

Bhopal gas disaster: Delhi Science Forum and People's Science Movement in India – In memory of Dr. Amit Sengupta

Desastre com gás de Bhopal: Fórum Científico de Délhi e Movimento Científico Popular na Índia – em memória do Dr. Amit Sengupta

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Introduction

One of the world's worst industrial catastrophes, the Bhopal gas disaster, hit the city of Bhopal in central India, on the night of 2-3 December 1984. A deadly mix of toxic heavier-than-air gases vented into the air from the Union Carbide pesticide plant, spreading across 40 sq.km around the plant and covering 36 of 56 municipal wards of the city. More than 20,000 people were killed that night and over the coming years, and injuries of varying degree were caused to around 550,000 others. The trail of death, deformity, disability, genetic disorders, pollution of soil and groundwater, and harm to flora and fauna continues even today. The Disaster was to go down in history as one of those transformational industrial calamities, like the Minamata mercury poisoning case in Japan, the Three Mile Island nuclear power plant core melt-down in the US, and the Chernobyl and Fukushima nuclear plant disasters that were to happen later.

These mishaps together contributed to a huge change in public perception of Science and Technology (S&T), and led to people's movements all over the world calling not only for greater regulation and public scrutiny of S&T-based projects, but also for a new social contract for S&T. Such movements have generated considerable momentum, in some countries more than others, and are now increasingly intervening in policy making and implementation, whether as part of institutionalized mechanisms or as advocacy groups. The Bhopal gas disaster too played such a catalytic role in India and triggered a slew of environmental and industrial regulatory policies and legislation, as discussed below.

Yet, from the perspective of the authors, and that of the Delhi Science Forum (DSF) and the broader Peoples Science Movement (PSM) network in which they work, this heightened engagement with S&T policy has also brought some worries with it. The large number of NGOs, civil-society organizations and movements involved have a diverse perspectives, goals, strategies, theatres of operations, and domain knowledge and disciplinary backgrounds. One crucial aspect of particular concern to the PSM has been how S&T is viewed as a knowledge system, as a dimension of public policy, as institutionalized practice, as an instrument of state power and corporate influence, and importantly as system informing the perspectives and actions of popular movements such as the PSM.

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Many S&T-related issues that have become theatres of contestation between the state or corporations on the one hand, and popular movements on the other, have witnessed divergent perspectives within the latter on how S&T is to be viewed. Without engaging in a wider debate on these different perspectives, it would be useful if the approach of the PSM is briefly stated up front so that readers may at least better appreciate some of the views articulated in this article. Briefly, a major point of distinction has been that some commentators and NGOs or other organizations seem to view S&T itself as part of the problem, inherently problematic, standing in opposition to people's interests and, in countries like India, bringing to bear Western cultural and ideational constructs inimical to the indigenous civilizational ethos and knowledge framework. There is a troubling tendency today of demonizing S&T *per se*. For DSF and the broader PSM, however, S&T *per se* is definitely not 'the enemy', and what impinges on people's interests is the manner in which S&T is institutionally constructed, administered and deployed, and how the state, corporates and other interest groups influence these processes. In this, S&T is no different from any other knowledge system. DSF/PSM has held the view that science can indeed be a weapon of empowerment in the hands of people and that S&T policies like other public policies are subjects of contestation in the social formation, and that S&T knowledge is not exclusively embodied in structures of the state and in expert bodies or individuals, but informed popular movements can also build their own capacities to participate in such contestations on an equal footing with S&T experts who customarily see themselves as privileged holders of knowledge beyond the reach of popular movements, which therefore ought to accept the experts' superior knowledge.

The PSM in India, and several other movements in India and abroad, operate with such a perspective and have, over the years, been able to hold their own in debates on S&T policy

especially as regards their impact on people's interests. In India, as we shall see, the Bhopal gas disaster was among the early sparks that crystallized this potential of the PSM in particular, and that of other S&T-capable people's movements in general, to demonstrate this capability and earn the respect, however grudging, of government officials and technocrats. Popular struggles on environmental issues, such as over Silent Valley in Kerala, and the contemporaneous and growing work on drugs and pharmaceuticals with which Dr. Amit Sengupta and several others were associated, were also important catalysts.

Amit, as a key activist of DSF and of the broader PSM, along with other colleagues, made major contributions to the understanding of, and official response to, the immediate and long-term health as well as rehabilitation issues stemming from the Bhopal gas disaster. Amit also played an important role in campaigns for appropriate policy formulation emanating from the tragedy and its prolonged aftermath, and to the continuing work of shaping the discourse regarding the role of S&T and related public policies. Many of these activities were catalyzed by the Bhopal gas disaster, but several of them took on significant lives of their own. Amit also gave several such initiatives institutional shape, bringing in other like-minded organizations and, in many cases, working to form new organizations in different States of the Indian Union or networks at the national level. This article seeks to highlight the salient aspects of these contributions made by Amit, and tries to capture the spirit in which he made them.

The disaster, DSF Report and aftermath

A DSF team comprising Prabir Purkayastha and Dinesh Abrol went to Bhopal on 9-11 December 1984 in the immediate aftermath of the Disaster to study the background and possible causes of the industrial accident and

its impacts. Both were engineers and founding members of DSF, the former with industrial experience in plant design and control systems, and the latter with research and work experience in S&T Policy Studies (also called Science, Technology & Society Studies or STS Studies in the UK and elsewhere). Other DSF members, including D. Raghunandan and C. P. Geevan, now in Kerala, stayed behind to compile other material, discuss the issue with experts, and help prepare the Report that was to be an outcome of this study. The team visited the worst affected areas near the Union Carbide plant, met several workers, engineers and managers of the factory, and also met with local doctors, scientists, political leaders and journalists, and gathered much valuable material.

