The second Bhopal disaster

In our Looking Back feature last issue, we recalled the Bhopal disaster and touched upon the incident's deadly legacy. Here, **Colin Toogood** describes how chemicals leaching into the aquifer are causing further and prolonged misery for nearby communities

Although the official toll from the cloud of methyl isocyanate that was released from the Union Carbide plant over Bhopal on December 2–3, 1984, is put at 2,259, many credible sources, including Amnesty International, estimate that 10,000 people died within the first three days. A further 15,000 have since succumbed to their injuries and another 150,000 remain chronically sick.

Union Carbide has never apologised and only paid meagre compensation to settle a civil suit. More importantly, it has not cleared up the toxic aftermath.

But today in Bhopal a second chronic toxic disaster is ongoing, one which began before the 1984 incident. In fact, the 'Second Disaster' significantly predates it and would have transpired with or without the events of December 1984.

Union Carbide manufactured three different kinds of pesticides in Bhopal: Carbaryl (trade name Sevin), Aldicarb (trade name Temik), and a formulation of Carbaryl and gamma-hexachlorocyclohexane (γ-HCH) sold under the trade name Sevidol. Carbaryl and Aldicarb fall under the carbamate group of insecticides and are persistent, highly toxic, highly water soluble and mobile in soils. Sevidol was extracted from technical grade HCH, is a mix of several HCH isomers and is a highly persistent and toxic organochlorine (Union Carbide extracted the γ-HCH and dumped the remaining isomers as waste).

Heavy metals were in abundance and mercury was used as a sealant in the Sevin plant, while chromium was used as a coolant in the Union Carbide India Limited (UCIL) factory's cooling plant. In a 1999 affidavit, an ex-factory worker related how, between 1969 and 1984, huge quantities of pesticides, solvents, catalysts, by-products and other toxic waste were routinely dumped in and around the site. Thousands of tonnes were left in unlined pits on the factory site itself and, later, put into enormous solar evaporation ponds (SEPs) a few hundred metres north.

In May 1972, engineers at Union Carbide's Technical Centre in West Virginia were asked to design three enormous SEPs into which toxic waste would be pumped. But when they began to examine the specifications and the site report they expressed concern.

The engineers warned that the proposed design risked the: "Danger of polluting subsurface water supplies in the Bhopal area… New ponds will have to be constructed at one to two year intervals throughout the life of the project." Only three ponds were ever built.

Effluent

In 1977 the SEPs were constructed and, it is alleged, were specified down to a low cost solution. The minutes of a meeting between the plant managers and the building contractors reveal that: "UCIL emphasised the need for reduction for (sic) cost of the pond as much as possible… certain seepage/effluent can be accepted." Thus, these vast lakes, intended to hold enormous quantities of dangerous toxic waste, were constructed with flimsy liners.

With every monsoon, rain had already been leaching through the toxic waste buried on the factory site but now these SEPs become overflowing lakes, spewing toxins into the surrounding soil while, over the years, their liners begin to fail. A March 1982 telex, from Bhopal to Union Carbide's HQ in Danbury, Connecticut, revealed that: 'Evaporation pond almost emptied… investigation of the leakage in progress. Unfortunately emergency pond has also shown some signs of leakage.' The SEPs were never repaired.

Five years after the gas disaster, in 1989, Carbide began testing soil and water samples taken from the factory site. Fish were placed in samples of groundwater and into other samples where soil had been mixed with fresh water. Every sample was found to be highly contaminated and all of the fish died instantly as they were added to the water.

Dense, slum housing surrounds the factory site and residents are likely to have been slowly poisoned since before the 1989 tests. The chemicals involved attack the body's organs, are carcinogenic, and cause birth defects.

People remained largely in the dark about this ongoing disaster until 1999 when Greenpeace ran an extensive series of tests and declared the derelict factory site a: "Global toxic hotspot".

The fact of Bhopal's second disaster is that innocent people, mostly living in extreme poverty, have found themselves poisoned not once, but twice.

"In total, the survey conducted by Greenpeace International has demonstrated substantial and, in some locations, severe contamination of land and drinking water supplies with heavy metals and persistent organic contaminants both within and surrounding the former UCIL pesticide formulation plant. There is an urgent need for a more detailed and extensive survey if the full extent of ongoing contamination from the plant is to be determined," according to Greenpeace. The NGO called for ultimate remediation of the aquifer, but added: "In the short term, the priority… must be to provide clean water to the communities and to prevent access to contaminated wells. Urgent action must also be taken to prevent further contamination of aquifers through proper containment of chemicals and contaminated materials both on and surrounding the site."

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Bhopal Medical Foundation

In 2002, Greenpeace issued a further report: *Technical guidelines for clean-up at the UCIL site in Bhopal*, proposing assessment and treatment protocols. It said the entire factory site and the surrounding areas, including the solar evaporation pond areas where wastes had been landfilled, should be sampled systematically, using a grid pattern and reinforced with extra samples at visibly contaminated locations.

"All wells and boreholes inside the UCIL site and within two kilometres (1.2 miles) of the boundary walls should be tested; if those furthest from the site show any signs of contamination, the testing area should be extended until no further contamination is detectable," said Greenpeace, adding: "While it may be appropriate to insert physical barriers to prevent further migration of contamination within the aquifer, this alone will not be sufficient. Water should be pumped from the wells and treated."

In 2009, a round of tests performed by Delhi-based Centre for Science and Environment (CSE) showed the greatest pesticide contamination (in ground water samples) at Shiv Nagar a distance of 3.5km (2.1 miles) to the North East of the UCIL site.

