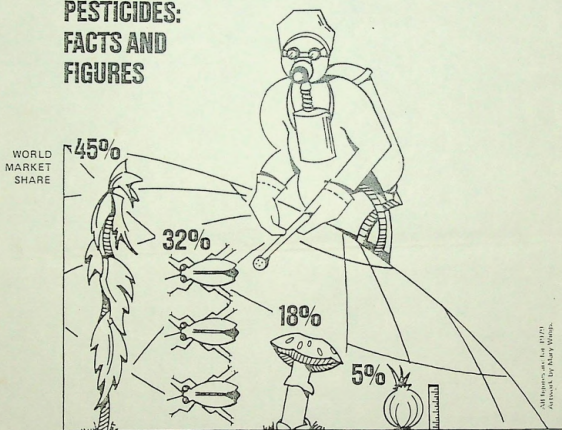


PESTICIDES: FACTS AND FIGURES



All figures are in US \$ million
Although, not shown in figure.

TYPE:	HERBICIDES	INSECTICIDES	FUNGICIDES	OTHERS	ALL TYPES																																																														
SALES:	\$ 6,000 million	\$ 4,500 million	\$ 2,600 million	\$ 660 million	\$ 13,760 million																																																														
USE:	Used to control weeds, particularly in developed countries where labour is expensive. Applied mainly to maize and soyabears.	Controls insect pests. Main use is on crops in tropical and subtropical climates.	Counteracts fungal diseases. Mainly applied to crops with a high market value such as fruit and vegetables.	Includes plant growth regulators, nematocides and fumigants. Use of PGRs is increasing rapidly.																																																															
WORLD USE BY AREA	<table border="1"> <tr><td>N. America</td><td>52%</td></tr> <tr><td>W. Europe</td><td>21%</td></tr> <tr><td>Japan</td><td>8%</td></tr> <tr><td>E. Europe</td><td>12%</td></tr> <tr><td>Others</td><td>7%</td></tr> <tr><td>Total</td><td>100%</td></tr> </table>	N. America	52%	W. Europe	21%	Japan	8%	E. Europe	12%	Others	7%	Total	100%	<table border="1"> <tr><td>N. America</td><td>23%</td></tr> <tr><td>W. Europe</td><td>13%</td></tr> <tr><td>Japan</td><td>13%</td></tr> <tr><td>E. Europe</td><td>12%</td></tr> <tr><td>Others</td><td>39%</td></tr> <tr><td>Total</td><td>100%</td></tr> </table>	N. America	23%	W. Europe	13%	Japan	13%	E. Europe	12%	Others	39%	Total	100%	<table border="1"> <tr><td>N. America</td><td>15%</td></tr> <tr><td>W. Europe</td><td>37%</td></tr> <tr><td>Japan</td><td>20%</td></tr> <tr><td>E. Europe</td><td>19%</td></tr> <tr><td>Others</td><td>9%</td></tr> <tr><td>Total</td><td>100%</td></tr> </table>	N. America	15%	W. Europe	37%	Japan	20%	E. Europe	19%	Others	9%	Total	100%	<table border="1"> <tr><td>N. America</td><td>44%</td></tr> <tr><td>W. Europe</td><td>37%</td></tr> <tr><td>Japan</td><td>7%</td></tr> <tr><td>E. Europe</td><td>6%</td></tr> <tr><td>Others</td><td>6%</td></tr> <tr><td>Total</td><td>100%</td></tr> </table>	N. America	44%	W. Europe	37%	Japan	7%	E. Europe	6%	Others	6%	Total	100%	<table border="1"> <tr><td>% OF TOTAL PESTICIDE USE BY AREA</td><td></td></tr> <tr><td>N. America</td><td>34%</td></tr> <tr><td>W. Europe</td><td>22%</td></tr> <tr><td>Japan</td><td>12%</td></tr> <tr><td>E. Europe</td><td>13%</td></tr> <tr><td>Others</td><td>19%</td></tr> <tr><td>Total</td><td>100%</td></tr> </table>	% OF TOTAL PESTICIDE USE BY AREA		N. America	34%	W. Europe	22%	Japan	12%	E. Europe	13%	Others	19%	Total	100%
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ICJIB

INTERNATIONAL COALITION FOR JUSTICE IN BHOPAL
A network of seven groups campaigning on behalf of the Bhopal victims

OH7:1

For further information:
Contact the ICJIB Member
Nearest You

FOR RELEASE:
28 July 1987

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U S A
- BHOPAL DISASTER MONITORING GROUP
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Shinjuku-ku, Tokyo 160
Japan
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Southall, Middlesex UB2 4PB
U K
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Regional Office for Asia and
the Pacific
P O Box 1045
10430 Penang
Malaysia

IMPORTANT

IMMEDIATE RELIEF FOR VICTIMS URGED

*International Coalition of Voluntary Organizations
Charges Union Carbide and Indian Government
with Neglect of Victims*

A worldwide coalition of voluntary organizations called today for the creation of an independent Bhopal Gas Victims Relief Commission to administer a vigorous and comprehensive program of interim relief for victims of the worst industrial disaster in history.

Citing widespread evidence of neglect and abuse of the 200,000 surviving victims of this disaster, a Special Report released simultaneously around the world by the seven member groups of the International Coalition for Justice in Bhopal urged that an independent body be created as soon as possible to undertake responsibility not only for the health care, nutrition, and other basic needs of the victims, but also their vocational rehabilitation and the creation of opportunities for employment.

The Commission, which should be governed by eminent Indians with significant experience in conducting relief operations, must be completely independent of local government, the ICJIB report insisted, because of widely reported failures by local government agencies to meet victim needs. The Commission would assume full accountability for proper use of funds, which should be provided by Union Carbide.

Funding of such interim relief operations is entirely in accordance with established common law principles in both India and the United States that any party responsible for causing

widespread pain and suffering is under obligation to mitigate that pain and suffering.

The Bhopal disaster occurred on December 2-3, 1984, when a Union Carbide pesticide plant leaked poisonous gases over large sections of the City of Bhopal. The official death toll stood at 2,253 as of last October, and continues to climb. Unofficial estimates place the toll much higher; between 5,000 and 10,000 is regarded as a conservative figure by these sources.

The ICJIB Special Report, We Must Not Forget: A Plea for Justice for the Bhopal Victims, is based on an independent investigation undertaken since the formation of ICJIB on the second anniversary of the disaster in December 1986. It examines Union Carbide's tactics to minimize its liability and to delay legal redress of the victims' claims, its aggressive public relations campaign, and the substantial reduction in its capacity to satisfy a meaningful judgment for the victims through sale of its assets.

The Special Report also looks at the Indian government's relief efforts thus far, the impediments to voluntary relief efforts by the local government, and other evidence of neglect of the victims.

Simultaneously with the release of this Special Report, ICJIB has issued a statement on its campaign for justice for the victims. The Coalition, which is comprised of voluntary groups in Britain, Netherlands, Malaysia, Hong Kong, Japan, and the United States, has collected close to 2,000 signatures and enlisted the active support of over 70 concerned groups around the world in urging both Union Carbide and the Government of India to release previously unavailable information crucial to achieving justice for the victims.

ICJIB strongly endorses the initiative of the judge in Bhopal handling the major litigation over the disaster, M.W. Deo, when he recently urged that "conciliatory substantial interim relief" be provided to the victims. According to press accounts, he made this proposal because of both the serious plight of the victims and his recognition that the litigation is still, even after almost three years, in the preliminary stages.

The Coalition continues to seek the support of other groups, the media, and concerned citizens throughout the world in confronting five

tragic lessons from the Bhopal disaster that compel immediate global action:

- Corporate irresponsibility in exposing workers and communities to highly hazardous substances and processes.
- Corporate ability to evade responsibility for harms inflicted and to defraud victims of corporate misconduct.
- Corporate ability to coopt and indeed suborn Third World professionals.
- Corporate ability to fabricate and promote misinformation through public relations' efforts and unequal access to media by corporations as compared with their victims.
- Bureaucratic apathy and governmental irresponsibility and lack of accountability in dealing with victims.

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Telephone numbers and addresses of the members of the International Coalition for Justice in Bhopal are attached.

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Asian Regional Exchange for New Alternatives
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Phone: (030) 321 340

Bhopal Trade Union Solidarity Group
Transnationals Information Centre
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UNITED KINGDOM

Contact: Barbara Dinham
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Bhopal Victims Support Committee
Southall Monitoring Group
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Contact: Suresh Grover or Gita Sigal

International Organization of Consumers Unions
Regional Office for Asia and the Pacific
P.O. Box 1045
10830 Penang
MALAYSIA

Contact: Hazardous Technologies Programme Coordinator
Phone: (04) 20391

OH

OH7:2

Contribution: Rs.10/US \$5

राष्ट्र नहीं होती भुक्खड जनता

नष्ट हो जाँये जंगल,
आम में न आये बौंस,
बगम में न चढ़ें चिड़ियों
कोयल को न मिले कूकने का ठेका

कुर्बान होने के लिये होती है।
इसलिये—
मर जाँये कुछ हजार या लाख
जदरीले धुएँ या पानी से,

राष्ट्र नहीं होती भुक्खड जनता।
और जनता अब कमजोर हो गयी है,
बीमार पड़ने लगी है,

The Bhopal Special

मर जाँये कामधेनु या नन्दी विधेला
पानी पीकर,
खल्ल हो जाँये मछलियों,
क्या करेंगी जीकर ?
कुछ किसान या मधुवोर
ही तो होंगे बेरोजगार,
जहरीले धुएँ से
कुछ लाख लोग ही तो होंगे बीमार,
या छोड़ देंगे दुनियाँ, कुछ हजार,

क्या फकी पड़ता है ?
राष्ट्र हिन सवेधिरि है,
उसके लिये इसना तो चलता है।

इसलिये पर्यावरण की
बात मत उठाओ,
विकास की दौड़ से
राष्ट्र को पीछे मत लौटाओ,
राष्ट्र नहीं होता पर्यावरण,
राष्ट्र नहीं होता जंगल,
राष्ट्र नहीं होती मछली,
राष्ट्र नहीं होती कोयल।
राष्ट्र नहीं होती नदी,

राष्ट्र नहीं होती हवा,
राष्ट्र नहीं होते पशु,
राष्ट्र नहीं होती फसल।

और जनता ?
वह तो राष्ट्र पर

तो उन्हे शहीद का
दर्जा दिया जाता है,
उनके शव के साथ
उनके मरने का समाचार भी
दफला या जला दिया जाता है।

तुम पूछने होकि
राष्ट्र कहेते किसे है ?
ऐसे सवाल राष्ट्र प्रोही पूछते है।
तुम्हे मालूम होना चाहिये कि—
बंदूके गुलाम है जिनकी,
सत्ता पर लगाम है जिनकी,
जिन्हाका नियन्त्रण है पूँजी पर,
जो बड़े बड़े उद्योग चलाते है
फैक्टरी के कचरे से नदियाँ
सड़ाते है,
साफ हवा में जहर मिलाने है।
छीन लिया है, जिन्होंने मूरज को,
और छिया दिया है
धुएँ के पहाड़ के पीछे,
सुगह होने की खबर मिल सके
इसलिये मिल का भोंपू बजाते है।
छलनी कर दिया है
धरती का कलेजा
अंधाधुन्ध उर्जा के दोहन से।
राष्ट्र यानी खुद के लिये
हर साल अरबों मुनाफा कमाते है।

अरे, राष्ट्र तो है,
जिनके शव में है संपन्नता,

गैस के धुएँ से मरने लगी है।
वह मुसावजा भी मांगती है,
अरुनत से आजादी सीना तानती है।

इसलिये वे राष्ट्र के विकास के लिये
मार्शन चाहते है,
जनता से आदमी नहीं;
मारील होने का यकीन चाहते है।
क्योंकि मशीने बीमार नहीं पडती,
मशीने गैस के धुएँ से नहीं मरती।
मशीने हडताल नहीं करती,
मशीने सवाल नहीं करती,
मशीने सीना नहीं तानती।
मशीने आदमी की तरह नहीं सोचती,
मशीने मुक्ति का भारी नहीं खोजती।

आदमी कुछ ज्यादा सोचने लगा है,
इसलिये राष्ट्र को
खतरा देने लगा है।
इसलिये देश में
सिर्फ दो रहेगे और मशिन रहेगी,
जनता जब तक
आदमी से मशीन न बन जाय,
संगीने रहेगी।

श्याम बहादुर नश्र

Produced by

The 87 NOV - 88 FEB hazards & Bhopal
Bulletin Newsletter

NUMBER 4-5

Between Despondence And Despair: In lieu of an introduction

More has been written about Bhopal than on any previous accident. Ironically, Bhopal's victims would have read little of it. Not that it matters, for whatever the media has printed, has at best affected their lives in not very tangible ways.

The first article in this issue is written by an activist who devoted 3 years to the cause of the victims. The event that occurred on that dreadful winter night in December 1984 has become distant to its perpetrator - Carbide, the victims' 'savior' - Government of India and in public eye. The victims' despondence is something only they really understand.

Basic issues

If a swath were to be cut through the myriad of confusing developments, the basic immediate issues of Bhopal stand out glaringly tall.

1. In a trice, a fourth of Bhopal's population was hit in the stealth of night by a killer gas, shattering their lives forever. The foremost task is to restore their health to the nearest to normal using the best devices that medical science can offer.

Moreover, as in Chernobyl, the Thalidomide case, and many such episodes, toxins have proved their disrespect for boundaries - national, temporal or class. The toxins that leaked could well have mutagenic and teratogenic effects. If one believed that today's world has no right to bequeath the effects of its wrongs on its progeny, it becomes absolutely binding on us to protect the health-rights of future Bhopal children.

Three specific medical programmes follow:

- developing a proper toxicological perspective;
- continuous medical monitoring of the victims and their offspring till as long as the toxic effects last;
- gearing the health care delivery system to offer the best available treatment at the victims' doorstep.

No health care delivery system in the world could have done very much better than that Bhopal's did. With an already overstretched system and lack of toxic information Bhopal's medics courageously fought death and acute injury for the first few weeks after the episode. Yet, Bhopal's medical establishment was hardly equal to the task of tackling the long-term chronic effects of the poisoning. The rap for this has to be shared all around - Carbide, for withholding critical toxicological information; the R & D establishments for dragging their feet in developing a toxicological perspective; the medical establishment for not developing the wherewithal to cope with the mass injury; and societal values which have influenced medical ethics to put primacy on money and ego.

In the 2 articles in the medical section it would have been well nigh impossible to cover the entire range of medical issues. They provide some understanding on the health-status of the victims, the medical issues and controversies and the lacunae of the medical establishment. Two points that have been dealt with

only in passing in the article need to be stressed here.

- A proper definition of who is a gas victim is yet to emerge.
- A proper head count of the gas victims has still to be done.

Despite the problems involved, there is certain urgency in performing these tasks; and with diligence too.

2. One of the more important aspects of living in dignity is to be able to work and earn one's livelihood. The victims are doubly handicapped. To start with, a vast majority of them were economically depressed. Now their bodies and minds have been ravaged. Even those who held regular employment stand to lose their jobs to those who are fitter. The health of those who work in hazardous work places, is further impaired with work. Wives are unable to perform the usual functions of housework properly and children's performance in school is probably retarded.

Yet, government has done very little to remedy this situation. To tackle this problem, a proper assessment of the nature and degree of health impairment is required. From here flows an understanding of the nature of work and degree of exertion each health-impaired group of victims can perform. There is little point in training 10,000 painters when there is work available for very few of them. So the next step would be to understand the labour market, including that which government establishes specifically for the victims. A viable job rehabilitation programme involves marrying the last two elements.

Little could be achieved in easing the burden of housework unless government spends more on infrastructure like water, housing, sanitation, etc. Children in particular, require additional attention. Classes where they can learn at differential paces are needed. And for those with mental disorders, the best remedy lies in community support programmes which give them a sense of belonging and hope. With this orientation, government can do little in this sphere except provide some infrastructure.

The Bhopal Special merely focuses on some issues of victim rehabilitation, a sad reflection on the extent of attention public interest groups involved with Bhopal have given to this crucial problem.

3. Catching Carbide is no easy task. When Carbide was first taken to the court in the US, statements like "we will force Carbide into liquidation and teach multinationals and the chemical industry a lesson they would not forget" floated around. Three years on, Carbide with its vastly superior resources, has made the over-confident eat crow.

In its essence, the basic issue is quite simple. For individuals committing murder or theft the legal remedy is quite clear. Why is it so fuzzy when a corporation kills thousands and steals the health and well being of lakhs? At the moral plane the answer seems obvious. But the world does not move by morality alone.

The media has covered the torturous twists of litigation against Carbide in some degree. We have, therefore, avoided a retrospect. Thus first article in the law section attacks the

recent MP High Court judgment for "standing law on its head". The second one explains just how difficult it is to bring multinationals (MNCs) to book and suggests some possible remedies.

Besides the procedural and legal questions Bhopal poses one major question. Can law incorporate the concept of open-ended liability? By its very nature, the cost of Bhopal to its victims and their environment cannot be computed either with any degree of accuracy for decades to come. Today, law has no device to provide a remedy for such episodes doing any degree of justice.

Carbide's various ploys to dodge liability and maintain the "good guy" image in public eye are well brought out in 'Merchants of Mendacity'.

Unanswered questions

A rigorous accident analysis is yet to see the light of day. Chauhan throws some light on the cascade of events that led to the runaway reaction. He also pooh-poohs Carbide's sabotage theory (for which Carbide has yet to offer the slightest shred of proof) with some good arguments.

Was it only methyl isocyanate (MIC) that leaked or were some other gases (hydrogen cyanide, monomethyl amine, carbon dioxide, carbon monoxide, etc) as well? What were their concentrations at various distances from the plant in the lead-up into which they diffused? Did MIC continue to react once it was in the ambient atmosphere? What was the total affected area?

What was the effect of the leak on biota, particularly humans? The controversy between 2 medical theories that gained currency in India (see 'Health Issues In Bhopal') ultimately contributed to the victim-toll as treatment remained symptomatic and never became systemic. Recent research findings show that MIC has dechlorinated potential in animals. This was not public information earlier. If this is so, in what manner and to what extent does MIC affect humans?

Why is Government of India dragging its feet in battling Carbide? Theories like government's compulsions to hide its own complicity or the need for US technology are not altogether convincing.

Why is it that we have collectively lacked the political will to meet a problem like Bhopal head-on? Are we too confused? Do we lack the expertise or access to a certain minimum amount of information? Can we not organise ourselves? Do we lack the infrastructure or the finances? Or are we, as individuals, too atomised to take on a problem as big as Bhopal? A deeper introspection is called for to find an honest answer to these questions. The result is there for all to see - the shamed-faced manner in which the professional and the common man have deserted the Bhopal victims.

These are but some of the unanswered Bhopal questions.

Bhopal - The City Of Despair: An Activist's Retrospect

In a sense, the collective emotions of people of Bhopal have passed through several phases in last three years. On the night of the disaster and for the next few days, there were to many bodies all around; bodies of people they knew, bodies with signs of the final struggle for life, bodies piled on top of each other in the morgue, in mass graves and at funeral pyres. With megadust all around, Bhopal was so shocked that it had become numb to all pain, in fact to all emotions.

A few days later, the Prime Minister blew the all-clear whistle as he flew back to Delhi the same day he visited Bhopal. But the smell of burnt chillies still haunted the nostrils. All India Radio (AIR) continued to advise the boiling of drinking water. People were still not sure whether the air they breathed and the water they drank was safe. They were not sure that their children, mothers, husbands, wives who had not yet returned were not among the bodies they heard were dumped into the Narmada river by the government people. They were not sure whether anyone or anything would help do something so that their eyes would not hurt and their lungs won't be on fire. They were not sure whether they could trust Operation Faith, of neutralising (utilising) the remaining gas. So they fled. In a state of shock and confusion, more than 3,00,000 people fled the city of death; in less than 24 hours.

They returned to their dwellings towards the end of December 1984. Till now they were on the run. As they settled to count their losses and pick up the threads of their lives, an overwhelming gloom descended on them. The dead and the dying, the possibility of never being able to work or ever able to live a dignified life - all these and more, contributed to the feeling of hopelessness. The machinations of the multinational to wriggle out of responsibility and the callousness of the government became clear. Resentment grew, slowly turning to anger. A 10,000 strong demonstration on 3 January 1985 demanded action against Union Carbide, and for better relief measures for the gas victims.

The following 36 months saw jubilation over minor victories, police terror and celebration of a favourable interim relief order. With events taking the turn as they have, the overriding emotion today is that of despair. "Those who died were lucky" young woman of 26 tells me in Jai Prakash Nagar "they did not have to suffer like us". People in other slums say similar things. Despair has certainly set in; and not without reasons.

Health-wise the situation does not seem to be improving. Thousands of people continue to suffer from symptoms related to the toxic gas exposure. Death still stalks the shanties. Men, women and children queue up at the government hospitals and clinics with breathing trouble, fatigue, muscle pain, neurological disorder, anxiety, depression, gastro-intestinal problems...

The doctors, a majority of whom have "malingerer-phobia", follow a routine of dispensing symptomatic supportive drugs. The victims measure the drugs consumed by them not in numbers but by weight. Yet they have found little relief. So they flock to the private doctors with dubious degrees, who have proliferated over the years since the disaster. With the keen business sense they have, the private doctors spend some time and listen to

their problems and then prescribe similar drugs.

The gas victims fall sick for some days, get temporary relief and then force themselves back to work. Physical exhaustion and exposure to hazardous work conditions make them sick again. The cycle repeats itself. Every month a few of the "lucky ones" escape this cycle of misery once and for all. In the Lamidia Hospital the gas victims die under medical supervision.

For want of systematic information on how to file a claim for a gas exposure related death, many deaths in the slums go unrecorded and unclaimed for.

The medical documentation centres which have been set up to help substantiate claims have only reinforced their suspicion about government's intentions. At these centres where gas victims are supposed to be medically examined, only the minimum rituals are followed. While more than 6 tests are mentioned in the format, only two are usually carried out. The government, the people feel, has sent these doctors to certify that nothing is wrong with the victims. The government, the people suspect, is more interested in protecting the interests of Union Carbide than its own "subjects". This suspicion is reflected in the attendance at the centres. More than half of those sent notices do not go to the centres.

With their eyes and lungs sensitized, workers in the textile mill and paper board factory find it extremely difficult to continue working under hazardous work conditions. The management of these industries recognize the problem. They respond by retrenching the "sick" workers. At least 600 workers have lost their jobs under the pretext of modernization in one plant and nationalisation in another. Unemployed workers who find work impairing their health. Choola smoke for women, tobacco dust for the 'bid' makers are all irritants that have now assumed a more hazardous meaning than before.

The Indian Council of Medical Research (ICMR) research projects have contributed little, if anything, to the evolution of proper line of treatment. The people from whom test samples have been collected have not been informed about the findings which have gone into the making of prestigious 'papers' read at sombre seminars. The victims are left to the monotony of yellow tablets twice-a-day, red capsules once-in-the morning and the tiny yellow ones-before going to bed with no permanent relief in sight. People have spent thousands. Many have borrowed money at interest rates as high as 120% p.a. in the hope of getting some relief. Three years is a long time to sustain hope. All that is left now is an overwhelming sense of despair.

It can rightly be said that Union Carbide's refusal to part with information pertaining to the nature of toxins, their effects on the human system and possible antidotes has played a substantial role in obstructing proper medical care of the victims. However, the government must own up its woeful inadequacy.

Incapacitated to carry on with their usual work, the victims continuously search for alternate sources of income. A truck driver cannot drive any more because of eye problems, a construction worker stops practising his trade because of unbearable muscle problem, a railway

porter cannot lift heavy loads, and many others are out of work. And yet the choola must continue to burn.

The number of opportunities for gainful employment provided by the government are surely limited. No attempt has been made to offer jobs that are conducive to the health conditions of the affected people. At the service centres, which form the bulk of the government rehabilitation efforts, women complain of eye strain and backache after long hours of sewing, at pitifully low piece-rated wages. The M.P. Mahila Stationery Karmachari Sangh, a small trade union of women workers has focussed attention on a number of instances of women earning spontaneously due to carrying heavy loads. And yet the only change of policy is the tapering down of the number of jobs in a bid to "make people stand on their own feet!"

Spurious organisations run by influential members of the ruling party are reaping enormous profits by making gas affected women work at rates lower than the prescribed ones. "Give us jobs not charity," shout the women of Bhopal. Gas Daily Mahila Udyog Sangathan in recent demonstrations and sit-ins and yet the right to a dignified life continues to be denied to them.

In the minuscule efforts at rehabilitation by officers of Carbide, women are paid very low wages and professional management techniques are used to pre-empt any organisational initiative of the women. More than 100 of Carbide's ex-workers continue to be jobless. Among those who have found jobs, are working at less than half their previous wages.

More than three years after the disaster most of the voluntary groups that had played a major role in organising the gas victims and securing some amount of interim relief, have abandoned them have ceased to function. Professionals from different walks of life, who had earlier volunteered their services, now find their local commitments too occupying. Journalists who made their careers on Bhopal have stopped visiting the Bhopal. The mock battle between political parties, celebration of the Russian festival, sensational killings in Punjab grab headlines, while the slow, silent death of Bhopal remains unsung. Three years after the big story happened it no longer makes "good" copy.

In the absence of any attempt by the government to inform the victims, whom it claims to represent, about the legal situation, what the victims get to know is often scanty. Judge Kecan's decision on forum-non-conveniens was received by the majority with a lot of skepticism. The revelation that one of the Bhopal judges was himself claimant only reinforced this attitude.

The possibility of an out-of-court settlement after the Prime Minister's US visit brought spontaneous protests. Five hundred women from Bhopal marched through the streets of Delhi demanding prohibition of proper medical care of the victims. Three years after the Bhopal district court and the city observed a day-long bandh. The possibility of the perpetrators of the genocide being allowed to go scot-free in the event of a settlement filled them with revulsion and anger. "We will raise money" they said, "and give it to Rajiv Gandhi. Let us see if he allows the killers of his mother go unpunished."

Criminal punishment of the death-dealers, according to them, would serve as a lesson for all those who pursue profits and in the process, destroy lives of innocent persons. The interim relief order brought hope to the gas victims. Debts would be paid back, a better doctor could be consulted or perhaps a small business could be started. The public interest lawyer who had played a substantial role in the granting of interim relief was given a rousing cheer in a number of slums. Carbide's appeal to the high court against the district court order was

followed quite keenly. Strangely, the upholding of the order at the high court did not generate much euphoria. It is quite possible they realise that despite all its proclamations about its concern for gas victims, Carbide is capable of every conceivable dilatory tactic. So despair has once again set in as they glimpse Carbide's 'settle or starve' policy.

Sunil Rajput, who lost his parents, three sisters and two brothers says: "How can this be allowed? The people of Bhopal might have tired

of fighting, but people elsewhere in the country and the world would not let the killers go unpunished". Possibly, Sunil's hopes are not based on realistic assessments. Possibly, he underestimates the power of a multinational. But his voice of hope amidst the silence of despair makes one feel that the battle is not over.

Satish Singh

Health Issues In Bhopal

Periodic attempts to draw the curtain over the Bhopal mystery have somehow been frustrated. The scheme of the out-of-court settlement of the compensation case was the latest move. Had this deal been consummated, the Bhopal case could have been officially declared closed and the proverbially short public memory would have done the rest. Now that the court battle for the compensation is on, unsolved questions and new problems are coming up to challenge the government's periodic assertions - all quiet on Bhopal front. A review of the health damage and medical issues of the Bhopal gas disaster will help clarify some of the unsolved problems and their urgency.

Health damage

The health of the gas victims, from the very beginning has been characterised by multi-systemic afflictions involving pulmonary, gastro-intestinal, neuro-muscular, reproductive and ocular systems, besides a host of mental disorders. According to the Medico Friends Circle 1985 epidemiological study, every person in J.P. Nagar, a severely affected locality right across Carbide's plant, reported 'at least one severe symptom'. The study recorded significantly higher incidence of about 24 different symptoms in J.P. Nagar compared to a sample from a mildly affected locality 10 km. from the plant. These symptoms included breathlessness on usual exertion (87%) and at rest (10%), fatigue (81%), muscle ache (73%), flatulence or gas trouble (69%), headache (67%), weakness in limbs (66%), loss of appetite (66%), nausea (58%), tingling/numbness (55%), abdominal pain (53%), chest pain/tightness (50%), cough with expectoration (47%), skin problems (29%), dry cough (28%), and bleeding tendency or coagulation disorder (9%). The data presented by other studies for the period early to mid-1985, though lacking in statistical rigour, is more or less similar to the same picture of the symptomatic pattern among the gas victims residing in different localities of Bhopal spread 2 km. from Union Carbide India Ltd. (UCIL) plant. The Indian Council of Medical Research (ICMR) Working Manual, April 1986, prepared for the guidance of Bhopal's medical community, summarises a more recent picture of the health status of patients visiting the clinics. It only confirms the results of earlier investigations.

The reported eye symptoms were blurred vision/ photophobia (77%), lacrimation or watering of eyes (59%), abnormal distant vision (42%), abnormal near vision (18%) and

corneal opacity (5%). The last two symptoms, though occurring amongst the gas victims with a higher frequency, were not statistically significant. This observation indicates that corneal opacity, earlier reported by a very high percentage of victims, was gradually healing up. However, it is not known whether the gas victims faced the risk of developing further complications of cataract, glaucoma and retinal pathology unless data from long-term follow-up studies become available.

Mental disorders included loss of memory for recent events (45%) and anxiety/ depression (44%). Independent surveys by a team from King George Medical College, Lucknow, have revealed that approximately 22% of the out-patients visiting the government clinics were classified cases of neurotic depression (37%), anxiety state (25%) and adjustment reaction (35%). A population based study has shown that the prevalence rate of psychiatric disorders was 13% in severely and moderately affected areas and 3% in control area. Besides, frequent complaints of insomnia and hysteria have been reported amongst the gas affected patients.

Documented effects on the female reproductive system include leucorrhoea (white discharge), excessive menstrual bleeding, pelvic inflammatory disease, cervical erosion and/ or endocervicitis, stoppage of foetal movement and suppression of lactation. In March 85, impotence was reported by 8% of males in J.P. Nagar compared to 0.72% of males in a mildly affected locality, a statistically significant difference. A pregnancy outcome study conducted by the MFC has established that the gas affected women who conceived upto 10 months after the disaster reported about four-fold higher rate of spontaneous abortions compared to the rate prevailing before exposure. An ICMR study has also confirmed the observation of a higher frequency of spontaneous abortions in the gas-exposed women, reporting a 6 to 7 fold increase compared to the normal frequency. Gas affected children suffer from lack of interest and retarded growth, besides many other emotional disturbances specific to childhood.

Clinical investigations have shown that fibrosis in the respiratory tract, resulting from injury to lungs caused by toxic exposure has, over a period of time, produced both obstructive (obstruction of air passage) and restrictive (loss of lung capacity) diseases in significantly high percentage of the subjects tested. Preliminary evidence of lowered immune response (defence against infections) has been

presented. On the other hand, indication is available that, in persons with pre-existing asthma-like symptoms, the toxic exposure may have 'triggered off airway hyper-reactivity to specific and non-specific stimuli'.

Most of the symptoms listed above have recurred to date, with frequent reports of persistent episodes of aggravation of symptoms. Unfortunately, ICMR's epidemiology report has failed to present adequate data to establish the total number of gas victims and classify them, according to the degree of affliction, into severely, moderately and mildly affected persons. In the absence of such information, the health situation may be depicted in qualitative terms by quoting BGIH, who observed in 1986 that:

"A majority of victims continue to have periodic bouts of acute discomfort and many have not had a single day's respite since the gas exposure. Instances of gas victims dying after protracted illness are still quite frequent."

According to a state government brochure released in December 1986, persisting ailments force, on average, 3500-4000 patients to government clinics and hospitals specially set up in the gas exposed area. This figure does not include the large number of victims who flock to myriad private practitioners. The victims' ability to perform normal functions has been seriously impaired in different ways by the continuing pattern of diseases, resulting in occupational disability among thousands of daily wage earners and thereby affecting their survival. A March 1985 preliminary study puts the figure of medically disabled at one lakh, two-thirds of them severely. The Students Federation of India (SFI), in collaboration with M.P. Vigan Sabha and Delhi Science Forum surveyed about 4000 households (covering about 18500 persons) in the worst affected zone. The survey showed that about 88% of respondents reported varying degrees of functional disability in their occupations, with over 50% reporting sustained disability. Among casual daily wage earners, 80% earned less than Rs. 100 per month compared to 2.5% before the disaster. Those earning less than Rs. 300 per month were 85% as against 56% prior to the exposure. In the words of the Vice-President of a textile mill workers' union:

"The main problem of the workers...is lack of stamina...in one or two workers, they are done for...if they work for two to four days, they have to go to leave. Absenteeism has greatly increased..." (December 1986)

In addition, the possibility of teratogenic, carcinogenic and mutagenic impact by the toxic emission continues to haunt the present and the future generations of the survivors of the leak. The scientific challenge, emerging from this complex health situation, is to formulate a theory that will explain the observed toxic damage in both the acute and chronic phases in a comprehensive manner.

Medical issues

The issues of diagnosis and treatment of the gas-exposed patients have been shrouded with controversy and conflicting claims from the very beginning. Ensuing confusion has been fuelled and compounded by a calculated disinformation campaign launched by Union Carbide Corporation (UCC). Obviously, a scientific approach towards diagnosis and management critically depends on the identity of chemical composition of toxic emission.

Chemistry of the toxic emission

Studies conducted by the Government of India team led by Dr. S. Varadarajan report residues in UCIL's exploded tank 610 consisting of about twelve chemicals - a methyl isocyanate (MIC) trimer, methyl ureas, trimethyl biuret(C), dimethyl isocyanurate, a cyclic diurea, methyl amines, a large amount of chlorides and some amount of sodium, iron, chromium and nickel salts. In reconstructing the events of the runaway trimerisation reaction (self-catalysing and exothermic) that took place in MIC tank, the Varadarajan report estimates the temperature inside the Tank 610 exceeded 250 degrees C. However, the report does not throw light on the maximum probable temperature build-up. According to a UCC document, MIC decomposes to produce hydrogen cyanide, carbon monoxide and oxides of nitrogen. A study conducted at the Defence Research and Development Establishment, Gwalior, thermal decomposition products of MIC contained 3% hydrogen cyanide at 200 degrees C and 20% at 400 degrees C. Further, some early journalistic reports about the presence of phosgene, a highly toxic intermediary in the manufacture of MIC, in significant proportions in the toxic emission, have not been confirmed by any of the studies.