The resultant Report (Delhi Science Forum, 18 December 1984), which was released within two weeks of the disaster, was a landmark. Its analysis of why and how the disaster happened provided a knowledge base for much of the popular movements to follow, and has remained to this day the definitive technical analysis of the event, not surpassed or superseded by any subsequent study including the government's own analytical report of 1985 (Varadarajan 1985) authored by the then Director General of the Council of Scientific and Industrial Research (CSIR), a network of over 40 government research laboratories covering different disciplines. The DSF Report helped focus the post-Bhopal popular movement and shape much of its immediate, short- and medium-term demands and orientation as regards industrial licensing, industrial siting policy, regulation of manufacture, storage and handling of hazardous materials, and regulation of occupational safety¹⁻⁵.

The Bhopal plant of Union Carbide (India) Limited (Ucil), was manufacturing the pesticide carbaryl (1-naphthyl methylcarbamate) under the brandname Sevin and producing and storing large quantities of extremely hazardous substances such as Methyl Isocyanate (MIC), phosgene (a substance used as a biological

warfare agent during World War I and II) etc. as intermediates. The technology had been transferred to Bhopal from the US-based plant in West Virginia, USA, built and operated by the parent Union Carbide Corporation (UCC).

The DSF Report revealed that the safety equipment in the Bhopal plant was severely under-designed compared to the plant in West Virginia, USA. Notably, unlike the US plant, the Bhopal plant did not have an additional emergency vent scrubber that could neutralize a sudden release of large quantities of MIC into the air as had happened that fateful night in Bhopal when contamination by water and other materials led to a runaway chemical reaction and the disaster. The Bhopal plant instead had only a normal scrubber designed to handle small and routine releases of toxic gases. Similarly, the flare tower in Bhopal was under-sized and could not handle the magnitude of MIC and other toxic gases discharged in a very short duration. Another major difference was that the US plant used MIC in an in-line process and therefore stored only small quantities of it, but the Bhopal plant used a less efficient process that required storage of MIC in a large tank on the premises. It was contamination of MIC in this tank that set off the chain of events that night in Bhopal.

Various other deficiencies and design defects in equipment in the Bhopal plant were also uncovered in the DSF Report. The chilling unit was not only under-designed, the contents in the tank, which should have been kept below 0°C, remained at ambient temperature (about 11° to 26°) since the refrigeration system had been shut off as much as six months earlier as a cost-cutting measure. There was no 'knock down' tank for taking liquid MIC from the storage tank. The entire safety system was manually operated rather than automatic and computer controlled as in the UCC plant in the US. The alarm system on the storage tank, meant to indicate any unusual rise in temperature or change in pressure, was malfunctioning and not properly monitored. Unlike the computerized system in the US,

there was no gas detection system in Bhopal except the workers' eyes themselves that are sensitive to MIC only at 2 ppm, which is 100 times the permissible limit.

Much of this was initially denied by UCC, but many facts were quickly confirmed, including by UCC officials at press conferences in the US, looking to allay fears among the American public about a similar event occurring in the US. In the weeks and months that followed, much more information flowed out of the US thanks to efforts by US-based activists and scholars, media investigations and freedom of information applications. Many of these activists had come in touch with DSF due to its Report.

Both Ucil and its parent UCC had kept confidential from the Union and State governments, supposedly on grounds of industrial secrecy and intellectual property, details of the manufacturing process, quantities of different input chemicals used, protocols to tackle emergencies like fire and sudden release of gases, and constituents, stability and toxicity of gases released in the eventuality of accidents. Information on safety precautions and emergency measures provided to employees and Ucil management were either strictly confidential or scanty. There was no practice at Ucil of conducting safety drills with workers at the plant, leave alone with the general public, unlike at the UCC plant in the US where public safety drills were regularly conducted, complete with instructions as to precautionary measures, treatment etc. Workers in the US plant also had detailed instructions about responding to emergency situations, and steps they could take manually to supplement the automated measures built-in to the plant equipment and processes. In Bhopal, as a result of this systematic concealment or dearth of information, neither the Ucil management nor the local authorities and hospitals knew how to respond to the disaster, what line of treatment to pursue, or what precautions to take, including even such simple measures as shutting windows or placing a wet cloth over one's nose and eyes. On its part, the Indian

government too did not conduct its investigations with any sense of urgency. In fact, as the DSF Report noted², it clamped down on information and actively discouraged Indian scientists and public health activists from undertaking independent studies, even while various foreign 'experts' had descended on Bhopal and were freely conducting all manner of studies, raising concerns in a section of the press and public as to the purpose of these studies and rumoured data-gathering linked to chemical weapons. The Right to Know or freedom of information therefore became yet another focal point of popular movements, although it would take over two decades to become institutionalized in Indian democracy, that too, with much ring-fencing around 'classified' or 'national security' areas, which are now increasingly being resorted to by the present government with its authoritarian tendencies.

The DSF Report highlighted these drastic shortcomings, and the culpability of licensing and regulatory authorities in permitting such 'blind' import of technology, faulty plant design and highly deficient equipment and safety measures, and concealment of vital information on process chemicals and possible reaction products in case of accident. Government also failed in responding to multiple incidents of toxic gas venting both inside and outside the plant.

