Incident

Bhopal revisited – a story of neglect

Fiona Macleod

In August 2023 I travelled to Bhopal, India to revisit the abandoned site of the former Union Carbide Factory.

In the almost forty years since the world's worst industrial accident there has been no clean-up of the site and much of the old equipment remains standing.

I had just started my working life as a chemical engineer when news of the tragedy hit the headlines, but some of you weren't even born in 1984. So, let's take a step back and remind ourselves.

Just after midnight on the night of 2-3 December 1984, thousands of people died, and hundreds of thousands were injured by a release of gas from a pesticide factory in Bhopal, India. A runaway reaction in a tank containing 40 tonnes of MIC (Methyl Isocyanate – an intermediate in pesticide production) led to the release of toxic gas into the neighbourhood.[1]

I last visited Bhopal almost ten years ago while working in India. At that time, I was unable to enter the Union Carbide factory site and could only inspect it from the outside — you get a good view from the elevated Vidisha Bypass Road. This time I obtained official permission from the Madhya Pradesh District Controller, but the afternoon spent in government offices proved unnecessary as the single security gate was unlocked and I was able to walk directly onto the abandoned site unchallenged.

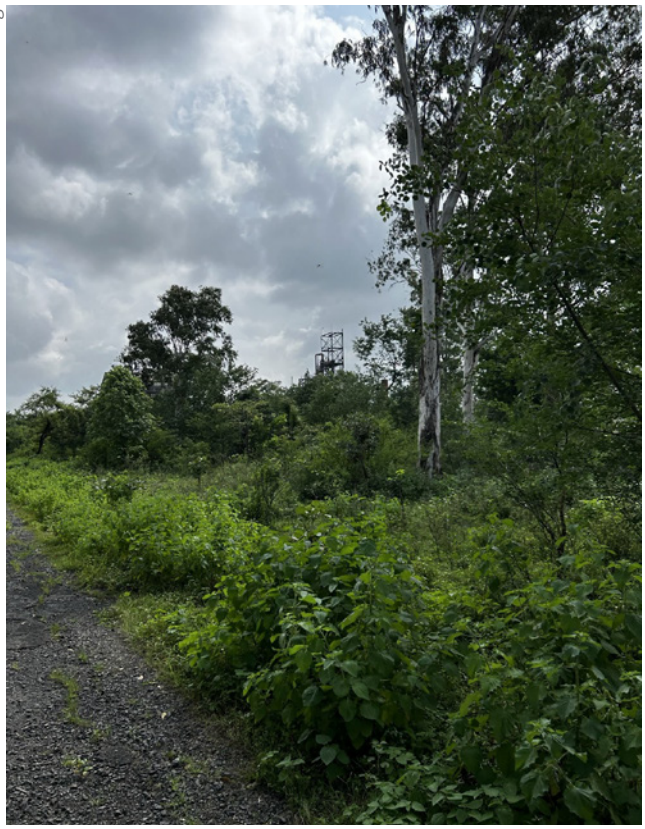
It is a strange place to visit, a piece of overgrown land the size of thirty football pitches (55 acres) bounded by two main roads and a major railway line. The scent of mint gets stronger as you progress from Berasia Road, bordering the busy JP Nagar district and delve deeper into the overgrown site full of trees and whooping, swooping birds. The main paths are clear, but the side routes are carpeted in mint, which release a fresh aroma as you crush them with your safety boots. There are butterflies everywhere — little yellow ones and large ones — orange, red and black. The vegetation clears towards the former waste dumping ground in the north-east corner and white storks rise up from the shallow pond as you approach. Dragonflies dart along the paths where streams and pools drain the monsoon rains.

The site is surrounded by houses, some of which back directly onto the factory land.

The structures that held the flare tower, the pipe bridges, the Sevin plant including MIC (Methyl iso-cyanate) distillation column and vent gas scrubber, all appear to be holding up although there

© thechemicaldetectiveblog

Figure 1 – Equipment at the former UCIL pesticide factory in Bhopal, India, August 2023



© thechemicaldetectiveblog

Figure 2 – Path at the entrance to the former UCIL site in Bhopal, India, August 2023

0260-9576/23/$17.63 + 0.00

Figure 3 – Former dumping ground in the former UCIL site in Bhopal, India, August 2023

is advanced corrosion right through some of the vessels. It is quite extraordinary to see parts of this factory exactly as they were on the night of the accident, untouched for almost four decades.