Diagnosis

Instead of extending a helping hand, spokesmen for UCC indulged in lies and half-truths from the very beginning to distract the medical authorities and victims from learning about the real nature of pathogenesis and formulating a specific line of therapy. A few hours after the disaster, UCIL's Dr. Loya told doctors of Hamidia Hospital that the gas was not poisonous and the patients be told to wrap a towel around the eyes. UCIL's Works Manager told Navbharat Times that MIC was only an irritant and not a deadly poison. Another Carbide official told the Free Press Journal "Nothing has happened. Can't you see us alive?" and as if was saying this, the newspaper mentioned that "several dead bodies lay barely 100 yards away from where he was standing just outside the plant gates. Mr. Jackson Browning, UCC's Director of Health, Safety and Environmental Affairs, asserted that MIC acts "like a very potent tear gas" and "long-term effects are not a major threat to the population".

Two days after the accident, Dr. Bipin H. Awasthi, Medical Director of UCC at USA,

sent a telex message to the Hamidia Hospital, titled "Treatment of MIC pulmonary complications", prescribing: "if cyanide poisoning is suspected use amyl nitrite. If no effect - sodium nitrite - 0.3 gm and sodium thiosulphate - 12.5 gm I.V. in two to four minutes. Can be repeated (half dose) as a prophylactic measure". This showed that UCC was aware of the possibility of cyanide poisoning from gas exposure, but later the same Dr. Awasthi, on arrival at Bhopal, reversed his stand stating that sodium thiosulphate was 'neither necessary nor advisable'. Even one Dr. K. W. Jaeger of WHO, without any inquiry or study whatsoever, supported UCC's stand by uncalled for pronouncements like 'the affected persons may suffer from only lung complications and eye problem' and further 'there was no basis for apprehension that pregnant women or foetus will suffer any damages or deformities'.

On the other hand, more than 3000 people died and moribund survivors continued to die. Medical authorities in Bhopal detected evidence of systemic effect of the poison gas and studies by Indian scientists came up with pointers towards systemic and persistent toxicity in the bodies of gas victims. The situation led to conflicting opinions on the diagnosis and management of the ailing victims.

Union Carbide's thesis

Unable to deny the lethal nature of the poisons, UCC subsequently conceded that MIC could kill and then gradually built up an explanation as to the cause of the observed health damage. A dominant section of medical profession in Bhopal, backed by the state health administration, persuaded themselves to put unlimited trust in UCC's thesis, which came to be known as the Exclusive Pulmonary Pathology Theory (EPPT). UCC claimed that:

- The toxic emission from their Bhopal plant consisted only of MIC;
- MIC is rapidly rendered harmless on contact with water on body surfaces, e.g. eyes and lungs;
- MIC does not enter blood stream and therefore cannot cause any systemic and persistent poisoning.
- MIC, at high concentrations, could at the most cause local injury at the point of contact (i.e. eyes and lungs) which may cause death and also chronic suffering in the survivors;
- The multi-systemic disorders reported by the gas victims could be explained by the secondary effects of hypoxia (oxygen deficiency in body) resulting from irreparable damage to the lungs;
- There was no need for detoxification, the treatment required essentially consisting of symptomatic relief.

Moreover, UCC suppressed all relevant information it had gathered over years of research on MIC particularly regarding:

- Chemistry of the exothermic reaction and thermal decomposition of MIC that took place in the fated tank 610;
- Identity of components of the toxic emission;

- Biochemical effects of MIC and other possible components of the toxic emission on humans and other biota;
- Antidotal treatment of systemic poisoning by MIC and other toxins.

Counter Thesis

Immediately after the gas leak, Dr. Heerach Chandra, Director Medical Legal Institute, Bhopal, raised the possibility of cyanide poisoning. His basis was autopsy findings of cherry red colour of venous blood and various organs, early setting of rigor mortis, coagulated blood in the veins and cerebral oedema, and later, by detection of cyanide in blood of victims. ICMR conducted a Double Blind Control Trial (DBCT) and found that the gas victims excreted 2-3 times higher amounts of thiocyanate in urine, and on administration of sodium thioacetate (NaTS) the amount increased to 8-10 fold along with amelioration of symptoms. ICMR thus concluded that the gas victims were suffering from chronic cyanide poisoning and prescribed mass detoxification with injections of NaTS.

Contrary to common belief that cyanide is so deadly a poison that even a drop causes instant death, human body absorbs small amounts of cyanide daily through consumption of certain foodstuffs, e.g. cabbage, rapinica, cassava, etc. and tobacco. This cyanide gets converted into thiocyanate by combining with sulphur, intrinsically present in the body, being catalysed by the enzyme, rhodanase. Thiocyanate, a less toxic chemical, is excreted in the urine.

In case of acute cyanide poisoning, this natural detoxification process cannot cope with massive amounts of cyanide which paralyses the cellular respiratory system, causing quick death from deprivation of oxygen. Life-saving treatment in such a situation consists of making available a large extraneous source of sulphur, say, by NaTS injections to neutralise excessive amount of cyanide.

In the absence of any available record in medical literature of chronic persistence of cyanide after single exposure, ICMR scientists found it necessary to invoke the concept of an 'enlarged cyanogen pool' in the bodies of gas victims, which would act as a continuing source of cyanide-like compounds through the chronic phase. This came to be known as Enlarged Cyanogen Pool Theory (ECPT).

Evaluation of the two theories

The EPPT failed to explain a large number of observed phenomena documented by various researchers, e.g.

- High frequency of symptoms relating to non-respiratory systems, high spontaneous abortion rate and other disorders of the female reproductive system, even after the lung function and oxygen availability status returned to normal;
- About 40% of the MIC ward patients in Bhopal's Hamidia Hospital suffered from respiratory troubles, but were free from any damage to lungs;
- Detection of carbamylated haemoglobin and anti-MIC antibody, disordered immune system, increased frequency of chromosomal aberrations

etc. point towards systemic effects of the poison;

- Animal experiments revealed that MIC could cross the air-blood barrier in lungs to enter the blood stream, and prior administration of NaTS produced a prophylactic effect on LD50 values and survival time of the MIC-exposed mice and rabbits.

On the other hand, ECPT offered an ingenious and logical explanation to the observed phenomena in as much as it admits acute lethal role of MIC through its local corrosive action on lungs and then attempts to explain chronic morbidity on the basis of systemic and persistent poisoning due to an enlarged cyanogen pool, thereby providing a rationale for giving priority to detoxification treatment.

ECPT, however, failed to gain acceptance in scientific circles due to ICMR's inability to produce scientifically valid documentation of its research claims. ICMR and other government research institutions have all along pursued a policy of secrecy and refused to subject their research data to scrutiny. The fragmentary data published so far by ICMR is apt to be rejected in any scientific forum as sampling techniques and chemical analysis procedures were faulty. Further, it was later shown that the autopsy findings could also be caused by MIC poisoning.

Treatment

UCC's refusal to share scientific information regarding the chemical nature of the poison and its toxicological impact became an insurmountable obstacle in working out a rational and specific line of treatment, including use of any antidote. Further, non-availability of reliable literature on the toxicology of MIC and its various reaction products forced the doctors to depend only upon symptomatic treatment measures.

Thus, treatment has primarily consisted of topical atropine and antibiotics for eyes, oxygen and bronchodilators for respiratory problems, antiacid-antispasmodics for gastrointestinal symptoms, paracetamol for fever, and systemic antibiotics to prevent or combat secondary infections. Corticosteroids have been given on a massive scale, initially to save lives; and later to prevent lung fibrosis. Psychiatric help was provided only erratically and physiotherapy, respiratory or otherwise, was conspicuous by its absence.

ICMR's recommendation of detoxification by a six-injection course of NaTS was resisted energetically by leading doctors and decried by the health authorities. While no scientific argument could be put forward against detoxification by NaTS, one of the safest drugs known, detractors employed various tactics to frustrate mass detoxification, including raising a scare among the gas victims for its non-existent side effects. As a result, only 0.8% of the symptomatic population, eligible by ICMR criteria, was administered NaTS by June 1985, the most critical period from the stand-point of detoxification, and about 3.5% by June 1986.

BGLA succinctly summed up the situation in one of its publications: "With all the medical studies commissioned...the treatment remains practically the same as it was in the first week of the disaster".

Scientific approach and tasks ahead

It is not suggested here that Indian scientists are incompetent or research establishments are inadequate. On the contrary, evidence is available to reveal that a number of Indian researchers produced valuable evidence to form the basis of meaningful investigations towards formulating an effective line of therapy. What thwarted adoption of such a programme was a policy of inexplicable secrecy pursued by almost all research authorities. Research results were not published, communication between different research organisations was poor and an overwhelming apathy was discernible among Bhopal's scientists. These factors cannot but result in negligent performance, perfunctory data and erroneous conclusions. The most significant lacuna was the failure to develop a comprehensive toxicological perspective for entire research package on the disaster.

On the other hand, a few investigators discovered significant early pointers towards systemic and persistent toxicity in the gas-exposed population. Some clinical and laboratory findings have been enumerated earlier. The recent disclosure of the results of the study of urinary thiocyanate estimation in gas victims by a team of investigators led by Dr. M.G. Karmarkar of Department of Endocrinology and Metabolism, All India Institute of Medical Sciences (AIIMS), New Delhi, is an example of application of standard scientific procedure. The study presents incontrovertible evidence of systemic and persistent presence of toxins in the bodies of gas victims and the risk of long-term health damage including carcinogenic, mutagenic and teratogenic reproductive disability now appears to be real.

Even those ICMR scientists who earlier were inclined to accept UCC's thesis have later observed that:

"Hypoxaemia (low oxygen content in blood) was rarely seen"

"...it is not possible to explain satisfactorily the disproportion between the clinical symptoms and the lung function data presented."

"MIC is believed to have crossed the mucosal barrier to effect the blood and distal organs like muscle, liver, kidney, brain etc."

But such observations have not led to renewed effort on the part of the official research establishments towards further investigations, instead ICMR terminated Dr. Karmarkar's research project prematurely.

An analysis of the published data strongly indicates the possibility of MIC itself being absorbed and bound to some durable protein in the body and acting as a source of persistent toxicity as well as generating thiocyanate through internal detoxification.

It is not too late yet to try to unfold the Bhopal mystery. In order to obtain necessary information for a meaningful and comprehensive therapeutic and rehabilitative programme, we need:

- dispersion modelling of the toxic plume from Carbide's plant.
- chemical analysis of gas-exposed water, plants and soil samples.

Abstracted from 'A Preliminary Report of Concern Regarding Persistence of Toxins in the Bodies of Bhopal Gas Victims' submitted by the Minority Members of the Supreme Court Committee for Bhopal Gas Victims, Oct. 1987.

Conclusions

* Exposure to toxic emission from the Union Carbide plant led to an increase in the excretion of urine thiocyanate in gas victims, and this increase persisted until at least March, 1987, if not even later. This indicates the possibility of a systemic and continuing presence of certain toxic chemicals in the bodies of the gas victims.

* Elevated urine thiocyanate levels do not necessarily imply cyanide poisoning alone, as has been assumed so far. MIC may cause systemic and persistent toxicity in gas victims. Studies conducted by DRDE (Gwalior) show that sodium thiosulphate (NaTS) may have an antidotal role in animals exposed to pure MIC. It would be pertinent to explore hitherto unknown biochemical basis of persistence of MIC or its metabolites and pathways for their removal from human body. Antidotes other than NaTS need investigation.

* The systemic and continuing presence of toxins in the bodies of the gas victims points towards the possible long-term risks to themselves and to their progeny. This clearly calls for much larger allocations for medical relief, rehabilitation, surveys, monitoring and research, covering the entire gas exposed population for much longer duration than what have been so far anticipated.

* There is a visible declining trend in the urine thiocyanate levels from September 1986 to March 1987. The statistical significance of this cannot be ascertained comparing mean values alone. Individual thiocyanate value comparisons at both points of time was not possible because of the original data, in possession of the Head, Department of Medical Biochemistry, Gandhi Medical College, Bhopal were not accessible. Only detailed analysis can predict toxic persistence, and current and future toxicological risks faced by the gas victims. Clearly, no detoxification program can be planned without such an assessment.

* Assessment of the current toxicological status would have been possible even without statistical analysis of the declining trend suggested above, had the direct monitoring of urine thiocyanate levels been continued beyond March 1987. This, however, did not happen since ICMR, for inexplicable reasons, could not see the significance of the findings by the AIIMS team and decided to terminate the project.

* The above-mentioned decision of ICMR to terminate the project is baffling. The study, when compared to the pioneering and much bigger study conducted by the Medico-Legal Institute, Bhopal is distinguished by its scientific approach, involved the following features:

(continued on page 25)

- an independent evaluation of Carbide's report on the chemistry which caused the MIC tank explosion and a cross-check of the thermodynamic computations in Varadarajan committee report.
- the designing and conducting of a proper epidemiological study.
- a properly controlled DBCT to determine the therapeutic efficacy of NaTS administration.

- an assessment of the loss of working capacity among the labouring people in different occupations.
- chemical and bio-medical experimentation to find out biochemical effects of MIC in the human body and the process of detoxification - natural and induced.

The experience of the gas victims with the medical and research establishments has been unhappy, often bitter. Even the high powered 'Scientific Commission for Continuing Studies on Effects of Bhopal Gas Leakage on Life

Systems' appointed by the Union Cabinet, has not enhanced public knowledge.

In order to fulfill the tasks outlined above, a thorough overhaul of the infrastructure for therapy and research is imperative. The policy of secrecy must be reversed. In fact, an inquiry into working of research bodies is called for. The gas victims should not only be taken into confidence but their records of therapy and investigations be supplied to them. Details of research data ought to be made public for scrutiny by the scientific community. Can one hope for such a change?

Anil Sadgopal and Sujit K. Das

THE GAS DISASTER AND HEALTH CARE DELIVERY IN BHOPAL

The experience in Bhopal emphasises the need for understanding how the medical system in India operates in disaster situations. We can learn many lessons by analysing the health care service organised in the immediate post gas leak period and the few months after the leak. This will also help us to prepare ourselves to deal with such incidents which might occur in future. On the basis of the pattern of medical relief that was emerging for the 'intermediate period', a few recommendations can be made about some aspects of long term relief in a situation like Bhopal.

Immediate post-gas leak period

The state medical service responded vigorously to the tragedy and medical people worked tirelessly to save lives and render medical relief in the first few days. There were however some problems symptomatic of the basic characteristic of our medical and social system.

1. Nobody in Bhopal knew anything about the ill-effects of MIC and Union Carbide authorities not only did not disclose whatever information they had but even misled the government doctors. Thanks to some original research on the autopsy and clinical findings by Dr. Hirsch Chandra, the forensic expert in Bhopal, antidote sodium thiosulphate (NaTS) was found to be useful for immediate relief to the victims. But because of established norms, ego problems and perhaps vested interests of the Union Carbide, this important finding was not positively followed up by a dominant section of the medical community in Bhopal. A subtle and not so subtle tussle began between pro and anti-NaTS lobby ensued at the expense of the gas victims' interests.

2. It is usual to send interns to help in medical relief in disaster situations. But in Bhopal, neither the interns nor the senior doctors knew how to deal with the situation. The interns were incompetent in clinical matters and had no idea about how to keep records which could be used later. Most of the time they were busy doing minor tasks like putting eye-drops which could have been easily delegated to paramedical staff or volunteers, especially when there were thousands of patients to be treated. The attitude 'doctor will do it all' that is in-built in our medical system was the culprit.

Weeks after the gas leak

Within weeks after the gas leak, the medical people in Bhopal assured themselves that the poisonous effect of the gas leak had died down. But volunteers working amongst gas victims found that the people were suffering from severe cough, breathlessness, weakness, nausea, skin rashes, vomiting, allergies, burning eyes, etc. Most of the women, were in addition suffering from many reproductive system problems. But doctors, by and large, did not take these complaints seriously and attributed them to exacerbation of pre-existing diseases and to compensation-neurosis. Later, studies showed that these complaints were genuine and were specifically due to the effects of toxic gas leak. Due to the findings of these studies and the pressure exerted by the gas victims now organised by voluntary groups, 'polyclinics' were opened in gas affected areas and more medical facilities were provided. The health care system however, remained cut off and alienated from the sufferings of people.

Months after the gas leak

Once it was apparent that the disaster had created health problems which were going to persist for quite some time, the health authorities should have drawn a plan for systematic intervention and should have made attempts to reach out to people. But the authorities were content with setting up 'polyclinics' and the referral hospitals. This reflects the clinic based approach of the authorities.

Clinic based approach

To begin with, it was necessary to know nature and extent of health problems existing in community to plan out any systematic intervention. But no such community based epidemiological survey was undertaken by the state health services.

In the absence of baseline data on the morbidity load, the health system had no knowledge about the type and number of health personnel required for the delivery of comprehensive health care. The nature and extent of health damage in the community was such that it was necessary for the health services to reach the doorsteps of the gas victims. This could only be done with the help of well

trained paramedical staff. This clinic based doctor centered approach was especially useless when thousands of people affected were in need of somewhat continuous medical care. Medico Friends Circle (MFC) had repeatedly appealed for a community based approach and had prepared an outline of a pilot plan for the comprehensive health care of gas victims from this perspective. All this fell on deaf ears.

That the medical services did not cater to the needs of people was evident to those of us who mingled with the people and listened to them patiently during an intensive community based epidemiological survey in the worst affected basti. Out of 27 persons interviewed, 6 persons said they had to wait for 1-2 hours in queues, 8 persons 2-4 hours and 13 persons more than 4 hours. Since in 70% of cases medicines were given for only 1 to 3 days, most people had to repeatedly wait. As a consequence, gas victims would rather stay at home and suffer instead of going to the government polyclinic, especially when the treatment given did not bring much relief. The private practitioners had no better treatment to offer and people did not have money to go to them repeatedly.

Disjunction from research

Whatever treatment was given to the gas victims, was uncoordinated in relation to the research findings. This was partly due to the disagreement amongst researchers about the role of NaTS. It was also due to the fact that neither researchers nor clinicians were keen on interacting with each other. In March 1985, the survey team of MFC met the doctors working in the 30 bedded 'DIG hospital' specially set up for the gas victims. It found that 'There were no standard guidelines for investigating, diagnosing and treating the victims. The doctors used their own line of treatment. Most of the doctors interviewed, had no definite knowledge about the role of NaTS, nor had seriously considered the problem of danger to the foetus and the option of Medical Termination of Pregnancy (MTP). There were no definite criteria for referring patients to the bigger hospitals.'

Doctors and activists from the voluntary groups had repeatedly urged the government to communicate the results of the research findings to the doctors and to the people. However an unnecessary shroud of secrecy was maintained. Many researchers were more in-

interested in defending their research findings against their critics and in perhaps making a career out of it rather than in the health of the gas victims. Because of the tussle between some of the researchers even 6 months after the gas leak, they could not come to a consensus about the strategy for medication. As a result, a compromise strategy, incorporating both the viewpoints was formulated.

The special issue of the Indian Journal of Medical Research, which gave the results of the studies in Bhopal, was published as late as September 1987! These published findings will by and large, not reach the doctors working in Bhopal.

Lip service to non-drug therapy

It is well known that after such ghastly disasters, many people suffer from anxiety and depression. National Institute of Mental Health and Neurological Sciences (NIMHANS) found that 10 to 12% of the gas victims undergoing treatment in Bhopal clinic had psychiatric problems. Thanks to its initiative, training programmes in mental health were conducted for medical officers posted in gas affected areas. But even by the first week of May, no strategy of 'psycho-social support' was ready.

Respiratory physiotherapy is very important to increase efficiency of respiration and hence to reduce distress. It could have helped limit the permanent damage to the lungs in the initial period. But this was never taken seriously and

only lip service, that too occasionally, was paid to this important therapy.

This neglect of non-drug therapies reflects not only the drug oriented approach of the established health system but also its doctor centered approach, since these therapies require substantial participation by paramedics.

Health education remained the last priority of the established health system. There was ignorance among most gas victims about the nature of health problems caused by the leak and the medical treatment given. The people were haunted by fears and tried out various expensive therapies. The state health authorities should have taken efforts to allay the fears in the minds of the people and to disseminate information regarding health effects through different media like pictorial exhibitions slide shows, films, radio etc. 'Eklavya' and MFC brought out a health education booklet in Hindi. The 'Jan Swasthya Kendra', a voluntary health centre, published a pamphlet on the role of NaTS. Such an initiative taken by voluntary groups was not followed up by the state authorities and suggestions made by activists were sadly ignored.

Conclusions

1. Hospital and doctor centered, drug oriented approach becomes quite useless in disasters where long-term health care for thousands is needed. An approach to such problems must be included in the training of state health authorities.

2. A community based survey of the health problems must be carried out periodically and based on a 'community diagnosis' plan for health intervention in quantitative and qualitative terms must be drawn up. Paramedics would invariably play an important role in such a health intervention. This must be very clearly recognised.

3. A part of the research must be directly aimed at improving the line of medical treatment and all attempts be made to integrate the research findings into the health interventions. Conscious and firm steps have to be taken to see that research on human suffering is not carried out to serve narrow interests of researchers.

4. Non-drug therapy can be very important in such situations and must be taken up seriously.

5. Relevant health education should be systematically planned. Education of doctors, both state and private, about scientific line of treatment is necessary.

6. The initiatives, suggestions and criticism by voluntary groups must be taken seriously. An active and open dialogue with such groups would be beneficial in many ways.

Since the health problems are going to persist for some time it will be beneficial to the victims if the above suggestions are implemented. However it is extremely doubtful that the state authorities will do so.

Anant R. S.

Chauhan joined Carbide's Bhopal plant as a trainee operator in 1975. He worked first in the Sevin plant. Later he was transferred to the Naphtha and the Methyl Isocyanate (MIC) plants.

Bhopal Group for Information and Action (BG) interviewed Chauhan, end-1987.

BG: How safe was the UCIL plant?

C: Initially, when the plant was commissioned, safety was taken very seriously. Later, safety procedures were gradually given the go-by and short-cuts were adopted. Production became more important than safety. Thus, minor leaks of carbon tetrachloride, alpha naphthol, MIC used to occur. A lot of mercury has been let into the atmosphere when it never should have been.

BG: Didn't the company lose money this way?

C: To recover Rs. 100 worth of naphthol costs twice that amount, so it was cheaper to pollute.

BG: So the company followed the policy of cost cutting?

C: Yes. There are many similar examples. Naphthol drums were broken open manually by casual workers. For each drum they got Rs. 5. To make more money they would break 20-25 drums a day, but would fall sick the next day and make no money. Permanent workers would have done this work only by proper procedure and after insisting on using safety equipment, which is why it was never given to them.

Untreated toxic wastes were often dumped along the railway track. I am sure they must

have leaked into the soil and underground water.

BG: Did UCC permit such practices?

C: To the best of my knowledge, all major engineering procedures were adopted only with the consent of the parent company.

BG: What was the plant's preparedness to meet toxic leaks?

C: Initially, mock emergency drills were held. They ran by the text book and everyone knew what to do. But these text book situations never actually occurred, so MIC's hazards were treated casually. When small leaks occurred, the knee-jerk reaction was to run. Treatment for gas exposure was water baths and eye fountains.

BG: What was the union's stand on this?

C: The management accepted in general our demands for safety equipment. Equipment would be used for some time after an accident, but would be discarded subsequently.

BG: Didn't the management insist on the use of such equipment?

C: They did initially, but turned casual subsequently. E.g., there were 2 separate alarms for fire and toxic leaks. The toxic-leak alarm stopped working, so we made do with just one alarm.

Sometimes even the other alarm wouldn't work. Initially, workers broke the alarm glass case even for minor leaks. Later, they were reprimanded for these acts. Moreover, when such episodes began to occur 3-4 times a month, the seriousness of the episodes

diminished.

More important, no off-site emergency procedures such as a public address system or an evacuation plan for bystander population existed. Emergency plan for tackling large toxic leaks were non-existent.

BG: What health effects did the workers have due to the workplace toxic exposures?

C: The most common symptoms were persistent cough and fever. Earlier, each worker was medically examined twice a year. If a worker was found unfit he would be shifted from his assignment.

BG: Were the workers shown their medical records?

C: No. The MRs were confidential. Workers were told "everything is ok with you". Since the workers got a good salary, good food, and were young and generally healthy, they too did not bother about the MRs too much.

BG: What would you say are the minimum requirements to run a plant safely?

C: Firstly, workers should be made thoroughly familiar with the plant process. Secondly, the equipment quality should be good.

Thirdly, the plant process should be inherently safe.

Fourthly, plant maintenance should be good.

Fifthly, the quality of raw materials used should be good.

Lastly, and what I believe to be the most important factor, the quality of the plant per-

portant factor, the quality of the plant personnel should be good. They should be well trained in operational and safety procedures.

BG: What were the changes in the personnel quality over time?

C: When the MIC plant was set up in 1980, the plant operators recruited had a bachelor's or a master's in science or had an engineering diploma. They were put through long periods of training. Over time, many operators resigned in favour of better opportunities. Operator replacement did not keep pace with resignations and training for fresh operators was reduced to two months. Sometimes operators were given charge during the training period. I would reckon that in 1982, about 30% of the plant operators did not have the desired level of training and by 1984 this had jumped to 70%. E.g., when I was transferred to the MIC plant, I was given 8-10 days to read the plant manual and then asked to take charge. I fought with the management and refused to take charge unless given proper training. I took 3-4 months to understand the MIC plant and even after that, took charge only of a small storage area in the plant. Even 15 days before the accident I was asked to take charge of the MIC plant as there was a shortage of operators. I reiterated my earlier stand and was therefore put as a spare operator. I worked in the MIC plant till 25 Nov. 1984, when I was transferred from the plant.

Earlier, each shift had a maintenance and instruments supervisors. In Nov. 1984, the management did away with these supervisors and instruments' technicians, except in the general shift. The night shift had 2 maintenance fitters. The MIC plant supervisor was trained by the plant operator. He gave the orders for water washing of the lines. When someone told him that there was no water, he instructed the night shift operator to continue with the washing. However, his orders were not very precise. He thought that once a valve was isolated, it was 100% safe. But Carbide itself believes that no valve should ever be trusted, particularly if highly corrosive substances are being handled. Therefore a slip blind was essential, so that no material can pass even if it leaks through a valve. But the supervisor had so much faith in the valve that he did not order a slip blind to be put. It never occurred to him that water could get past the valve while washing was being done, and find its way into the MIC tank. All this reflects on the quality of training.

Also no proper charge was given to oversee the water washing, the time period was not fixed and no process parameters had to be measured since the plant was not working. Earlier there was a dedicated Fire and Rescue Squad. Since manpower was being reduced, operators and helpers had to leave their posts and perform these functions.

BG: What was the run-up of events prior to the accident?

C: Two critical safety systems, the vent gas scrubber and the flare tower were hooked-off the system for maintenance in the last week of November. Water washing of some of the blocked lines in the MIC plant was ordered on 28 November and actually conducted at about 9 p.m. in the second shift on 2 December and stopped at about 12.15 p.m. the same night. MIC started leaking into the atmosphere at about 11.30 p.m. The loud siren was sounded at 00.50 a.m. and shut after 10 minutes. The muted siren was left on be-

tween 1-2 a.m. The loud siren was again sounded at 2 a.m.

BG: What are your comments on Carbide's sabotage theory?

C: At low temperatures, without agitation and in the absence of a catalyst or other impurities, MIC reacts slowly with pure water. At 20°C, it takes about 23 hours to reach the stage of a violent runaway reaction. At 30°C, it takes nearly 67 hours. This information is from Carbide's Unit Safety Procedure Manual. If there is a catalyst or impurity, the reaction is greatly speeded up. E.g., ferric chloride, a product of the action of phosgene on iron, can produce a violent reaction in about an hour. If someone had deliberately let water directly into the tank, it would have taken well over 20 hours for a violent reaction to occur, as the water temperature on a December night would have been less than 20°C. Whereas, what happened was that, water entered the tank at about 10 p.m. through piping, as water washing was being done elsewhere in the plant. At 10.15 the tank pressure was normal. Since the water had various contaminants, a violent reaction occurred about 2.5-3 hours later. So much for Carbide's sabotage theory - the facts of the accident do not support it.

BG: Where did the impurities come from?

C: Some of the lines through which the water passed were made of carbon steel. That was where the water picked up the impurities.

BG: Could the accident have been contained?

C: If the temperature alarm had been functioning or if there had been pressure or water detection alarms, the water entry could have probably been detected and there would have been an early warning.

However, let us talk about reality. If a knowledgeable person had been around and had kept his cool, he would have gone about detecting the source of the leak. No such person was around, as the plant was shut and under maintenance. When workers finally went to the tank, they realized that it was hot and heard noises from it. The safety valve gave way at about 11.30 p.m. That was when they realized that there was water contamination. It took them about an hour to locate the source of the water. By then it was too late. A good man-in-charge of the situation, if he had realized early enough that water had got into the MIC tank, would have quickly distributed the contaminated material to the two other tanks to reduce pressure in Tank 610. From there the material could have been taken to the Senvin plant which had cooling systems in various places. The superintendent, supervisor and the night shift operator had been transferred from the formulation department to the MIC plant. The second shift supervisor was from the Battery plant. None had adequate training in operating the MIC plant, so they couldn't think of these moves.

If the flare tower and vent gas scrubber had been operational, they would not have controlled the situation as they were just not designed to tackle such high flow rates, but they would have bought a little more time, as would have the refrigeration system, if it had been working.

There were other contributory factors. The manuals never referred to the possibility of a runaway reaction. Such a reaction probably occurred at Institute due to brine contamina-

tion about five months before the Bhopal accident. The situation was somehow controlled. UCC made a report of this accident but it was never given to the workers, nor was the 1982 safety audit report of the Bhopal plant. When workers are not taken into confidence, how would they know what to do in emergencies?

BG: Could anything have been done to minimize the effects of the accident?

C: The management had never drawn up an off-site emergency plan. This was the biggest drawback. So there was no way of informing the bystander population either of the gravity of the situation or what steps to take. The plant workers were not trained in how to handle such a situation. In 1982 when a toxic leak occurred, the bystander population ran away. At least after that the management could have formulated an emergency plan. After this incident, the union demanded that an alarm system be installed. Government set up an enquiry committee, but gave the plant a clean chit after inspecting the water jets and alarm systems.

The management could have sent a bus with the driver wearing a gas mask to inform public what to do. Hospitals could have been instructed about medical emergency procedures. Since the workers were so used to minor leaks, they never realized the gravity of the situation, until they saw dead bodies. There was no senior knowledgeable person to handle the situation. Even if the loud siren had been sounded at the right time and for a sufficiently long time, it would have given bystander population some time to evacuate. Half-an-hour after the leak started, people at the railway station had not realised what had happened. By the time they did, it was too late.

BG: In light of the Bhopal experience what suggestions would you make to workers and unions in other hazardous chemical plants?

C: Each worker should know the hazards of the chemicals in his plant, the emergency procedures and what his role is.

BG: What lessons can be drawn from Bhopal?

C: The role of information is very important. It is not just the workers but the bystander population too should know what to do in emergencies, as in the case of hospitals, civil defence, transport systems, etc. Secondly, there should be an emergency plan. Thirdly, accident analyses reports should be accessible to public. Fourthly, something should be done to mitigate the high operator turnover in chemical plants.

BG: Was the compensation given to the workers adequate?

C: Hardly so. Initially, we were offered 15 days salary for each year of service. Only after we pressed our demands did the company give each worker Rs. 10,000 and washed its hands off. And it made each worker sign an illegal statement that he would claim no further compensation or litigate against Carbide. We have gone to court to have the clause declared illegal for violating the Industrial Disputes Act on grounds of no prior notice being given. Moreover, Carbide should take the responsibility to continue to

monitor and treat workers' health for any occupational related ailments.

BG: What is your opinion about an out-of-court settlement?

C: It may be done in the interest of expediency, provided it is fair but at no time should liability proceedings be dropped. Otherwise it is like a murderer going scot free by paying some money.

BG: Were there any changes in the plant's operating procedures?

C: Yes. Earlier various process parameters like temperatures, pressures and flows were read hourly. Subsequently, this was changed to once in two hours and one month before the accident, instructions were given to take readings only at the end of each shift. When you read the instruments only once in 8 hours, you don't know what has been happening in between, and more important, you stop taking the readings seriously.

On the night of the accident, the 10.30 p.m. reading was taken at 10.12 p.m. Everything appeared normal then. The next reading was to be taken only in the morning, so nobody was on the lookout for any abnormal changes.

Earlier the MIC tanks were kept at 0°C for safety and to reduce losses while transferring MIC from the tank to drums. Later, the

refrigeration system was operated only during material transfer from tank to drums and about one and a half months before the accident it was switched off altogether.

BG: What were the design or engineering control problems with the plant?

C: The temperature alarm of the MIC tank was not functioning for 4 years prior to the accident and nobody even bothered to fix it.

BG: Did no one raise any questions about this?

C: They (management) knew about it. Actually they should have had a back-up alarm as they have at the Institute plant. While designing the plant they should have provided for separate tapping points for temperature, pressure and level measurements. But they put everything in the same manhole to cut costs. All material goes in and comes out of there. Thus, impurities such as moisture and scaling would get concentrated there. In tank 610, the pipe had heavy scaling on it. Whenever the pipe was cleaned, the alarm worked for 1-2 weeks and then stopped again.

BG: You mean to say that the temperature monitor and alarm

should have had separate tappings?

C: Yes, this would have minimised the chances of failure due to scaling. There is solid evidence that not a single temperature reading, one of the most important safety features of the plant, was obtained in 4 years prior to the accident.

BG: One hears so much about a "jumper line" addition which contributed to the accident occurring. Could you throw some light on it?

C: The jumper line was an additional pipe fitted between two lines. It was a short-sighted design modification, done with the consent of the parent company about a year before the accident, to provide a route for any fugitive MIC emissions to be neutralised at the vent gas scrubber, if any maintenance work was being done on either of the two lines. Water washing of lines was started at 9.30 p.m. Since these lines were choked, water found its way into MIC tank 610 via the jumper line. If the jumper line had not been there, no water would have got into the MIC tank. Since the line was made of carbon steel, the ingress water picked up some contaminants which ultimately greatly hastened the runaway reaction. Moreover, a slip blind, a device to isolate a line, was not used while water washing, as the valves were trusted.

The Curious Twists of The Bhopal Litigation :

M.P. High Court's dissidence to the victims and the Indian Judiciary

The case

Over three years have passed since the first suits were filed against Union Carbide Corporation (UCC) in India and the US, seeking compensation for the loss of life, injuries suffered and economic losses resulting from the Bhopal gas disaster of December 1984. In the intervening period, proceedings have taken such a bewildering variety of twists and turns that in the welter of claims and counterclaims, appeals and interim orders, the rationale for the entire exercise has become blurred. Yet for all the confusion, the basic goals of the litigation and the strategy adopted, for the most part, essentially remain valid.

In retrospect, the basic form of redress pursued by the victims, that of seeking a remedy in torts against UCC rather than its subsidiary Union Carbide India Ltd. (UCIL) in US courts, seems to have been suggested by the intervention of the American personal injury lawyers who flocked to Bhopal in the immediate aftermath of the disaster. This is not to question the merits of the remedy chosen but only to point out the crucial role played by these lawyers in setting the terms, as it were, of all future actions.