Within roughly one year of the Bhopal gas disaster, on 4th December 1985, a leak of oleum gas (fuming sulphuric acid or H₂SO₄.O₃S) occurred from a factory operated by Sriram Foods and Fertilizers (SFF) in the capital, Delhi. The same complex also housed a cluster of many industries, including one making caustic chlorine. The plant was located in an old industrial part of Delhi, which had gradually come to be in the heart of the city, much like the Ucil plant in Bhopal had once been on the outskirts of Bhopal but had seen settlements growing around it in an unplanned and haphazard manner. Since the Bhopal disaster was very much in the minds of the people as well as the authorities, action was promptly

initiated in the form of immediate closure of the plant. A Public Interest Litigation (PIL) against SFF was filed in the Supreme Court, which appointed a three-person Committee including DSF's Prabir Purkayastha, due to his work on the DSF Bhopal Disaster Report, to examine the technical aspects and safety measures and, *inter alia*, recommend whether or not the plant could be reopened. The case and the consequent Supreme Court ruling became a landmark in environmental jurisprudence, partly because it was seen as somehow making up for the egregious role played by the Courts in the Bhopal Gas Tragedy case as discussed later. The judgment introduced the concept of strict liability of the company (in this case SFF) in industrial accidents, a concept that had been brushed aside in the Bhopal case, as probably would not have happened in the US with its strong base in tort law.

From the DSF view point, however, the SFF case and the role of the petitioner in the PIL, had several unfortunate outcomes. The case led to the wholesale shifting of all industries, not merely hazardous or polluting ones, out of Delhi causing enormous hardships to workers and their families, as also to others whose livelihoods depended on these industries. This became a part of a wider process of gentrification of the city, with shifting of working class settlements to the outskirts of the city, forcing workers to commute over long distances at huge expense in order to pursue their vocations in inner-city localities. A major outcome of the SFF case, and interactions during and after it with workers' unions and town planners, was that DSF got deeply involved with planning and other urbanization issues in Delhi, such as democratization of urban planning, public transport, mixed zoning, creation and restoration of urban commons, and industrial policy in the National Capital Region around Delhi.

In the longer term, the conflict of interest that can arise between workers' rights and environmental protection and sustainability, also became a crucial aspect of DSF's

perspective and agenda, especially given the fact that traditionally the Left had long viewed environmental issues with skepticism and as inimical to workers' interests.

Major new legislation and regulations were enacted over many years following the Bhopal gas disaster in response to sustained public pressure, with significant campaigns by, and contributions from, civil society organizations and popular movements including DSF and other PSM groups. Mention may be made here of the Environment Protection Act (1986), which brought under one umbrella earlier legislation on Air and Water Pollution, and brought under its framework the Central and State Pollution Control Boards, the Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules (1989), Environment (Siting for Industrial Projects) Rules (1999), Hazardous Wastes (Management & Handling) Amendment Rules (2003), all of which went through several amendments in subsequent years in response to both industry pressure and popular advocacy.

As noted by a DSF Review presentation at a National Seminar commemorating the 25th anniversary of the Bhopal disaster, actual implementation, monitoring and enforcement of most of these regulations, however good they may seem on paper, have left much to be desired. This is a common problem with legislation in India, where institutional capacity is weak and enforcement is lax compared to the requirement. DSF therefore continues to campaign on implementation issues even after enactment of protective legislations which should not be viewed as ultimate outcomes of advocacy and popular campaigns.

Clinics and other interventions for Bhopal gas victims

Hospitals in Bhopal, especially those run by the government, responded to the disaster

with commendable dedication and due sense of urgency, despite being hampered by lack of information. The DSF Report noted that Bhopal was the first known case of mass release of MIC gas, rather than liquid, into the atmosphere. Given the absence of guidance from UCC/Ucil or government, and the dearth of information from the literature regarding the possible effects of MIC gas on humans, animals and the food chain, doctors provided symptomatic treatment and actions based on available information and collective brainstorming. On their part, government agencies were extremely slow in arriving at even preliminary findings and making them public. In this context, many doctors and health activists working with non-government organizations or informal groups took the initiative to set up local clinics in the gas-affected areas to provide treatment to victims, at least until such time as the government health system started regular and systematic treatment, care and monitoring of victims, and also interacted and networked with each other in sharing knowledge and results of studies, field surveys and other experiences.

Dr. Amit Sengupta played a leading role in these efforts as well as in networking with several young doctors of Bhopal led by the late Dr. Ajay Khare, who played a key role in founding a new PSM organization called Madhya Pradesh Vigyan Sabha (MPVS) (or Madhya Pradesh Science Group) working in the State of which Bhopal is capital. Dr. Khare was to become a key figure in the Jan Swasthya Abhiyan (People's Health Movement - PHM in India) or JSA, and one Dr. Harindra Agarwal. This group ran one of the clinics in Bhopal and, working with DSF, intervened in other ways to assist with treatment, relief and rehabilitation of victims.

Amit contributed several paragraphs and sections to different parts of the DSF Report, including a detailed annexure on organic isocyanates, possible chemical reactions and resultant products, and some information on potential effects, symptoms, toxicology and so on. The 2nd reprint of the Report in

April 1985 also contained another annexure reproducing an important Joint Statement by DSF, Medico Friends Circle and Voluntary Health Association of India, all well-regarded organizations working in public health and the wider public interest on S&T issues, on the line of treatment of Bhopal gas victims. The Statement related to a controversy that had arisen, notably between the government and non-governmental organizations, regarding the efficacy of treatment with sodium thiosulphate in the early aftermath of the disaster.

