THE BHOPAL DISASTER

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The events in Bhopal in December 1984 shook the world out of its sense of complacency about modern technology in general, and about the chemical industry in particular. This information was gathered from hundreds of interviews with doctors, Union Carbide officials, medical students, voluntary aid service workers and many others. There is a publication embargo on the medical establishment in Bhopal, but we need to plan in the light of their experience.

The Events

Bhopal is the capital city of Madhya Pradesh, the middle province of India and has a population of about 900,000 people. Union Carbide India Limited was permitted to manufacture a pesticide called Sevin at its plant. An active ingredient in the manufacture of Sevin is methylisocyanate (MIC) which few of the people of Bhopal even knew existed. This highly hazardous and volatile chemical escaped into Bhopal's night air at about 1:00 a.m. on the 3rd of December 1984.

Because of its low boiling point MIC is stored in near subterranean tanks; there were 11,000 gallons of MIC in tank 610. It is presumed that water got into the tank accidentally and the temperature in the tank started to rise; the MIC, normally under a pressure of 8 lbs per square inch, rose to a pressure of about 40 lbs per square inch and various mistakes were made:

1. The staff could have opened a vent between tank 610 and the empty tank 619. They failed to do this.
2. The refrigeration system was out of action.
3. A vent gas scrubber can combine the MIC together with a caustic soda solution. It was inoperational on the day and when it was switched on staff omitted to switch on the fresh supply of caustic soda solution.
4. Another safety measure was the flare tower. This was under maintenance and inoperational on the day.
5. Around the plant jets could disperse water and "knock down" MIC, acting as a water curtain. However, the jets themselves rose only to a height of 30 feet whereas the MIC was released at a height of 100 feet.

Even if all these measures had been taken, and all these safety devices worked, there would still have been substantial amounts of MIC released into the night air, approximately 6-7,000 gallons.

When the gas was released the area affected initially was a 3 mile radius downwind; the wind was from north to south, and here the people were severely affected. When the wind increased later at about 2:00 a.m., the gas spread to a distance of 6 km from the plant itself. It was only the presence of the two lakes that diminished the effect of the gas.

The first lesson that we need to learn, is that the chemical industry needs to have adequate safety measures and adequate staffing. There should be some kind of control on the so called safety measures that they take. We are now well aware that there are a lot of dangerous plants all over the world, not just in the developing countries; it is estimated that there are 50,000 plants which are suspect.

The Alert

The factory workers realized at about 12:30 a.m. that something was seriously going wrong. The siren to alert the public was put on at full blast but was discontinued after a few minutes at 1:00 a.m. and was turned to its muted mode. The workers were therefore alerted, they were told which direction the wind was blowing and naturally they made off in the opposite direction. It was not until 2:00 a.m. that the siren was again turned on at full volume to alert the already frightened, injured and dying people.

MIC is relatively dense and heavy, so those who lived in the taller establishments on second and third floors encountered no significant problems if they closed their windows and doors. Most of the gas affected areas were in the poorer parts where the majority of the populace lived in shanty towns and in single story housing colonies. Many of the people ran out, some realizing the wind direction and managing

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