Given the poor security and the poverty level of the surrounding communities, it was unsurprising to see signs of habitation inside the abandoned factory — bed rolls and cooking equipment inside otherwise empty concrete buildings. I met several people looking after their grazing animals: herds of cows and goats.

Outside the site, on the other side of the railway line, unfenced and open to all, lies a huge abandoned lake covered in water lilies and hyacinths. This was a solar evaporation pond (SEP) where liquid waste from factory operations was concentrated.

The soil and groundwater inside and outside the factory are known to have been contaminated by the factory activities. While much of the contamination may not be directly linked to the 1984 accident, the failure of the polluter to clean up after themselves is most definitely a direct result. The fragility of the gas affected population and their children makes them especially vulnerable to further assaults.

The victims, their families and neighbours have been neglected and forsaken. There has been a complete abdication of responsibility: by the company that ran the site at the time of the accident, by its US parent company at the time, all the later companies that acquired its assets, by the police and the law courts for failing to investigate or prosecute effectively, by the central government for settling too hastily and for insufficient compensation, by the local state government for failing to provide adequate relief or restitution to those affected. The more I dig into this tragic case the more shocked and angry I become.

When I visited ten years ago, the CSE (Centre for Science and the Environment), an Indian public interest research and advocacy organisation based in New Delhi, brought together technical experts and community representatives to outline an Environmental Remediation Plan for the former UCIL operations.[2]

Since then, things appear to have gone backwards.

It's not hopeless though.

There are good people who refuse to look away. I met the fiercely intelligent and articulate activist, Rachna Dingra of BGIA (Bhopal Group of Information and Action). We may differ on how we view the international chemical industry, but as I listened to her talk about her experience, the lack of progress or support and all the petty setbacks, I marvelled at her calmly rational approach and indomitable spirit.

I also visited the Sambhavna clinic and talked with Satinath Sarangi and others. The clinic is unique in that it provides both conventional medicine and complementary Ayurvedic therapies under the same roof. It is free to access and provides a calm and peaceful haven, designed not to look, feel or smell like a hospital, a fascinating model of care, compassion and participatory management.

Bhopal itself is an extraordinarily beautiful city, and the upper town is booming. Capital of the Tiger state, Madhya Pradesh,

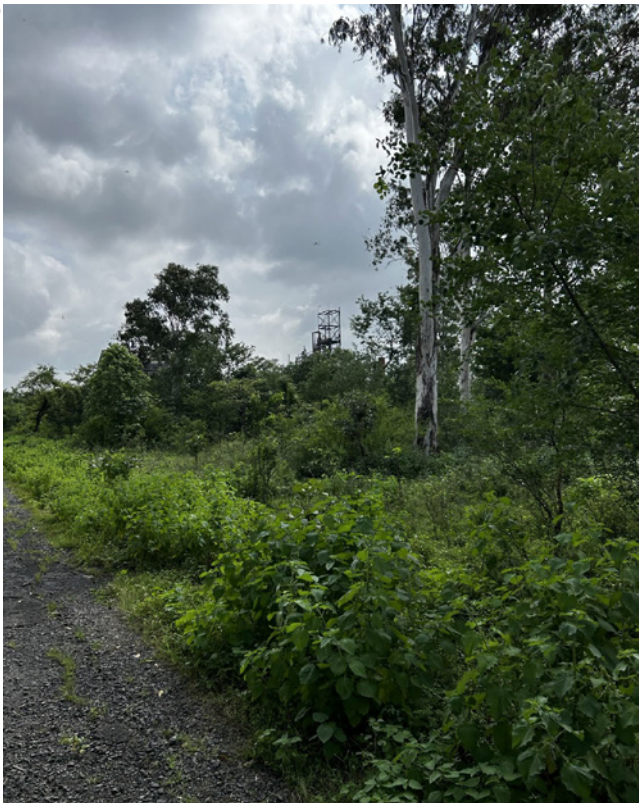


Figure 4 – Pipe bridge inside the former UCIL site in Bhopal, India, August 2023

Figure 5 – Solar Evaporation Pond outside the former UCIL site in Bhopal, India, August 2023