The issue related to whether or not hydrogen cyanide (HCN) was among the gases released into the atmosphere in Bhopal. The Joint Statement held that by all accounts it was, that temperatures in the MIC tank were well in excess of 200°C when MIC dissociates producing nitrous oxides, carbon monoxide/dioxide and HCN. By end-January 1985, studies by the Indian Council of Medical Research (ICMR) had shown evidence of symptomatic relief with sodium thiosulphate and urinary excretion of sodium thiocyanates, prompting ICMR to issue guidelines for sodium thiosulphate treatment, despite which this line of treatment was being avoided in Bhopal public hospitals. The Joint Statement demanded that authorities issue appropriate guidance to enable victims to benefit from the therapeutic value and detoxifying effect of sodium thiosulphate.

DSF and MPVS also conducted a survey of over 5000 households in the worst affected areas of Bhopal, till then the largest such survey. Results of the survey were also made available to other non-government organizations to utilize as they desired. Raghunandan, with background in both engineering and sociology, led the team to design the Survey and analyze its results, with Amit of course also involved along with Dr. Ajay Khare and other activists in Bhopal playing a major role in data collection. DSF's sister organization, the Centre for Technology & Development (CTD) which Raghunandan leads to this day, and which undertakes action research activities for development and application

of technologies for pro-poor livelihoods and habitat, also undertook along with MPVS a government-funded project to install energy-efficient 'smokeless' wood-burning cook-stoves in homes of gas victims. Such stoves, improved versions of stoves normally used by rural and urban poor households, are designed for better combustion and vent the exhaust gases and smoke outside the home using a chimney, thereby significantly reducing indoor air pollution and load on the badly affected lungs of gas victims. Along with Dr. Anwar Jafri of Eklavya, another PSM organization in Madhya Pradesh specializing in alternative pedagogies for science and social science teaching for middle-school children, CTD also set up and for many years jointly managed a new Trust for rehabilitation of gas victims through a manufacturing Unit in the gas affected areas. This Unit made leather goods using light sewing machines and other such equipment that would not demand strenuous physical effort from gas victims who were employed there. A former manager of Ucil, wanting to give back to the community, acted as manager of this Unit which ran successfully for many years.

Several other non-governmental organizations undertook a range of activities aimed at medical assistance, legal aid and studies in the area. While a comprehensive listing is not being attempted here, mention may be made of a 1996 report by the Bhopal Group for Information & Action (BGIA) looking at solid and liquid wastes dumped all around the Ucil plant over a long period during 1969-77 and 1977-84, which then contaminated groundwater, soil and the general environment with all kinds of toxic including carcinogenic chemicals. Many tons of other by-products such as tarry residues and alpha-naphthol had been stored in the open or in poor condition within the plant boundary, and had slowly washed away and leached into the ground. In 1999, Greenpeace International had studied samples of soil and groundwater around the factory and from wells in nearby residential areas, mostly slums, and found high levels of mercury,

chromium, copper, nickel, lead and also toxic organo-chlorines. In 2002, Srishti published results of a study, based on tests carried out at the prestigious Indian Institute of Technology, Kanpur, of the trajectory of chemical pollutants through the food chain. It reported that soil, groundwater and vegetables were contaminated with toxic chemicals and heavy metals, while breast milk was found to contain carcinogenic organic compounds and benzene hexachloride, which could only have originated from the Ucil plant. The People's Science Institute (PSI), Dehradun, in 2001 found that water in tube-wells, hand pumps, solar evaporation ponds inside Ucil plant, and an open well in the area, all had high levels of mercury.

Judicial and government callousness and worse

The enormity of the disaster, as well as the clear, knowingly inadequate safety measures provided at the Ucil Bhopal plant by the parent UCC (USA), and other acts of commission and omission such as poor maintenance, lack of precautionary measures in view of several earlier gas leakages from the Plant, absence of information at and from Ucil or UCC about possible composition and nature of leaked gases, precautions to be taken by workers and citizens in the Plant vicinity, were all both then and now are well known and widely acknowledged. Yet the struggle of the Bhopal gas disaster victims for justice, proper medical treatment, rehabilitation, and fair compensation has been long, lonely, arduous and ultimately less than fruitful. The victims have, throughout, faced the full might of US-based Multinational Corporations (MNCs) with tacit support of the US Government and the enormous pressure they can together bring on a developing country like India. There has also been callous disregard for victims' welfare and willful avoidance of proper response by the civil authorities in India at both the State and the Centre. Perhaps worst of all, the

country has witnessed what is widely regarded as callous denial of justice to Bhopal disaster victims, and collusion with the Indian State and corporate interests by sections of the judiciary in India, right up to the highest Court in the land. Unfortunately, this came at a juncture when the Indian public had come to hold the Courts in high regard as the last resort for grievance redressal in a governance system widely perceived as self-serving, corrupt and venal.

Faced with the recalcitrant behaviour and dilatory tactics of UCC and Ucil, and the insensitive response by government authorities, victims took to the Courts early for fixing responsibility, seeking adequate compensation, and for relief and rehabilitation. However, the judicial process has proceeded in a lackadaisical manner, dragging on even till today, and is briefly recounted below in three broad sections viz: (a) the criminal case, (b) the civil case for compensation, and (c) the civil case for medical relief and rehabilitation.

