# Emergency Situations in Environmental Pollution

## The Great Smog of London 1952

The dramatic events of December 1952, are a classic example of that in normal conditions of a stabilized situation may change by the weather and turn into a disaster. Involvement of England's (especially London and the Thames Valley) thermal inversions associated with fog led to the usual concentration of smoke increasing 5 times. The level of carbon dioxide, achieved during this period was 6 times the normal levels. The concentration of air pollution began to soar about 12 hours after the arrival of dense fog.

A type of smog reduction (reaction) took place. It is a mixture of smoke, oxides of sulfur and coal combustion gases in combination with high relative humidity. It has reducing properties and is accompanied by dense fog. Diagnosis of gaseous components is more obvious by the presence of ash, which allows their penetration into the lower respiratory tract. This type of smog peaks early in the morning, at temperatures from 0 to 5 ° C. These changes led to an unusual incidence (fourfold increase) of disease and death:

- Dominated by particular diseases of the respiratory tract: coughing with little sputum, runny nose, sore throat
- Sudden vomiting

More severely affected individuals, were those who had already a similar history of disease and also patients who were treated for heart problems: in severely ill people dyspnea, cyanosis, bronchospasm, and mild temperatures could be observed. Most of these diseases had a sudden onset.

Statistical data showed that men were more frequently affected than women and most patients were older than 45 years of age. The two-week period (the week of Great smog and the week after) were recorded about 4000 more deaths than the same period the previous year. In a later study of this situation, it was concluded that the devastating effects caused by a combination of:

1. Fog
2. Low temperatures
3. Carbon dioxide
4. Fly ash from coal smoke

## Los Angeles Smog (summer smog)

Similarly, as in the previous example, it is the occasional occurrence of irritable smog during clear summer days in Los Angeles. The site is bounded on one side of the Pacific Ocean coast and the northern side of the mountain is closed → characteristically slow air flow, which records the occurrence of smog. There is oxidation of smog from exhaust gases through the combustion gases at low humidity and intense solar radiation and a number of photochemical reactions. It is most intensive in specific environmental conditions:

- temperature 25-30 °C
- low humidity
- clear weather with intense sunlight

Characteristic coloration for smog in California in the beige cloud bank behind Golden Gate Bridge. The brown coloration is due to the NOx in the photochemical smog.

The result is called photochemical smog, whose components are constantly transforming themselves because of the ongoing reactions. Its basic components are:

1. Atmospheric oxygen
2. Ultraviolet radiation
3. Nitrogen oxides
4. Hydrocarbons (mainly unsaturated)
5. Carbon dioxide.

The products of photochemical reactions are:

1. Ozone
2. Peroxiacetylnitrate
3. Aldehydes

4. Acetic acid

During the period of the smog, there were a number of hospitalizations of patients with respiratory and cardiac problems, and town residents often complaining of irritation of the eyes, nose and throat. It was also found that children in school during the occurrence of smog were more restless than usual. As with the situation in London in 1952, it is shown that changing weather conditions can cause the abnormal accumulation of normal emissions.

## Bhopal accident in 1984

The disaster, which occurred in central India were due to accidents in a chemical factory belonging to Union Carbide group. During production, there was an accidental release of 900 liters of water into the tank containing stabilized phosgene methylisocyanate. Hydrolysis of phosgene was the emergence of HCl, which catalyzes the polymerization methylisocyanate. During this reaction, a considerable amount of heat released increased the pressure in the tank, causing subsequent release methylisocyanate (and probably also hydrogen cyanide) into the air.

The late reporting of the accident and inadequate emergency measures have led to an accident with tragic consequences. Escaped chemicals hit the slums near the factory. In addition, part of the population after hearing sirens got the impression that it is a fire and ran even closer to the factory in order to help extinguish it. About 150000 people were affected and 1800 had died and even more of them had long-lasting consequences, particularly affecting the eye. Many of the health problems could have been avoided by taking a simple measure: to lie down and cover their face with a wet cloth.

Similar accidents show the importance of informing the public about how to react in crisis situations and the necessary preparation of emergency plans to manage them.

## Links

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### References

### Bibliography


- BENCKO CHARLES UNIVERSITY, PRAGUE 2004, 270 P, V, et al. *Hygiene and epidemiology. Selected Chapters.* 2nd edition. Prague. 2008. ISBN 9788024607931.


### Further reading