Judge Keenan, in the 18 months that he presided over the case, did not make a determination of the preliminary issue of representation, i.e. whether the Government of India's (GOI) legislated right to represent the claimants, to the exclusion of the US lawyers, was legally binding on the proceedings before him. Instead, on his suggestion, the plaintiff's counsel elected a three-member committee to represent them consisting of Michael Cirisi

from the firm retained by the GOI and Stanley M Chesley and F Lee Bainley. Though the GOI chose to maintain a separate action, both its suit and the one filed by the US lawyers similarly alleged that UCC had designed, constructed, owned, operated and managed the Bhopal plant to manufacture and store large quantities of methyl isocyanate, a chemical that the corporation's manuals describe as reactive, volatile and extremely toxic. UCC had warranted that its design was based on the best information available, it had trained the plant's personnel, had supervised the Bhopal operation and had, moreover, undertaken to provide its subsidiary upto-date information on the processes employed.

Thus, the plaintiffs alleged, UCC was absolutely and strictly liable in law for creating the material conditions responsible for the escape of the lethal gas and for all the resulting damage. Further, they alleged, UCC had been negligent, was guilty of a breach of warranty and of misrepresentation. By way of compensation, the plaintiffs sought unquantified damages for the loss of life, and injuries suffered, the economic and environmental losses incurred, reimbursement of expenditure on relief and rehabilitation, the costs of conducting research on long-term health effects and finally, punitive damages to deter others from indulging in such wrongful conduct.

Victims at disadvantage

From the very first days following the Bhopal gas disaster of December 1984 it has been widely recognised that a major obstacle to litigating claims for compensation against UCC lay in the abject poverty of much

of the victim population. Not only did the victims lack the resources to independently proceed against the corporation but, given their debilitating injuries, even the certainty of surviving the course of prolonged litigation was difficult. An immediate relief programme was thus dictated as much by the need to alleviate their suffering as to enable them to seek legal redress. Without such sustenance, the victims would inevitably be forced to compromise their claims and settle for a fraction of what they stood to recover, were the case to be tried.

The GOI appeared to recognise this when, in addition to paying interim compensation to the bereaved and the injured, it undertook to litigate the victims' claims on their behalf. Under an ordinance dated 20th April 1985, which was later replaced by statute, the government acquired the exclusive right to represent all claims in respect of the disaster, as also the unrestricted power to determine the level of compensation to be sought and the best means to secure it. The Act further provided for the government to be reimbursed for all expenses it had incurred on Bhopal from the amount decreed or settled upon. If the Bhopal Act gave statutory recognition to the unusual nature of the case, requiring a sovereign to initiate legal proceedings on behalf of its subjects and in the process depriving them of the right dealt with their claims as they chose, it cast no obligation whatsoever upon the government to provide for their immediate needs or even to consult them on the handling of their claims.

While the government appears to have pursued the litigation against UCC with a fair de-

gree of diligence, the same cannot be said for its concern for the victims' welfare. By its own admission, in the three years that have elapsed since the disaster, the government has spent a total of Rs. 87 crores on relief to the victims and on litigation. Considering that around 2,00,000 people have been 'provided' for, the government's outlay per head works out to barely Rs. 4350 or just Rs. 1450 per annum to date. It is not accidental therefore that every court that has presided over the case so far has sought to draw the attention of the parties to the victims' precarious state and has tried to devise some arrangement to secure their immediate requirements. Invariably, the courts have encouraged the parties to settle the case failing which, they have advanced several proposals to pay the victims 'interim relief'.

Carbide has, of course, made the most of the government's failure in this regard. Its counsel have never lost an opportunity to accuse the government of ignoring the victims' interests and in suggesting that the litigation was politically motivated. The corporation favors a quick settlement of the case, under which it would pay a fixed sum as compensation in exchange for a complete renunciation of all claims against itself as well as the withdrawal of all legal proceedings in respect of Bhopal.

Compromise attempts

Judge Keenan, before whom all cases filed in US were consolidated, delayed ruling on whether the case should be tried in the US or in India in the hope that he could compel the parties to compromise. After months of negotiations, Carbide offered \$350 million which the government rejected as inadequate and Keenan was forced to rule on the case. In April 1987, Judge M W Deo, before whom the case now lay, revived the settlement proposal, arguing that a compromise would be in the best interests of the victims, particularly when even 2 years after filing suit, the case had not reached trial. Reports indicated that UCC had almost doubled its initial offer to \$ 650 million, but even this round of negotiation proved fruitless as the two sides could not agree over payment schedule. When they informed Deo in early December 1987 that they had failed to settle the case, he then took it upon himself to find a solution. If the case could not be settled out-of-court, it would have to be tried; but considering how prolonged the exercise threatened to be, he had first to ensure that the claimant was in a position to last its duration.

Setback to Carbide's play

On 17 December, Judge Deo passed an order directing UCC to deposit a sum of Rs. 350 crores (\$ 270 million approx.) with the court, to be used to make interim payments to the victims and to meet the costs of providing them medical care and suitable employment. Arguing that the victims had a 'substantive right' to receive interim relief, Deo clarified that such a payment would be without prejudice to the 'rights and defences of the parties to the suit' and could not therefore be construed as an admission of liability. In passing his order, Deo relied on the power of the courts to pass interlocutory order under section 94(e) as well as the 'inherent powers' of courts under section 151 of the Civil Procedure Code, which permit the court to 'make such orders as may be necessary for the ends of justice or to prevent abuse of the process of the court.'

In essence, Deo was setting right the single most obvious flaw in the case, the inequality of the parties to the suit. There was no way the ends of justice could be met if the victims were to remain unprotected. In a single move, whatever compulsion existed to unfairly compromise the case were removed, and the right of the Bhopal victim to a legal remedy clearly established.

Carbide was obviously taken by surprise; not only was asked to pay up but more important, it was being compelled to undermine the very strategy that it had pursued so effectively over three years. UCC had always argued that the victims could not afford the luxury of litigation and should therefore accept an immediate payment in exchange for their legal claim. The longer the case dragged on, the more pitiable the state of the victims, Carbide reasoned, the more receptive would all concerned be to its settlement offer. All of a sudden, UCC found itself being asked not just to abandon the 'gains' of the last three years but to actually represent for them by 'sustaining its adversary' herself.

M.P. H.C. disservice to the victims and Indian judiciary

In its revision petition before the M.P. High Court, UCC launched a frontal assault on both the order and on Deo himself, stating that the corporation had lost faith in the judge's impartiality. Arguing that the award of interim relief at this preliminary stage of proceedings amounted to awarding 'damages' before its liability was established, UCC claimed that Deo had 'pre-judged the case'. UCC further alleged that Deo had exceeded his jurisdiction in passing such an order as a court in the exercise of its inherent powers could not affect the 'substantive rights' of either party. In the Bhopal case, the corporation had not only wholly denied liability, but had in fact filed a counter-suit against both state and central governments holding them liable to compensate the victims. As the rival claims had not been tried and liability clearly determined, an order directing UCC to pay interim relief amounts, the corporation contended, to arbitrarily assigning the responsibility to compensate to just one of several co-defendants. To compel it do so without first giving the corporation a chance to lead evidence and to argue its case, was to deny its substantive right to defend itself.

On 4 April this year, the revision bench of the M P High Court presided over by Judge S K Seth returned a verdict so incredible that it virtually stood the case on its head, rendering quite meaningless over three years of litigation. By the strangest of 'reasoning' yet witnessed in the Bhopal litigation, Seth upheld Union Carbide's case against Deo's order in its entirety, but nevertheless concluded that, subject to a minor modification, the order was binding! Union Carbide would have to pay not Rs 350 crores as 'interim relief' but Rs 250 crores as an 'interim payment' (or a first installment) of damages. In other words, Seth determined, Deo had clearly exceeded his jurisdiction both under sec.94(e) and in the exercise of inherent powers under sec.151 by passing an interim order on a subject that legitimately belonged to a final decree, that the inherent powers of the court could be permitted to prejudicially affect the right of either party, thereby prejudicially affecting the rights of the petitioner. Yet he maintained that Deo was justified in ordering UCC to make an interim payment to the victims.

Seth explained this apparent paradox by claiming that UCC's liability had already been established although Deo had not realised it. Not only had the plaintiff made out a prima facie case against the corporation but the 'corporate veil' that separated it from its Indian subsidiary, had been lifted and the parent's direct complicity in the entire affair established beyond reasonable doubt. The question of a trial to determine liability, Seth felt, was entirely redundant as the principle of 'absolute liability' laid down by the Supreme Court in the Shriram case, was directly applicable to the facts of the Bhopal case. Thus Union Carbide, which had undertaken a hazardous or inherently dangerous activity, would be absolutely liable to compensate its victims and was not entitled to any defence. Thus Seth summarily dismissed UCC's counterclaim against the state and central government. Further since the Supreme Court had determined that damages payable should correlate to the offender's capacity to pay, a deterrent measure which clearly conflicts with the principle of 'no fault' or absolute liability, Seth decreed that an interim award of \$123 million was entirely justified when UCC's assets totalled several billion dollars. The only problem, as the learned judge himself was so eager to point out, was, Indian law had no provision to compel the defendant to make an advance payment on an amount yet to be decreed against him. So Seth decided to 'borrow' the appropriate law from England; not a precedent or a principle laid down in the common law but an entire statute! The UK's Administration of Justice Act, 1969, stipulates that where liability is either admitted or the court is convinced that the plaintiff stands to win substantive damages from the defendant, the court can order the defendant to make an interim payment to the plaintiff pending a final decree. The latter case is clearly where liability has already been established in trial and only the precise quantum of damages remains to be determined.

In the Bhopal case, the plaintiff had justified their claim to recover damages from UCC rather than UCIL, which legally owned the plant, by advancing the novel theory of multinational enterprise liability. They argued that despite its complex corporate structure, the multinational enterprise, with its network of interlocking directors, common operating systems, global distribution and marketing systems and financial control, was, in reality, one monolithic entity. Thus the distinction between the parent and the subsidiary was nothing but a legal fiction which had to be disregarded, if the responsibility for any harm caused by a unit of the enterprise was to be accurately assigned.

While the government of India led substantive evidence of UCC's day-to-day control over the activities of UCIL, the issue of legal liability in the Bhopal case has not yet been directly addressed, let alone determined. However, two US courts in pre-trial rulings, have indirectly dealt with the question. Both Judge Keenan and the three judge appeal bench held that the plaintiff had failed to show such a degree of control of the parent over the subsidiary to sustain its claim that the bulk of evidence on liability lay in the US, thus necessitating trial

This is not to endorse their view but only to point out that thus far, every court prior to Seth, has taken the view that the liability issue was still open and should only be resolved on the basis of substantive evidence.

Judge Seth, in summarily holding UCC liable has done parted the entire proceeding to date, rejecting in their entirety the views expressed by courts that preceded his on the Bhopal case. Yet he imagines that his order is actually enforceable; that is, he expects a US court to execute his interim decree" even after the federal appeals court found little prima facie evidence of UCC's involvement in the Bhopal disaster. More important, Seth thought it necessary to clarify that any judgment rendered against UCC would have to comply with the requirement of US statutes on the enforcement of foreign judgments, or in other words, conform to the principles of natural justice.

Seth was merely asked to determine whether Deo, in passing the interim relief order, had exceeded his jurisdiction. Ironically even while answering in the affirmative, he seems to have been unaware that he was committing the same error. Not only was he exceeding his revisionary jurisdiction, Seth applied non-existent laws to the facts of the Bhopal case to suit a predetermined end and violated due process by ruling on issues on which he did not hear the parties. What is worse, he actually seeks to clothe such violations with legality by justifying a summary trial procedure for the Bhopal case.

It is imperative that Seth's order be immediately appealed by both parties. Even if the Supreme Court were to disallow any form of interim payment at the present stage of proceedings, it would at least serve to put the case back on the rails. The absence of interim arrangements would moreover provide incentive to hasten proceedings. Seth's order does a grave disservice not only to the image of the Indian judiciary but more important, to the Bhopal victims. In his eagerness to 'do justice' to the victims, Seth has only succeeded in further delaying that goal.

The Bhopal Massacre: The Worst Kind Of Multinational Encounter

By the mid-1980's, a number of studies had warned against the virtual absolute power and total lack of accountability of multinational corporations (MNCs). Works such as *Global Reach*, *The Sovereign State of AT & T*, *The Seven Sisters and How the Other Half Dies*, have documented beyond dispute how pervasive and pernicious the power of MNCs had become. First World public interest lawyers and Third World social action groups and networks, such as those involved in the infant-food boycott campaigns, have been struggling constantly to hold MNCs accountable. Despite winning several "battles", these groups are often in despair as MNCs win the "wars" and MNC accountability remains a distant and impossible dream.

December 1984 witnessed the world's worst industrial disaster as thousands in Bhopal lost their lives to the recklessness and cupidity of Union Carbide Corporation (UCC). For UCC, Bhopal was by no means a "first offence". Indeed, even before Bhopal, UCC had chalked up so dismal a record on health and safety issues as to merit being treated as a dangerous recidivist offender, deserving the severest sanctions. Ironically, it was only after Bhopal that U.S. regulatory agencies slapped UCC with record penalties and fines. For years before Bhopal, and the 3 years since, UCC has used its considerable financial resources on public relations campaign and legal expenditures to successfully evade legal accountability and well-merited public censure. The Bhopal victims' struggle to hold UCC accountable and to obtain compensation demonstrates all too graphically the difficulties in dealing with MNCs.

The Bhopal carnage was not just an industrial disaster. It was a multinational disaster, caused by and exacerbated by the multinational character of UCC. A number of the accident's causes were a result of decisions made in Danbury, UCC's U.S. home, and Hong Kong, from where UCC controlled its agricultural products worldwide. These decisions often overruled or ignored the wishes of the management, technical experts and consultants of UCC's Indian subsidiary, Union Carbide India Ltd. (UCIL). Crucial decisions as to the basic design of the plant, including choice of methyl isocyanate (MIC) manufacturing process that was more hazardous than other known processes, inadequate safety system design and the MIC storage tank sizes were taken abroad, by UCC. So too were decisions regarding the choice of substandard construction materials

used, and the day-to-day running of the plant. UCC conducted its own internal safety audit of the Bhopal plant. The parent company's control was so extensive that, shortly before the disaster occurred, UCC had decided to shift the Bhopal plant to Indonesia and UCIL had no say in the matter.

UCC's multinational character not only contributed to the accident causation, but also exacerbated it in terrible ways. All research on MIC's toxic effects and its detoxification was done by UCC, the inadequacy of which contributed to the death of several thousands. The powerful MNC that it is, UCC has been able to deploy its vast financial and human resources to delay litigation; indulge in forum dodging; attempt to force an utterly inadequate settlement offer on Bhopal's victims; withhold the provision of effective interim relief, and thereby blackmail the victims into bargaining their rights and just claims; and cover-up all these acts by spreading misinformation through effective public relations. UCC's frequent mouthed assertions of concern for Bhopal's victims has not stopped them from using their flexibility as an MNC to act consistently against the interests of the victims. E.g., UCC has undergone a global corporate reorganisation which has reduced its assets, thus placing a substantial amount of these assets beyond the reach of Bhopal's victims.

Multinational corporations: Transnational accountability or supernational irresponsibility?

The Bhopal experience demonstrates, all too graphically, how MNCs use their global mobility and enormous power to flout their responsibilities, flaunt their lack of accountability, and evade liability. UCC's response to Bhopal is quite typical of the way in which MNC responds to crisis:

* **Corporate interests above all else:** The massacre of Bhopal was precipitated by UCC's placing its corporate interests above all others. The Bhopal operation was running at a loss. Hence UCC decided on a furious bout of cost-cutting measures to which even the most elementary safety standards and practices fell victim. Even after the disaster, Carbide continues to place its own corporate survival above the physical survival of the Bhopal victims.

* **Cover-up and minimize:** Carbide has used its labyrinthine structure to cover-up and minimize the extent of damage caused at Bhopal. Carbide has not hesitated to co-opt medical "experts", PR "specialists", and high-priced legal flunkies to raise elaborate smoke screens, such as sabotage, and spread deliberate misinformation.

* **Delay and Dodge:** Carbide, like any other MNC, is eminently capable of waging a war of attrition and employing tactics of delay and forum-dodging, to evade processes of law that establish their responsibility and legal liability. The 40 months since the Bhopal tragedy provide a plethora of examples of Carbide's behavior in this regard.

* **Victim Blackmail:** MNCs invariably tend to use their dominant power position to impose unfair settlements upon their victims by fully exploiting vulnerabilities that have been created by the multinational's own illegal acts. Carbide's continued withholding of interim relief to the Bhopal victims is an obvious case in point.

* **The Phoenix Ploy:** MNCs are uniquely placed to defraud their victims by indulging in corporate restructuring and, if need be, filing in bankruptcy and starting all over again.

Carbide has already reduced its shareholders' equity to less than half of what it was at the date of Bhopal disaster.

* **Double jeopardy for victims:** Multinationals, by their ability to move assets around between different global locations, are able to force victims into an endless round of re-litigation of the same issues. Even where victims obtain a judgement or order, such as the order for interim relief obtained by the Bhopal victims, the multinational is able to virtually re-litigate the issue by keeping assets beyond the jurisdiction of the court and rehearsing earlier arguments when recognition and enforcement of a decree is sought in the jurisdiction where the assets lie.

The above problems are compounded by the fact that:

- Multinationals usually enjoy a "protected" status, or at least special privileges, under the laws of the host country

- Multinationals usually enjoy the support, at times taking the form of diplomatic interventions, of the governments of their home country; and
- Multinationals, almost always, are in a position to buy and bribe their way out of trouble.

Thus, the need for multinational enterprise liability stems today from much more than ideological considerations. As the Bhopal experience indicates, multinational enterprise liability is also needed for very pragmatic reasons of securing accountability and justice.

The Bhopal Victims' Search for Accountability and Justice

After more than 3 years, the Bhopal victims are still a long way from securing accountability and justice from Union Carbide. The absence of effective mechanisms for securing multinational enterprise liability has considerably hampered them in their quest. The Bhopal victims have sought three main objectives:

- **ACCOUNTABILITY** by establishing why the Bhopal disaster occurred and who is responsible.
- **JUSTICE** by securing interim relief to speed up the process of decontamination; compensation for losses and harms suffered; and assurances against future victimization.
- **PUNISHMENT** of those who perpetrated the Bhopal massacre by way of imposition of punitive damages and criminal sanctions. Only thus could the vital objectives of prevention and deterrence be served.

After three and a half years of pursuing these objectives through civil litigation in India and the US and criminal litigation in India, the Bhopal victims are still very far from securing these objectives because of the multinational character of UCC. In the civil litigation, Carbide first refused to subject itself to the jurisdiction of the Indian court. Later, they succeeded in having the case transferred away from a US court, where severe punitive damages were a likelihood. At the moment, they are experiencing second thoughts about submitting to the jurisdiction of the Indian court and may well argue the absurd proposition that the US court set itself up as a supervisor of the Indian courts in the guise of being an arbiter of "due process". The result of these Carbide stratagems has been that they have, thus far, largely evaded accountability. They have also evaded providing justice to the Bhopal victims. In a historic judgement last December, the Bhopal district court ordered Carbide to pay \$270 million by way of interim relief to the Bhopal victims. But Carbide refuses to comply and will probably go through an appeal procedure after another as they continue to stall, taking every advantage of their multinational mobility. Modest strides have been made towards accountability as a result of use of discovery procedures available under US law, but Union Carbide has been able to contain the damage by obtaining a favourable ruling from the US Court of Appeals which frees it from the reach of US federal discovery law from here-on. Similarly, modest strides towards punishment and deterrence have been made as a result of the institution of criminal proceedings in India against the

Union Carbide parent and its subsidiary in Hong Kong. But here again, Carbide will raise jurisdictional hurdles by taking advantage of its legal status as a multinational which enables it to evade accountability, justice and punishment.

Making the world safe from and not safe for multinationals: The need for legal renovation

The Bhopal experience has revealed several serious gaps in the legal system of both India and the US, and indeed probably most countries, which greatly reduce their effectiveness as an instrument for holding MNCs accountable. At present, the law helps make it safe for MNCs to operate. It is essential, however, that mechanisms, including but not necessarily confined to legal ones, be developed to secure multinational enterprise liability. Only then can we be provided some degree of safety against the operations of multinationals.

The concept of multinational enterprise liability is a very simple one and ought to flow naturally from the concept of multinational. The multinational is a single global corporate entity for the enterprise's own functional purposes. It should therefore also be a single legal entity for purposes of accountability and liability. Thus, the parent multinational should be held vicariously liable for the acts of any and all of its subsidiaries. Such an approach could be based jurisprudentially, both on concepts of principal and agent as well as on concepts of control.

Secondly, a multinational should be held liable directly for its own acts and such liability should be enforceable either in the courts of any of the countries in which the multinational parent does business or in the courts of any of the countries where any of its subsidiaries does business. This is essential if the multinational is to be prevented from indulging in forum-dodging. Such an approach can be defended jurisprudentially on the ground that subsidiaries are in fact little more than the limbs of the parent and that the legal distinction between parent and subsidiary is, in fact, little more than a legal subterfuge for evading liability.

Several approaches need to be concurrently adopted in attempting to develop adequate mechanisms for securing multinational enterprise liability.

• **The direct judicial approach** is being adopted by the Indian government, on behalf of the Bhopal victims, who have been arguing first before the US courts, and now before the Indian courts, for the adoption by the courts of a principle of multinational enterprise liability. Such a principle would treat the multinational as a single enterprise for purposes of liability.

• **The indirect judicial approach** would be to ascribe liability vicariously to the parent multinational, either when it can be shown that the parent was exercising control over the subsidiary or when it can be shown that the subsidiary was acting as an agent on behalf of the parent multinational. Such an approach is much less comprehensive and encompassing than the preceding direct approach and requires proof of facts, showing control or agency, thus leaving multinationals with considerable manoeuvre.

• **The domestic legislation approach** would embody a formulation of multinational enterprise liability under national corporate law. This could be achieved once again, either directly, by providing that all acts of the subsidiary will be treated as those of the parent; or indirectly, by incorporating, for example, non-rebuttable presumptions of control resulting from percentage corporate ownership.

• **The international treaty approach** would work towards negotiation and adoption of an international treaty adopting substantive provisions of multinational enterprise liability, or adopting reciprocal arrangements on certain procedural aspects, such as forum non conveniens, discovery, choice of law, recognition and enforcement of foreign judgements, and interim orders which would help prevent forum-dodging by the multinational.

• **The state responsibility approach** which would, at least in respect of ultra-hazardous activities, attempt to develop rules of international law creating state responsibility for the acts of its corporations.

• **The criminalisation approach** which would provide for corporate criminal liability and the imposition of sanctions such as punitive damages against the corporate entity. Such an approach could also ascribe liability, at a personal level, to the leading corporate decision-takers such as chief executive officers, chairpersons, plant managers and supervisors. Criminal law is not usually extra-territorial in reach. But where compelling social policy reasons exist, exceptions have been made in favour of creating extra-territorial reach of penal provisions of law, e.g. US anti-trust law. Extra-territorial criminal law would be a most compelling device, often acting in a preventive and deterrent rather than punitive manner, in securing multinational enterprise liability.

Thus, a variety of legal devices do exist to achieve the objective of multinational enterprise liability. Bhopal underscores the crucial need to mobilise public opinion and governments to adopt the strategies needed to make multinational enterprise liability not just an impossible dream but a non-negotiable demand. Only then will justice be done for the present and future victims of Bhopal and for the victims of future Bhopals.

Clarence J. Dias

(continued from page 19)

More damaging is the news that the TMI reactors began operations just one day before the end of 1978, so that their owners could qualify for as much as \$40 million in federal tax credits and write-offs. The plant had not shown itself trustworthy by that period.

For the citizen of the globe, the large scale devastation he now sees has become possible with the help of modern science and technology, has raised an entire new range of troubling questions. It is almost as if the devastations caused by science are making an about-turn and mauling science in return. People now wish to know whether himsa is an intrinsic component of modern science and technology. That is a question I have sought to answer elsewhere. The answer is not flattening to science, or technology. But then, neither was Bhopal.

Claude Alvarez

Union Carbide: Perfectionists in Prevarication and Merchants of Mendacity

Union Carbide's corporate strategy to overcome the Bhopal massacre appears to be built upon duplicitous doublepeak; strategic reliance on bald-faced lies; overabundant use of mealy-mouthed platitudes expressing concern for the victims; and a vigorous public relations campaign to spread misinformation. A few of the most glaring examples of the above speak for themselves:

1. We Have No Leak. Forty-five minutes after the leak, J. Mukund, works manager, Bhopal plant insists, "The gas leak just can't be from our plant. The plant is shut down. Our technology just can't go wrong." (1)

2. There Is No Danger. On December 3, 1984, L.D. Loya, medical officer of Union Carbide India Ltd. (UCIL) insists that "The gas is non-poisonous" and J. Mukund insists, "Methyl isocyanate (MIC) is only an irritant, it is not fatal." (As far back as 21 years ago, Union Carbide Corporation (UCC) knew, "MIC appears to be the most toxic member of the isocyanate family... and presents a definite hazard to life by inhalation") (2). The Operation Manual of the MIC unit of the Carbide plant, issued in 1978, warns "MIC is fatal even in limited doses".

3. The Victims Are To Blame. UCC has attempted to blame victims of its operations for the injuries they received:

"Some have TB, which is endemic in that area. Some have malnutrition which is a troublesome thing in that area. The claims include a considerable number of fraudulent claims, we expect" (3).

"MIC produced a heavy cloud which settled very close to the earth, killing children because of their immature lungs, the elderly because of their diminished lung capacity, those who ran because their lungs expanded too rapidly, and small animals. The survivors included those people who stood still and covered their faces with handkerchiefs..." (4).

The Bhopal disaster was not the first time UCC has blamed the victims. In 1933, during trials following the discovery that hundreds of workers engaged in a UCC silica mining project in West Virginia were dying of silicosis, UCC's defence strategy was to allege that the workers were suffering not from silicosis but from TB:

"(After working only 26 days in one of the shafts), this Negro is now enjoying notoriety, travel without cost to himself, and the pleasure of making an impression on white people for probably the first time in his life" (comments by UCC on one of the workers who testified for the plaintiffs) (5).

"The Negroes didn't know how to care for themselves. They got sick and died from pneumonia and 100 much alcohol and poker. Nobody ever proved anything against the company anyway, and it had been blown all out of proportion when you considered all the company had done for those people" (5).

4. One Happy Global Carbide Family? Warren Anderson, the former chief-executive officer of UCC, who had no children of his own, "felt in a sense that all of his 100,000 employees working in some 700 factories in 38 countries

around the world were his children and constantly reminded them that they belonged to the Union Carbide family (6). Yet in order to avert responsibility for the Bhopal tragedy, counsel for UCC, argued in Bhopal. *Govt vs. Union Carbide Corp.*, the first case to be heard after the disaster, "The Indian Company has nothing to do with the U.S. company" (7).

5. Now You Have It/Now You Don't: Jurisdiction Over UCC. In the Yunus Farhat case, it was argued that the Indian Court had no jurisdiction over UCC and therefore no suit maintainable against it in India. Later, UCC man, argued before the US court that the US was an inconvenient forum for the trial of the case since much of the evidence and most of the witnesses lay in India. It will be stretching credibility beyond all limits if once again UCC reverses itself and attempts to come before the US courts arguing that the Indian court, because it has ordered Carbide to pay \$270 million by way of interim relief to the Bhopal victims, is without jurisdiction. Shamelessly, that is precisely what counsel for Carbide has been arguing before the Madhya Pradesh High Court in India. In effect, UCC is arguing that it is beyond the law and indeed, is a law unto itself!

6. Immoral Irresponsibility. Both W. Anderson and his successor, Robert Kennedy, have reiterated that UCC is morally responsible for the Bhopal tragedy (8). On December 7, 1987 Judge Deo called upon UCC to discharge its moral responsibility ("without any prejudice to their rights and defenses") in the litigation by providing the victims with \$270 million in interim relief. UCC's response has been to criticize the order, stall for time and file an appeal before the state High Court. Should they pursue further appeals in India and the US against the order for interim relief they will be exposing the hollowness of their moral responsibility play since victims are dying in Bhopal at the rate of at least one a day because of lack of interim relief.

7. Humanitarian Loss of Confidence. On April 2, 1987 when Judge Deo called upon UCC to provide substantial reconciliatory interim relief to the Bhopal victims, UCC, with an obvious eye on public relations, hailed the judge's initiative as "a sincere, constructive and humanitarian effort to get aid to the Bhopal victims" (9). In December, 1987 Judge Deo sought to implement his "constructive and humanitarian effort" by passing an order requiring UCC "to get aid to the victims". In February 1988, counsel for Carbide appealed to a superior court demanding Judge Deo for having done so and describing the act as a "material irregularity" prompting a loss of confidence in Judge Deo. It is unclear whether Carbide's loss of confidence in Judge Deo is as a result of his sincerity, his constructiveness, his humanitarianism or any combination thereof.

8. From Innovativeness to Irregularity. Counsel for UCC, seeking to prevent the Bhopal suit from being tried in the US, argued eloquently before Judge Keenan that the Indian courts are innovative enough to fashion new procedures and concepts to do justice to the Bhopal victims. UCC submitted lengthy affidavits extolling the virtue of the Indian judicial system. Today, in opposing the order of interim relief

granted against UCC, their counsel, in an inexcusable turn around, are arguing against the very concept of innovation that they had cited in their support before Judge Keenan and seem more than likely to attempt to complain to the U.S. courts that the very Indian judiciary it so recently extolled, has been committing violations of due process. For UCC, violations of Carbide's corporate interests and priorities seem tantamount to violation of due process and "material irregularity" by the judiciary.

9. Carbide's Desire to Settle Its Own Corporate Wrongs. Union Carbide has loudly, indeed stridently, proclaimed its anxiety and desire to settle the Bhopal litigation. Concern about the plight of victims has been advanced by Carbide as a reason for quick settlement. Yet Carbide has adopted every possible delaying tactic in the litigation. The sums offered by Carbide for settlement have been so grossly inadequate as to constitute an affront. To the dignity of Bhopal victims. Moreover, the recent undertones behind Carbide's settlement offers are clear in statements such as that made by Robert Kennedy "Our settlement offers have been more than generous by any Indian standard" (8) and also in disparaging remarks made about the Bhopal victims by Carbide spokespersons (see 3 above). Carbide has been treating the process of negotiation of a settlement as an operation more "covert" than the funding and arming of the Contras in Nicaragua. Earlier they tried to reach an agreement with US personal injury lawyers excluding the government of India and the victims, thereby earning a strong reprimand from Judge Keenan. Last time they attempted to once again totally exclude the victims from an attempted settlement. If, as Carbide claims, settlement is in the interests of the victims, why is it that they are the last to know the terms and amount of any such settlement? Carbide's real motivation for a settlement (to avert criminal liability and punitive damages) has become clear from their lack of response to a proposal made by leading US public interest lawyers that Carbide agree to face an action for punitive damages in the US. If, as Carbide repeatedly asserts, they bear no responsibility for the Bhopal disaster, then they have nothing to fear from an action in punitive damage.

10. Carbide Concern for the Bhopal Victims. Union Carbide spokesmen, from Anderson to Kennedy, from Wishart to Bersok, and from Holman to Nariman, have repeatedly expressed their concern for the Bhopal victims. Yet, when called upon to make voluntary contributions towards interim relief for the victims, their response has been begrudgingly an offer of \$5 million to the Red Cross of which \$2 million was in fact spent. More recently, they made an offer of \$4.6 million to the Bhopal district court. These sums seem inadequate when placed alongside the sums Carbide has spent on legal costs relating to Bhopal which were announced at last year's Annual General Meeting of Union Carbide as being "in the order of \$3.4 million for Bhopal related events alone" (Minutes, p. 38). Carbide spokesmen have been scathing in their denunciation of the relief efforts of the Indian government and the Madhya Pradesh government. Robert Kennedy, for example, writes "it's plain through all of this that the victims and their needs are playing second fiddle to Indian politics and greed" (8). Jackson Browning, Vice-President of Union Carbide,

in a letter to the New York Times entitled "India's Disrespect to the Victims of Bhopal" accused the Indian government of making the health concerns of Bhopal victims subservient to litigation concerns and urged them to make a commitment to meet the immediate needs of the Bhopal victims.¹⁰ Yet when it suits Carbide's litigation interests, Fali Nariman, counsel for Union Carbide argues before the Bhopal district court, "Where is the need for interim relief" advertising to the relief measures taken by the government in Bhopal (11) Warren Anderson proclaims, "We are not the adversaries of the sick and poor and we don't want to be cast in that light. We want to move forward." He goes on to say "Bhopal is not a survival issue for the corporation...Although the crisis is over for Union Carbide, the problem for some of the people of Bhopal are still a major concern for us"¹². Yet when Judge Deo called upon Carbide last year to make an offer of interim relief, their response took four and a half months. When Judge Deo ordered interim relief last December, Carbide counsel sought a six weeks delay and ultimately a stay order even while in the proceedings has been asserted that at least one Bhopal victim is dying per day for lack of interim relief. The Bhopal victims may well need to be protected from Carbide's concern for them!

11. Sabotage Against Carbide or By Carbide: Union Carbide's repeated assertion is that Bhopal disaster was caused by a deliberate act of sabotage by a disgruntled worker. Such claim would only absolve Carbide of liability in limited circumstances and only if the act were not a foreseeable one. Yet as far back as 1982, an Operational Safety Survey conducted by Union Carbide, of Bhopal plant warns of "recent labour conflicts" and states that "enough different comments were received to raise concern on the part of the team as to the real effectiveness of procedures in all cases"¹³. The same Safety Report details ten major concerns and several other concerns regarding the operational safety of the Bhopal

plant. The report makes several recommendations addressing those concerns. Union Carbide's failure to heed those recommendations brought about the Bhopal disaster. If "sabotage" occurred at Bhopal, was it the result of a disgruntled worker or of a Corporation engaged in reckless cost-cutting regarding an unprofitable plant?

12. Hazardous Businesses as Usual: Union Carbide's Indian subsidiary shut down, in April 1986, the Chemco unit of Union Carbide in Bombay and for more than a year has refused to reopen the unit citing various reasons. Among these is the claim that they cannot risk total liability in case of an accident while conducting an "inherently hazardous operation." A judgment of the Indian Supreme Court in December, 1986 had established the principle of "absolute liability" for "inherently dangerous" industrial operations. In June, 1987's new company has been registered under the name "Vidhya Petrochemicals." The company will reportedly do business in the same products as the Chemco unit of Union Carbide. The company is promoted by Subimal Bose, Director of Union Carbide and formerly Vice-President in charge of Chemco, Madgaokar, General Manager Personnel, Chemco, V.R. Dubey earlier Manager Chemicals, A. Samtani, Assistant Financial Controller, and V. Nijhawan, Works Manager now in Union Carbide Hong Kong (14). What Union Carbide feels is too unsafe to do under its own name seems safe enough as long as it simply has a new name!