Over the years several organizations and individuals have appeared in the Courts for and on behalf of Disaster victims, despite the State having declared itself as their sole representative, obviously due to the prevailing and persistent trust deficit. Among the most consistent of these litigants, to this day, has been the Bhopal Gas Peedit Sangharsh Sahyog Samiti (BGPSSS) (Bhopal Gas Victims' Struggle and Solidarity Society) of which DSF has been a key part, along with all major trade unions, students', youth and women's organizations, and several NGOs and concerned individuals. On behalf of DSF, Jayaprakash has followed and looked after this part of the Bhopal related work, from the Disaster down to the present time.

(a) Criminal case

On the night of December 3, 1984, the Station House Officer (SHO) of the Hanumangunj Police Station in Bhopal registered a case as required under Section 304-A (causing death by negligence) of the Indian Penal Code (IPC)

and arrested five officers of Ucil. On December 7, 1984, Warren Anderson, Chairman UCC, Keshub Mahindra, Chairman, Ucil and V. P. Gokhale, Managing Director, Ucil, were arrested on arrival in Bhopal. However, Anderson was released within six hours on bail of Rs.25,000 (\$2200 in 1984). He was flown immediately to Delhi on a State Government aircraft and from there allowed to leave the country, never to return, and the US never agreed to extradite him to India despite having declared him a willful absconder. All other accused were also granted bail within two weeks. India's premier criminal investigation agency, the Central Bureau of Investigation (CBI) took over the case on December 9, 1984.

On February 14, 1989, after much lobbying, the US Administration finally granted permission to the CBI to inspect the safety systems of UCC's pesticide plant in West Virginia, USA, for purposes of comparing the safety standards with that of the safety systems installed at the Bhopal plant. However, the CBI was thwarted from carrying out the inspection due to the abrupt, all-encompassing settlement between UCC, Ucil and the Indian Government in the Supreme Court of India on February 14-15, 1989, including the quashing of all criminal cases arising from the Bhopal gas disaster, despite protestation by victims who were denied a hearing by the Court. (This is further discussed under the sub-section on the Civil Cases). The Supreme Court revoked the quashing of criminal cases on October 4, 1991, and the Chief Judicial Magistrate's (CJM) Court in Bhopal consequently revived the criminal cases in India against all the accused on November 11, 1991.

In April 1993, the Sessions Court, Bhopal, (institutionally higher than the Magistrate's Court) framed charges against all the major accused of Ucil for various offences under the Indian Penal Code (IPC). After the High Court of the State of Madhya Pradesh rejected the appeals against that order, the Supreme Court in April 1996 upheld the Appeals filed by the accused and reduced the severity of

charges against them from culpable homicide to negligence. Various other charges too were reduced to minor ones. Subsequently, trial against the accused proceeded before the court of the CJM, Bhopal. On June 7, 2010, the CJM found the accused guilty of various offences as charged and sentenced them to 2 years imprisonment and a fine of Rs.100,000 (US\$ 2187) for some charges and paltry fines of Rs.50, Rs.250, and Rs.1000 for others. All the convicted were released on bail.

The convicted Ucil managers and officials filed appeals before the District & Sessions Court, Bhopal, where the matter has been pending for the last nine years! Cases against the absconding accused, namely Union Carbide Corporation, USA, and Union Carbide Eastern, Hong Kong, are still pending before the Court of the CJM, Bhopal, with the parties neither appearing nor being proceeded against *ex parte*, and the successor company Dow Chemical disowning any liability for the Bhopal disaster. Thus the Bhopal disaster remains a crime that, magically, no MNC committed, and for which their Indian subsidiaries have yet to be finally pronounced guilty!

(b) Civil case (compensation)

By an Act of Parliament passed on March 29, 1985, the Union of India (UOI), i.e. the Indian State, was declared as the sole legal representative of all Bhopal gas disaster victims, putting a legislative stamp on the administrative Ordinance promulgated by the President of India in the previous month. On April 8, 1985, legal proceedings for recovery of compensation for the Bhopal victims were initiated by UOI against UCC in the Southern District Court of New York. Roughly a year later on May 13, 1986, this Court dismissed UOI's plea on the grounds that courts in the USA were not the appropriate forum. The Indian government simply went back to the Indian courts and filed suit for damages in the District Court of Bhopal in September 1986, while several activist groups in the US persisted with various appeals and writs, ultimately however to little or no avail.

On December 17, 1987, following a proposal mooted by representatives of the Bhopal victims and one put forward by the Court itself, the Bhopal District Court ordered UCC to pay interim compensation of Rs.3500 million (\$270 million in 1987) to the Bhopal gas victims. On April 4, 1988, on UCC's appeal, the High Court of Madhya Pradesh modified the order of the Bhopal District Court and reduced the compensation amount to Rs.2500 million (\$180 million). Both UCC and UOI filed appeals against the High Court order before the Supreme Court of India.

On February 14-15, 1989, when the matter came up in the Supreme Court, the Court 'assisted' a settlement of the main suit itself. After disposing of the original suit in the Bhopal Sessions Court without ruling on it, the Supreme Court directed that there be an overall settlement of claims in the suit for \$470 million (about Rs.7130 million at the time) and termination of all other civil and criminal proceedings. The settlement amount was arrived at on the assumption of a mere 3,000 dead and 102,000 injured due to the Disaster.

On October 3, 1991, the Supreme Court of India, in response to review and writ petitions filed by BGPSSS, Bhopal Gas Peedit Mahila Udyog Sangathan (BGPMSUS) or Bhopal Gas Victim Women's Enterprises Organization, and others, revoked the criminal immunity granted to all the accused in the case. However, the Court upheld the validity of the rest of the terms of the settlement including the compensation amount.