0260-9576/23/$17.63 + 0.00

Figure 6 – Sambhavna Clinic in Bhopal, India, August 2023

Bhopal is stuffed with lakes, gardens, wonderful museums, extraordinary palaces and one of the largest mosques in India. There are two UNESCO world heritage sites within easy reach — the prehistoric cave shelters at Bhimbetka and the Buddhist Stupas at Sanchi, and multiple wildlife reserves offering tiger and other safaris.

I arrived at a brand-new railway station – Rani Kamlapati – which links to an ambitious new metro already under construction. Domestic tourism is alive and well and there are several excellent hotels, but foreign tourism — and the money it brings — has been blighted by Bhopal's association with the gas tragedy.

The past can't be changed. But nor will it go away by ignoring what happened. The remediation and redevelopment of the old Union Carbide factory site in Bhopal is a big task, but India has many well-qualified engineers and the expert knowledge needed to solve the technical problems.

The challenge is not a technical one.

The issues are all political.

India is a complicated place with even more complicated politics. But the Bhopal tragedy was never a uniquely Indian event; it should have been a lesson to us all.

Poor operational decisions were made in the 1980s. The factory was uneconomic and was in the process of closing down. Experienced people left. Inventories of hazardous material rose. Equipment ran to failure. Safety systems were compromised.

But the root causes[3] of the accident go back to design decisions made in the 1970s, including:

- Materials of construction (mild steel instead of stainless steel for the vent gas header leading to iron catalysed solid formation which was removed using water);
- Equipment selection (conventional pump seals which leaked on hazardous service);
- Storage of large quantities of a hazardous intermediate (the minimisation principles of inherent safety were applied to phosgene but not to MIC);
- Inadequate instrumentation for measurement, alarm and control.

The wider world has a unique opportunity to learn from what happened and do right by the victims of the world's worst chemical accident, those who suffered and whose children and grandchildren continue to suffer from the effects of contaminated soil and water and a lack of economic opportunity.

We would all benefit from taking a good hard look at the terrible events of December 1984, to gather together the information collected, to review the lessons not learned, to share them transparently and work to ensure that such a tragedy can never happen again.

What needs to be done

The following action is needed:

- Make secure
  - Immediate improvement of security to prevent access to the former UCIL site and Solar Evaporation Ponds (SEPs).
- Make safe
  - Assess the condition of drummed waste:
    - ensure effective containment (transfer to stainless steel drums)
    - prepare a credible destruction plan
    - destroy the waste safely without further harm to people or the environment.
  - Assess the condition of buildings, structures and ponds and make safe as required.
- Remediate
  - Carry out a comprehensive scientific assessment of the ground and groundwater pollution from the factory site and evaporation ponds as well as all the water sources at increasing distances from the site.
  - Construct a predictive model of the spreading underwater plume and develop alternative clean-up options that involve and benefit the people closest to the site.
  - Implement a remediation plan.
- Alleviate
  - Deliver on the promise of free clean piped water to the affected population.
  - Deliver on the promise of free health care to the affected population.
  - Rehouse anyone living on the site or using it to graze domestic animals.
- Redevelop
  - Evaluate alternative redevelopment options with the full involvement of the affected population.
  - Implement a redevelopment plan that will involve and benefit the affected population and the people of Bhopal.

References

1. *For more information see: LPB special edition 2014*
2. *Action Plan CSE India Environmental Remediation http://cseindia.org/userfiles/Action%20Plan_Environmental%20Remediation%20in%20and%20around%20UCIL,%20Bhopal.pdf*
3. *Rethinking Bhopal by Kenneth Bloch, Elsevier (2016), ISBN-13 : 978-0128037782*

0260-9576/23/$17.63 + 0.00