Union Carbide's words, actions, policies, and corporate record through the years speak for themselves. Such agility in reversing positions might be a sign of corporate flexibility and dynamism...and hypocrisy?

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Institute Is Bhopal, Bhopal Is Institute

Just as Union Carbide attempted to transfer blame for the Bhopal massacre to its Indian subsidiary, so also apologists for the international chemical industry attempted to attribute the massacre to social and technical backwardness in the "peripheral" countries. With varying degrees of subtlety, commentators in "metropolitan" countries put the blame for Bhopal on ignorant and unskilled Indian workers and government authorities, the lack of a 'culture of safety' or the inability of 'developing countries' to handle advanced technology. This racist picture explained the massacre at Bhopal as a result of letting loose ignorant, unskilled workers from an 'underdeveloped' country, on a highly complex and toxic technology.

One argument used to rebut this racist view is to point to the responsibility of Carbide for the training of workers and the maintenance of the killer plant. A stronger argument, and a more useful one politically, can point out the similarities between the massacre at Bhopal and similar chemical disasters in metropolitan countries. This argument creates a basic unity between the struggle of opponents of toxic industry in both peripheral and metropolitan countries and provides a basic critique of chemical process operations which is applicable anywhere. This position on Bhopal

has been summed up by D. Wartenburg: 'A recent report by the International Confederation of Free Trade Unions argues that despite the technical flaws and poor safety and maintenance records at the Bhopal facility, adherence to US standards would not have averted this disaster. The accident didn't happen because we're safe and they're not. No one is safe'.

The best way to illustrate this thesis is to see the many ways in which the gas leak at Carbide's Institute, West Virginia, plant in August 1985 mirrors the disaster at Bhopal. The only difference is in the death toll: some 130 members of the public were injured by the leak, as were six workers, one seriously. However if the disaster had occurred one step farther along the chemical process, the death toll could easily have been as large as Bhopal's.

As was the case at Bhopal, the gas leak resulted from a runaway reaction. The scrubbing tower and subsequently the flare tower to which the escaping chemicals were vented, were overwhelmed by the amount and pressure of the chemicals flowing through them. As at Bhopal, the water spray system nearby was not strong enough to deal with the leak. The equipment was broken or malfunctioning and left unrepaired: a high-temperature alarm was

out of service and the level indicator on the tank that leaked, was broken. Both toxic leaks resulted from such multiple equipment failures, however much Carbide tried to blame the workers in both cases.

If the technical aspects were similar, so were the social aspects. Carbide took hours to reveal what chemicals leaked, making early medical treatment a guessing game. When Carbide finally named the chemicals involved, it downplayed their hazards. Their medical officer assured the exposed citizens that, one of the main constituents of the leak, aldicarbicide, was a 'very minor irritant' with 'no long-term effects'. Carbide failed to warn the local authorities of the leak when it occurred. Nor was the public warned. Such evacuation attempts as the local authorities made were inefficient. As at Bhopal, government inspection of the plant was inadequate, though regulators and local authorities had assured the surrounding population that the plant was safe. As with MIC, there was little or no information publicly available on aldicarbicide's health effects.

Carbide's management of the leak also echoed their management of Bhopal. The company minimized the problems caused by the leak, indulged in ritual displays of concern, including

a visit by the corporation's chief executive to the scene of the crime and, as at Bhopal, corporate management blamed local plant management for the leak. Later, when the while heat of media attention had passed and the lawsuits had been initiated, the corporation denied and it dismissed those using the company as hypochondriacs.

The most basic similarity between Bhopal and Institute is that both disasters can be traced back to decisions based on capital's values of profit-making and cost-cutting. If the major cause of the Bhopal massacre can be traced back to Carbide's original concept of unsuitable and ill-designed plant and its 'rationalisation' of staffing levels and maintenance work due to the plant's lack of profitability, a similar economic motive can be found behind the Institute leak. Carbide closed the MIC unit at Institute immediately after the Bhopal massacre and promised not to reopen it until it knew what went wrong at Bhopal and how to prevent such a situation recurring at the Institute MIC plant in May 1985. Carbide needed to reopen the unit to avail of the

market involved in that year's planting season and to prevent users of its MIC-based pesticides from switching to alternate products. Similarly, while Carbide reportedly spent \$5 million to make a safe plant safer by installing new safety devices, including a much-vaunted computer system, the usefulness of these measures was undermined by Carbide's cost-conscious purchasing decisions and its concentration on MIC alone, and not the many other toxic products used in the plant. Thus Carbide installed ground sensors to detect MIC leaks, but for other chemical leaks Carbide used its workers' noses to determine where and when they occurred.

Advocates of technical fixes, such as computer systems, as effective ways to prevent chemical disasters found their position undermined by the leak at Institute. There is a grotesque irony in the fact that new safety features attached to the plant made their own contribution to the accident. Incorrect results from the much-publicised computer equipment persuaded management that gas leak would not spread beyond the plant site.

The Institute leak shows chemical accidents are as likely to occur in metropolitan countries with developed infrastructure, skilled workforce, industrial culture and technologically advanced modeling and warning systems as they are likely to occur in peripheral countries which lack these dubious benefits of industrial civilisation. Adding another layer of technology to an already-faulty technology results in increased risk, not in increased safety. The more complex the technology, the more varied are the ways in which it may fail. The increasing technical complexity of chemical process plants, combined with management practices which are designed to keep workers ignorant of plant operations and hazards, make future chemical accidents inevitable. The increasing scale and spread of these plants increase the possible magnitude of these disasters and increase the number of places in which these disasters may occur. It is only a matter of time before another massacre as devastating as Bhopal occurs.

T. Jones

International Mobility of Hazardous Products, Industry, And Wastes

A public health problem

A characteristic of the 1970s in many Western developed or industrialised countries, including the US, was the expansion of government intervention and regulation in the areas of occupational and environmental health and consumer protection. Although some governments have recently tried to weaken their regulations, these attempts have not been popular and have not responded to a general mandate. But disparities in national regulations and other factors controlling hazardous products, processes and wastes have had some undesirable consequences. Pesticides, drugs and consumer products banned in some countries have been exported to others. Multinational Corporations (MNCs), under no immediate pressure to protect workers and communities from industrial hazards in developing countries to the extent required in the MNC's home countries, view protection measures as discretionary costs. The pressure to minimize expenses and maximize profits militates against such expenditures. Hazardous wastes, formally shipped within countries to points of minimal public resistance, now also cross national borders and are dumped in other countries.

Hazardous products

The careless and uninformed use of pesticides accounts for an enormous toll of preventable death and disease in developing countries. In the state of Sao Paulo, Brazil, an estimated 2000 people die each year from pesticide poisoning. David Bull of Oxfam, believes that 30% of the pesticides exported to the Third World are either banned or severely restricted in industrial nations. Many of these substances are prohibited because of their latent health effects (e.g. cancer and reproductive hazards), their long persistence in environment, and the threat that their environmental persistence poses through the poisoning of fish and animals and the polluting of surface

streams and groundwater. Other pesticides are used only under controlled conditions in industrial nations because of their recognised acute toxicity. When these products are used casually in tropical areas, the results can be devastating. In Trinidad, Dr. Rahid Rahman reports almost one fatal case of paraquat poisoning each week. This herbicide causes severe, untreatable damage to the lungs when significant amounts are absorbed through the skin. Yet Imperial Chemical Industries (ICI) has promoted the use of paraquat by showing a barefoot worker spraying paraquat on rice paddy and on his legs.

Thus, double standards in advertising, promotion and labeling of pesticides in the Third World by MNCs contribute to the toll of preventable death and disease. Though environmental regulations and export restrictions in the US and other countries may cause some manufacturing to be diverted to developing countries, multinational corporations based in the US and Western Europe will continue to dominate and control these profitable businesses. Pesticides not registered for use in the US or being shipped for a use that is cancelled or suspended in the US face some pre-export notification requirements. However Congress has so far declined to require that an export licence be obtained prior to the shipment of banned and unregistered pesticides.

Some developing countries have made great efforts to reduce their use of pesticides, especially the most notorious ones. Nicaragua, which imports most of its pesticides, will not accept any pesticide that has been banned in the country where it is made. Nicaragua has tried to limit pesticide applications by closely monitoring plant growth and introducing natural predators in the fields. A 40% reduction in pesticide use has been achieved without reducing crop output. However many other developing countries encourage farmers to use excessive amounts of pesticides. A survey of 9 countries in Africa, Asia, and Latin America showed that governments in 8 enhanced the

sale of pesticides by providing subsidies ranging from 19 to 89% of the retail price. Pesticide subsidies in Egypt and Indonesia are believed to be responsible for the bulk of pesticide usage in these countries, at an annual cost of \$200 million to each nation.

Hazardous processes

In the 1970s, as new laws in the US and Europe were applied to protect workers and communities from hazardous industries, the possibility was raised that hazardous industries might simply relocate in other countries. This appears to have been the case with only a small number of declining industries in the US (asbestos, textiles, arsenic recovery from copper smelting, and the manufacture of dyes from the intermediate benzidine).

But with the industrialization of the Third World, with its vast resources and markets, there was a growing concern that hazardous technology was being transferred without the concomitant transfer of engineering controls and expertise to minimize the dangers to workers and communities. Multinational corporations dominate heavy industries of all kinds, despite state ownership of some large facilities and the involvement of local firms in others, and preside over the industrial development of the world. Governments are not only dwarfed by some of these companies economically, but also in terms of technical know-how. Most of the literature in industrial medicine is also based on historical experience in plants owned by these giant firms. More than anyone else, the companies that have long been dominant in the various industries are aware of the hazards involved and the means for controlling them.

The multinational corporations' expertise was nowhere more evident than in the regulatory arena. At rulemaking hearings and in the courts, affected industrial firms and trade associations have challenged workplace and en-

environmental regulatory authorities on every front. Not uncommonly, the threat of industrial relocation, with its employment and economic penalties, was invoked by industry. The emergence of US workplace and environmental standards presented a challenge to US multinational corporations that extended far beyond US borders. Would the companies still insist that these standards were needlessly strict? If so, did this justify a "double standard" - a lower level of worker and community protection outside the US? When pressed, most US-based companies say that their policy is, "at a minimum", to observe US standards the world over.

Unfortunately, policy and practice frequently differ. Double standards in worker and community health protection are sadly commonplace in the world today. Extreme examples of the lack of health safeguards for Third World workers by MNCs based in Europe, Japan, Canada, United States, and Australia have been reported in the asbestos, vinyl chloride, pesticide, chromate, steel, and chlor-alkali industries. Abuses proliferate throughout Asia, Africa, and Latin America as industrialization occurs, and dramatic double standards are easy to identify even without police powers of plant entry or sophisticated air-sampling equipment. Often, to identify abuses it is enough to visit the plant site's environs, look at the workers' clothes and hair as the workers come off a shift, and ask about the working conditions. What type of personal protective equipment is available and in use? Are disabled employees dismissed without compensation for occupational injuries and diseases? Is hazardous work subcontracted to day labourers? Have there been any signs of government standards and inspections? Do workers receive periodic medical examinations? The picture obtained by asking these and similar questions can be supplemented by a visit to a government office, clinic, university, or newspaper.

The double standard in industrial hazards was brought to the front pages of newspapers the world over by the Bhopal catastrophe. During the night of December 2-3, 1984, a massive release from Union Carbide India Ltd. (UCIL) killed between 2000 and 5000 people in Bhopal. Permanent lung damage is evident in approximately 85,000 people who survived, and the event, one third of whom are severely disabled. Failure to alleviate the co-existing threats of malnutrition and endemic diseases among poor Bhopal victims has prolonged their suffering and steadily added to the death toll. It has been the worst chemical disaster in history.

The details of what happened are still unclear, and different theories have been proposed by Indian government scientists and Union Carbide Corporation (UCC). All seem to agree that the runaway reaction was started when water entered a storage tank containing about 41 tons of methyl isocyanate (MIC) during maintenance activities. MIC's irritating vapours were first perceived at around 11 p.m., but such leaks were a frequent occurrence and did not cause great concern at first. The source of the leak was not located, and the concentration of the vapours became more intense. Soon after midnight a sharp rise in pressure was noted in one of the large MIC storage tanks. Heat from the runaway reaction in the tank boiled unreacted MIC, forcing open the safety valve and releasing most of its contents in the vapour state. The plume of deadly gas was emitted between the hours of midnight and around 2 a.m. and spread out over the sleeping community.

An engineering analysis comparing the Bhopal plant with Union Carbide's sister facility in West Virginia revealed numerous shortcomings in the Indian plant. These included substandard design features:

- lack of redundant process and vapour detection safety instrumentation monitors;
- lack of adequately sized and automatically operated emergency equipment.

There were also serious shortcomings in the operation of the Indian plant, including:

- the shutdown of all three vital safety systems, prior to the disaster, that could cool the stored MIC, neutralize escaping vapours, or burn them;
- lack of a regular control instrument and equipment maintenance programme;
- lack of detailed emergency instructions in the plant operation manual, and lack of emergency training for plant operators.

Inadequate water spray hoses in the MIC storage area, profusely leaking valves, and nonfunctioning vital instruments (e.g. pressure gauges on phosgene storage tanks) were noted in a corporate safety audit of the Bhopal plant in 1982. Yet the plant management was not changed, and its already poor record of safeguarding workers and nearby community continued to get even worse. Union protests about the dangers at UCIL were disregarded.

Executive management is solely responsible for decisions that led to the catastrophe, which were the result of an indiscriminate economy drive. Some examples are as follows:

- The number of blue-collar workers was reduced from 850 to 642 over a two-year period; management cut operator strength by half in a number of dangerous jobs.
- Certified plant operators were replaced with less qualified workers.
- Corporate safety auditing was nowhere near as frequent in India as it was in comparable, potentially hazardous Union Carbide operations in the US.

Most serious of all, Union Carbide's corporate engineering group overruled the Indian subsidiary's objections in deciding to store large amounts of MIC in Bhopal starting in 1980. The largest chemical companies of Germany and Japan had always regarded MIC as too dangerous to store in large tanks, and their operations were designed so that large-scale storage of MIC was unnecessary. Though most of the ultra-hazardous features of Carbide's Bhopal operation were not in violation of specific US regulations, they were demonstrably far below the US standard of practice in safeguarding plants against potential runaway reactions.

The Bhopal disaster has fortunately brought forth many reactions that one hopes will lessen the severity of future tolls of industrial hazards. Public interest organisations in science, engineering, medicine, and law have taken a prominent role in demanding government regulation of hazardous chemical plants in India. The International Organisation of Consumer Unions has issued a community action resource manual for hazardous tech-

nologies. An international trade union investigation reports that Bhopal was conducted, and it is likely that unions in industrial nations will now make greater efforts than before to transfer health and safety expertise to unions in Third World countries. International cooperation among the above types of groups is generally on the increase, and once networks are forged, they tend to persist. Through collective international cooperation, health professionals and others should be able to moderate the severity of industrial hazards at the plants controlled by MNCs in the developing countries.

Double standards in occupational health, thus, arise in various human activities, including exposure to recognised hazards, warnings to those exposed, notification to the employees of medical conditions discovered by industrial physicians, compensation to the injured worker as an employee or as a consumer of products used in industry and agriculture, and exposure to technologies that have been widely replaced by less dangerous alternatives. Some economists seek to explain or justify such disparities with cost-benefit analyses based on imprecise estimates of job risks, compounded by assumptions of full knowledge and economic constructs of "willingness to pay for safety" among the victimized population. But destroying poor people's health for an increment of profit is inescapably a moral issue, and narrow economic rationalizations fall short of justifying such predatory business conduct.

Liability as a preventive factor

In many countries, it has long been a principle of social policy that, sellers of defective products and industries releasing harmful materials should bear responsibility for the damage caused. Product liability law in the US holds that if a product has serious non-obvious hazards associated with its use, and if the seller fails to provide warnings to the user of the product, then the seller is liable for damages that the product user sustains. Thousands of persons in the US have sued the sellers of asbestos products and Dalkon shield intra-uterine devices, claiming that these products have caused disability and death. But even after the sales of asbestos insulation and Dalkon shields were banned in the United States, US companies continued to sell the same products to an unsuspecting public in other countries. By 1977, the asbestos industry was beset with a growing number of personal injury and wrongful death suits in the United States.

The internal corporate documents reveal the decisive impact of liability considerations in determining product user warnings for asbestos.

They also suggest that health benefits might be achieved through international application of US liability laws. For example, workers in Costa Rica sterilized by a neomatec (dibromochloropropene) made in the US have sued the manufacturers, Shell and Dow Chemical in Texas. These suits are in essence identical to others brought by US workers sterilized by the same product. But their outcome may have enormous impact on the international sales practices of US based firms.

The suits by victims of Bhopal tragedy against UCC in New York have had far reaching impact. Even the Indian government has sued UCC, asserting that the US parent multinational corporation exercised direct control over the design and operation of its (50.9% owned) Indian subsidiary. The US district

court handling the Bhopal claims referred the case to Indian courts, but on these conditions: The parent corporation must pay any damages assessed by the Indian judiciary; and UCC must abide by US procedures in providing information to the plaintiff in pre-trial legal discovery. The realisation at corporate headquarters that liability for any Bhopal like disaster would be decided in the US courts, more than pressure from Third World governments, has forced corporations to tighten safety procedures, upgrade plants, supervise maintenance more closely and educate workers' reported Wall Street Journal, describing the reaction of the multinational corporations. Added pressure was created by the insurance industry's virtual withdrawal from the field of pollution liability coverage. In coming years it can be expected that more countries will establish civil liability for the sale of unreasonably hazardous products and pollution from poorly managed industrial operations. In addition, courts and legislatures in some countries may permit international application of such laws to redress and, it is hoped, curb most extreme abuses committed by their corporations in foreign lands.

Hazardous wastes

The export of hazardous wastes from industrial nations to dump sites in developing countries has become a major problem in 1980's. The political impacts, unlike many of the health consequences, have often been immediate. Publicity about hazardous waste export from the US to Haiti, the Dominican Republic, Sierra Leone and Mexico has led to enraged public reactions, followed by governmental intervention to prevent or halt the dumping in all of those countries.

In Mexico, an estimated 116.5 million metric tons of hazardous wastes are generated yearly. As of 1985, the country still had no law for regulation of hazardous waste disposal. There was one small (6000 TPA) authorized, broad-

spectrum hazardous waste landfill operating in the entire country. Air pollution authorities have forbidden the incineration of hazardous wastes near Mexico City, so wastes are drummed and shipped to other parts of the country (and presumably dumped in the environment). When asked what becomes of their Mexican operations' hazardous wastes, US based multinational companies (which have a large and growing number of plants across the Mexican border) said they did not even know. Some of the waste drums were the subject of publicity in Mexico when it was shown that they had been cut in half and used to store potable water. Similar situations exist in many countries, especially the rapidly industrializing ones.

As of early 1986, all a company needed to ship wastes to Mexico (or to any other country) was to notify EPA a month before exporting, no more than once a year. The notice was supposed to identify the waste material and the party who would dispose of it but it did not have to even specify the quantities involved or the frequency of the shipments. EPA's office of international activities was then supposed to pass this information on to the authorities of the importing country. After Los Angeles Times reporters showed Mexican environmental authorities the names of eight Mexican firms listed by EPA as recipients of US wastes in 1984-85, the authorities found that none were licensed for that purpose. The Mexican official had independently received word on only one of these sites, near Tecate, where waste inks and other liquid chemical wastes were illegally dumped. The Tecate operation was closed in February 1986, and the owners have been indicted on criminal charges in California.

In Europe, an estimated 3 million tons per year of hazardous chemical wastes cross national borders every year. As of 1983, Belgium, Italy, Greece and Ireland had no waste disposal laws at all. After the shocking discovery of dioxin contaminated wastes from Seveso, Italy unat-

tended in an abandoned slaughterhouse outside Paris, French officials led the call for international controls. Other dioxin contaminated wastes from Chemie Linz in Austria were discovered by angry Belgian authorities after being sent to Belgium from Austria via East European countries.

The European Parliament endorsed the following proposals in 1983:

1. International transfer of toxic wastes should be carried out only with full knowledge of all countries concerned.
2. Special transportation routes and border crossings should be designated.
3. Heavy prison sentences should be imposed on the producers or transporters who ignore the rules.

A more recent EEC directive would oblige exporters of hazardous wastes to provide authenticated evidence of the willingness and the capacity of the recipient countries to deal with the wastes before an export license can be granted. The new directive would apply to the exports of hazardous wastes both within the EEC and to other countries. It is a hopeful sign that so little tolerance exists for the international dumping of hazardous wastes. By refusing to be victimized in this way, developing countries not only protect the health of their people and the integrity of their environment, but they hasten the worldwide advance towards a new generation of less polluting technology by refusing to be an outlet for the wastes created as a design feature of today's technology.

B. I. Castleman and V. Navarro

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A Post Mortem On Modern Technology: The Bhopal Disaster

The ancient world boasts seven wonders, monuments that still engage our sense of wonder and awe. These artifacts were constructed by peoples with little access to the phenomenal capacities and mechanical energies available to man through modern science and technology today. Hence the provocation for wonder and astonishment. We somehow feel these are exceptions, that ingenuity is a quality only modern intelligence can claim.

Not that there are no technological marvels created in our own times. But in addition to these, and as if to counterbalance them, we also recognize that our age and its singular intelligence have raised a crop of monstrous achievements whose individual and combined effects have succeeded in producing a different kind of wonder, one laced with terror and a sense of the horrendous. The list is well known: Hiroshima-Nagasaki, Seveso, Bhopal, Three Mile Island, Chernobyl, Thalidomide, Minamata, SMON, Challenger, the recent oil spill in the US. Except for the Challenger spectacular, all the rest are mass disaster events. All are contributions of that new invention:

modern technology or its new whiz label - hi-tech.

In describing the nature or impact of these disasters the media and other assorted commentators generally use superlatives: the world's "worst spill", the world's "worst chemical disaster", or "second worst". It may be the worst disaster of the year, of the decade, of the century. All these events have constituted colossal assaults on modern technology's claims to competence, but despite the bludgeoning, the infatuation with such technology continues. "It is impossible to stop technological progress. The genie has escaped from the bottle. It will not listen to commands to return."

Without man there is no technology. Without society, no technological race. Yet, man pretends he is unable to control his momentum creating new technology. He is obsessed with its continuous creation. Underlying this alleged helplessness is a still intact faith, simplistic but powerful, in the benign nature of technology, its ability to enhance welfare. There is a continuing universal mesmerization

with the gadgetry modern technology exhibits, and this is true of people both within the so-called industrialized and industrializing worlds. Technology is a consumption item, intimately linked to the profits and power of those who nurse its drive and direction.

It is now admitted that modern science and technology have proved instrumental in killing more people than both the world war put together. This is certainly a new development: people now die in peacetime on a colossal scale because of technology. Industrial accidents, pesticides, drugs, mass disasters, the car - or the impact of effluents on the quality of life in the form of sustained ubiquitous, uncontrolled pollution. One form of mass death is often used to condone other forms of mass kill. "More people", say J R D Tata and Raja Ramanna, "die due to car accidents, than in nuclear disasters or because of nuclear radiation." We do not, therefore, ban the car, so we need not dehaard modern life. Industrialized death is so pervasive, it seems natural. Death is to be accepted as a natural consequence of man's involvement with modern technology.

The hisma associated with modern technology is often sought to be counterbalanced and justified by proclaiming the spectacular results found associated with the use of the same technology. Green revolution, white revolution, blue revolution, the second green revolution: the technocrat has now become the new order, revolutionary (Lenin and Che Guevara have been retired). Technology may have damaged the world, but it has also helped it survive and cope.

Therefore we should have expected that the ghost of the Bhopal gas disaster would not intimidate us beyond a point. Bhopals we know occur everyday, in similar, more acceptable doses. We have been immunised, we have relented. We have decided to accept living dangerously. We have no other choice.

There are no indications either that Japan or the US or any of the other technology impellers are suffering from exhaustion, or any disinclination to call off the game, or a failure of nerve. They are unable to take a bit of rest. They are equally victims.

All that is left for us to do in the circumstances is to carry out post mortems. As any doctor will tell you, post mortems merely establish the immediate cause of death. They give no indication to the corner of when future deaths from the same cause will occur in other individuals. Death, Manu Kohari and Lopa Mehta have recently proposed, occurs independent of disease. It uses disease for its own purposes, merely gives disease a bad name. So do mass disasters: their dissemination will offer no clue as to when other disasters will occur. Technology is as mortal, frail and incompetent as its creator. That result is incumbent on us to accept. We have no choice in the matter. This may seem a fatalistic discourse. But modern technology being intrinsically fatal can provide no other consolation for the believers.

But do we not have safeguards? Can we not improve on them and enhance safety? Can we not work out a future using the same technology, and not create Bhopals?

One of the reasons why the Bhopal gas disaster turned out to be so vicious was because the usual safeguards had not been maintained. So the experts said. The experts do not tell us what would have happened with the reacting MIC even if all the safeguards had been working well. I suggest that safeguards would still not have made much of a difference.

For the plain truth of the matter is that even if all the safeguards were intact and in working order, and water had entered the tank as it did, more than 30 tons of the toxins would still have leaked into the atmosphere. So far, only two reports, one in India Today, the other in Newstime, have drawn attention to this. But both do not tie up their implied conclusion: that none of the safeguards, nor all together, were designed to cope with neutralisation of those 40 tons of MIC rushing out in a couple of hours.

I do not think it is necessary now, except briefly, to go over the major safety features of the Bhopal UC plant and to demonstrate that none or all of them could have prevented the mishap. The water curtain, for instance, was designed to neutralize MIC escaping at a height of not more than 15 metres, whereas the vapour actually exited 33 metres above the ground. The refrigeration system for the tanks were out of order, but the manual itself states that "the low temperature will not eliminate

the possibility of a violent reaction, if contamination occurs." At the most, time for detection of the problem may have increased. The vent gas scrubber, working in such an emergency, could not have neutralised more than six tons of the escaping gases. The use of the flare tower for burning out such a huge quantity of escaping gas would have generated an even more hazardous consequence.

So it is a false argument that attempts to suggest that the safety features were inoperative, therefore the disaster. If the plant had actually been designed to contain such a contingency as the escape of 40 tons of MIC, it would have been completely uneconomical. The simpler truth is that the scientists did not even conceive of an accident on this scale. As for the company, the results of the tests it had done of the impact of small doses of MIC on human beings were probably so terrifying, it merely refused to entertain any prospect of an event such as this even occurring at the plant.

The notion that safeguards will prevent accidents of this kind in such technological systems is extremely naive, and is better treated with extreme caution.

The second major conclusion of our post mortem is that high tech produces disasters which are not only unpredictable, but essentially uncontrollable. Let us look into Bhopal and some of the other disasters it has enumerated much earlier.

In Bhopal, once the venting of the gas commenced on the night of December the 2nd, it proceeded with its own logic and steam, and nothing could be done to either stop the reaction or control the consequences. The accident ceased only when the tank exhausted its contents. The only option modern technology offers one in such circumstances is that one should rely on one's feet and run.

At Chernobyl, loss of coolant to the reactor sent temperatures soaring. Overheated steam began generating a number of hostile reactions which ended in an explosion blowing off the roof of the reactor, inviting a rush of oxygen from the atmosphere to feed a graphite fire. There was a meltdown of the core. Soviet scientists, unable to put out the graphite fire, had to ask for help from West German and Swedish nuclear experts. The latter were as incompetent. Eventually, the fire extinguished itself on its own.

At Three Mile Island, Harrisburg, in March 1979, a pump driving water to a steam generator quit, setting in rapid motion a bewildering sequence of events that ended in a partial meltdown of the core, and the creation of a massive bubble of hydrogen within the reactor (1000 cubic feet in size). Had the bubble exploded or expanded further, a full meltdown of the core would have been inevitable. The scientists were unable to do anything with the bubble. Eventually, after a number of terrifying days the bubble reduced in size of its own accord. The prospect of an explosion as meltdown occurred, blasting the containment and the dome of the reactor, was so real that evacuation of all vulnerable sections of the population (particularly pregnant women and children) was advised. As at Bhopal during Operation Faith, people in Harrisburg preferred to evacuate rather than stay.

The final conclusion one can draw from the post mortem is that such disasters are not due to any peculiar "third world" conditions. In fact, too much was made of the fact that the

disaster took place in India, and numerous journalists and critics were ready to claim that such a disaster "could not happen" in their own advanced societies. Even Union Carbide USA had attempted to distance itself from its Indian subsidiary, claiming that its unit there was run differently from its own unit back home. Mystery however is all too short.

Three major disasters have taken place in the advanced economies ever since the Bhopal disaster. The first was Chernobyl, the second was the Sandoz-Rhine chemical spill, the third was the major oil spill in the US in the first week of January, 1988. Prior to these major accidents, all other major disasters, except Bhopal, have occurred within the advanced economies: Seveso, Three Mile Island, Minamata, Smon, Thalidomide. The more hi-tech the economy, the more advanced, the larger the number of disasters.

In fact a number of features of the Bhopal accident have repeated monotonously in the other accidents after. What has emerged quite dramatically from the Sandoz-Rhine chemical spill is that the company whose profits over safety it ignored the safety recommendations of a Zurich-based insurance company, and decided to have its liability underwritten by a cheaper firm, rather than accept the Zurich company's terms.

The Sandoz unit had no water catchment, so all the water used by the firm to control the fire entered the Rhine carrying all the chemicals, thus causing the disaster. It had but two sprinklers. As with Bhopal, citizens and officials, some along the Rhine river, were not informed for a period of nearly 40 hours.

Recall Chernobyl too. If European governments had been thoroughly annoyed with the Soviets precisely because the latter had not informed them for a full three days after their nuclear accident in April, now West German, Dutch and French officials were going to the Swiss what they had done to the Soviets a few months earlier: calling them names.

As for corruption, it was only when scientists discovered new chemicals in the Rhine waters when making their analysis and began to suspect that other companies were also dumping their effluents, that Ciba Geigy came out with the confession that 105 gallons of a toxic herbicide atrazine had leaked into the river from its own plant, one day prior to the Sandoz fire.

What subsidiary conclusions may one now draw from the ones above? First, there is no guarantee that safeguards will work absolutely in any major hazardous process gifted to the human race by modern technology. One Russian expert observed that the Chernobyl accident could only have occurred due to an "almost improbable coincidence of chances". But possible none the less.

Second, the very socio-economic, political context in which modern technology is situated makes it potentially all the more dangerous with or without safeguards. If safeguards are incorporated in the design and even installed, they may still not be used. In TMI, valves that would have allowed coolant into the reactor from emergency pumps were closed instead for routine maintenance, just as the refrigeration unit had been dismantled in the Bhopal plant.

Bhopal - Book Reviews

Prelude

Three years ago, Bhopal once again brought into public view the strange affinity that profit hungry Multinational Corporations (MNCs) have for hazardous technologies, especially in their plants sited in the Third World. The issues that Bhopal raised were far ranging and many. In a long term political sense the questions that were raised pertained to, the technology choice and evolution - the very basis of industrial societies - in general and the social relations that govern such choices; for instance, the 'collaboration' between local Third World elites with MNCs which leads to obsolete and usually hazardous process technologies being dumped onto peoples of these countries.

In the short term there is a crying need for justice to be done to the victims, many of whom have been maimed for life, and to survivors of those who have been killed. Results of the legal tangles created by the disaster will also be of historic significance since they will be the landmark precedents on corporate liability of parent multinationals in their Third World operations.

A number of books, articles, reviews, documents have appeared in the literature; which analyse the disaster from all angles and viewpoints. However there is still dearth of literature on some salient aspects of the tragedy.

Some of more prominent books and compilation that have appeared till date constitute the matter of this review. The reviewer order indicates a rough rating given by the reviewer.

The Bhopal Syndrome: David Weir, IOC, 1986 pp vii + 117, (Rs 28).

David Weir's book is thin and concise and offers the relevant perspective within which Bhopal tragedy is to be placed. It asks the right questions, traces the subtle outline of what constitute the answers and reveals less well known facts about the pesticides industry.

The book does not focus exclusively on Bhopal. Only the first part of the book titled 'The Tragedy' deals with the actual tragedy presented in manner which is integrally enmeshed with book's overall perspective. The first chapter aptly introduces us to the fact of 'Running Towards Bhopal' and then leads us to some startling facts about the pesticides industry on a global scale; that \$13 billion worth of pesticides were sold in 1983 alone; the sales growth rate is 12.5% and the overall percentage of each year's crop lost to pests is same in spite of chemical warfare against pests; that profits in this chemical industry range from 17-25%, which only add to making food more expensive, and the structure of the pesticides industry follows the usual skewed pattern of a few multinationals dominating the scene.

The past decade has witnessed the markets in developed countries approach saturation and multinational corporations have turned more and more towards exports of their hazardous products, technology and an agriculture based on the use of such products to the newly cap-

tered markets in the Third World countries. This then constitutes the current political context which governs the relationship between the pesticides companies and the governments of the underdeveloped countries. The following quote from Weir's book puts it rather aptly: 'By moving into the Third World the MNCs have encountered conditions quite unlike those at home. Malnutrition, illiteracy, poverty and short life expectancy are the norm. Economic development, the priority of practically every government in the world lags far behind that of Europe US and Japan. By 1974, a decade before the Bhopal tragedy, for example, Union Carbide was marketing its products in 125 different countries, 75 (or 60%) of which had smaller economies compared to the corporation. Holding such an advantage in size and money over many host governments gives the company a great deal of leverage. Though they seldom comment publicly on their relationship with Third World governments, officials, internal company documents reveal intense competition amongst firms to influence policy makers in host countries. In spite of India's larger size how different does the above description sound compared to what we have seen of the insidious nexus that existed between government agencies and Union Carbide India Ltd. (UCIL), as has been exposed in the aftermath of the tragedy? It is indeed this nexus that sets in the role of government agencies which first 'allowed' the disaster to occur and then went out of their way to 'cover up' things.

The rest of the chapters in this first part of the book document the actual tragedy and its immediate aftermath. A brief account of Union Carbide's history is provided as well as its influence - 'that despite Indian law limiting foreign ownership of corporations to 40%, the US parent company was allowed to retain a majority ownership (50.9%) of UCIL because it was considered a "high technology" enterprise'. Thus from an initial formulation facility for Sevin (carbaryl), UCIL expanded into a \$25 million enterprise based on a technology which was perhaps the cheapest but also the most hazardous since manufacture and storage of dangerous methyl isocyanate (MIC) was involved. In the 1980's, synthetic pyrethroids entered the Indian market and the demand for Sevin spiralled downwards, forcing UCIL into an economically tight corner, in spite of Union Carbide Corporation's (UCC) covert international campaign to 'prove' that synthetic pyrethroids caused cancer. Cost-cutting and sundry quality measures which were basically compromises on safety in an extremely hazardous enterprise coupled with the development of slums and shanty towns around UCIL plant due to the historic migration of people from the villages in search of work in urban centres created all the necessary conditions for a 'disaster waiting to happen'.