"The sample collected from the hand pump near Chaurasia Samaj Mandir in Shiv Nagar was the most contaminated. It has the highest concentration of carbaryl (0.011 ppm or 110 times the standard), lindane (0.004 ppm; 40 times the standard) and mercury (0.024 ppm; 24 times the standard)."

Further tests, any greater distance away from the factory site, are yet to be performed.

In August 2000 a campaign for safe water to be supplied to the affected communities began and by September the local government, the Bhopal Municipal Corporation (BMC), had installed six 10,000 litre tanks to be filled, daily, by tanker truck, in one of the closest and apparently worst-affected areas.

By May 2004 the campaign petitioned the Supreme Court which, in turn, ordered the state government to supply safe water to the affected areas. By August that year, Bhopal's Gas Relief Minister announced that all affected areas would receive clean drinking water within three months, but this did not materialise. In 2006 a group of campaigners walked from Bhopal to Delhi to present a list of demands to the Prime Minister but they were given no audience until after they had endured a beating from the police, savage enough to hospitalise some of the group, including elderly women, and others who had put their lives at risk with ▶

a hunger strike. In 2008, another group of campaigners set off on the same, long march.

This time, as the campaigners sat on the pavement, they received news: the government was believed to be looking for ways to help Dow Chemical avoid the 'successor liability' inherent within the merger with Union Carbide (in fact a later Right to Information request revealed that, in a 2005 communication, Dow lobbied the Indian government to: "Implement a consistent, government-wide position that does not promote continued GoI (Government of India) litigation efforts against non-Indian companies over the Bhopal tragedy").

Dow Chemical acquired Union Carbide in 2001 and, along with assets came liabilities, including the issue of Bhopal.

In 2003, a report from the International Medical Commission on *Bhopal: Findings & Recommendations* outlined a serious problem in responding to the gas disaster that had clear parallels with the water contamination crisis: "In addition to the large-scale loss of life and continuing health problems experienced by the victims of the Bhopal disaster, a major casualty has been the lack of information. Compared to other major chemical disasters in the world, Bhopal has the dubious distinction of not only being the worst, but also one of the least investigated.

"The scientific and medical response to the crisis was begun in a social, political, and legal climate in which there was little experience in dealing with a major environmental release. Scientific and medical personnel needed access to accident-related and toxicological information to understand the causes and potential consequences of the disaster. Union Carbide, the primary repository of this information, faced with lawsuits and the prospect of bankruptcy, closed down its channels of communication. On the other hand, the extreme sensitivities of the local and national government bodies towards all aspects of the disaster, coupled with the lack of expertise and funds, resulted in an inadequate response on India's part to meet the urgent health care needs of the community. Whereas a flood of information was expected from a disaster of this magnitude, only a trickle resulted."

A report issued by a combined group of Bhopal survivors' organisations in 2005 entitled *Children of Bhopal* stated: "Lack of research into the possible genetic and reproductive ramifications of gas exposure, and now of exposure to contaminated water, have seriously handicapped efforts to understand and respond to the effects on the next generation in affected communities."

In the absence of any official response, these survivor groups have undertaken a major epidemiological study of their own and the results are expected within months of the 30th anniversary of the gas disaster this December.

By 2009, the Bhopal Municipal Corporation (BMC), under constant pressure from the campaign, had installed a rudimentary piping system to augment the tankers and help get safe, if not clean, water into the communities.

But, a report published by the Bhopal Medical Appeal, including a detailed survey carried out on the water supply, explains that: "The clean drinking water supply system, installed by the BMC, does not supply sufficient drinking water and that many of the residents, in the areas surveyed, must resort to drinking the toxic groundwater to meet their needs… The water supply system, where it has been installed, is in poor shape."

Bhopal is not only the worst chemical disaster in the world, but also one of the least investigated

In 2010, after the conviction of UCIL on criminal charges, for its part in the 1984 disaster, the Government of India was anxious to be seen to act. It assembled a 'Group of Ministers' (GoM) to examine various legacy issues – not least that of the contaminated water and the GoM-commissioned reports from the National Environmental Engineering Institute Research (NEERI) and National Geophysical Research Institute (NGRI).

A group of experts was requested, by Bhopal survivor organisations, to comment on their behalf during a period of consultation with an oversight committee chaired by the Indian Environment and Forests Minister.

They concluded that the NEERI report failed to produce an accurate site model, accounting for concerns over the spread of contaminants, and based conclusions on incomplete and/or inaccurate hydrogeological information and that, furthermore, the NGRI report did not support certain hypothesis put forward by NEERI.

"The sampling programme employed by NEERI, was not systematic and was limited in scope. Evidence has accumulated to show that contamination issues related to UCIL are still prevalent and that this is a direct cause of morbidity in the local community. The NEERI and NGRI investigations have not sufficiently accounted for the fate of the contaminants identified in their own desk study and by other investigators."

In the years since this activity, sporadic testing has revealed further communities to be affected by the contaminated water, but a full contamination survey, performed to acceptable, international standards has not been carried out.

Affected communities

Since August this year, 22 affected communities have been getting water through pipelines. However, many communities north of the factory still consume poisonous groundwater as they have no access to pipeline water," said Satinath Sarangi of Bhopal Group for Information and Action.

The 22 communities receiving a piped supply are those now officially acknowledged as affected by the contaminated groundwater; but the unfortunate truth is that nobody knows how far the contamination has spread in to the aquifer and, thus, how many communities are actually affected.

This information – and the true figure of how many people are still being poisoned in Bhopal's second disaster – will not be known until a full contamination survey is performed. CRJ

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