Adjudication of over 1 million claims took 12 years to complete, from 1992 to 2004. Over 40 Claims Courts set up for the purpose determined that the number of dead was over 5,000 and the number of injured in varying degrees of severity was around 569,000. Meanwhile, the compensation amount of \$470 million (Rs.7130 million at the time), which had been retained in a dollar account, rose in value to around Rs.30,000 million by 2004. The Claims Courts settled all the claims at around Rs.15,000 million.

After the matter was brought to its notice by a few individual victims, the Supreme Court ordered on July 19, 2004, that the balance

compensation amount be disbursed on a pro rata basis to all victims whose cases had been settled by the Claims Courts. Despite this order, the victims effectively received less than one-fifth of the compensation they should have got under the terms of the Bhopal Settlement. It may be noted that, out of the settlement sum of Rs.7130 million, Rs.1130 million was set aside for those who had lost property, livestock etc., and for specialized medical treatment. In other words, Rs.6000 million was to be disbursed among the assumed number of 105,000 gas victims at an average of Rs.57,143 per victim (at 1989 value). However, as on December 30, 2008, no less than 574,367 gas victims as recognized by the Claims Courts were actually awarded compensation working out to an average of Rs.12,410 per victim (at 1989 value), with almost the entire settlement amount of Rs.7130 million being utilised for the purpose. Therefore, in September, 2004, BGMUS and BGPSSS filed applications before the Supreme Court seeking enhancement of compensation by a factor of 5 given the magnitude of the disaster as acknowledged by the Supreme Court. However, on May 4, 2007, the Supreme Court rejected this application on the ground that determination of facts was the task of the Welfare Commissioner, Bhopal.

In August, 2008, 9 gas-victims belonging to BGMUS and BGPSSS filed a joint petition before the Welfare Commissioner, Bhopal, urging payment of compensation at least at the value of the rupee prevailing on the date of the Settlement and as per its terms. On January 31, 2009, the Welfare Commissioner rejected this petition, and the High Court too dismissed the appeal by the petitioners. BGMUS and BGPSSS filed a Special Leave Petition against the order of the High Court before the Supreme Court of India, which the Court admitted in April, 2010, and where the matter is still pending.

Surprisingly, on December 3, 2010, UOI too filed a Curative Petition against the Bhopal Settlement of February 14-15, 1989, seeking an additional amount of Rs.70,000 million as compensation from Dow Chemicals Company, the present owners of UCC, so as to augment the

compensation awarded to gas-victims as well as to remediate the contaminated environment around the Bhopal plant by Ucil as a result of toxic wastes dumped prior to the Disaster. While in principle supporting the Curative Petition filed by UOI, BGMUS and BGPSSS filed an Interlocutory Application on October 23, 2013, (with an Additional Affidavit dated September 7, 2015) to rectify inadequacies in UOI's Curative Petition and seeking grant of appropriate relief on the basis of pleas made by the Interveners. It is hoped that the Constitution Bench will hear this long pending matter in July 2019.

(c) Civil case (medical)

In August 1985, on behalf of some gas victims and others, reputed attorney Ms. Indira Jaising of Lawyers Collective filed a writ petition in the Supreme Court alleging that the State of Madhya Pradesh and Union of India (UOI) had failed to provide proper medical treatment to the victims. In November 1985, the Supreme Court ordered the setting up of a 7-member independent Expert Committee to look into the grievances of the victims and propose remedial measures. On October 26, 1987, a Minority Report was submitted by 2 of the 7 expert committee members highlighting the adequacy of the medical treatment being provided to the victims. A month later, the Supreme Court again directed UOI to submit an affidavit detailing medical treatment being given to the gas victims. However, the UOI ignored that directive, and soon, the abrupt Supreme Court-'assisted' settlement of February 14-15, 1989, provided the excuse desired by UOI to wash its hands of the responsibility to provide adequate medical care to the Bhopal disaster victims.

In 1994, the ICMR suddenly shut down its Bhopal Gas Disaster Research Centre, which had initially been set up in 1985 to coordinate all research on the Disaster. In 1995, it was converted to a Centre for Rehabilitation Studies and placed under the Bhopal Gas Tragedy Relief & Rehabilitation Department of the State

Government. In practical terms, this meant that monitoring of the health status of gas victims came to an almost complete halt. In January 1998, BGP MUS, BGPSSS and the Bhopal Group for Information & Action (BGIA) knocked on the doors of the Supreme Court once again with a writ pleading for the right of all Disaster victims to receive free and appropriate medical care, for resumption of disaster-related medical research by ICMR, and for issuance of health cards to Disaster victims with full information on his/her medical status.

On August 9, 2012, a full 14 years later, the Supreme Court ruled in favour of the Petitioners and issued several directions yet again, and also ordered the High Court of Madhya Pradesh to monitor the execution of these directions by the concerned agencies, including the Ministry of Health & Family Welfare (Government of India), the Bhopal Gas Tragedy Relief & Rehabilitation Department (Government of Madhya Pradesh), ICMR, and the Bhopal Memorial Hospital & Research Centre (BMHRC), Bhopal.

Even seven years after this, the explicit orders of the Supreme Court remain largely unexecuted. The matter is currently pending before the High Court of Madhya Pradesh.

There is seemingly no end to the travails of the Bhopal gas disaster victims, and all the vaunted powers of the Union and State Governments under different political dispensations, and all the majesty of the highest Court of the land, are unable to provide them the minimum succour the victims have waited for over the past 35 years.