The gruesome 'night of terror' left thousands dead, perhaps of the order of 5000, and left another 200,000 injured, about 20,000 of them seriously. A host of factors pertaining to design and operating flaws, siting and licensing errors as well as socio-political factors typical of the Third World countries ultimately led to the disaster. These have been presented briefly enough to maintain the continuity of the narrative. (For a more detailed account see reviews of some of the other books).

UCC's and the Indian government's attitudes after the disaster followed expected stereotyped patterns. There was a terrible in-

formation vacuum regarding MIC. Controversies about the exact nature of the contents of the leak that took place and about the possible breakdown and effects of MIC in the body raged furiously. A sharp polarisation gradually emerged with the non-governmental voluntary organisations and health activists' groups on one side and the 'establishment' on the other. Some of them deserve greater public attention and have been analysed in some of the other books.

Part two of the book is even more significant in that it discusses the syndrome constituted by hazardous technology, its apparent necessity by the 'modernisation' drives of 'developing' countries and its peculiar interaction with Third World socio-political structures. It attempts to bring out the appalling ignorance that exists about thousands of chemicals being dumped on mankind by industrial society and the havoc they wreak in a politically divided world constituted by a diversity of societies who are themselves divided into social classes with conflicting 'interests'. And it is always the 'poor who pay'.

We indeed live in a world of dilemmas. Seveso, Love Canal, Three Mile Island all point to the impossibility of zero-risk society. All these 'incidents' have provoked serious reevaluation of manufacturing processes obviously governed by the industry's own need to survive in an increasingly hostile environment. But this dialectic in technology evaluation itself constitutes the history of safety development in the chemical industry. Hazardous and un-sound as many of these industries are in-herently there is an added burden of 'double standards' in 'Third World' societies. Unsafe 'short cuts' are almost always the norm. There is a pathetic lack of trained labour and adequate disposal facilities; badly located plants with primitive control systems often accompanied by a lack of statutory controls are very common, and lastly, of course there is hardly any infrastructure that can respond to catastrophic situations in terms of personnel, financial and material resources and efficient, viable, accountable and organised structures to tackle the 'crisis'. This then is the Bhopal Syndrome.

Witness the scenario in some other Third World countries as brought out by Weir:

Ciudad, Indonesia - A facility to make dispersible DDT powder let out tremendous smoke in mid-August 1984. The dust formed blankets on everything and affected cattle as well as humans. The plant is surrounded by slums and the company is involved deeply into the local politics with the president's son having ownership stakes in it. In the same country, during a drought, people consumed pesticide coated rice and died. Rio-de-Janeiro, Brazil - A Bayer chemical complex (Bayer controls 100% of the world market in pesticides) caused heavy pollution killing all the fish in the river. The management denied responsibility for the situation even though it was clearly evident that it was running an ill-kept plant.

Taichung, Taiwan - In this small country where living, habitable space is tremendous problem, there are some 66 pesticide local factories. In May 1985 protesters led to closure of a plant. MIC storage is not allowed and manufacture of phosgene is prohibited. And in spite of stringent checks on pesticide use (DDT is banned) there are still cases of accidental poisoning and suicides. Gradual ef-

facts of pesticides which are not so visible are ignored and there is nothing much that can be done about the proximity of communities to formulation factories.

The list is literally endless—Tanzania, Egypt, Zimbabwe, Liberia, Dominican Republic, Guatemala—all contain these ingredients for explosive disasters. A common theme running through the accounts is the location of a chemical plant in populated areas. This happens because most of the services and infrastructure including roads, electricity, public transportation and supplies are located only in cities. The rural parts of underdeveloped countries practically remain undeveloped.

The book also attempts to bring out briefly the inherently dangerous nature of hazardous technologies by focussing on industrialised nations: Accidents were reported in a Japanese plant also (Mitsubishi) where focus is on preventive maintenance and the plant is equipped with computerised controls as well as automatic shutdown facility. Japan also followed double standards in safety, examples of which are provided by the Malaysian Rare Earth Corporation and the Asahi Glass Company dumping mercury wastes into Thai rivers. In US 7.5% of the population lives near chemical plants. There have been leaks galore and the problem should become worse in future because of an aging industrial base. However, state-of-the-art technologies also fail sometimes due to extremely simple errors. A false sense of security generated by the newly installed computer alarm system was madly shattered when a leak went undetected because the computer had been programmed to detect only a single compound and not a mixture! And about whether a Bhopal can occur in US, it was said 'You are dealing with such terribly dangerous chemicals that human failure or mechanical failures can be catastrophic. The potential is there and it could happen, maybe today or fifty years from now'.

The third part of his book is titled 'The Solutions' and raises the most significant questions, some of which have already been raised above. The aftermath by Claude Barry is even more provoking. Indeed, there is a tremendous need for the 'right to know' all over the world since it is only this awareness that can lead to an all out mobilization against hazardous technologies, but merely by itself this can achieve little. The ultimate choices are political and so long as the power to choose rests with the elite, a radical change in the scenario is unlikely.

We must ask whether pesticides are an appropriate technology, especially in Third World nations, since they do not know 'when to stop killing'. At a general level some political choices need to be made about chemical technology in particular. Too many chemicals are being put to human use while there is too little time to track their hazardous properties. Witness the information vacuum on MIC. Health hazards related to pesticides are known only for some 10% of those in use (a total of about 3350). Unknown sequences can trigger off catastrophes which are totally unforeseen. The inherent hazards of these chemicals are enhanced in Third World countries because the support infrastructure in industrial culture does not exist. Local ruling elites collaborate with MNCs and enjoy their share of this multinational loot while the poor in every country pay for it in dear terms. For the same reasons MNCs get away with the double standards not only in safety but also in the shifting of banned chemicals' production to the underdeveloped nations. For instance, the 'global

pesticide map of Hoechst reads like a who's who of banned and heavily restricted pesticides'. It is the same elite which ravages the countryside causing large rural population to shift to centres of urban industrial opulence, in search of a livelihood. And it is this elite only, when not in the garb of banana republic dictatorship, which dabbles with an imitative form of 'democracy' and 'socialism'. The result is a terrible lack of accountability - political, economic and technical - at every level in the Third World countries. Hazardous plants surrounded by slums in well populated urban centres in countries run by quasi-lumpenized elites and serviced by self-seeking 'scientific' establishments comprise the horrifying scenario all over the world.

This little concise book is recommended reading for all who care. It describes not an event but a syndrome. It would have been wonderful if the book had been a bit thicker so that the internal politics, class structure and modern institutions could have been discussed in somewhat greater detail. At times the book sounds anti-technology per se, where as it is the relevant social forces, human political decisions which govern technology choice not the other way round. It is significant to comprehend that a critical political outlook is not necessarily anti-technology or anti-chemical industry. It is the undesirable characteristics of the industry and the dominant direction of its evolution and the class interests that need to be altered radically.

The Bhopal Tragedy - A Preliminary Report for the Citizens' Commission on Bhopal, Ward Morehouse and Arun Subramanian, CPA, 1986, pp xiii + 190, (Rs.32)

Behind the Poison Cloud, Larry Everest, Banner Press, 1985, pp 192, \$ 8.95.

Both the above books provide fairly detailed and decent accounts of the disaster within a well informed, critical frame work. They cover the tragedy, its immediate aftermath, the social and technical factors that contributed to it and all some of the lingering political and legal questions that can be raised.

A fairly accurate picture of that 'Night of Horror' is presented; how UCIL made no efforts to inform the surrounding communities of the leak, the horrendous way in which people dropped dead, the lethargic and confused response of an administration caught unawares and the disinformation campaign unleashed by the Carbide establishment. Mean while as the dead and the injured kept pouring into the under-equipped city hospitals, efforts were already underway to minimize the official toll of the tragedy - about 1750 by government estimates but more likely to be in the region of 3000 to 5000. More important very few assessments were made of the environment to determine the changes wrought on the air and water in Bhopal.

The medical response to the tragedy was also as expected, not only inefficient and ad-hoc but partly rendered useless by the polarization and infighting within the medical establishment itself. Apart from improper records, the major controversy to rage was the cyanide theory. Initially the information based on the properties and characteristics of MIC was so great that, it took some time to recognise the possibility of cyanide formation due to thermal decomposition of MIC. It was added to this, a deliberate confusion was generated by Carbide. Only a few doctors and activist groups having access to medical personnel were able to explore in a preliminary way, the thioisulphate antidote therapy.

The role of voluntary organisations and activist groups need to be appreciated in a major way. Their struggle against an abettor state is a pointer to the significance of such organisations. It will not be an exaggeration to state that the resolution of a number of controversies, the elements of pioneering work (such as the Medical Frontiers (MFC) epidemiological survey) and constant pressure on the government against falsification and corrupt practices, were due to the sincerity and hard work put in by these groups. All this, in addition to the sense of caring and security provided by these organisations to the largely poor victims of the demonic chemicals.

The full medical impact of the chemicals that leaked out is only now beginning to show patterns and, therefore, is not a part of the above books. Abortion levels are higher; women are prone to peculiar gynaecological problems. Lung impairment, exhaustion, proneness to other diseases and perhaps yet to be seen delayed effects are all beginning to show. A separate study of the medical response is a dire need, including that of the wishy-washy response of institutions like the ICMR, which initiated a number of spectacular projects, which either led nowhere or to deliberate burying of inconvenient results. The incompetence and sheer indifference of the technical manpower (third largest in the world) to a disaster of such proportions is also appalling. The madrasa of Operation Faith is an indicator of the level of experts we have at the topmost level of the scientific bureaucracies. The response of the people, an indication of distrust that people have towards 'modern' institutions which have marginalised them. Worse than incompetence is, of course, the indifference: there were hardly any voices of protest and criticism from within the empire of the 'science barons'.

The 'technical faults' that contributed to the leak have been documented in proper detail. A classification of these flaws provides a ready-made idea of the degree of culpability of the various parties involved: the government was responsible for the licensing and siting of the plant. As to the arguments that many shanty towns sprang up around the plant after its establishment, there are two answers - firstly, the government did nothing to prevent these from 'springing up' due to sheer political expediency and secondly, even initially the plant was too close to the city and railway station. In addition, apart from outright corruption, nepotism and bribery, what did the government agencies do to check to the arguments that the shanty towns properly or not? How in the first place did they allow so much of storage of MIC? Union Carbide Corporation, (UCC) and UCIL were directly responsible for the inherent faults in plant and process design. Unnecessarily large storage inventory for MIC was designated. The vent gas scrubber and flare stack were meant to handle only 'routine' leaks of a minor

nature. Control systems used were primitive, there were hardly any 'alarm' systems. And most critical was the connection between headers—the jumper line—which could provide a route for water entry into the tank. And then of course there were operating and maintenance flaws involving a cut back on plant operating personnel, shutdown of all safety devices when so much MIC was in storage, faulty pressure gauges and leaky relief valves, etc. Many plant personnel were undertrained and there seems to be an evident tendency of the management to underplay the hazardous nature of the chemical involved, thereby giving at times a false sense of security or indifference to safety procedures. Even after the disaster, a not insignificant UCIL manager 'thought' MIC only to be a 'lachrymator'!

The legal aspects of the tragedy are obviously not upto date since the issue is still in process. The two important aspects of the legal outcomes of the disaster are firstly, 'just' compensation to the victims and secondly, the establishment of liability of the parent multinational in such corporate crimes'. Neither of these seem to be in view. After the initial vulture-like swoops of the American tort lawyers there seems to be confusion all around. The government's data is improper and incomplete. It has declared itself to be the sole custodian of the compensation money that may be paid. It is simultaneously a legal adversary of UCIL in trying to minimize and hide its own accessory role in the episode as well as its abettor and a colluding party. And then there are the oft repeated questions of compensation standards (American or Indian) — how costly is a life? In a Third World country lives obviously seem to be a cheaper commodity, but this is where the case should be fought. On one hand American courts are expected to grant much more in compensation and punitive damages (one really can't see why the Indian courts can't, provided they are granted jurisdiction over UCC assets) and on the other hand there is tremendous need to develop torts and compensation litigation, judicial precedents and standards within the country, what will we do if an Indian firm, and that too a public sector company, blows up half a town? The government of India, in its usually expedient form, has deemed it fit to divide the judicial administration of its own country. Sad indeed! But then what does one make of the sabotaged 'commission of inquiry' into the incident? Was it not official non-cooperation that brought the whole effort to naught? No wonder commissions don't work in this country!

Morehouse and Subramanian focus heavily on 'what it means for American workers and communities at risk'. This book is well documented and ends with an agenda for 'citizens' action'. Many technical pieces of information are provided, especially in the appendices. It is obviously recommended reading. Subramanian had done some first rate reporting in 'Business India' on the cause of the disaster and this material appears here in an elaborate form.

Everest's book is more continuous and gripping and provides two chapters worth of political insights into the structural nature of the problem. Perhaps the best book in a certain sense. One only hopes a new version of the book appears, updated and revised.

Bhopal: Industrial Genocide? A Compilation, Arena Press, 1985, pp 222, price not mentioned.

A reasonably fine collection of documents and articles from Indian publications on the Bhopal tragedy and related aspects. The compilation consists of eight sections, each focusing on a specific theme. Nearly all aspects of the actual tragedy are ably covered in the first section by Praful Bidwai of the Times of India as well as Ivan Fera and Radhika Ramaseshan. Perhaps, more coherent and full length continuous description based on some of these articles are available in books (see some of the other reviews).

Section two presents information about Union Carbide while section three discusses the relative culpability of all the parties involved in the disaster namely, the UCC, UCIL and the government of India. 'Technological Terrorism' by Jayanta Bandyopadhyay is particularly passionate and provoking.

The fourth section discusses the connection between multinationals, Third World governments on the one hand and the relationship between environmental pollution and profit on the other. Section five presents the profile of a chemical like MIC including reports of alleged germ warfare research in the R & D set up of UCIL at Bhopal. Section six focuses specifically on the pesticides industry, its use and hazards including the known fact of banned pesticides being dumped on the 'developing' countries.

Section seven deals with legal issues arising out of the Bhopal holocaust regarding corporate liability especially in relation to multinationals and at a more general level the legal aspects of environmental disasters. The concluding section carries a significant document namely the Delhi Science Forum report as released to the press in mid-December 1984. Despite the small size of the report, it tries to look at the tragedy, in its immediate aftermath, with all kinds of angles which include the technical causes of the tragedy, the medical effects on the exposed population, the information monopoly of the Union Carbide and a host of legal and political issues.

The postscript as well as the prologue by Padma Prakash provide a condensation of the outlook and the issues which the compilers have kept in mind while assembling the articles.

For those who prefer go through newspaper reports and first hand responses to a crisis the book is obviously excellent material. Even otherwise the compilation is fairly comprehensive but even more than that the choice of documents reflects a judicious, politically sensitive and aware perspective.

The Bhopal Tragedy: One Year After? An Appen Report, Shabat Alam, pp 235, (Rs.30)

A very extensive collection of documents of all kinds ranging from letters and affidavits filed by the activist groups associated with relief and legal aspects of the tragedy to

the documents submitted by the Carbide establishment and the governmental agencies. It opens with a radical, pro-people perspective article followed by a plethora of documents. To the uninitiated these may not be of much interest but to those who are following the aftermath of the tragedy from specific angles, it will be a very useful compilation.

Managing Industrial Crises, Paul Shrivastava, Vision Books, 1987, pp 196, Rs. 125.

A more sophisticated attempt to analyse the Bhopal

terms of a management-cum-systems approach. The attempt is more refined because it tends to 'neutralize' and 'decolour' insights that may be drawn from a classical Marxian or radical critique of corporate enterprises. It uses these insights and associated information to develop a highly classificatory and structured analysis but somehow all the 'stakeholders' seem to become 'equal'. Only those who believe that the basic profit motive for commercial activity is a necessity and follow the outlook that flows therefrom will find themselves comfortable with the book.

It is indeed a well informed effort. A crisis is defined as being made up of a 'triggering event' occurring in circumstances that blow up and multiply the effects and consequences thereof, thereby precipitating a crisis. The next two chapters discuss the actual tragedy, the latter being more details than the former. The fourth chapter focusses on the consequences of the disaster in Bhopal, the US and around the world. The succeeding chapter presents 'models of a crisis' as viewed from a 'multiple perspective approach' involving the way in which the major stakeholders, namely, the govt. (host), look upon the disaster. There are insights galore in the book. One often has a feeling that even small things are taken note of, there is indeed a sense of comprehensiveness, only the jargon is managerial, though nevertheless incisive.

The 'lessons' of the tragedy are appropriately addressed to the relevant parties; the governments are asked to ensure that sustainable development plans should be formulated with proper thought to 'hazard management' and available supportive infrastructure in the location area. A government which could follow this prescription would rather obviously be a responsible one and not one which abets and colludes with profit hungry MNCs, sometimes in the most blatant manner. Even more important, the mis-match between the supportive infrastructure and the nature of the enterprise (product, process) are direct outcomes of the haphazard, uneven development schemes that are indulged in from time to time, often governed by the short term gains of electoral politicking. The industrial scenarios, in countries such as India are the obvious consequences of a 'modernization' perspective wedded to capitalist development; companies and businesses are told to 'clearly understand' the causes of industrial accidents, environmental degradation, product injuries, etc.; as if companies don't. They damn well do, but pollution abatement measures cost money and safer manufacturing processes are not necessarily the cheapest. In such economies as ours, only incentive schemes, outright subsidies and

the least likely to be enforced—enhanced, stringent regulation standards are the possible tools to create external pressures on corporate entities to be cleaner and safer in their processes. And after all why should the abettor enforce? As for the generalities of 'siting policies', 'impact assessment', 'operational safety procedures and audits', 'emergency planning and clear crisis prevention', etc.—these are rather fancy names for common sense approaches, the recommendations are obvious and well known, the question is why will somebody undertake them. Only a perceived threat to the survival of the industry as a whole may help but it all depends on when the ruling elite chooses to make the 'state play the arbiter!'

In any case, the largest stakeholders are the people themselves and whether they can alter the basic nature of manufacturing enterprises through organized pressure is a question beyond the scope of managers.

Therefore this is the kind of book that would be written, read and appreciated by 'enlightened' safety managers. As a necessary outcome, the author tends to be normative and offers all kinds of prescriptions without recognizing that decisions regarding such matters flow from a political outlook and environment; they are NOT a matter of corporate planning alone and neither do they necessarily constitute good 'economics' in the current context.

Asia's Struggle to Affirm Wholeness of Life, Report of Consultation on Transnational Corporations in India, Documentation for Action Groups in Asia, Hong Kong, 1985, pp 132, price not mentioned

It's a beautiful book in the sense of being precise and with punchy cartoons and posters. Somewhat irritating is the fact that various religious perspectives have been first postulated (Christian, Islam, Buddhist, Hindu) with which one looks at the 'wholeness of life' and hence these provide points of departure for the various critiques of multinational corporations. This kind of approach, however, seems unnecessary since one need not quote from the scriptures to prove that human beings do not like pain, misery and exploitation. Section 1 of part 2 may thus be skipped except perhaps by those who find linking 'religion' and a critique of the current world order a compulsive necessity. Section 2 and 3 of the second part discuss the interaction of these powerful MNCs with Asian Third World countries and the deleterious effects this interaction results in, with respect to the rural sector, workers and trade unions and the environment along with the various modes of collusion that the corporations use to woo the ruling elites. Part 3 is devoted to the Bhopal case and contains most of what can be expected in any account on the tragedy. Part 4 focusses on planning and follow up but apart from cartoons and posters there is really nothing much here. The book ends with a solidarity statement and a campaign letter.

As an overall rating it provides interesting reading. One only wishes there were no sections where divine blessings were sought to

'prove' the repugnant nature of pain, destruction and death.

Dateline Bhopal, Anees Chisti, Concept Publishing House, 1986, pp 160, Rs. 100/\$ 20.

Dateline Bhopal is a newsmen's diary of the gas disaster. The book consists of a journalist's dispatches, divided into sections, the first one on 'The Trauma and After' and the second one on 'The follow-up Endeavour'.

Perhaps the most immediate responses to a crisis situation like the gas leak and the deaths and injury it caused can be found in the book. These first impressions may be right or wrong, many streams of thought might have stopped dead after a few dispatches—all these may be gleaned from Chisti's account, ranging from the allegations about technical matters to those regarding political responses of the state administration, the crisis response of the medical establishment including the various controversies that raged and the basic effort of voluntary organizations.

A Killing Wind : Inside Union Carbide and the Bhopal Catastrophe, Dan Kurzman, McGraw Hill, 1987, pp xvi + 297, \$ 19.95

The only plus point in Dan Kurzman's book is that it is one of the most up-to-date one but is recommended reading only for those who like to view history and events in terms of persons and personalities. Though one will find all the relevant information that one would in any detailed account of the Bhopal gas disaster, the narrative follows a peculiarly improper 'Americanized' style which at times seems to have the makings of a 'thriller'.

The book uses the strategy of following the lives and thoughts of a few representative characters including that of Warren Anderson. Personalized descriptions of facts and events are intertwined with the authors' reconstruction of thoughts and feelings of most of the characters—a device which befits a novel more than a tract on a disaster, especially one which is so eminently a product of social forces. There is an utter lack of a political perspective in an explicit sense even though by default the author follows a 'neutral', managerial (liberal-corporate) the so called 'objective' approach. Everything just happens. There seems to be no social motive for anything; whether it is deliberate disinformation, action or non-action.

The net result is that, in a book of its size, there is hardly any sustained critique of anything except for mildly critical comments and tangential references to where technology is taking humanity to. The social context within which the event should be placed and within which hazardous technologies should be analysed is thus obliterated since the whole 'drama' seems to be enacted by individual actors and their own webs of guilt and intrigue.

One must also mention in passing the authors' generous but perhaps unintentional remarks

on tribals and ancient Hindu philosophy which only seem to reinforce 'westernized' stereotypes of India being an exotic land of spiritual mysteries and mysticism amidst the rising stirres of a patronizing 'westernized' modernity.

Perhaps an eminently condensable book for the Readers Digest book section!

A Cloud Over Bhopal : Causes Consequences and Constructive Solutions, Alfred De Grazia, Kolos Foundation, 1985, pp 145, Rs. 20/\$ 20.

This book goes the credit of being the first one to be published after the disaster. It is somewhat funnily written in clumsy prose with unnecessary philosophising in the abstract, bordering on incoherence at times. The author has tried to address himself to too many issues in too short a book and in the process he overstretchses himself.

It follows a peculiar, undefined perspective with too many normative statements which often display shades of political naivete. For instance, the author generates nonsensical concepts of 'creative liability' worries about the survival of Union Carbide Corporation and talks of a 'world association of hazardous products business' which will be expected to self regulate its activities—a suggestion which seems to be totally oblivious of what the current cartels of multinationals actually seem to be doing, namely, creating false needs for unnecessary and hazardous products.

Many portions in the book are technically un-sound, especially those which deal with the technical details of the disaster.

Though there is an element of partial understanding of the exploitative relations between MNCs and Third World countries the 'constructive solutions' all depend upon somehow everybody turning a good leaf.

In spite of the disjointed presentation in the book it is recommended, only for the multitude of ideas and angles and 'streams of thought' that it puts forth, to all those who may be interested in pursuing specific issues.

Bhopal - Its Setting, Responsibility and Challenge, Sidney C. Sufrin, Ajanta Publications, 1985, pp 98, Rs. 60

This is an incomprehensible book written by an academic from the University of Massachusetts at Amherst (US). It follows a 'libertarian' outlook in terse prose and a meandering style which adds to a lack of readability.

At the level of writing, the viewpoints the book uses are borrowed from an institutional-management perspective: for instance 'psychological distance between home office and operating plant', 'courage or imagination or probably both were in short supply in the whole 'Union Carbide-government complex'.

And finally the book moves on from a 'moralizing manager' to 'strategic planning'. Recommended to those who believe that the world and its nations are multinational corporations where politics is only a matter of effective management rather than a set of irreconcilable class conflicts.

Concluding Note

Of the many books that have been reviewed Weir's book is recommended as a perspective builder. Everest's 'Behind the Poison Cloud' could provide good, coherent follow-up reading material. The others, at least some of them, should prove to be interesting depending upon what the reader is looking for.

There is an urgent necessity of accounts detailed and informed—on the medical aspects of the tragedy, which trace the sequence of effects on the victims and the responses by interested parties from the beginning till today. Many new facts have been hushed up, especially regarding health effects and some are now being grudgingly acknowledged by a besieged administration. The Indian Council of Medical Research has now accepted that long-term deleterious effects are likely.

There is a need to expose these facts and the sad saga of an irresponsible system, to the public at large. We need to know what research and rehabilitation programmes have taken off with what consequences and more important; what more can be done and undertaken. A document of the sort outlined above should prove to be a simultaneous critique of India's top heavy, scientific bureaucracy wedded in many ways to the state's policies on capitalist development and 'modernization'.

A similar enterprise on the legal aspects is also necessary—something that is free of jargon and legal perambulation and is addressed to laymen.

R.K. Yadav, General Secretary, Union Carbide Karmachari Sangh was interviewed by Bhopal Group for Information and Action (BG)

Yadav now works as an industries inspector for M.P. government and supervises a rehabilitation centre.

BG: How aware were UCIL workers about the hazards of chemicals used in the plant?

RY: Our plant workers were more conscious about safety than therein other industries. Personal safety came first. Even production linked incentives did not induce them, as they were aware of the health hazards.

BG: What steps did you take to highlight the issues of occupational safety?

RY: We had asked the management for personal safety gear. We wrote about the plant's condition to all concerned officials and ministers, even to the President of India—naming all the hazardous chemicals used in the factory. Government in its wisdom, did not deem it pertinent to publicize the findings of the in-

All this with whatever we already have and know should prove to be invaluable for a 'Right to know' campaign. Politically, of course, a campaign like this should be linked with the broader issues of 'modernization' and technology choice. We need, desperately, and now, a blueprint for synthesis of safe technology, ecology and social justice.

A.M.

The lessons of Bhopal: A community Action Resource Manual On Hazardous Technologies, Martin Abraham, IOCU, 1985, pp 151, price not mentioned.

This book is divided into 2 parts. The first essentially covers some responses of governments, industry international agencies and community action groups in about 50 pages. Some of the more important lessons and policy issues that flow from Bhopal are touched upon.

The second part consists of a 100 pages of appendices where various documents published by OICD, FAO, UNEP, ILO etc. are reproduced. The documents pertain to policy issues regarding chemical hazards and the chemical industry. They documents deal with subjects such as restricted chemicals, hazards analysis, information exchange etc.

The first part of the book appears to be based on newspaper reports and documents available to IOCU. It lacks both a coherent structure and depth. The conclusions at the end of the first part reiterate without going any further what was already being said about Bhopal.

The second part holds slightly greater interest as the documents relate to specific subjects and shed some light on the publications of several international organisations.

quity it conducted in response to our complaints. After a phosgene leak a few years ago, which killed a UCIL worker, M. Ashraf, a lot of public awareness was created. We turned it into a movement and asked for the plant to be shifted to a safer and less populated place. But the government's response was that it was a Rs. 25 crore company, not a stone that could be shifted. We asked information on antidotes for the chemicals in use. We wanted a closer link between the production manager and the operators so that the latter became more aware of the plant's operational hazards. We wanted increased supervision and a separate surveillance cell set up for the MIC plant. We also asked for the nature of procedures to be carried out in the event of a leak. However, this information was never made available to us.

BG: What pressures did UCIL workers and the union face after the tragedy?

RY: Just after the leak there were people who said that the workers had themselves leaked the gas, but the general view was that they were innocent. The gas victims wanted the factory shut. As a union, we had to protect our members' jobs, but at the same time we

The author seems to have put the book together in a hurry. The introduction to the book says that "this manual is intended for use by community action... committed to protecting the health and safety of consumers the world over". One quite fails to see how a book which deals largely with policy issues and generalities can achieve this objective. To fulfil intended objectives requires specific information. Also, most of the organisations referred to are the better known, usually well funded ones. There is little reference to grassroots level struggles against chemical hazards or good case studies which illustrate a point.

Nevertheless the author's concern for a safer world comes through quite clearly. It is a little sad that this concern, in the form of this book, will adorn the shelves of resource centres and libraries, to be used at best by a few journalists. I sincerely wish the author had taken a little time off to put his ear to the ground to listen to what was happening in the field. I am very certain that with his concern, he could then have produced a far more useful and valuable document with the same time and effort.

S.D.

Bhopal: The Lessons of a Tragedy, Sanjoy Hazarika, Penguin India, 1987, pp 230, Rs.55

This book will be reviewed in the next issue of The Hazards Bulletin.

• Figures in brackets indicates price of book available in India from progressive documentation centres

had to take care not to hurt the victims' feelings. Initially, we held our meetings secretly. Later when public began supporting us, we were able to bring together the workers and the gas victims.

BG: What role can unions play in bringing the workers and the Bhopal victims together?

RY: Initially, we had to change the attitudes of our workers. On advice from other unions, we started doing relief work along with other organisations in the affected areas. We held demonstrations, and worked on relief and rehabilitation, alternative employment etc. During operation Faith, we advised people not to waste money and leave Bhopal. Our advice is appreciated even now.

BG: In your case such a unity of workers and the gas victims took place after the tragedy. What should the unions in other chemical plants do to forge an understanding between workers and bystander population at risk?

RY: Unions should chalk out a common programme in which the relations between the society at large and unions is on equal terms. A union, in a hazardous chemical plant, should have a technically qualified person. It will help us to have a technically superior management on health and safety issues. Secondly, the union must educate their workers about the chemical hazards in the plant and emergency procedures, etc. Thirdly, the union should make the people living in immediate vicinity aware of these facts. Thus the union should act as a pressure group for workers and bystander populations.

BG: Do you feel the government was justified in its efforts to arrive at an out-of-court settlement?

RY: No, the settlement must take place in court. It should take place in front of repre-

sentatives of people, not the elected ones, but those who are affected or those who have had a close contact with the affected people. Only they will put our case properly. The criminal charges against Union Carbide officials must not be dropped. If this happens, anyone who commits such crime can pay money and get away. Compensation will have to be given in the form of money but the company must be prosecuted. The government cannot decide or carry out an out-of-court settlement.

BG: Do you feel the proposed settlement is satisfactory?

RY: The compensation amount must not include the money that has been spent by the government till date. If it does, the compensation will turn out to be very less. Secondly, they must guarantee permanent employment for the people. Otherwise the whole amount

will be spent in 2-3 years. Carbide should also accept liability for adverse effects that may be seen 5-10 years hence. The scheme for rehabilitation must be made public. It is unfortunate that the government has not been able to properly identify affected persons or assess degree of injury. Whatever compensation we get, if we are not able to distribute it properly and if the money does not go to right persons, then there is no point.

BG: What is the present condition of UCIL's workers?

RY: Many workers haven't got jobs. Those who have, are in lowly paid jobs. They cannot even go to their villages because they cannot undergo treatment there. The government has done hardly anything to improve their lot.

(continued from page 2)

Broader Issues

The dystopians believe that man has unwittingly and foolishly created a terror-machine in modern technology, for, by its very nature, technology is believed to be hazardous. Over time, technology will only worsen the situation. The utopians believe the opposite. The traditional socialist school holds technology to be neutral; it's use or disuse to society depends on the class that controls it. This view has recently been challenged by a newer school within the Marxist paradigm which argues that technology is not neutral and contains a class bias within it.

A selection of 3 articles in the public policy section and some of the books reviewed fall within this broad debate. One part of the argument believes that modern technology had the inherent capacity to breed terror to mankind, regardless of a nation's economic status or political hue. The other that MNCs, because of their safety double standards in North and South Nations, make accidents more probable in the latter. The debate in this issue is only a part of a larger ongoing one. We have, nevertheless, presented it to situate Bhopal on a larger canvas.

(continued from page 6)

- Use of more reliable and specific method of estimation of urine thiocyanate.
- Use of a statistically valid method of sampling population; in contrast, the Medico-Legal Institute's study had investigated only hospital bound patients, that too without taking a random sample, and thus it has never been able to present a representative picture of the toxicological status of Bhopal's gas-exposed population.
- Use of comparable controls whose only limitation was due to ambiguity in ICMR's coding of areas with respect to degree of exposure.
- Accounting for tobacco consumption on urine thiocyanate output.
- Doing a follow-up analysis six months later on the same individuals, which makes it the only study on Bhopal victims known to us that has yielded information on the trend of

Who needs pesticides anyway? Weir's book reviewed in this issue asks and answers this question. In the same light, one may well ask why the world requires the petrochemical industry? It is responsible for producing chlorine-bonded hydrocarbons, which invariably are carcinogenic. Yet, if the petrochemical industry were done away with where would the world's plastics and synthetic fibres come from. The problem of technology choice is by far the most difficult one in building perspectives to situate a Bhopal in. An answer to this problem can only be found in conjunction with those to questions of cultural and consumption choices, desired quality of life and who ultimately will exercise these choices. There is no escape from these questions for, without answering them the slogan "No more Bhopals" will remain unactionable.

The first step to a safer world is to have the right-to-know the risks we are put to by technology. The next, is the right-to-act against these risks. A more important gain for making the world a safer place to live in implies acquiring an equal right by everyone to decide and control the destiny of humankind.

Why the Bhopal Special

In addition to our belief that all that has been written about Bhopal has made little difference to its victims' lives, this publication being in English, has only added to our sense of frustration and mute rage. In our way, this issue is an expression of our atomisation and helplessness, for not being able to do any better for Bhopal's victims.

When this project was conceived, there were no illusions about its impact magnitude. We still felt it worth the while. At best, it may help in some minuscule way in countering some of Carbide's devices and the Indian government's callousness. At the very least, some information on Bhopal would spread. And even if does not help the living-dead of Bhopal, it may contribute in some small and indirect way to create a little more will and preparedness to fight a frightfully hazardous world.

Sagar Dhara

toxicological status as a function of time.

Recommendations

- Another distinguishing characteristic of the AIIMS team of investigators engaged in the study has been its willingness to share and subject its data to open and scientific scrutiny.
- Government of India should undertake toxicological research on the Bhopal gas victims.
- A special implementing agency for monitoring the toxicological status of gas victims and consequent long term risks faced by them, and to undertake epidemiological surveys and studies should be established.
- Union Carbide may be directed to immediately disclose all information in their possession regarding to the chemical composition of the toxic emission, the toxicology of MIC and all products of its exothermic reaction and thermal decomposition.

* ICMR should re-analyse the entire data collected by Government on urine thiocyanate levels, in order to derive some meaningful toxicological information.

* Government should provide MIC samples to the Minority Members of the Supreme Court Committee for undertaking animal studies and other related investigations.

* The Department of Medical Biochemistry of Gandhi Medical College, Bhopal may be directed to make available to the Minority Members the raw data, alongwith all methodological details, regarding urine thiocyanate investigations, so that the statistical significance of the observed declining trend in urine thiocyanate values of gas victims be assessed.

