dollars. Investigations later established that substandard operating and safety procedures at the understaffed plant had led to the catastrophe. In 1998 the former factory site was turned over to the state of Madhya Pradesh. (Britannica, 2020)

1.1 Causes for Disaster:

There are two main lines of argument involving the disaster:

1. Corporate Negligence

2. Worker Sabotage

- **The "Corporate Negligence"** point of view argues that the disaster was caused by a potent combination of under-maintained and decaying facilities, a weak attitude towards safety, and an undertrained workforce, culminating in worker actions that inadvertently enabled water to penetrate the MIC tanks in the absence of properly working safeguards. (Wikipedia)

- ✓ This point of view also argues that management (and to some extent, local government) underinvested in safety, which allowed for a dangerous working environment to develop.
- ✓ Factors cited include the filling of the MIC tanks beyond recommended levels, poor maintenance after the plant ceased MIC production at the end of 1984, allowing several safety systems to be inoperable due to poor maintenance, and
- ✓ Switching off safety systems to save money— including the MIC tank refrigeration system which could have mitigated the disaster severity, and non-existent catastrophe management plans.
- ✓ **Other factors identified by government inquiries included** undersized safety devices and the dependence on manual operations. Specific plant management deficiencies that were identified include the lack of skilled operators, reduction of safety management, insufficient maintenance, and inadequate emergency action plans. (Wikipedia)

- **The "Worker Sabotage"** point of view argues that it was not physically possible for the water to enter the tank without concerted human effort, and that extensive testimony and engineering analysis leads to a conclusion that water entered the tank when a rogue individual employee hooked a water hose directly to an empty valve on the side of the tank. This point of view further argues that the Indian government took extensive actions to hide this possibility in order to attach blame to UCC. (Wikipedia)
- **Theories differ as to how the water entered the tank.** At the time, workers were cleaning out a clogged pipe with water about 400 feet from the tank. They claimed that they were not told to isolate the tank with a pipe slip-blind plate. The operators assumed that owing to bad maintenance and leaking valves, it was possible for the water to leak into the tank. (Wikipedia)
- Methyl isocyanate from chemical plant was advertently released into the air killing as many as 2,500 people and injuring thousands of others

1.2 Short Term Effects:

The short term effects of the exposure were

- Coughing,
- severe eye irritation
- A feeling of suffocation,
- Burning in the respiratory tract,
- Blepharospasm, breathlessness,
- Stomach pains and vomiting.
- People awakened by these symptoms fled away from the plant. Those who ran inhaled more than those who had a vehicle to ride. Owing to their height, children and other residents of shorter stature inhaled higher concentrations, as methyl isocyanate gas is approximately twice as dense as air and, therefore, in an open environment has a tendency to fall toward the ground (Wikipedia)

- Thousands of people had died by the following morning. Primary causes of deaths were choking, reflexogenic circulatory collapse and pulmonary oedema. Findings during autopsies revealed changes not only in the lungs but also cerebral oedema, tubular necrosis of the kidneys, fatty degeneration of the liver and necrotising enteritis.[30] The stillbirth rate increased by up to 300% and neonatal mortality rate by around 200% (Wikipedia)

1.3 Long-term Effects:

Studied and reported long-term health effects are:

- **Eyes:** Chronic conjunctivitis, scars on cornea, corneal opacity, early cataracts, Blindness
 - **Respiratory tracts:** Obstructive and/or restrictive disease, pulmonary fibrosis, aggravation of TB and chronic bronchitis
 - **Neurological system:** Impairment of memory, finer motor skills, numbness etc.
 - **Psychological problems:** Post traumatic stress disorder (PTSD)
 - **Children's health:** Peri- and neonatal death rates increased. Failure to grow, intellectual impairment, etc.
 - **Cancer**
 - **Immune deficiency**
 - Soil and water contamination in the area was blamed for **chronic health problems** and high instances of **birth defects** in the area's inhabitants
- ❖ A 2014 report in Mother Jones quotes "spokesperson for the Bhopal Medical Appeal, which runs free health clinics for survivors" saying "An estimated 120,000 to 150,000 survivors still struggle with serious medical conditions including nerve damage, growth problems, gynecological disorders, respiratory issues, birth defects, and elevated rates of cancer and tuberculosis (Wikipedia)

❖ **In 2004** the Indian Supreme Court ordered the state to supply clean drinking water to the residents of Bhopal because of groundwater contamination. In 2010 several former executives of Union Carbide's India subsidiary—all Indian citizens—were convicted by a Bhopal court of negligence in the disaster. (Britannica, 2020)

Conclusion:

Union Carbide's pesticide plant in Bhopal, India, was the scene of one of the worst industrial accidents in history when methyl isocyanate gas leaked from the plant and spread over a populated area, killing at least 2,000 people at the time of the accident and causing an estimated 15,000 to 20,000 subsequent deaths. Many thousands more sustained lifelong injuries. (Britannica, 2020)

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