AIPSN formation & other networking

DSF was involved in networking with different non-government organizations and popular movements, not only as a direct result of activities linked to the Bhopal gas disaster as seen above, but also in response to other concerns related to public health and science and

technology policy or deployment by the state or corporate entities. Such networking led to formation of several issue-based coalitions especially, relevant to this article, in the area of public health. This coalition building also led to the formation of the All India People's Science Network (AIPSN), a formal coming together of People's Science Movement organizations in different states. Amit played a key role in forming, giving shape to, as well as running several of these networks.

The Bhopal disaster itself spawned a wide range of activities involving public interest groups around themes such as industrial policy including siting, regulation of hazardous industries and substances, occupational health, and legal and regulatory frameworks governing each of these. Many organizations working on health issues either expanded their ambit of work to include some of these themes, or gave more specific focus to them due to experiences around the Bhopal disaster. For other organizations, these themes became new focus areas and part of longer-term public policy agenda.

Pharmaceuticals and their different dimensions of public health, industrial policy, patents and intellectual property, regulation and pricing, emerged as a major concern and focus of activities for many of the groups that had got involved with health-related issues in the Bhopal disaster and also brought in several others. For DSF, the All India Drug Action Network, of which it was then a part, and its several constituent organizations, was an important such coalition. In parallel, DSF was also working closely with other health-centred groups such as the Lok Cehat Manch (People's Health Platform) in the state of Punjab, the People's Polyclinic group and Praja Chaitanya Vedika (People's Awareness Forum) in Andhra Pradesh, Arogya Dakshata Mandal (Health Promotion Group) in Maharashtra, and the newly formed Madhya Pradesh Vigyan Sabha, other older PSM groups with major thrust in health-related activities such as the Kerala Shastra Sahithya Parishat (Kerala Science and Culture Organization) or

KSSP, Tamil Nadu Science Forum, Pondichery Science Forum and others.

Over time, many of these groups and other individuals became nuclei of broader PSM Organizations in the States. The work on the Bhopal disaster in its different dimensions, particularly regarding critiques of S&T policy, related advocacy campaigns, and raising awareness at the grassroots so as to promote informed participation of people in decision-making on these issues, led to deeper and more widespread networking throughout the country. DSF and some older PSM groups, especially the highly experienced and influential KSSP from Kerala, played active roles in these efforts. Amit, who was already engaged in effective networking with health groups, was among those leading these endeavours to nucleate new PSM Organizations in all major States of the country.

The Federation of Medical & Sales Representatives Association of India (FMSRAI), a union of sales representatives of various pharmaceutical companies, which also joined the AIPSN, is a unique organization. FMSRAI has either bought or rented premises in many district towns throughout India as an accommodation for sales reps while on their rounds in different towns and cities, and as a place to hold study classes and workshops on technical as well as public interest issues related to the pharmaceutical industry.

This networking process was given a huge fillip by the organization of the Bharat Jan Vigyan Jatha (BJVJ) or All-India Peoples Science Festival in 1987 by the People's Science Movement. The BJVJ comprising 4 traveling troupes from different corners of the country, traversed through 500 villages and towns of this vast land, covering over 25,000 km and converging on Bhopal, roughly in the centre of the country and which had now come to acquire enormous symbolic significance as the site of the gas disaster which brought to light various issues relating to industrial and S&T policy formulation and implementation. This Festival, as an activity embracing science

popularization and promotion of a critical approach, also received crucial financial support from the government of the day, notably its National Council for S&T Communication (NCSTC). However, the relationship between the NCSTC and the PSM soon soured when the PSMs' critical approach became a source of friction with the government.

DSF provided the Secretariat for the BJVJ, and Amit played a major role in organizing and preparing communications material for it, as did Jayaprakash, while Raghunandan was its Organizing Secretary and was elected as the first Executive Secretary of the AIPSN in 1989 once the coalition of like-minded PSM organizations catalyzed by the Festival formalized itself as the AIPSN. Amit was later to become AIPSN Secretary during 2000-2004.

DSF organized an important Seminar in Delhi on a National Drug Policy in April 1986 in collaboration with some of these organizations, along with some new partners. This was preceded, and followed, by considerable work by different groups on irrational and combination drug therapies, on corporate malpractices, pricing, and need for social control, accountability and regulation of the drug industry. A book consisting of important papers presented at the Seminar and edited by Amit Sengupta (Sengupta A., 1986), was published by DSF and FMRAI (as it was then called). The book became famous as a reference work and resource material for further work, and firmly established Amit as a leading expert on the Indian pharmaceutical industry. Combined with his later work on intellectual property in general and the Indian Patent Law in particular, in the years that followed Amit became the go-to person for the media especially from the business press, health activists and advocacy groups and academics from India and abroad. Despite not having a PhD himself, Amit was selected as a joint supervisor for many doctoral candidates.

This work led organically to considerable study and activism by DSF and other groups on issues related to the health sector, especially after the rapid march of privatization in India

post its embrace of economic liberalization and globalization in the 1990s, and the assault on state sector enterprises by multinational companies and through government policy. Enormous pressure was mounted on India during this period through the World Trade Organization (WTO), General Agreement on Tariffs and Trade (GATT) and other international institutions to bring its rather unique patent laws, with leeway for process patents rather than product patents, and its famous generics industry, into conformity with norms imposed by the global North.