* The Minority Members of the Supreme Court Committee may be provided with all essential infrastructural support and coordination by Government for completing their work.

AS & SKD

The Nation Is Not The Starving Millions

what if forests die,
magpies dont sing, birds dont sing,
the cuckoo finds no twig to warble?

along with fish. Kanadhenu and Nan-
dini die drinking poisoned water,
what would they do by living?
at best some farmers and fishermen
would turn unemployed,
poison gases would sicken but a few
lakhs, and kill a few thousands.

does it matter? after all,
national interest is supreme,
for which no sacrifice is too small

so, talk not about the environment,
and put a brake on development,
for the nation is not its environment,
nor its forest, nor its fauna,
nor its rivers, nor its fresh air,
and the nation is not its crops.

and people?
they are sacrificial goats -
for the nation.
if a few thousands or lakhs perish
in poisoned air and water,

No translation ever brings out the power, the nuances and the richness of the language of a poem. This translation does little justice to the poem. Nevertheless, we are printing it for the benefit of our non-Hindi speaking readers. This poem was written soon after the Bhopal accident by a peasant activist who stays not too far from Bhopal.

they will be martyred,
their corpses will be buried or
burnt, along with the headlined-
news their deaths made.

do you ask what the nation is? only
anti-nationalists ask such questions,
you should know- that the nation is
those who tote guns, hold the reins
of power, are monied, run big
industries, destroy rivers with
factory-scum, poison the atmosphere
snatch the sun and hide it behind a
cloud of smoke, herald the morn
with screeching sirens from mill
cops.

use energy, to tear mother earth
apart,
the nation is the self-interested,
those who make profit by the crores
each year.
the nation is the rich few,
the nation is not the starving
millions.

the people have become weak now,
fall ill, succumb to gases,
ask for compensation,

and through it all, keep their
heads high.

therefore, they prefer machines to
men- to build the nation
they want, not humans, but an
assurance that people will work
like machines. because, machines -
dont fall ill,
die of gas,
go on strike,
ask questions,
ask for compensation,
walk with their heads held high.

machines dont think like humans,
nor search for liberation,
Humans think a little too much,
so the nation feels threatened.
therefore, only they and machines
will remain,
until humans dont transform into
machines,
the flash of the sword will remain

Shyam Bahadur Namra

UNION CARBIDE CORPORATION TOXIC INCIDENTS WORLDWIDE, 1968-1985

Union Carbide has the dubious distinction of being responsible for some of the world's worst industrial disasters. In the 1930s, 476 workers died and 1500 were disabled of silicoes caused while sigding a tunnel in a rock containing almost pure silica. The following records reflect a striking regularity of accidents in Carbide plants.

*Taft, Louisiana(May 27, 1968): one person killed and five injured in paracetic acid plant explosion and fire.

*Ponce, Puerto Rico(1971): one worker killed and another injured seriously by benzene gas leak at petrochemical complex. Reportedly, three workers killed by a similar accident in 1972.

*Antwerp, Belgium(Feb 10, 1975): Six workers killed in an explosion at a Carbide plant. Twenty five others injured.

*Bhopal, India(Dec 26, 1984): A deadly phogene leak resulted in the death of the plant operator.

*Bhopal, India(Jan 1982): Phogene gas leak injured 28 people.

*Taft, Louisiana(Dec 11, 1982): A storage tank containing acrolein exploded resulting in the evacuation of 17,000 people. Many cases of adverse health effects were reported.

*Bhopal, India(Dec 2-3, 1984): A runaway reaction of methyl isocyanate resulted initially in the death of 2,500-10,000 individuals. Upward of 200,000 were injured.

*Institute, West Virginia(Aug 11, 1985): Despite additions of new safety systems fitted in reaction to the Bhopal tragedy, toxic gases aldric oxime and methylene chloride leaked from the pesticide plant. 135 people were hospitalized.

The Bhopal Special was a joint project of The Hazards Bulletin and the Bhopal Newsletter. Opinions expressed are those of the authors'. Material may be freely reproduced with acknowledgements to the authors and The Bhopal Special.

Orders for copies of the Bhopal Special may be sent to The Hazards Bulletin. For bulk orders of over 25 copies, postage will be borne by us.

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The Hazards Bulletin, 2/32 Trimmurthi, Chunnabhatti, Sion, Bombay 400 022. US correspondence: Sejay Kasturia, PO Box 10088, Stanford, CA 94305, USA.

The Bhopal Group for Information and Action (BGIA) has been generating and disseminating information on the Bhopal gas disaster. Through the Bhopal Newsletter, 12 issues of which have been published so far, BGIA has attempted to keep alive the issue of the Bhopal tragedy. BGIA has also supported other groups working on Bhopal.

BGIA, c/o Ekalavya, E1/208 Arera Colony, Bhopal 462 016.

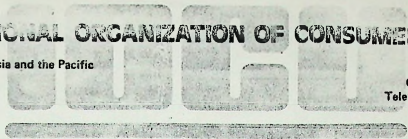
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INTERNATIONAL ORGANIZATION OF CONSUMERS UNIONS

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OH

PRESS RELEASE

-1 APR 1986

PESTICIDE HANDBOOK DOCUMENTS NEED FOR STRONG FAO CODE

In a global effort to bring about compliance with the recently approved International Code of Conduct on the Distribution and Use of Pesticides and to encourage safe pest control practices, the International Organization of Consumers Unions (IOCU) today launched the completely revised Pesticide Handbook: Profiles for Action.

"The Code recently approved by the UN's Food and Agriculture Organization is an important step towards stopping the 2 million poisonings attributed to pesticides each year," commented Anwar Fazal, Director of IOCU's Regional Office for Asia and the Pacific. IOCU is a founding participant in the Pesticide Action Network (PAN) International.

Half of all pesticide poisonings and three-quarters of all fatalities are believed to occur in the Third World, though the developing countries account for just one-fifth of the world's pesticide use. Inadequate labelling of pesticides, lack of proper training or safety equipment, chronic malnutrition and lack of medical care are some of the factors intensifying hazards of pesticides to Third World users.

...2/-

The International Organization of Consumers Unions (IOCU) links the activities of some 120 groups that serve the consumer interest in over 50 countries worldwide. An independent, non-profit-making and non-political foundation, IOCU promotes international cooperation in consumer protection and education, represents the consumer interest at the global level, furthers the dissemination and documentation of consumer-related information and facilitates the comparative testing of consumer goods and services. The headquarters of IOCU are at 9 Emmastreet, The Hague, Netherlands. Phone: (3170) 476331. Cable: Interocu Haag. Telex: 33561.

"Curbing pesticide abuse will take more than just approving a Code," observed Fazal. The Pesticide Handbook provides the tools needed to strengthen government regulations and to urge corporations to act responsibly in their marketing of dangerous pesticides."

He added that the handbook, "reflects IOCU's continuing commitment to provide citizens groups, especially in the Third World, with the resources needed for local and global campaigns challenging the powerful vested interests involved in marketing hazardous products".

The Switzerland-based International Federation of Plantation, Agricultural and Allied Workers terms the handbook "a valuable instrument". Not Man Apart, published by Friends of the Earth (USA), describes it as "a marvellous compendium of information for activists and others concerned about pesticide use and abuse here and abroad...Absolutely essential for anyone worried about pesticides".

Designed to provide easy access to the data most sought after by concerned groups and individuals, The Pesticide Handbook is divided into six sections: (1) data sheets on 44 of the most problematic pesticides in global trade, including trade names; (2) pesticide hazards and symptoms of pesticide poisoning; (3) an overview of the global pesticide problems, with three case studies from Third World countries; (4) description of the Pesticide Action Network (PAN); (5) complete text of the FAO Code of Conduct; and (6) a comprehensive bibliography.

The Pesticide Handbook: Profiles for Action is available from the IOCU Regional Office for Asia and the Pacific, PO Box 1045, 10830 Penang, Malaysia at US\$25 (US\$12 for non-profit public interest groups).

For further information, contact: Ms. Sarojini Rengan, (04) 20391

E

FOUNDATION FOR RESEARCH IN COMMUNITY HEALTH

ENVIRONMENT AND HEALTH SERIES (1982)

WORK-PLACE ENVIRONMENT

by

Ravi Duggal

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3/7/84

WORK-PLACE ENVIRONMENT

by

Ravi Duggal

Serious as the general environmental levels of chemical pollutants, particulate matter and noise, exposure to such insults in the work-environment is usually much more intense. This is cause for great concern for a number of reasons (Ehrlich et al, 1977). The first, of course, is concern for the lives of individuals exposed to the hazard. Second, very large number of people are occupationally assaulted by high concentrations of some dangerous substances (asbestos, lead, cotton dust, vinyl chloride, etc.). Third, the effects of occupational exposure extend beyond the working population (asbestos fibers on workmen's clothes threaten their families and friends; mutated genes in workers exposed to radiological or chemical mutagens are spread into the population outside of the work-place). And fourth, inadequate standards for the confinement of dangerous substances in the work-place make them a focus for contamination of adjacent areas or for accidental contact with non-workers.

Fast-paced growth of the industrial economy continuously aggravates this situation increasing the incidence of occupationally caused diseases. Industrialization, no doubt, has been the most important factor in socio-economic development but brings with it various human-degrading consequences. Slum colonies, inhuman working conditions, industrial accidents and environmental pollution are some of the visible symbols of industrialization. Most industrialised

(developed) countries have overcome a large quantum of industry-caused human degradation. However, some of the subtle and dangerous ingredients (radiation, noise, pesticides) may prove to be more harmful than the visible hazards of industrial effluents and emissions. Rachel Carson's 'Silent Spring' has exposed these dangers that are emerging in the highly industrialised countries (Carson, 1962).

The degradation of the environment resulting from industrialization is very recent in India but the study of health effects of the work place environment has received much attention since independence, as against the general environment, mainly because the earlier experience of the western world stood as a warning (Bowles, 1955).

Mitra and Banerjee (1962) conducted a clinical survey of 500 factory workers in 1958 and found that only about 5% of the workers appeared to be healthy without any obvious pathology; nearly two-third were found to be suffering from some kind of visual defects and 43% of the morbidity was found to be of buccopharyngeal and gastrointestinal origin. One-third of the morbidity was due to diseases of the respiratory tract and conditions such as hydrocele, hernia, varicose veins of limbs and enlarged inguinal glands accounted for some 10% of the cases and malnutrition among workers was fairly common.

The United Nations expressed deep concern about the deteriorating working conditions in the early fifties. A joint ILO/WHO Committee on Occupational Health was appointed to study and report on health conditions in the

working environment. The Committee (WHO, 1953) stated that the general aims of occupational health should be the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of workers in an occupational environment adapted to his physiological and psychological equipment, and to summarise: the adaptation of work to man and of each man to his job.

Lighting, heat, ventilation, humidity, dust control, prevention of emission of toxic gas and fume, optimum methods of working, weight-lifting, shift systems, ways of avoiding boredom in repetitive work, adjustment of human relations, detection and removal of source of friction and fear, investigation of processes known or suspected to lead to disease, development of physical and chemical methods to determine the absorption by the worker of dangerous compounds, maintenance of high standards of hygiene and sanitation, control of nutritional standards in canteens, development of the best technique of the treatment of injuries and poisoning, all come within the scope of workplace environment study (Hunter, 1959).

By such detailed study of the working environment health conditions at work can be monitored successfully and the worker assured of illness-free work conditions.

Occupational health hazards are generally classified into two:

- (a) toxic chemical agents,
- (b) biological and physical agents and conditions, including accidents (Kawata, 1967).

Toxic Chemical Agents

Toxic chemical agents consist of dusts, fumes, mists, vapors and gases used in or arising out of industrial processes. The American Standard Association has defined these chemical agents as shown in Table 1.

Dust exposure is intense in the mining, quarrying and mineral processing industry, as also in the fiber associated manufacturing industry. It is estimated that about 21 million workers are exposed to silica dust in the mining, quarrying and mineral processing industry (Krishnamurthi, 1978).

A clinical and radiological examination of 7,653 underground miners with 5 or more years of service in the Kolar Gold fields revealed the incidence of silicosis to be as high as 43.8% (Capalan et al. 1967) and 329 mica miners from Bihar showed an incidence of 34% (Gupta, M.N. 1969). A survey of 11 coal mines totalling 9,643 workers showed the prevalence rate of all categories of pneumoconiosis to be 10.8%, chronic bronchitis at 2.9%, tuberculosis 7.4%, and 39.2% of hookworm infestation (Gupta, M.N. 1969). A study of 227 stone cutters also revealed a high incidence (35%) of silicosis (Gupta, R.K. et al, 1972).

Table 1

CLASSIFICATION OF CHEMICAL AGENTS

<u>Chemical Agents</u>	<u>Definition</u>	<u>Examples</u>
Dusts	Solid particles generated by handling, crushing, grinding, rapid impact, detonation and decrepitation of organic and inorganic materials such as rock, ore, metal, coal, wood and grain. Dusts do not tend to flocculate except under electrostatic forces; they do not diffuse in air but settle under the influence of gravity.	Quartz dust can cause silicosis; other toxic dusts may produce pneumoconiosis, systemic poisoning, dermatoses and cancer.
Fumes	Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, and often accompanied by a chemical reaction such as oxidation. Fumes flocculate and sometimes coalesce.	Lead and cadmium are highly toxic metallic fumes. Zinc, manganese and magnesium are somewhat less toxic, but all may cause metal fume fever.
Mists	Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as splashing, foaming and atomizing.	Chronic acid mists from electroplating; oil mists from machine tool lubricants.
Vapours	The gaseous form of substances which are normally in the solid or liquid state and which can be changed to these states either by increasing the pressure or decreasing the temperature alone. Vapours diffuse.	Mercury and solvent vapours are major sources of hazards.
Gases	Normally formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Gases diffuse.	Carbon monoxide, hydrogen cyanide, ozone and oxides of nitrogen are hazardous gases.

Source: American Standards Association, 1958.

An ICMR study (NIOH, 1981) of 605 slate pencil workers at Mandsaur in Madhya Pradesh pointed out that about 80% workers were below age 35 years, and very few survived or worked more than 10 years. The prevalence of respiratory symptoms was highest among the cutters and increased with duration of exposure, 52% of workers were suffering from dyspnea. The various physical signs noted were clubbing of fingers, diminished chest movements, impairment of breath sounds, displacement of trachea. Radiological findings showed that 51% of workers were having positive evidence of silicosis.

The above and many other studies* clearly expose the extreme health hazards involved in mining and related work environments. However, preventive action has not kept pace with the growing incidence and intensity of dust related health hazards.

- * (a) Regional Occupational Health Centre (E), Calcutta, "Pneumoconiosis due to mica dust inhalation in mica processing industries", ROHC(E), ICMR, 1981.
- (b) ROHC(E), "Studies on Occupational Health Problem in Coal mining Industry", 1982 (on-going study).
- (c) Vishwanathan, R. et al., "Report of morbidity survey in Dhanbad in Jhania Coal fields with special reference to pneumoconiosis", Rajendra Memorial Research Institute of Medical Sciences, Patna, 1972.
- (d) Raghava, M. et al, "Health hazards associated with uranium mining in India", Indian Journal of Industrial Medicine, 12, 1966.
- (e) Sabnis, C.V. et al, "Dust in relation to disease and disability", Environmental Health, 7, 1965.

Fiber manufacturing industries, especially the textile industry, is one of the largest employers in India and also presents a highly hazardous working environment. Most of the recently established units have taken adequate technological measures to abate pollution within the working environment but the majority being old mills produce levels of dust that is harmful to the human respiratory system.

Various studies* on the effects of fiber dust have been conducted in the cotton ginning, spinning and weaving industries (cotton dust); jute industry (hemp dust); coir processing industry (coir dust); sugar cane crushing industry (bagasse dust); and asbestos cement industry (asbestos dust).

Surveys conducted in textile mills at Ahmedabad, Bombay, Coimbatore and Madras reveal that a clear picture of cause and effect of the relevant dust and the associated respiratory disorder, has not been firmly established (Sabnis et al. 1965). However combined effects of working

-
- * (a) Gupta, M.N. "Review of Byssinosis in India", Indian Journal of Medical Research, 57, 1959.
- (b) Gupta, B.N. et al. "Immunotherapy in hempworkers having respiratory complaints", Archives of Environmental Health, 1978.
- (c) Kamat, S.R. "Effect of cotton dust on textile workers", Chemical Age of India, 27, 1976.
- (d) Vishwanathan, R. "Bagassosis", Technical Report of Scientific Advisory Board of ICMR, New Delhi, 1960.
- (e) Regional Occupational Health Centre (S), Bangalore, "Occupational health hazards among coir workers", ROHC(S), ICMR, 1981.
- (f) NIOH, "Environmental-cum-medical surveillance in the Asbestos Cement factory", NIOH, ICMR (on-going study).

in a dust infested environment (eg: cotton dust) alongwith smoking, slum living, drugs, alcohol, malnutrition, etc. creates a synergistic effect (W.H.O, 1981), and brings about so called classical occupational diseases such as pneumoconiosis in coal miners and asbestos workers, byssiniosis of the textile workers and bagassiosis of the sugar-cane crusher (Krishnamurthi, 1978).

Asbestos cement factory workers and construction workers face the most serious hazards from dust. There is no question about the significance of direct industrial exposure to asbestos. Asbestos particles are also a serious threat to the non-worker resulting in an indolent pneumoconiosis and pleural and peritoneal mesothelioma is found mostly among workers (Rai, J.C. 1982). Asbestos particles called "ferruginous bodies" have been detected in the urban air but it has been shown that typical reaction to asbestos is of high prevalence only among workers of the building trade and those who have direct exposure to its manufacturing process.

The occupational hazards of exposure to other chemical agents in the working atmosphere have received very scant attention in India (Krishnamurthi, 1978). A study by the Indian Chemical Manufacturers' Association in 1966 was one of the first systematic studies on chemical agents in the work-place environment. This study covered 20,793 workers in 34 small, medium and large size chemical factories located in and around Bombay, Calcutta and Madras. The extent and nature of pollutants and the type of diseases in chemical factories surveyed is brought out by data given in Tables 2 and 3.

Table 2

AIR POLLUTION IN THE WORKING ATMOSPHERE OF
REPRESENTATIVE CHEMICAL FACTORIES

Pollutant	Highest concentration observed	Threshold limit value
Sulphur dioxide	36 ppm	5
Chlorine	25 ppm	1
Ammonia	60 ppm	50
Hydrogen fluoride	313 mg/m ³	2
Sulphuric acid	20 mg/m ³	1
Formaldehyde	3.2 mg/m ³	6
Nitric acid	134.1 mg/m ³	5
Rock phosphate dust	414.0 mppcf	50
Chrome dust	96.0 mppcf	50
Ammonium phosphate dust	103.0 mg/m ³	50
Bleaching powder dust	27.0 mg/m ³	15
NaOH mist	2.4 mg/m ³	0.2
Lime	84.7 mg/m ³	5

Source: Thacker, P.V. "Report on medical-cum-environmental hygiene studies in chemical industries", Indian Chemical Manufacturers' Association, Calcutta, 1968.

Table 3
PERCENT DISTRIBUTION OF DIFFERENT DISEASES AMONG
913 WORKERS IN CHEMICAL FACTORIES IN
CALCUTTA, MADRAS AND BOMBAY

	Calcutta	Madrass	Bombay
Total lung cases (TB, suspected TB, asthma, bronchitis)	11.2	6.0	14.0
Gum sepsis	54.5	20.7	40.4
Blue line on gums	1.4	10.7	30.0
Angular stomatitis	9.0	2.2	1.2
Vitamin A deficiency	13.4	2.4	0.7
Anaemia	9.0	1.7	4.1
High blood pressure	5.7	2.2	1.4
Contact dermatitis	0.7	1.1	1.0
Other skin diseases	1.5	2.4	4.5
Old accident injury marks	12.0	...	2.6
Brisk tendon reflexes	...	1.1	5.5
Tremors	...	0.3	0.5

Source: Thacker, P.V. "Report on medical-cum-environmental hygiene studies in chemical industries", Indian Chemical Manufacturers' Association, Calcutta, 1968.

The findings clearly indicate gross abuse of the human component in the production process. It is a social paradox that on one hand health technology is improving greatly but on the other human degradation as a result of industrial production is on the rise. Health hazards associated with the working environment of foundries and metal processing, gas manufacture, petroleum and petrochemicals, fertilizers and DDT manufacturing have been investigated over the years by the Central Labour Institute (CLI), Bombay.

Details of one such study conducted by Drs. V.P. Gupta and Harwant Singh (Gupta & Singh, CLI, Bombay) for the CLI are given below in brief.

Three caustic soda plants were identified where cases of mercury poisoning were reported. The mean atmospheric concentration of mercury in the 3 plants was 0.08 mg/m^3 (0.01 to 0.12 mg/m^3) when 0.06 mg/m^3 concentration in the work-place environment is considered as the threshold limit for ill-health symptoms to manifest themselves.

Eighty-six exposed workers and thirty-six controls (who only had traces of mercury) were medically examined. Urine and blood levels of mercury were examined and symptoms ranging from insomania to loss of teeth were identified. The findings are summarized in the following two tables:

Table 4

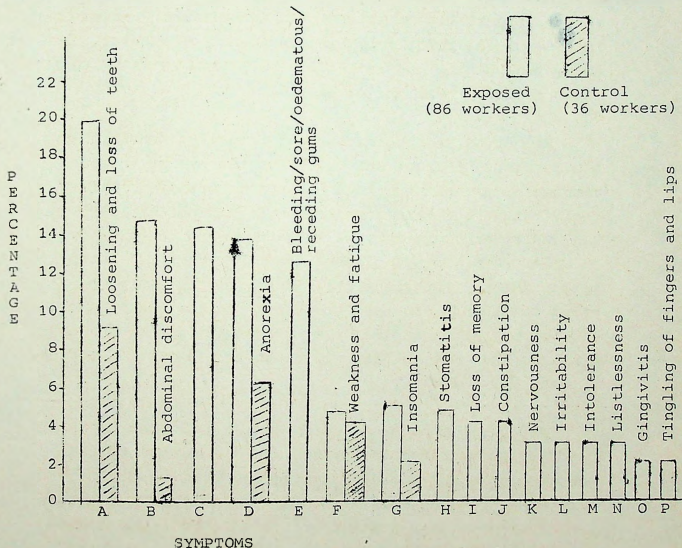
MEAN URINARY AND BLOOD LEVELS OF MERCURY IN
DIFFERENT CATEGORIES OF WORKERS EXPOSED
TO TIME WEIGHTED AVERAGE ATMOSPHERIC
MERCURY VAPOUR CONCENTRATION.

Plant	Job category	Avg. atmospheric concentration (mg/m ³)	MEAN	
			Urinary mercury concentration (micrograms/liter)	Blood level of mercury (micrograms/100 milliliters)
I	Fitters & Helpers	0.12	358	23.4
	Supervisors	0.07	177	12.3
	Chemists	0.08	186	10.0
II	Fitters, Helpers & Collectors	0.05	192	Traces
	Chemists	0.05	130	Traces
III	Fitters & Helpers	0.01	221	2.2
	Operators	0.08	180	3.0
	Supervisors/Chargeman	0.04	108	Traces
	Chemists	0.05	64	N.A.
	Shift Engineers	0.04	57	16.0

Source: Gupta, V.P. & Harwant Singh: "Effects of Exposives to Mercury in three Caustic Soda Plants in Maharashtra", Industrial Medicine Division, Report No.1, Central Labour Institute, Bombay.

Table 5

PERCENT OF VARIOUS SYMPTOMS DUE TO MERCURY
INGESTION BY EXPOSED WORKERS AS COMP-
ARED TO CONTROLS



Source: Gupta, V.P. & Harwant Singh, "Effects of Exposures to Mercury in three Caustic Soda Plants in Maharashtra", Industrial Medicine Division, Report No. 1, Central Labour Institute, Bombay.

Since the main attack of the chemical agents is on the human respiratory system the need for establishing reliable norms of lung function and ventilatory capacity has repeatedly been emphasised in order to quantify their effect, especially in synergistic association, for example in view of the relatively high incidence of tuberculosis among the working population living in the slums of India's major cities (Abdullah, et al. 1973).

The drugs and pharmaceutical industry, manufacturing a wide range of drugs which involve the use of various chemicals, present numerous hazards to workers. During their manufacture and formulation, refining, filling, packing and other operations, a large number of chemicals such as chloroform, methyl alcohol, acetone, methyl isobutyl ketone (MIBK), methylene chloride, aromatic nitro and amino compounds, etc. are used which when present in excessive concentration in the work environment may cause pollution problems that may be detrimental to the health of workers (Gupta, V.P., 1981).

A diverse type of diseases of the skin, blood, liver, bladder and reproductive system can appear with chronic exposure to a new breed of synthetics like pesticides, plastics, dyes and solvent vapours. The diseases include cancers and various neurological and cardiovascular disorders (Krishnamurthi, 1978).

Industrially advanced nations have evolved technological processes which reduce exposure of workers to chemical pollutants in the working environment.

For example, the use of double contact process rather than single contact in manufacture of sulphuric acids has reduced harmful emissions from 17.5 kg/ton to 3.5 kg/ton of sulphuric acid manufactured (ECE, 1977). Member countries of the Organization for Economic Cooperation and Development (OECD) have combined to develop appropriate and safe methods under the chemical testing programme. Also the WHO, ILO and UNEP have agreed to cooperate in an International Programme on Chemical Safety (IPCS) (UNEP, 1982). Their effort is to diffuse safe manufacturing technology developed in western countries to developing countries so that greater control over pollutants and safety becomes possible in the work place environment and subsequently the general environment.

However, a complacency on the control of harmful contaminants prevails and the issue being debated in India is whether the industry or the government should take up the responsibility of abating pollution in the working as well as general environment. Such apathetic attitudes may prove disastrous for the human worker (Gupta, V.P. Industrial Safety Chronicle, X).

The following Tables provide a select sample of chemical contaminants in the work-place environment where they occur and at what levels:

Table 6

LIST OF SOME OF THE HARMFUL CONTAMINANTS AND THE
INDUSTRY WHERE THEY ARE LIKELY TO BE
ENCOUNTERED

<u>Contaminant</u>	<u>Industry/Industrial Operations</u>
Lead	Glass, storage battery, engineering.
Mercury	Caustic soda manufacture, scientific instruments manufacture, pharmaceutical pesticide, electrical.
Carbon monoxide	Steel, chemical and engineering.
Oxides of nitrogen	Fertilizer and chemical.
Cyanide	Chemical and engineering.
Aromatic nitro and amino compounds	Dye-stuff, pharmaceutical and chemicals.
Solvents	Fertilizer, pharmaceutical, engineering, dye-stuff, organic chemicals.
Benzene	Dye-stuff, steel plants, pharmaceuticals, pesticides, petrochemicals.
Dust	Foundries, asbestos manufacture, ferro-manganese plant, cosmetic, rubber manufacture, steel plants, glass, cotton and textile.
Hydrogen sulphide	Tanning, refineries, viscose rayon, chemical.
Carbon disulphide	Viscose rayon manufacture, rubber, chemicals.
Polychlorinated biphenyls (PCB)	Heat exchangers, transformer oils and cleansing agents.
Vinyl chloride	VC and PVC manufacture.

----- contd...

Table - 6 (contn...)

Contaminant	Industry/Industrial Operations
Organophosphorous compounds (parathion, malathion, DDVP, etc)) Pesticides manufacture and formulation
Chlorinated hydro-carbon (DDT, BHC, Aldrin, Endrin, Heptachlor)) Pesticides manufacture and formulation
Heat	Engineering, steel and glass.
Biological agents	Pharmaceutical, meat, leather, tanning
Noise	Engineering, tanning, chemical.
Radiations (ultra violet + infrared)) X-ray, welding, furnances

Source: Gupta, V.P., Central Labour Institute, Bombay.

Table 7

CONTAMINANTS LEVEL IN SOME INDUSTRIAL WORK ENVIRONMENTS

Industry	Pollutant	Pollutant levels *	Permissible standards
Sulphuric acid plant	Sulphur dioxide	12.2-35.0 ppm	10 ppm
Steel plant	Dust containing free Silica (Foundry)	3 - 1075 mppcf	5 mppcf
	Refractory dust	2 - 17 mppcf	20 mppcf
	Carbon monoxide (blast furnace)	20 - 200 ppm	100 ppm
	Aromatic hydrocarbons benzene	20 - 50 ppm	35 ppm
A chemical factory manufacturing sodium carbonate and ammonium chloride		34 - 107 ppm	
	Ammonia	40 - 172 ppm	
		204 - 430 ppm	50 ppm
		75 - 1240 ppm	
Chemical works	Oxides of nitrogen (Nitric acid plant)	11 - 31 ppm	5 ppm
	Chromic acid dust (Chromic acid plant)	0.5 - 2.1 mg/m ³	0.1 mg/m ³
	Bauxite dust	8 - 198 mppcf	50 mppcf
Blending of pesticides	Soapstone dust	33 - 134 mppcf	20 mppcf
	DDT	15.3-17.8 mg/m ³	1.0 mg/m ³
	BHC	25.2-29.8 mg/m ³	0.5 mg/m ³
Engineering Industry (tool room)	Isophorone	296 mg/m ³	55 mg/m ³

contd...

Table - 7 (contn...)

Industry	Pollutant	Pollutant levels *	Permissible standards
Pharmaceutical laboratory and works	Talc dust	60 - 90 mppcf	20 mppcf
	NIBK	408 - 792 mg/m ³	410 mg/m ³
	Ethyl alcohol	482 - 7812 mg/m ³	1900 mg/m ³
Heavy engineering factory manufacturing electrical equipments	Iron compound dust	0.67-5.58 mg/m ³	1 mg/m ³
	Alumina dust	15.0-32.4 mppcf	30 mppcf
	Silicone	37.1-4156.6 mppcf	30 mppcf
	Coal dust	28.0-35.3 mppcf	
	Iron dust	17.9-51.5 mppcf	30 mppcf
	Sand bearing free silica	23.5-101 mppcf	6 mppcf
	Asbestos	847.2-1517.9 fibres/cc	5 fibres/cc
	Oil mist	4 - 158 mg/m ³	5 mg/m ³
	Noise	87 - 120 db	85 db

* Range of means (minimum and maximum values)

Source: Gupta, V.P., Central Labour Institute, Bombay.

BIOLOGICAL AND PHYSICAL AGENTS

Hazardous biological and physical agents have received relatively less attention in the working environment except when the hazard is very obvious and visible. In the latter case protective measures are provided but not always are the hazards eliminated totally.

The biological agents consist of bacteria, fungi and parasites that are able to cause extreme discomfort, disease and even death.

Almost any infectious disease may be acquired in the course of employment, thus becoming an occupational disease. This is particularly true of infectious diseases acquired by medical personnel in caring for infected patients! Persons working in bacteriological laboratories may acquire infections through breakage of apparatus and spilling of cultures. Workers most exposed are tanners, veterinarians, zoo and circus attendants, slaughter house and packing employees, agricultural workers and municipal workers (Vakil, R.J., 1973).

Cases of anthrax among agricultural workers, veterinary surgeons and butchers have been recorded (HMSO, 1958). Weil's disease (leptospirosis) is transmitted by water contaminated with urine of infected animals. It is an occupational hazard of rice field workers, sewer workers, fish workers, and those who work in rat infested premises. A number of epidemics of dermatitis among farm labourers especially at grain harvest times has been traced to mites Herms, W.B., 1961).

Some other occupational diseases of agricultural workers is brucellosis, hydatidosis, ornithosis, ring worm, fowl pest and erysipeloid (Kawata, K. 1967).

However, the most serious hazard for the agricultural worker today is not from biological agents but as a result of extensive use of agro-chemicals. DDT and other pesticides are a severe hazard to agricultural workers and the general population alike, but more serious are the cases of those who work in pesticide manufacturing plants and as sprayers. Pesticides are strong inhibitors of colinesterase and cause fatal poisoning in man.

The sequence of events following pesticide poisoning, which may occur either through absorption by skin or through inhalation, include nausea, vomiting, vertigo, excitability, tremors, convulsions, tingling of the limbs, paralysis, pulmonary oedema, coma and death (from respiratory failure) (Vakil, R.J. 1973).

Among the physical agents and conditions that need to be controlled in the working environment so as to secure healthy conditions for the worker are radiation, noise, extreme temperatures and humidity, abnormal air pressure, weight lifting, repeated motions and shocks and vibrations (Kawata, K. 1967).

Radiation, having a physiologic effect, includes ionizing radiation, ultra-violet radiation, visible light and infra-red radiation (Kawata, K. 1967).

Ultra-violet radiation can produce severe injuries to the eyes and skin. Other than sunlight, arc welding in industry is one of the most common sources of ultra-violet radiation. Visible light is an important variable in occupational health and therefore industrial codes clearly specify qualitative and quantitative levels of illumination. Poor illumination is often the indirect cause of accidents; direct and reflected glare give rise to eye fatigue and interfere with vision (Kahler, W.H. 1958). Foundry workers handling molten metal are subject to infra-red radiation which can cause acute eye damage, besides increasing the body heat load which creates heat exhaustion.

Ionizing radiation, which is being used increasingly in industry, is a much more serious radiation hazard. X-rays and gamma rays are used for radiography of castings and welds, x-rays for fluuroscopy and beta rays for the elimination of static electricity troubles and the gauging of material thickness. Radio active isotopes are used for tracing processes in a large variety of trades. Accidental exposures to high dozes of ionizing radiations tends to cause severe burns, blood dyscrasias, gastro-intestinal symptoms and post-cervical cataract. The late effects are osteosarcoma and genetic mutation (Vakil, R.J. 1973).

Occupational hazard of noise effecting human hearing depends upon frequency, intensity and duration (continuous or intermittent) of the noise, the age of the worker and individual susceptibility, the use of protective devices and the presence of concurrent aural disease. Among occupations incurring the risk of noise-induced hearing

loss, are boiler making, aircraft, motor maintenance, black smithing, weaving, rivetting, chipping, blasting, various metal working trades, high pressure steam, rock drilling and lathe operating (Vakil, R.J. 1973). Besides progressive deafness, caused by continuous exposure to noise in the industry, the worker may suffer from rupture of the ear drum as the result of acute acoustical trauma due to sudden explosions or blasts.

Table 9

TYPICAL INDUSTRIAL NOISES

Sounds	Decibels
Jet motor at 22 meters	130 to threshold of pain
Drop hammers, chipping hammers	110 to 125
Planers, routers, special hammer, circular saws	110 to 115
Screw machines, punch presses, riveters, cutt-off saws, air drill, milling machines, compressed air	90 to 110
Spinners, looms, lathes, loud street noise, automobile	80 to 95
Noisy office, average street noise	60 to 80

Source: Kawata, K. 1967.