DSF in general, and Amit in particular, played a major role in launching and running the National Working Group on Patent Laws (NWGPL), which had as members many non-government organizations including DSF as well as sections of the Indian drug industry, and conducted a prolonged, sustained and influential campaign on intellectual property rights as well as on the specifics of Indian patent laws. This long campaign culminated with passage of crucial amendments to the revised Indian Patents Act, a legislation brought to Parliament under pressure from WTO and Western governments. Due to intense advocacy efforts of the NWGPL and many domestic and international civil society organizations and popular movements, and the active support of Left political parties inside and outside Parliament, the amended legislation as finally passed contained 11 out of 13 clauses proposed by the popular campaign, included many clauses protecting provisions from the earlier Patent Law taking into account contemporary developments. The battle with MNC drug companies and Western governments, notably the US, continue to this day.

Within India, DSF took forward its networking with civil society organizations in the field of health which, over time, led to formation of the Jan Swasthya Abhiyan (JSA) or PHM in 2000 during the build-up to the global Assembly in Dhaka, Bangladesh. On behalf of DSF/AIPSN, Amit played a lead role in these efforts. We shall not delve further into

the history of JSA since readers of this Issue would be familiar with it.

International Networking

Likewise, DSF, and Amit in particular, played a major role in forging international linkages and building a global movement to advance peoples interests in public health. These eventually led to the formation of the global PHM and its many multi-country activities towards crystallization of a common understanding among civil society organizations and popular movements across the world, training and capacity-building of PHM activists, and efforts at advocacy and interaction with national governments and international bodies. (See Baum, Nayaran and Sanders in this Issue for more about PHM.)

From the mid-1990s onwards, following an initiative by popular movements in Brazil, an annual World Social Forum (WSF) came to be organized, as a platform opposed to capitalist globalization in response to the World Economic Forum (WEF) held annually in the Swiss town of Davos. The WEF brought together many heads or leading figures of governments, heads of multi-lateral organizations especially the Bretton Woods institutions, and leaders of major multinational and other corporations to discuss and take forward the global capitalist agenda. In contrast, the WSF brought together movements and groups opposed to this agenda. In the midst of a rising tide of anti-capitalist movements around the world, including the militant street protests at major international gatherings such as G-20 Summits etc. and the 'occupy' movements, the WSF provided a platform for discussions and networking between all those who were opposed to capitalist globalization but had different strategies, tactics and outlooks regarding preferred alternatives, around the common slogan 'Another World is Possible'.

The WSF events themselves were a 4-5 day set of self-organized seminars and workshops

by civil society organizations, non-government organizations and especially popular movements, all seeking to bring about convergence around ideas, goals, alternatives and means of struggle. The organizing principle of the WSF were horizontal, non-hierarchical and democratic structures, no binding collective decisions or resolutions, full respect for divergences of opinions especially as regards alternatives and means of achieving them, but keeping out armed groups, corporate-funded entities, governmental bodies and political parties *qua* parties, recognizing that individual participants may indeed be activists of this or that political party. In the initial few years, an International Committee (IC) to coordinate efforts, funding etc was largely Brazilian, as were the Venues of the Forum itself, but this gradually opened up as the movement itself expanded into newer areas, notably including India.

In India, DSF/AIPSN was among the organizations and movements to join this global effort early, along with a diverse set of organizations with different ideological orientations. As this network gradually grew, it came to be seen as possibly the broadest coalition of groups since the Independence movement and the struggle against the Emergency regime (1975-77). Amit, Prabir Purkayastha and Raghunandan of DSF were the major DSF/AIPSN representatives in the 'India Organizing Committee', whose task it was to coordinate and steer the efforts and expand the network of like-minded groups, and with the last-named elected to act as Executive Secretary of the Trust set up for administrative purposes. An additional 'exclusionary' criterion of keeping out communitarian and religious fundamentalist organizations was adopted in India, keeping in mind the rise and aggressive stance of right-wing Hindu-fundamentalist forces in the country (which have unfortunately been elected since then to form the Union Government in India in two successive general elections in 2014 and 2019).

Large contingents from India participated in the WSF events in Brazil. The IC sought

to experiment with holding the WSF outside Brazil and, as a test or trial run, asked WSF-India to organize an Asian Social Forum (ASF) in India. The ASF was organized in the southern city of Hyderabad in July 2003 with the above-mentioned DSF figures playing a leading role in its organization and AIPSN participating in strength in organizing different Seminars/Workshops. IC observers, impressed with the very different and decidedly developing-country flavour they saw in Hyderabad, then passed the baton of organizing the global WSF outside Brazil for the first time to the India team. The very successful WSF in Mumbai in 2004, in which Amit played a crucial role, has come to be highly-regarded in the annals of the WSF events. Following this success, an Indian Social Forum was held in Delhi November 2006 in which, again, DSF played a key role.

Amit also represented the global PHM in the IC and, since he was there, the WSF-India Committee too.

As part of the WSF effort, but organizationally on the sidelines outside the Forum, an effort was made to initiate a World Forum for Science & Democracy (WFSD) in 2007 in which, again, DSF/AIPSN especially the three above-named persons including Amit played a major role. The WFSD sought to bring together groups of working scientists, associations and unions of scientific workers and popular science movements like the AIPSN on a common platform overlapping the anti-capitalist agenda of the WSF. Several such WFSD events have been held on the sidelines of successive WSFs.

On behalf of the JSA and Asian Community Health Action Network (Achan), Amit also co-ordinated the work of several civil society organizations during 2005-07 in different countries towards the civil society report for the WHO Commission on Social Determinants of Health. He also worked hard in editing and compiling the 3rd, 4th and 5th publications of Global Health Watch in 2011, 2014 and 2018 respectively, a quadrennial collection of essays

from different countries, adding to his many important contributions to the academic work of the global PHM.

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Collaborators

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