When the human body is subjected to temperatures beyond its thermo-regulatory control, the circulatory system is disturbed. Several types of acute clinical conditions may result from excessive exposure to heat, the most common being heat cramps in the muscles of firemen, furnace and foundry workers, metal casters, iron and glass workers, miners and those working in the steam press shops in the rubber industry; heat exhaustion resulting from the failure of the cardiovascular system (to maintain a normal, stable blood pressure and flow) leading to dehydration due to salt or water deficiency or from extensive injury to sweat glands; and heat stroke, which raises body temperature between 107°F and 110°F sending victims into coma followed by convulsions of acute delirium, that is usually fatal (Vakil, R.J. 1973).

Even a mild upset of the homeostatic balance mechanism in the work environment may cause apathy, lassitude, sleeplessness and cramps. The final effects are determined by the degree of temperature, period of exposure and the state of adaptation of the individual.

Atmosphere humidity and wind velocity are variables that can either aggravate or lessen the effects of heat. In hot, humid atmosphere, even at a lower temperature, though the body may produce ample sweat, heat effects may ensue due to lack of evaporation of water. Air inertia may increase the liability to heat effects, especially in humid temperatures, and conversely a high wind velocity of over 32 km. per hour can cause "reversed convection" and is therefore dangerous (Vakil, R.J. 1973).

Workers who lift heavy loads, as in many factories, at the docks or on railway platforms are easy victims of various diseases of bones and joints, strangulated hernia and varicose veins. However, this aspect of occupational health, as also many non-industrial occupations (drivers, policemen, agricultural labourers, etc.) have received very scant attention.

Similarly, abnormal air-pressure, vibration and shock in various occupations that can cause severe damages to the circulatory and nervous system, and bone structure have received very little attention.

These wide range of occupational hazards for the working population and the indifference shown by the industry towards them has become a major concern for the health condition of the worker. Many of the hazards attributed to chemical, physical and biological agents can be easily controlled through general environmental hygiene within the working premises and the use of basic protective materials like filter masks, gas masks and oxygen masks for occupations that endanger the human respiratory tract or wearing protective apparels like special gloves and boots, helmets and shields (Kawata, K. 1967). In India it is not uncommon to come across work environments that lack these basic amenities for workers, especially in the mining, textile and chemical industries. For the trade unions in our country, who have not gone beyond the monetary demands, the struggle for better working conditions and environment is an ascending task in this era of technological revolution which has intensified the pace of production (Economic Times, 1982).

ACCIDENTS

Accidents, the most serious among occupational hazards, have received greater attention primarily because of its visible manifestations. There is gross underreporting of other physical, biological and chemical-caused occupational diseases, but accidents easily come to the notice of all concerned and therefore information on them is easily available. As a result, action for the prevention of accidents and compensations, and other corrective measures for accidents caused, has received some serious attention from the industry, government and workers themselves.

As industrial activity expands in developing countries, the incidence of accidents within the work-place environment also rises.

Industrial accidents occur as frequently due to human error as mechanical malfunctions. Anxiety, fear, worry and other distractions may cause accidents. Troubles at home and with colleagues and superiors prevent adequate concentration on the job and this may lead to some mishap (Lykes, N.R. 1954). Absence of adequate lighting, ventilation and other disturbing environmental conditions often become contributing factors to industrial accidents.

Injuries due to industrial accidents may result while handling materials, products and moving mechanical devices, through falls, or by objects falling, flying and being thrown off. Explosions, fires, electrical short circuits, structural collapses and certain major plant damage during the production process may result in mass accidents, both fatal and non-fatal.

Textile, metal and engineering industrial units and mines account for the major proportion of industrial accidents. This is evident from the data tabulated below:

Table 9
PERCENTAGE DISTRIBUTION OF FATAL & NON-FATAL INJURIES
& AVERAGE DAILY EMPLOYMENT BY INDUSTRY (REGD. FACT-
ORIES) FOR THE YEAR 1978 (EXCLUDES MINING AND
CONSTRUCTION)

	Injuries		Average employment	
	Number	% of total	Number	% of total
Textile	1,93,503	56.32	15,45,000	23.62
Metals	47,110	13.71	10,05,000	15.37
Transport Industry	20,913	6.09	3,97,000	6.07
Machinery	21,839	6.35	4,72,000	7.22
Chemicals	12,449	3.62	4,28,000	6.55
Others	47,797	13.91	2,62,200	41.17
Total	3,43,611	100.00	64,69,000	100.00

Source: Compiled by Nair, R.R., Central Labour Institute, Bombay.

The textile industry's share of accidents is disproportionate to the number of people it employs. It accounts for 56.32 per cent of accidents but employs only 23.62 per cent of the industrial labour force. Besides, one in every five workers in textile mills suffers from byssinosis, and cotton dust inhalation is responsible for a high incidence of tuberculosis among them (Pandit, V. et al 1972).

According to a survey carried out by the Union Labour Ministry (Economic Times, 1982) the disturbing rise in absenteeism among Bombay's textile mill workers is partly due to the greater number of accidents they suffer. The facts that over 55 per cent of all recorded industrial accidents occur in the textile units was due to spinning machine, flying shuttles and other weaving machinery. Obviously the safeguards that exist are inadequate. Another disturbing factor is that 'badli' workers who are recruited to fill any temporary vacancy (in many mills they are majority workers) are put on the job with little or no training. That the accident rate among badli workers is much higher than others is, therefore, no surprise.

The mining industry too has suffered large human losses. Among the mining disasters 75 per cent of the cases occur in coal mines and over 77 per cent fatal cases and 72 per cent non-fatal injuries take place in collieries.

Of the 7.63,000 mine workers, 5,10,420 work in coal mines, that is about 67% of the total mine workers (GOI, 1980), but the fatality rate in some other mines like

copper, gold and stone quarrying is much higher (GOI, 1978). The following Table gives details of fatal and non-fatal accidents for various minerals:

Table 10
NUMBER OF ACCIDENTS AND PERSONS KILLED OR INJURED
SERIOUSLY DURING 1977 (BY MINERALS)

Minerals	Number of accidents		Number of persons		Rate per 1000 persons employed	
	Fatal	Seriously injured	Fatal	Seriously injured	Fatal	Seriously injured
Coal	216	2093	237	2177	0.47	4.38
Galanis & Sphalerite	2	54	2	58	0.54	15.72
Copper	7	153	7	153	0.61	13.27
Gold	6	144	7	149	0.67	14.19
Lime Stone	10	172	11	175	0.23	3.59
Iron Ore	12	93	12	95	0.23	1.79
Manganese	1	43	1	43	0.04	1.55
Mica	3	7	4	7	0.54	0.95
Oil	2	65	1	68	0.07	4.86
Stone	10	15	10	18	0.73	1.47
Other minerals	12	54	12	58	0.20	0.99
All minerals	281	2893	304	300	0.40	4.03

Source: Director General of Mines Safety, New Delhi.

It must, however, be added that there is gross under-reporting of mine accidents.

According to the latest statistics released by the Ministry of Labour over 2.5 lakh workers have been maimed, crippled or disabled every year in the last decade and upto 600 of them eventually lose their lives. During 1980, 806 people were killed in industrial accidents as compared to 660 in 1975. The total number of industrial accidents also rose from 2,42,352 in 1975 to 3,56,341 in 1980 (Economic Times, 1982). The overall frequency rate of accidents in industrial units is 68.9 per 1000 and fatality rate is 0.16 per 1000.

Not only the reported incidence of industrial accidents is high in India but various experts believe that even this high rate is an under-estimate because a large number of accidents go unreported (GOI, 1978), inspite of the fact that fairly detailed safety precautions have been laid down in the Factories Act, 1948 to protect the workers.

LEGISLATION:

India's record in industrial safety has been far from satisfactory. It is high time the government took some steps to reverse this trend as the concern for human values must find its central focus at the workplace.

Table 11

HOW THE ACTIVITIES OF THE I.L.O ARE DESIGNED
TO BACK UP NATIONAL ACTION IN OCCUPAT-
IONAL SAFETY AND HEALTH

National Action	ILO Action
Legislation	Conventions, recommendations and advice on the drafting of legislations.
Regulations	Model codes of regulations, codes of practice, technical advice.
Technical and medical inspection	Manuals, guides, technical publications, the CIS services.
Activities by safety and health institutes, training and information of specialists	Fellowship, symposium, congresses, technical advice and cooperation, the CIS services.
Information for employers	Seminars, publications.
Workers' education	Seminars, publications, a-v-aids.

Source: Encyclopaedia of Occupational Health and Safety,
 International Labour Organization, Geneva, 1971.

The protection of the worker against sickness, disease and injury arising out of his employment is one of the essential tasks assigned to the International Labour Organization (ILO) under its constitution.

The level of employment accidents and occupational diseases throughout the world has reached alarming proportions; each year there are over 1,00,000 deaths and more than 1.5 million permanent disabilities. In other words, many countries are hit far harder by occupational hazards than by the consequences of war. The incidence of occupational diseases is much lower than that of occupational accidents, and as a result of industrial hygiene, the former is gradually declining (ILO, 1971).

The objectives of the ILO to promote a healthy work-place environment are summarized in the Table 11. The ILO is guided by two specific criteria in this connection; firstly, the number of workers at risk and second the level of risk at present in a given process or industry. The types of action shown in the Table 11 fall under three major headings: Standards; Research and Information Dissemination; and Technical Cooperation (ILO, 1971).

In India the Factories Act, 1948, makes it obligatory on part of factories to send the appropriate authorities information regarding incidence of certain specified diseases which cause serious bodily injury or death, or regarding occupational diseases contracted by employees.

Such cases are also required to be reported to the Chief Inspector of Factories by the medical practitioners attending on persons suffering from occupational diseases. Factory inspectors have been authorised to take samples of substances used in the manufacturing processes, if their use is either contrary to the provision of the Act or is likely to cause bodily injury to the worker's health. The state governments are empowered to appoint competent persons to enquire into causes of any accident or into any case of occupational disease (GOI, 1978).

The health provisions in the Factories Act dwell upon reduction of overcrowding, general sanitation and cleanliness, adequate ventilation and circulation of fresh air, maintenance of comfortable room temperature and adequate and suitable lighting in work areas. For the code of safety, the legislation envisages secure fencing of rotating parts, efficient power cut-off devices for transmission machinery, provision of spare pulley for belt-drive for change over, restriction on employment of young persons below 18 years, safe covering or fencing of vessels containing dangerous fluids, periodical examination of lifting equipment and of handrails on open side in passage and stairs, fencing of opening in the floor, proper maintenance and construction of ladders, provision of manholes in confined spaces to safeguard against dust and fumes and wearing of belts, availability of breathing and lifting apparatus, provision of alarm and proper escapes in case of fire, constructing lift-ways and hoisting of fire resistant material (Economic Times, 1982).

In spite of such elaborated legal provisions most cases of occupational diseases and a substantial number of accidents remain unreported. The 24 notified diseases under the factories are rarely, if ever detected, because most diseases among workers are attributed by the doctors, who have little or no training in public health, to causes other than the work environment (GOI, 1978). Records of illness associated with the occupational levels of exposure to dust, toxic fumes, chemicals and various physical conditions are maintained in a systematic manner by only a few large industrial houses. In effect, non-detection for want of competent examination is being interpreted as non-existence of occupational diseases (Thacker, 1971).

A national commission for labour appointed by the Lok Sabha in 1969 revealed health conditions and facilities provided by most factories to be appalling (Krishnamurthy, 1978). According to it, legislation for provision of a safe work-place environment is not of much avail when the whole-hearted cooperation of workers to safeguard their health is not forthcoming.

Trade unions have successfully utilized their bargaining power to obtain wage increases and other rights but very rarely have trade unions demanded even a dialogue on health hazards in the working environment. Trade unions thus have an important and constructive role to play in making workers aware of occupational health problems in particular and public health problems in general (Krishnamurthy, 1978).

Since industries are to grow, environmental control of contaminants should be accepted as social and moral obligation by the industries themselves and organizations concerned with the safety, health and welfare of the workers (Gupta, V.P. Industrial Safety Chronicle, 10,1). There is a price to pay for industrialization but it is the State's responsibility to see that this is paid by the industry itself and not passed on to the workers or the general public through adverse effects on health. What is needed is a careful monitoring of the changing situation, adoption of the needed control measures, and their effective implementation (ICSSR/ICMR, 1981). This would mean freeing the monitoring and control system from its bonds of corruption. Only a workers movement and action can ensure this.

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RADIATION-CAUSED GENETIC DISEASES AT
CHAVARA-NEENDAKARA IN KERALA, INDIA

- The Anatomy of a Non-Debate -

V.T. Padmanabhan

Introduction.

Both carcinogenic and mutagenic effects of ionising radiation are stochastic and hence a safe threshold does not exist. There is a wide gap in the estimates of cancer and genetic disorders resulting from long term exposure to chronic low dose radiation. (1) Almost all such estimates are extrapolated either from the experience of Hiroshima-Nagasaki or from the results from laboratories. Such extrapolations can be inaccurate since: (a) in the former case, radiation was delivered in one single dose, whereas the problem in a plutonium power economy is chronic exposure to low dose radiation. Even though the effects of radiation are cumulative, an insult to the gene is repaired and erased by specific enzymes, leaving no effect on the cell. (2) This repair mechanism would not be efficient in a violent situation like bombing. (b) Cells of different organisms are not equal in their resistance to radiation insult. For instance human skin cell in culture is hundred times more susceptible to radiation injury than bacteria in culture. (3)

Background radiation at the coastal villages of Chavara-Neendakara in Kerala and Manavalankurichi in Tamil Nadu, India, is higher than normal due to the presence of thorium bearing monazite in the beach sand. An epidemiological study of the populations in these villages would go a long way in establishing a near-accurate dose-response relationship between chronic low dose radiation exposure and diseases like cancer, premature ageing, genetic disorders among the offspring etc. Even though no such comprehensive study has so far been conducted N. Kochupillai and colleagues of All India Institute of Medical Sciences (AIIMS), Delhi, undertook a survey of Down's syndrome and related abnormalities at Chavara-Neendakara. Their conclusion that the higher frequency of abnormalities observed in the study population is due to high background radiation was contradicted by K. Sundaram of Bhabha Atomic Research Centre (BARC), Trombay. Both the debating parties quoted All India mortality/fertility rates which are considerably higher

than that of the study population. This led to a gross underestimation of risk.

In this paper, which is in two parts, the debate is analysed in its minute detail. A brief summary of the findings of the team reported in the first communication, the arguments raised by Sunderam and the formers' reply to it are presented in Part I. In Part II some errors which have seriously affected the interpretation of the findings are pointed out and the results of Kochupillai et.al's survey are subjected to re-interpretation.

I

While investigating a possible relationship between high background radiation and thyroid diseases, Kochupillai N, Verma IC, Grewal MS and Ramalinga-Swamy V of AIIBS observed a higher frequency of Down's syndrome and related abnormalities at Chavara-Keendakara in Kerala State on the ~~South~~ South West Coast of India.⁽⁴⁾ A house to house survey of developmental abnormalities in this region and Punnappra-Purakadu, a "comparable" control area with normal background radiation was conducted. The findings are reproduced below:

1. Down's Syndrome and Severe mental retardation. See table I

Table I
Prevalence of Down's Syndrome and Severe Mental
Retardation

Effect	<u>Study Population</u> (N 12018)		<u>Control Population</u> (N 5938)	
	Total	Per 1000	Total	Per 1000
<u>Genetic</u>				
Down's syndrome	12	0.93	0	0
SMA with physical abnormalities	12	0.93	1	0.17
Idiopathic	11	0.90	3	0.50
<u>Acquired</u>				
Perinatal and postnatal	6	0.46	3	0.50
Total	41	3.1	7	1.16

Source: Table I of ref. 4

2. Cytogenic abnormalities. Chromatid and chromosome aberrations were scored in 1705 metaphases from 46 subjects and 1547 metaphases from 39 individuals in the study and control areas respectively. Mean frequency of chromosome aberrations was higher in the study area and the difference was significant at 0.01 level.

Kochupillai et.al pointed out that the observed frequency of Down's syndrome at Neendakera (1:1076) is considerably higher than other published values : Eastern countries of England, 1:10000, London, 1:3,000, Germany 1:7,000, Denmark, 1:4,000, Australia, 1:2083, and North East Scotland, 1:2,000.

Of the 12 cases of Down's syndrome, 1 was born to a woman in age group 20-29, 9 to age group 30-39 and 2 to age group 40-49. The authors observed that "the maternal age dependence suggests that the damaging event accelerates oocyte ageing and causes primary trisomy, rather than translocation trisomy which is known to be independent of maternal age. ... The higher prevalence of chromosome aberration in apparently normal subjects from the radiation area also supports the view that environmental radiation may be the cause of the genetic damage in the population".

In a rejoinder K Sundaram of BARC raised the following objection: (5)

1. Comparison of the observed frequency at Neendakera with any other published value would be valid if only the age structure of the populations is similar. "The infant mortality rate (IMR) in this region is 200 per thousand births and is independent of the background radiation. Furthermore, in most other surveys, only 4% of the births have been to females 40 years old and above. The data of Kochupillai et.al show about 20% of the females in this age group, which incidentally carries the highest risk of bearing children with Down's syndrome.....The greater frequency of Down's syndrome in the study group.....than in those reported from other countries could be explained solely in the differences in population structures".

2. Regarding the higher risk of Down's syndrome births in age group 30-39, Sundaram observes: "Kochupillai et.al. have demonstrated only that mothers in the age group 30-39 run a risk 10 times greater than those in the younger age groups which agrees with other evidence of increasing risk with advancing maternal age. They made no comment as to why this risk is about three times lower in mothers in the age group 40-49 yr.

If higher background radiation is involved, an even greater risk would be expected in this group than in comparable age group of the general population". (Emphasis added)

After demolishing Kochupillai et. al's hypothesis, primarily on the basis of difference in mortality rate and age structure of the population between the developed countries and Neendakara, Sundaram engages in his original task of reinterpreting the data generated by the formers.

He estimated 11,500 births in the study population, "based on the value of family size (6.2), the number of females (2213) in the study population (12918), an infant mortality rate of 200 per 1000 births and a mortality of 60 per 1000 births in the age group 1-20 years". He further estimated a total of 20 cases of Down syndrome among 11,500 live births. The expected frequency, according to Pensore and Smith being 1,507 per 1000 births⁽⁶⁾ would be 17 cases. The difference between expected and observed, Sundaram ruled, is not statistically significant.

In their reply to the rejoinder IC Verma et. al⁽⁷⁾ argued that even though "infant and childhood mortality in India is about 6 times higher than in Western countries", the mortality of Down's syndrome should also be substantially higher than the general population and hence the difference observed in the population frequency is not an artefact due to lack of standardisation for age structure. The second serious objection raised by Sundaram was about the high fertility rate among women aged 40 and above in the study population. On this, the authors observed: "Sundaram's comparison of 4% of all births to females 40 year and above in other surveys with 20% of females in this group is incorrect. The percentage of women 40-49 year old is less in Kerala than in Western countries". (See table II). Verma et. al also pointed out that the risk of Down's syndrome births in the 40-49 yr old age group is no less than in the 30-39 yr old group "if the difference in age specific fertility (about 56 and 186 per 1000 females in two groups respectively) is remembered". (Emphasis added)

Table II

Age-Group	Kerala		India	Australia	UK	Denmark
	Study	Control	1961	1965	1966	1964
1-14	43.39	38.57	41.14	41.14	29.06	21.83
15-19	13.54	12.66	8.12	8.79	7.39	8.71
20-29	13.64	16.49	17.47	13.31	12.61	13.45
30-39	11.53	12.73	12.55	12.45	11.70	12.04
40-49	8.42	9.11	9.97	12.49	12.69	12.89
50-	9.48	12.42	11.75	23.90	23.78	29.83

Source: Table I of ref 6

Note: figures are percentages.

In the case of 'Frequency of Down's syndrome at birth, while accepting Sunderam's estimate of births, Verma et. al pointed out that the former erred in calculating the total Down's syndrome births in the population "by incorrectly equating the mortality of Down's syndrome with the usual childhood mortality". They instead, used the survival rates for Down's syndrome after Collmann and Stoller giving an allowance for the "substantially higher mortality in Kerala" and estimated a total of 33 Down's syndrome births in the study population. Frequency of the abnormality at birth, thus works out to 2.8 per 1000.

The debate thus ended, which in other words means that Kochupillai et. al's initial hypothesis stands uncontested. The paper is being quoted in all serious works on radiation related health hazards. (8)

II

There are two demographic variable playing a central role in a survey of this sort. Infant and child mortality and fertility rate of women in the advanced age group. Incidentally both Sundaram and Kochupillai et. al chose to ignore the difference in these rates between India and Kerala.

Kerala and India

In demographic variables like birth rate, death rate, age specific fertility rate (ASFR), infant mortality rate (IMR) and sex-ratio, there is difference between India and Kerala. Equally prominent is the difference between various regions in the latter. Kerala state can be classified into low land, mid land and high land regions. The narrow strip of land adjoining the Arabian Sea is the low land, high land region refers to the areas contiguous to the Western Ghate, Midland, as the name indicates is in between. The study and control populations of Kochupillai belong to low land regions of Quilon and Alleppey district respectively, in Southern Kerala.

Birth rate, death rate and infant mortality rate are considerably lower in the low land region than the high and midland. Mortality rates are given in Table III.

Table III
Mortality Rates: Low land Kerala, Kerala and India

Region	Mortality rates			
	0-1 Yr	2-4 Yr	5-9 Yr	10-14 Yr
Low land Kerala (1971)	34-39	11-47	2-39	0.86
Kerala (1971)	60-89	13-08	2-39	1.13
India (1965-70)	139-00	18-90	15-50	4-60

Sources: For Kerala - Bureau of Economics and Statistics, Kerala state Annual Report - 1971 (Issue No. 8) Tables II and V.

For India - UN Demographic year book, 1971 p 670.

Sandaram argued that IMR in the study population is over 200 per 1000 live births. The highest recorded IMR in India during the last sixty years was 178 during 1926-30.

Age Specific Fertility rate (ASFR)

The second objection of Sandaram is the higher proportion of women aged 40 and above in the study population, which is incorrect in two ways. Firstly, women aged 40 yrs and above constituted only 8.42% of the total female population and 13.7% of the females aged 15-49 yrs. While Verma et. al in their reply could refute this part of the statement, because of the ignorance of ASFR in low land Kerala, exact quantification of age specific risk of Deen's syndromic births in the 40-49 yr old age group is no less than that in the 30-39 yr old age group if the difference in ASFR (about 56 and 186 per 1000 females in the two groups respectively) is remembered. The rate quoted is obviously from the all India figures. ASFR Low Land Kerala and India is given in table IV.

∠ was not attempted to. Instead, they argued tant : " the risk

Table IV

ASFR: Low Land Kerala and India

Age Group	Low Land Kerala	India
15-19	47.00	83.00
20-29	211.00	246.00
30-39	141.00	187.00
40-49	25.00	56.00
Total Fertility Rate (TFR)	4.01	5.12

Sources: Kerala Table VI SRS report (1971) ibid.

India Government of India, National Sample Survey, No. 186, 19th round - July 1964- July 1965, p 8.

ASFR in age group 40-49 yrs is not just 3 times lower than 30-39 yrs as pointed out by Verma et. al, but almost 6 times lower.

In Sandarams' mezz exercise of estimating the total number of births, there are factual as well as methodological errors. We saw how reliable are the mortality figures. More intriguing is

number of females quoted by him. The total number of females in age group 15-49 at Cheyara - Neendakara is 2983 and not 2213 as quoted by him. (9) The latter figure appears nowhere in the original report. Since the number of women in the population and also the estimated rates of infant and child mortality quoted by him are wrong, his estimate has to be rejected outrightly. By the way, the total fertility rate (TFR - the average number of children that would be born to a woman during her life time if she were to pass through her child bearing years conforming to the ASFR of the year) in low land Kerala during 1971 was 4.01. 11,500 children would be born to 2867 women during a span of 35 years.

A more accurate method would be to work out the female population of the study region and find out the total births using the fertility rates of the past. The study population was drawn from Cheyara and Neendakara Segments (locally known as KARA KARA) of two revenue villages Cheyara and Thekkumbhagam. Population details are given in Table V.

Table V
Demographic Details

Region	Population						
	1951	1961	Increase 1951-61	1971	Increase 61-71	1981	Increase 71-81
Cheyara (RV)	19,304	25,526	32%	28,432	11%	33,388	17%
Cheyara (Segment)	2,717	3,647	34%	4,191	15%	4,419	6%
Thekkumbhagam (RV)	14,751	19,613	33%	23,338	19%	27,420	19%
Neendakara (Segment)	5,887	8,745	49%	11,887	36%	13,623	15%
Cheyara -Neenda- kara (Segments)	8,604	12,392	44%	16,078	30%	18,042	12%
Karunagappalli (Taluk)	216,436	270,922	25%	321,164	19%	378,064	18%
Quilon (District)	1478,384	1946,963	32%	2412,821	24%	2813,590	17%

Source: Census Handbooks, Quilon district, 1951 to 1981.

Note : RV - Revenue Village.

The growth rate of the villages during the decade 1951-61 is considerably higher than that of Karunagappalli. Of this, Neendakara region segment which registered a 49% growth stands out. This abnormal growth can be explained by the high rate of in-migration due to the expansion of mining in the study region. The higher rate of in-migration to Neendakara segment than Chovara is due to the availability of more wasteland for settlement of migrants. (In 1951 Neendakara had a population density of 3.83 persons per acre as against 7.09 persons per acre in Chovara.)

The estimated total population and number of women aged 15-49 yrs in the study region during the past is given in Table VI.

Table VI
Estimated Population and Number of Women in
the Study Region

Year	Decadal Variation	Total Population	No. of women
1975		13913	2980
1973		12628	2910
1971	12% (1971-81)	12330	3040
1966		10900	2510
1961	30% (1961-71)	9480	2180
1958		8610	2015
1955		7740	1780
1951	44% (1951-61)	6580	1510

General Fertility Rate (GFR - Number of live births in a year to 1000 women in age group 15-49) in Lowland Kerala during 1971 122.9. (This has been consistently declining. GFR in Lowland Kerala during 1961 was 85.9). Since fertility rates of the state during earlier decades were higher (rates not available) we assume a GFR of 130 in the 60s and 145 in the 50s. Total number of births in the study region during 20 years prior to the survey (1955-75) is estimated in table VII.

Table VIIEstimated births in Chevara - Neendakara: 1955-75

Period	Midpoint	Midpoint Female Popn.	GFR	Total births in a year	Births during theperiod
1972-75	1973	2910	123	358	1430
1962-71	1966	2510	130	326	3760
1955-61	1958	2015	145	292	1750
				Total	6440

While estimating the total number of Down's syndrome births Verma et. al used a survival rate lower than that of Collman and Stoller for the developed countries "because of the higher mortality rates in the study region". Since mortality rates in the study region is not higher, this allowance is unwarranted. In Table VIII, total number after Verma et. al and Collman and Stoller is provided. (10)

Table VIIITotal Number of Down's Syndrome Births: Chevara-Neendakara

Age	Observed Frequency	Chance of Survival and total births			
		After Verma et. al		After Collman & Stoller	
		Chances	Total	Chances	Total
Up to 5 yrs	5	45%	12	49.4%	10
5-10 yrs	4	35%	11	46.2	9
Above 10 yrs	3	30%	10	38%	8
Total -	12		33		27

Twelve observed cases of Down's syndrome were survivors of 27 cases in 6440 infants born during twenty years preceeding the survey. Rates of Down's syndrome at births at Chevara-Neendakara and other centres are given in Table IX.

Table IX

Down's syndrome at Births - Various Surveys

<u>Survey/Centre</u>	<u>I</u>	<u>Ratio</u>	<u>Rate per 1000</u>
World	1:	663	1.51
India, excluding Madras	1:	1215	0.82
Madras	1:	3933	0.26
Trivandrum	1:	1194	0.84
Chavara - Neendakara	1:	238	4.19

Sources: World - Venrose LS and Smith GR (1966) Down's Anomaly, Churchill, London.

India and Madras: Verma, IC and Singh, M(1975) Lancet i, 1200.

Trivandrum - Suguna Bai quoted in ref 4.

Frequency of Down's syndrome at Chavara-Neendakara is 5 times higher than Trivandrum and All India(excluding Madras) and 16 times higher than Madras.

Age specific Down's syndrome Risk- Down's Syndrome birth risk in different age groups is computed in table X.

Table X

Age Specific Down's Syndrome Birth Risk: Chavara - Kasaragod

Age Group	No. of women	ASFR	Expected Births in a year	Percentage share of births	Total births	No. of Down's Syndrome Observed	Down's Syndrome Born	Risk per 1000 births
15-19	360	47.00	40	12	770	-	-	-
20-29	862	211.00	182	54	3430	1	2	0.57
30-39	729	141.00	102	30	1930	9	20	10.36
40-49	532	25.00	13	4	260	2	5	19.23
Total	2983		337	100	6440	12	27	4.19

Note:- No. and age break up of women pertains to the year of study.

ASFR is that of 1971. This would be different during the rest of the period.

Fertility among women in younger and older age groups (15-19 and 40-49) would be higher in the previous years, because as a rule when fertility declines, these groups are affected first.

The risk among mothers aged 30-39 yr and 40-49 yr is 18 and 33 times higher respectively than that of mothers in 20-29 yr age group. The mothers aged 40-49 yr have almost two times greater a chance of giving birth to Down's Syndrome babies than women in age group 30-39 yrs. Both the over all frequency and the internal differences are much higher than that reported by Renrose and Smith for normal population. (11) In India, out of 615 documented cases of Down's Syndrome births, only 51% were born to mothers aged 30 yrs and above. (4) This proportion at Heendakara is 93%.

Weaknesses of the Study

Over and above the points raised above, Kochupillai et. al's study is weak on the following grounds:

(a) Study and Control Populations-Dissimilarity. The teams' assumption that the study and control areas are comparable from a socio-economic angle is questionable. Heendakara, the study region has two distinguishing features, viz modernisation of fishing and extensive mining of monazite and ilmenite.

- (i) Fish Economy of Heendakara- Heendakara has played a vital role in modernisation of fishing industry in India. This village had the headquarters of Indo-Norwegian Project(INP) which heralded the capital-intensive fishing(using trawlers, purseine nets etc)in India. In 1971, Chavara-Heendakara coast had 700 trawlers out of a total of 2700 trawlers operating in the state as a whole. The author is in total agreement with the critics of modernisation of fishing who argue that the long term effects of mechanisation has been disastrous to the economy and ecology of the region. However, the region and its people did enjoy short term gains in the form of increased employment(in trawlers, processing points etc). There has also been an overall increase in the catch between 1960 & 1971 (This has come down since 1971)
- (ii) As part of INP, a hospital was set up at Heendakara(This hospital has now been taken over by Medical College Trivandrum by all standards, the functioning of INP Hospital(known among the locals as Foundation Hospital)was far more satisfactory than any government hospital in the region.

- (iii) The mining and export of monazite and ilmenite which started in the early decades of the century provided more or less regular employment to a considerable number of people. It is to be remembered that the wage rate in the modern sector is always higher than the traditional sector.

Purakkad in Alleppey district which is also ^a fishing village did not experience any kind of mechanisation till 1970.

(b) Dose-Response Relationship. The problem before the radiation health experts today (and also in the mid-seventies) is not whether low dose radiation exposure leads to cancer or genetic disorders. From a theoretical as well as practical point of view, what is relevant is a dose-response relationship. The dose quoted by the authors is of little value. The level of reliability of BARC figures of radiation exposure is not very satisfactory (being discussed below). ARIES team could have, within their own limitation, made the data collected by them more meaningful by seeking one more information regarding the place of birth of women in the sample. The high background radiation region is a small stretch of land, about 5 kms in length and less than a kilometer in width. A woman born in a normal background radiation region moving into the study region after marriage would have received considerably lower dose than those who were born and married into the study region.

The question of Dose. Even though the presence of thorium bearing monazite was detected at Neendakara decades earlier and the Indian Atomic Energy Commission has been involved in commercial exploitation of the mineral for the past three and a half decades, the data regarding dose absorption is all too scanty. According to BARC, average radiation dose received by a population 70,000 is 342 m/rem/yr. Exposure at Chavara village, which has the highest concentration of thorium was over 500 m/rem/yr. (12) WHO places the dose at 1500 m/rem/yr. (13) The Chairman of Indian Atomic Energy Commission says that the radiation exposure at Neendakara is well over 5000 m/rem/yr, (14) while his counterpart in USA quotes a figure which is over 10,000 m/rem/yr. (15) The BARC survey of radiation exposure had its own shortcomings. BARC issued 13,000 thermoluminescence dosimeter (TLD) to be worn around the neck for a period of three months. There was no fool proof device to check whether the people wore it or not. Many people who were given TLD informed that they did not wear the gadget because: (a) it was uncomfortable (b) in the case of women, who wear tight blouses, wearing it underneath the blouse was uncomfortable and also the projection of it over the breast was a positively ugly sight. The level of Co-operation

which can be elicited from people in such studies would be very minimal in the absence of proper motivating factors.⁽¹⁶⁾ If TLD were kept in the houses, the dose recorded on it would be far from accurate, since in their working hours, adults would have stayed away from the region. Fishermen, move in the opposite direction for selling fish. Both these areas have normal background radiation. / seawards and fishermen go

The survey only focussed on external exposure. No measurement of radiation from internally deposited nucleides (through inhalation of radon and thoron and ingestion of thorium and uranium daughters through food and water) has been done.

Conclusion

Kochupillai et. al had reported their findings regarding the rate of abortion, chromosome and chromatid aberration, severe mental retardation and Down's syndromes in the study and control population were not statistically significant (which in itself does not mean that the effect is non-existent), difference in others were statistically significant. Sundaram totally ignored all effects other than Down's Syndrome. Sundaram's silence on the chromosome aberration rate at Neendakera is significant in the light of consistent reporting of no aberration by BAMC which has been involved in cytological studies in the region since the early sixties.⁽¹⁷⁾

While the difference in abortion and chromatid aberration scientific objectivity or Politics of Profit?

At expert committee of WHO in its meeting in 1959 had underlined the need for conducting studies on possible health effects due to radiation in the high background radiation regions in Kerala and Tamil Nadu states in India.⁽¹⁸⁾ Even though there are high background radiation regions in Brazil, there is no comparable control population in that country. The expert committee ruled that Kerala and Tamil Nadu are the only regions which would valid results.

A study of all possible health effects of chronic low level radiation exposure assumes importance in an era when all the major countries in the world are considering a quantum leap in generation of nuclear electricity. A fierce battle is being fought for reduction of present maximum permissible dose for workers as well as for general public between the environmentalists/trade unions and the nuclear establishments. Would an unbiased, comprehensive survey of Chavara-Neendakera influence the course of this battle?

Alongwith Sundaram's rejoinder, W Nature had also published a short letter from JH Edwards and DE Harnden. (19) They pointed out that "as this background radiation (at Chavara-Noendakara) is less than half the limit of 5 rems/yr recommended for registered radiation workers by the International Commission on Radiological Protection in 1965, this might cause anxiety both to those exposed and to those responsible for their welfare". The authors forgot to add another category - the owners of nuclear facilities. In the body of this report, we have heard the Chairmen of Indian and US Atomic Energy Commissions saying that the radiation dose received by those living in Chavara-Noendakara is well over 5000 m/rems-the ICRP statutory limit. They were quoting Noendakara to 'prove' that the existing ICRP standard is safe and hence no need for revision.

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SUBMISSION ON THE HEALTH STATUS AND HEALTH CARE OF VICTIMS OF THE

BHOPAL GAS DISASTER OF 1984

TO THE INTERNATIONAL MEDICAL COMMISSION ON BHOPAL (JANUARY 1994)

by

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* * * * *

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"All scientific work is incomplete - whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time."

A.B.Hill

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 To Dr CRTF / Dr VB
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SUMMARY

Studies done and published during the past nine years show concrete evidence of continued, multi-systemic clinical manifestations, which in several thousand victims are severe and in others moderate and mild. Immunological effects and genotoxicity are also evident. There is serious disruption in quality of life.

This has occurred among a population living below the poverty line, who were totally unaware of the hazard potential of their neighbourhood plant.

Medical care has been largely hospital/clinic based, symptomatic, curative care. There is some evidence of irrationality and overdrugging. The preventive aspects of health care are inadequate and there is no attempt at person centred, wholistic health or even of the basics of primary health care or community health.

Further victimization of the victims is evident from protracted legal cases, unjust settlements, grossly delayed processing of compensation claims and disbursements, and disregard for the invaluable human dignity of the affected people.

Comprehensive, just and humane health services are urgently needed. These will necessarily have to build on present realities in the government and voluntary sector. A shift in emphasis towards greater community organisation and building of community capability is suggested so that the victims are in greater control of their own health. Other components of community health also need to be built up/strengthened.

1. INTRODUCTION

Studies since the Bhopal disaster, have increased our understanding of the health effects on people exposed to toxic gases in December 1984. These clinical, epidemiological and laboratory studies done by varied organizations provide evidence of the bodily harm caused to approximately half a million Indian/world citizens. They in no way measure the suffering caused to those affected and their families.

These nine years have also been witness to the response by Union Carbide (the concerned company), the state and national government and the international community. These could be seen in terms of:

- * availability/lack of timely authentic information;
- * research efforts and utilization of their findings;
- * evolution of appropriate therapeutic measures;
- * organisation of medical care and rehabilitation; and
- * utilization of medical information to work out compensation, etc.

Glaring lacunae exist in all the above, which would be considered beyond the levels of acceptability for other groups of citizens more favourably placed, even within the country. This response is added insult to the injury that was caused to innocent victims.

During present times the concept of social justice and equity in health and health care has been accepted worldwide and has led to the articulation of the Alma Ata Declaration to which most nation states are signatories. It is therefore important for members of the medical profession, and all those involved /interested in health issues, to work towards making these concepts and the goal of "health for all" a reality in specific situations such as Bhopal. It may also be worth remembering that Bhopal is no accident, but is representative of a large number of instances of industrial and environmental hazards to which populations, particularly in the Third World, are susceptible.

2. HEALTH STATUS

The definition of Health by the WHO as " a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", can be taken as the gold standard for health efforts. In the Bhopal situation all the different aspects of health need to be considered in comparison to this standard.

2.1 POPULATION EXPOSED/AFFECTED

Of the total population of 850,000 in Bhopal in 1984, the officially estimated exposed population was 5,21,262 (ICMR).

The ICMR estimates of the distribution of affected people is as follows:

Severely exposed area	:	32,477 people
Moderately exposed area	:	71,917 people
Mildly exposed area	:	4,16,868 people

It is important to have a reasonably accurate number of those exposed, as they comprise the 'population at risk' who could potentially manifest adverse health outcomes as a result of the exposure. This number would be the denominator for calculating exposure related morbidity and mortality rates, besides being crucial for organizing medical care and arriving at compensation amounts.

The Government does not have a complete list of victims and it is estimated that 1,00,000 victims who are residents of the 36 officially declared gas affected municipal wards have not been registered. It is strange that a country that successfully conducts census operations and regular enumerations for elections, besides other exercises like the Sample Registration Scheme and several other large studies by national research institutions and operations research groups, suddenly finds it near impossible to list a relatively small population in a confined and concentrated geographic area. Factors such as migration are not specific only to post disaster situations and other issues such as verification and misreporting are certainly not as difficult as made out to be. This basic and simple need for reasonably accurate data needs reiteration, as individual and collective rights to compensation, medical care and rehabilitation depend on it.

2.2 MORTALITY

In November 1989 and October 1990 the recorded number of deaths due to the disaster were 3,598 and 3,828 respectively (Dept. of Relief and Rehab., Bhopal Gas Tragedy, Govt. of Madhya Pradesh, Bhopal). Abortions and still births are not included here. However, 10,000 claims on account of death were still pending before the claims commissioner in 1992. Local sources say that over 70 per cent of claims taken up so far have been arbitrarily rejected. Local sources also mention 3 - 4 gas related deaths per week in Bhopal in 1993, based on newspaper reports, i.e., 156-208 excess deaths per year.

The mortality rate among those exposed is decreasing over time (6). This could probably be explained by the fact that those more severely affected have died in the immediate and intermediate period and the more healthy survivors live longer. The mortality rates are however still slightly higher among the severely exposed as compared to the controls (6).

Crude Death Rate (per 1,000 population)

<u>Year</u>	<u>Severely Exposed</u>	<u>Control</u>
1986	14.10	6.04
1987	11.79	7.23
1991	8.55	7.46

Source : (6,11)

Abortion Rate

1985	24.2%	5.6%
1987	9.6%	2.1%
1991	6.8%	5.9%

Source: (11).

The stillbirth, perinatal and infant mortality rates show a downward trend, but are slightly higher in the severely exposed area as compared to the control (6).

2.3 MORBIDITY : A brief review

2.3.1 Important overall features from a review of literature

a) Long term, progressive symptomatology and clinical findings during the nine years since the disaster. Animal studies and type of lesions developing, suggest a life time continuation of ill health. The acute, subacute and chronic phases, are part of a continuum, representing the natural history of the after effects of exposure.

b) Multi-systemic clinical picture involving the respiratory, ocular, gastrointestinal, reproductive, psychological, neurobehavioural and neuromuscular systems. There is some evidence of depressed cell mediated immunity and of genotoxicity.

Well designed toxicology studies also demonstrate long term, multi-systemic involvement.

c) MIC and its degradation products are highly toxic, reactive and exposure to it is associated with considerable long term effects (20, 13,10,18).

d) The majority of the exposed population live below the poverty line defined by the Government of India. The environmental and occupational conditions of poor housing, unsafe water supply, inadequate sanitation, inadequate nutrition, poor work environment and unemployment is a cause for greater exposure to other infections, to which the victims are more prone, due to factors cited in (b). This further aggravates their ill health.

2.3.2 The Eyes

In the acute phase a large proportion of the exposed population had superficial Keratitis, conjunctivitis and swelling of the eye lid. Several had superficial corneal ulcerations in the interpalpebral region which responded to treatment. There were persistent symptoms of watering of the eye, burning and itching. Later studies (6), (12) found chronic conjunctivitis, deficiency of tear secretion, high prevalence of corneal opacities and early age onset of cataracts.

Another 3 year cohort analysis of community clusters (13) suggests a threefold excess of eyelid inflammation, twofold increase of new cataracts and loss of usual acuity among the more severely exposed clusters. There was also an excess of recent eye infections and hyper responsive phenomenon. Toxicology (animal) experiments also showed evidence of dose related progressive chronic inflammation (13).

2.3.3 The Respiratory System

The experience of people (8), several studies (1),(6),(10),(14) and reviews (3),(9) (18) indicate a heavy load of morbidity due to respiratory problems throughout the post disaster period. It continues to be a major cause of death among the exposed population (10).

An 18 month follow up of a self selected group of patients exposed to the toxic gas revealed a pattern of chronic respiratory disability showing flow volume reductions along with restrictive lung damage with alveolitis (6).

A follow up study of a random sample of 288 case (6) showed that a large number of cases were symptomatic at the end of 5 years. There is an emergence of hyper reactive airway injury with asthma like features among 24%, Chronic Obstructive Airways Disease among 11.4%, bronchiolitis obliterans in 13% and restrictive lung disease in 1.4% of the sample. 12.8% had recurrent chest infections requiring the use of antibiotics. It was concluded that exposure related lung injury had damaged both large and small airways, resulting in different types of obstructive airways disease.

Misra et al (6) studied pulmonary functions of 250 patients with respiratory symptoms during December 1984, with severe and moderate exposure and followed them up every year. After the fourth year prevalence of clinical symptoms were as follows: exertional dyspnoea (98.4%), recurrent respiratory infections

(78.0%) and chest pain (42.0%). 97.5% had evidence of small airway obstruction, which was suggested as a marker for the diagnosis of toxic gas induced lung disease. It was later reported (11), (covering a period till March 1991), that there was no change in the pulmonary parameters of patients examined, but sequelae of chronic bronchitis and corpulmonale were increasing.

2.3.4 The Reproductive System

An early cross sectional community based study (1985) indicated alterations in menstrual flow, length of menstrual cycle, dysmenorrhea and leucorrhoea among women, impotence in men in exposed areas. these were significantly different from control groups (1).

An epidemiological study in September 1985 (2) also showed altered menstrual patterns and reported a significant four fold increase in the incidence of spontaneous abortions. Still births too were significantly high.

An epidemiological study by Varma (reviewed in 10) showed high pregnancy loss - 43.0% of 865 pregnancies at the time of the gas leak, within 1 Km of the plant, did not result in live births.

2.3.4 Mental Health

Exploratory studies in February 1985 showed that 50% of people in the community and 20% of those seeking medical care were suffering from psychiatric problems (5). In a community based epidemiological study in March 1985, 44% of people in a severely exposed area, had anxiety or depression and loss of memory, which was significantly higher than the control group. (1)

Behavioural studies conducted two and a half months post disaster revealed that memory, mainly visual perceptual, and attention/response speed, along with attention/vigilance were severely affected in the exposed population (17).

A later study (5) using standard questionnaires (SRQ) and psychiatric interviews (PSE), found that 22.6% of patients attending general clinics suffered from psychiatric disorders, namely anxiety neurosis (25%), depressive neurosis (37%), adjustment reaction with prolonged depression (20%) and adjustment reaction with predominant disturbance of emotions (16%). In a community based survey using random sampling (done by the same study group) the prevalence rate of psychiatric disorders was 94/1,000. 94% of the patients had a diagnosis of neurosis (neurotic depression (51%), anxiety state (41%), hysteria (2%) and had a temporal correlation with the disaster.

2.3.6 Immune System

Studies of immune function (16) showed a depression of cell mediated immunity. Among the exposed the T-cell population was found to be less than half (28%) than that found in a normal Indian population (65%). Animal studies corroborate this (10).

2.3.7 Genetic effects

A review indicates that animal and invitro studies demonstrate genotoxic effects of MIC (10). Cytogenetic studies on small samples of exposed people show statistically higher frequency of chromosomal aberrations (16, 10).

2.3.8 Comments

The studies have been done in a post disaster situation and often under several constraints, including a lack of access to available information, due to the medico-legal implications. Though there are methodological limitations to some of the studies (3), (10), (18), (19), when seen together, and with the additional back-up now available of animal and laboratory studies, there is adequate evidence of serious long term damage to the health of the victims who survived. It is only but humane to translate these facts and findings into expressions of adequate medical care, just compensation and rehabilitation with a sense of urgency.

3. MEDICAL/HEALTH CARE

- 3.1 **Maintenance of medical records:** In the immediate aftermath of the disaster there was a massive response by the Government health services and by voluntary organisations to respond to the medical crisis. However, lack of maintenance of accurate records has caused a major problem for the victims. This factor needs emphasis even now.
- 3.2 The **lack of authentic information** regarding the possible causative agents, along with misinformation, created confusion regarding appropriate therapeutic measures to be adopted. The utilization of sodium thiosulfate (NaTS) as an antidote was embroiled in controversy (1). There have in fact, surprisingly, been no other attempts towards findings appropriate therapeutic agents.
- 3.3 **Medical services:** A 30 bed hospital was started by the Government very close to the severely affected area. More recently the number of beds have been increased. Several clinics providing out-patient services by doctors and allied health workers were started at different locations within the exposed areas. These provide primarily symptomatic, curative care.

Within three months of the disaster the medical officers of these clinics / hospital were trained, by a team from the National Institute for Mental Health and Neurosciences (NIMHANS) Bangalore, to recognise and treat mental health problems that had emerged in the post disaster situation. A manual and several videotapes of case studies were prepared for the purpose.

Voluntary organisations in Bhopal started health services catering to specific geographic areas. Some of these groups trained local community health workers and had more community based services including health education, awareness raising etc. However their number and outreach is small.

3.4 Peoples organisations developed and activist groups also started work. They raised wider issues concerning the disaster and also concerning the health consequences. Epidemiological studies undertaken by some of them, under conditions of severe resource constraints, lack of access to information and suspicion, recognised early the widespread prevalence of multi-systemic clinical symptoms and signs, which could not be explained by lung damage alone (1). Similarly the important area of womens health, which was totally neglected thus far, was studied and highlighted (2). Efforts at evolving a communication strategy were made (22) along with wider advocacy and building of solidarity groups elsewhere. Efforts of victim organisations have been crucial in getting interim relief and challenging court orders

3.5 The Indian Council of Medical Research initiated several studies. Following double blind clinical trials of Sodium Thiosulfate, the ICMR gave recommendations for its use to medical practitioners through the State Health Services. These guidelines were given scant recognition, without reason.

The ICMR also subsequently set-up the Bhopal Gas Disaster Research Centre, based in Bhopal. Twenty two long term research studies were initiated with the involvement of various departments of the Gandhi Medical College in Bhopal and with collaboration / support of several other specialized research centres in the country. Medical officers and staff in the community clinics participate in the data collection for these studies and have received training for the purpose. A supplement to an issue of the Indian Journal of Medical Research published findings of the ICMR studies in 1987. Some papers have also been published in other journals. However other than these, all reports are classified as confidential and are not available to other researchers or to the medical practitioners, and much less to NGO's and the affected people.

- 3.6 **Medical malpractice / over medicalisation:** Chronic ill health has turned out to be a bonanza for private practitioners and pharmacists. We have received personal communications regarding overdrugging and irrational therapeutics. An informal study also revealed the use of several banned drugs. The possibility of iatrogenic problems is real and its extent needs to be studied.
- 3.7 **Preventive/community health:** The Integrated Child Development Services were introduced by the government into the area. Victims organisations however even now mention the lack of sanitation and adequate safe water supply (8). Other preventive and promotive health work at the community level with community involvement is lacking. Health education, child health programmes, counselling and supportive services have not developed.
- 3.8 **The procedures for assessing the medical status for processing of compensation claims** is said to be convoluted, inefficient, corrupt and tardy. It is also technically flawed (4). A document of the U.S. National Institute of Mental health reports that failure of secondary level support systems is one of the most demoralising experiences for victims. This has been a regular occurrence in Bhopal.
- 3.9 **Interest in the Bhopal issue and hence in the people affected is also waning.** The ICMR has closed down all but 2 of its research studies. Payment of interim relief has stopped and payment of compensation through the claims courts have had a very slow start. At the current rate they would take several years to complete the job. Rehabilitation work centres for women have also closed.
- 3.10 While there are a larger number of research papers in international journals every year, very little gets back to Bhopal. This raises an important issue concerning **social accountability of research**. Besides the victims being used as guinea pigs, it is the public or tax payers money that keeps most of the research institutions running, necessitating public accountability.

4. **EVOLVING ALTERNATIVES**

- 4.1 Given the ground realities of :
- * Serious, progressive effects on the health, well-being and livelihood of victims;
 - * a medicalised approach to health care, prone to overdrugging and irrational therapeutic practices;
 - * waning interest by governmental and non-governmental organisations;
- it seems necessary and urgent to build a more **comprehensive, humane and just health care service** for victims. We however probably need to build on the present realities with all their limitations. Health care services for the urban poor in the country are ill-developed, with the private sector being

- 4.5 While acknowledging the important role played, of keeping the Bhopal issue alive, the experience of the past 9 years has also exposed the frailties, organizational limitations, problems of leadership and incompatibilities within the "pro-people" NGO/activist sectors as well. In a spirit of introspection many aspects of critiques of the "establishment" could be applicable to us as well. We therefore need to equip ourselves better, be more tolerant, and allow space for dialogue and growth.
- 4.6 Several suggestions have been given in the past about developing a comprehensive health care system for the people (2), (9), (21) affected by the Bhopal disaster. Key components are:
- 4.6.1 Basic needs of adequate shelter, potable drinking water and sanitation to be met.
- 4.6.2 Need for adequate nutrition, income and employment. Just settlement of compensation and provision of alternative employment can provide the purchasing capacity necessary. Working conditions suited to the health situation of the victims need to be ensured, e.g., dust free environment, relatively light work, rest periods, good lighting etc.
- 4.6.3 Basic medical and health care:
- a) Patient retained records /copies in folders that are water, insect, dust proof are suggested as being important for further treatment and for legal purposes in case a reopening clause is allowed.
 - b) Practice of rational therapeutics, workshops on rational therapeutics for practitioners, provision of therapeutic guidelines to all practitioners in the area on common presenting conditions, with regular updating. Adverse Drug Reactions need to be monitored.
 - c) Programmes for specific communicable diseases. e.g., TB, trachoma, water borne diseases etc.
 - d) Health education.
 - e) Mother and Child health.
 - f) School health, child to child programmes, play therapy.
 - g) Mother and child health care.
 - h) Womens health care.
 - i) Community based programmes for disability, especially respiratory disability.
 - j) Mental health care- counselling, selfhelp groups, community building, use of appropriate psychiatric services when needed.

- k) Building community organization through health committees or basic units comprising 10 families each.
- l) Identifying, training, supporting community health workers and building links with referral government /NGO health centres/hospitals.
- m) Regular assessment of the health situation and health work.

4.7 **Research:** There is need for continued research efforts-clinical, epidemiological, toxicological and forensic with dissemination of findings.

5. CONCLUSION

A socio-epidemiological analysis of the consequences of the Bhopal disaster on the health of the victims, outlined in this submission, places on Union Carbide, the Government of India, the Government of Madhya Pradesh State, on society in general and all of us in particular, an urgent responsibility to respond meaningfully to the continuing suffering of the victims.

This response has to move from unjust legal remedies, inadequate and tardy monetary compensation and ad hoc medical interventions to a more wholistic and humane community health care support system, sustained and supported by an empowered 'victim' community. While doing so, we need to constantly keep in mind that 'Bhopals' exist widely and many more Bhopals will take place in the coming years, especially in the Third World because of the current economic-political trends. The rights of workers and impoverished communities urban and rural, will therefore to be safeguarded through continuing solidarity of effort at all levels - local, regional, national and global.

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The Problem Stated:

The rapid increase in the use of chemical pesticides has been found to be very hazardous both at the level of manufacture and use. The Bhopal tragedy exposed the dangers of pesticides at the level of manufacture because 4000 people were killed and another 200,000 people were suffering disabilities by the leakage of toxic gas Methyl-iso-Cyanide. (1) At the level of application, exposure to chemicals is most common among those working in farming. (2) As a result on an average approximately 8000 farm-workers are being killed- (3) in the fields of India due to pesticide poisoning. This shows that there is inherent danger in the use of chemical pesticides. Further U.S based pesticides Trust-Club in its 1993(Feb) report has warned India that agricultural fields in cotton-growing areas of Andhra Pradesh and elsewhere have become harvests of death.(4) The noted Scientist Vandana Shiva opines that use of pesticides in India by our farm-workers have become literally suicidal in nature.(3)

Scientists have found that most of the Organo-Phosphates like Parathion, Malathion, etc. degrade and release substances which are more toxic than the parent compound when absorbed through the human skin. Moreover they remain on the leaves and branches as "dislodgeable residue" for much longer periods. In other words tolerance levels set by law to protect consumers fails to protect workers from exposure to foliage soil and other sources. The other side of the problem is that developed countries are not willing to accept the principle of "prior-informal consent"(6) in the export of pesticides to the developing and under-developed countries.(7) From this one can say authoritatively that the real problem is inadequate information about the safety parameters of pesticides. This is the problem of the whole world and it is not just confined to developing countries like India. Because of this reason the developed countries are seriously thinking of alternatives to the pesticides.(8) In this context it should be noted with concern that India is using 70% of pesticides in tonnage that are banned in other countries.(9) This itself shows how inadequately we are informed about the hazardous nature of pesticides.

After the chemical pesticides began to be used in Indian agriculture in the year 1950, the first serious incidents are reported in the year 1958 from Kerala and Madras state (now Tamilnadu) wherein more than 100 persons died due to consumption of pesticide contaminated food grains.(10) There were also cases of person who fell seriously ill though not fatally on account of food-poisoning in the same areas. Subsequent to the poisoning cases in 1958 in Kerala and Madras State, cases of food-poisoning were also reported in 1962 in Malda and Dinjapur districts of West Bengal and Assam respectively as a result of which 450 persons were crippled by paralysis.(11) Again in the year 1970 in Malnad area of Karnataka, there was high incidence of crippling bone deformities and congenital abnormalities produced among the poor harijan farm-workers.(12) By 1977 this had spread over to 40 villages.(13) This story may be exceptional in terms of the impact of pesticides on people's Health. But it illustrates the close relationship between the people and their environment. This kind of problem is being faced by other developing countries also. (see table-I).

TABLE - I.

Pesticide poisoning episodes in developing countries

<u>Sl.No.</u>	<u>Country</u>	<u>Year</u>	<u>Cases</u>	<u>Deaths</u>	<u>Comments</u>
01.	Guyana	1966	88	10	Flour contaminated with Parathion.
02.	Qatar, Saudi Arabia & Jamaica	1967	874	26	Flour contaminated with endria.
03.	Iraq	1971-2	6000	500	Treated seed corn consumed as food.
04.	Jamaica	1976	79	17	Flour contaminated with Parathion.
05.	Pakistan	1976	2810	5	Poor safety practice for new pesticide in malaria control programmes.
06.	Indonesia	1983	169	96	Eight episodes of poisonings from consumption of food (various pesticides)
07.	Pakistan	1984	194	19	Sugar contaminated with endria.
08.	Seirra Leone	1986	49	14	Flour contaminated with Parathion.

Source: WHO "Our Planet, Our health", Oxford University Press, Delhi 1993 p-82.

As at present, it is found that although India uses just 2% of World's pesticides use, $\frac{3}{4}$ of the poisoning cases and $\frac{1}{2}$ at the deaths are taking place here.(14) The poisoning cases and deaths due to pesticides in agricultural use at the global level are as follows: (table-II)

TABLE - II.

Year	Agency	Number of countries	Members affected	Deaths
1972	WHO	19	5 Lakhs	5000
1977	WHO	9	-	20640
1981	OXFAM	-	750,000	21000
1985	ESCAP	-	2 Million	40000

Source: FOO GAIKSTA, "The pesticide poisoning Report", Penang, Malaysia, 1985 pp - 1-2.

Another mysterious and horific problem linked to poisoning and death cases is resistance of pests to chemical pesticides. According to the report of the WHO Commission on health and environment since 1940's over 1600 insect species have developed significant resistance to major pesticides because of long-term and non-selective use.(15) The number of pests resistant to chemical pesticides are increasing over the years with the decrease in the doubling time as each new class of pesticides is introduced. (See table III). As a result there is also increase in the number of new chemicals in the market.(See table IV).

TABLE - III.

Year	Resistant species	Insecticide class	Average resistant	doubling pests (years)
1938	07	DDT/Methoxy Chlor	6.3	Years
1948	14	Lindane/Cyclodienes	5.0	"
1957	76	Organ Phosphates	4.0	"
1967	224	Carbomates	2.5	"
1978	392	Pyrethroids	2.0	"
1980	432			
1990	500			

Source: Association Medical British, "Pesticides Chemicals and Health". Edward Arnold London 1992 p-15.

TABLE - IV.

<u>Year</u>	<u>New Chemicals</u>
1950	1800
1970	7400
1977	12000

Source: Bull David, "A growing problem of pesticides and the III & third world poor" OXFAM 1982 P-24.
IV)

Source for 1990 (resistant species) is "Global Development and Environment crisis" Sahabat Alum Malaysia 1988 P-5.

The worst cast at pest-resistance has been reported from Andra Pradesh in the year 1987. In this case when farmers sprayed synthetic pyrethnids in cotton-fields the number of pests increased and damaged 66% of crops,(16) and as a result of unbearable economic losses many farmers committed suicide.(17) Similar cases of pest-resistance have been reported from other parts of India also, (see table-V).

TABLE-V.

<u>Year</u>	<u>Place</u>	<u>Pest</u>
1977-8	T.N. & Guj.	Tobacco, Cater pillar
1979-80	"	" "
1984-86	A.P., Kar., T.N. & Maha- rashtra.	White fly.
1987-88	A.P.	Heliothis Armigere.
1992	Kar.(Gulbarga)	Crop loss worth Rs.10 crores (Un-reported)

Source: Alagh K., Yoginder "Pesticides in Indian Agriculture", Economic and Political Weekly, Vol.23, No.38, Sept 17 1988 p-1959.

In the field of entomology nothing is known about pest-resistance. The entomologists simply brush it aside by saying that it is a natural phenomenon and the only solution is to spray more and more pesticide or new pesticide. This can be done if a pest is resistant to one or two pesticides. The new trouble that has been reported

is pests are double, triple and quadruple resistant to a broad range of pesticides greatly increasing both the growth and the magnitude of the problem of pest-resistance.

The problem of pesticides is not mere increase in the number of pesticides chemical in the market, but the million dollar question is how safe they are? Because the cost of testing one chemical ranges from 500 dollars to 5 Lakhs dollars (18) and the time required is 2 to 6 years.(19) Therefore most of the times pesticides are tested not on "use-by-use" basis but only on testing its active ingredients. This shows that a pesticide product remains untested until the major incidents of its harmful effects are reported.

The other side of the problem is that information given on the label of pesticides is not usable information. For advise about the use of protective equipment to be usable, the equipment must be available and within the financial reach of the agricultural farmers. In this regard, Thackery Committee constituted by the Indian Council of Agricultural Research in the year 1964-65 has clearly reported that in India there are no protective equipments suitable to the climatic conditions.(20) Moreover, the antidotes mentioned on the label of the pesticides are not at all available in the rural health clinics. As a result the doctors refuse to handle pesticide poisoning cases.

As far as symptoms of pesticide poisoning are concerned, it is very difficult to identify immediately, specially for Organo-Phosphates and Carbamates. For instance, at the time of Bhopal tragedy many people died, because doctors could not differentiate between the symptoms of ammonia and methyl-iso-cyanide poisoning. It indicates that science is much ahead of technology about which there is no adequate information. Hence, this problem of chemical pesticides which are considered essential in agriculture, calls for an effective solution to protect the health of poor farm workers who are supposed to be back bone of agricultural development.

PREVALENCE OF OCCUPATIONAL ASTHMA IN SILK FILATURES

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A clinical survey in two silk filatures revealed that 36.2% of the persons engaged in the processing of natural silk were suffering from bronchial asthma, while 16.9% of the total subjects had asthma of occupational origin. Skin prick tests using crude silkworm cocoon and pupal allergen extracts revealed that 28.8% of the subjects were sensitive to the silkworm-derived allergens. IgE antibodies specific to both cocoon and pupal allergens were demonstrable by RAST in the sera of patients with positive skin reactions and occupational asthma.

Introduction

SERICULTURE, the production of silk is an important industry in Italy, Japan, India, Thailand, and a few other Asian countries. It has been known for a long time that persons engaged in the process of silk manufacture are at risk to develop bronchial asthma believed to be allergic in nature. Although there are a few reports regarding the incidence of occupational asthma in sericulture from Japan,¹⁻⁶ no information is available from India pertaining to this problem. Further, the prevalence of this syndrome, the source and chemical nature of the offending agent(s), immunologic mechanism of the disease, and possible modes of treatment remain to be elucidated. Hence, studies were undertaken to determine the prevalence of occupational asthma among workers in silk filatures, the results of which are presented in this communication.

Materials and Methods

Materials

Polysorbate 20 and histamine disphosphate were from Sigma Chemical Co. St. Louis, MO, USA. Millipore filters (0.45 μ) were purchased from Millipore Corporation, Bedford, MA, USA. Munktel's Swedish filter paper OOH (S1-80-40) was from Grycksbo, Papersbork AB, Grycksbo, Sweden. Round-bottomed disposable polystyrene tubes (8 x 60 mm) and LT/35

polythene press-on stoppers were obtained from Luckham Limited, Victoria Gardens, Burgess Hills, Sussex, England. Phadebas RAST reagents were purchased from Pharmacia Diagnostics AB, Sweden. Silicone 21R Emulsion was purchased from Metroark Private Limited, Calcutta, India. All the other reagents used were of analytic grade available commercially.

Stages of Silk Processing

The silkworm cocoons received at the filatures from the surrounding villages are sorted out by hand in the 'cocoon-sorting' section. This section employs only women. Prior to storage, cocoons are steamed (to kill the pupae) in the 'steaming' section predominantly by women. The steamed cocoons are then boiled for three minutes in small trays containing water which is heated by steam. This is called the 'boiling' section. The boiled cocoons are then floated in trays of warm water (about 40 °C) and the threads are rolled over reels. The boiling and reeling sections also employ only females who are exposed to an atmosphere contaminated with silkworm derived materials. The reeled thread is then transferred to the 'skeining' section which involves rearrangement of the reeled threads. Further, the processed silk is either transferred to the 'weaving' section or transported to factories for the production of silk fabric. Throughout this process, no chemicals are added.

Subjects

Persons employed at two silk filatures in South India (Kollegal and Kanakapura) were subjected to clinical examination and allergy skin tests.

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Sera

Blood samples were collected from subjects with positive skin reactions to crude silkworm allergen extracts (cocoon/pupal) as well as from control subjects with negative prick skin reactions and without atopic history. Serum was separated and stored at -20°C .

Clinical Examination

A brief questionnaire was used to obtain information regarding the type and duration of work, details of respiratory symptoms, history of asthma during childhood, and familial predisposition to atopy. Particular attention was given to elicit the history of absence of wheezing episodes while the subject was away from the work as well as recurrence of asthma upon resumption of the work at the silk filature.

Preparation of Antigens for Prick Skin Tests

Allergen extract from silkworm cocoons. The outer layers of silkworm cocoons were peeled out and immersed in boiling water for 20 minutes. This resulted in the extraction of the soluble protein component (sericin) and other substances leaving behind the insoluble fibroin or the silk thread. The hot aqueous extract was filtered aseptically under suction, cooled and lyophilized.

The freeze-dried powder (100 mg) was dissolved in 2 mL of sterile 100 mM sodium phosphate buffered saline, pH 7.4, by gentle heating. The clear solution obtained after centrifugation at $20,000 \times g$ for 20 min was mixed with an equal volume of sterile glycerine to give a 1:40 (wt/vol) allergen extract, which was used in skin prick tests.

Allergen Extract from Silkworm Pupae. Silkworm pupae (day 5) separated from the cocoons (50 g) were immersed in liquid nitrogen and crushed to a fine powder in a mortar with a pestle. Water was added to the powder and masticated till it formed a slurry and squeezed through a two-layered muslin cloth. Four volumes of chilled acetone were added to one volume of the extract and after stirring, the mixture was filtered through a Whatman No. 3 filter paper under suction. The residue was washed several times with chilled acetone and finally with chilled peroxide-free diethyl ether. The resultant powder was dried *in vacuo* and stored dry in an airtight container at -20°C until further use.

Acetone-dried powder of the pupae (1 g) was stirred for two hours at room temperature with 20 mL of 100 mM sodium phosphate buffered saline, pH 7.4. The slurry was centrifuged at $20,000 \times g$ for 15 minutes. The crude extract thus obtained (1:20, wt/vol) was filter sterilized and used for prick skin tests after diluting with an equal volume of sterile glycerine to give a 1:40 (wt/vol) extract.

Prick Tests

Skin prick tests were performed on 243 workers in silk filatures, mostly females (over 90%) in the age group of 20 to 45 years, including subjects suffering

from seasonal, perennial, or occupational asthma as well as on 30 control subjects who did not have any history of bronchial allergy. Prick skin tests were performed on the volar surface of the forearm of the subjects using cocoon and pupal allergen extracts (1:40, wt/vol). Sterile glycerinated buffered saline and sterile glycerinated histamine solution (1 g/L, wt/vol, in buffered saline) served as negative and positive controls, respectively. Results were read after 15 to 20 minutes. A wheal greater than 3 mm in diameter over the negative control was considered as a positive response.

Quantitation of Silkworm Allergen-specific IgE by Radioallergosorbent Test (RAST)

Silkworm allergen-specific IgE in the sera of subjects was measured by RAST. Filter paper discs of 5 mm diameter punched from Munktell's Swedish filter paper OOH were activated with CNBr and crude allergen extracts of silkworm cocoons and pupae in 100 mM NaHCO_3 (pH 8.3) were coupled to the activated discs according to the procedure of Ceska and Lundkvist.⁷ Assuming a uniform coupling, the amount of protein bound to the discs was 67.5 and 27.3 $\mu\text{g}/\text{disc}$ for cocoon and pupal allergen extracts, respectively. The allergen coupled paper discs were stored in RAST incubation buffer (50 mM sodium phosphate buffer, pH 7.9, containing 0.9% NaCl, 0.3% human serum albumin, 0.05% sodium azide, and 0.5% polysorbate 20) at 4°C until use. The phadebas RAST components excluding allergen discs were obtained from Pharmacia Diagnostics. The RAST procedure using silkworm allergen discs and suitably diluted sera was performed according to the instructions enclosed with the reagents. The results of RAST are expressed as the percentage of total counts (T) of added radiolabeled anti-human IgE bound (B) to the allergen disc ($B/T \times 100$).

Statistical analysis of the data was done by the method of Snedecor and Cochran.⁸ Student's *t* test was employed to compare the means between two samples. The corresponding *P* values were obtained from Fisher's tables.⁹

Results

Prevalence of Asthma

Out of 400 workers employed in two silk filatures, 243 were randomly selected to study the prevalence of occupational asthma. The information obtained from the questionnaire revealed that 36% of the workers were suffering from asthma of varying severity, which required regular medication, often with corticosteroids. The prevalence of asthma among workers in various sections of the filatures is shown in Table 1. Based on the observation that the workers were free from asthmatic symptoms while away from work with exacerbation upon resumption of the occupation, 16.9% of the total subjects (as shown in Table 1) could be clinically categorized as having occupational asthma. From the data it is clear that persons working in various

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Table 1. Prevalence of Asthma among Workers in Silk Filature

Occupation	Number of Persons Examined	Number of Persons Suffering From	
		Asthma	Occupational Asthma
Sorting	8	5	2
Boiling	44	21	9
Reeling	139	45	24
Skeneing	17	1	—
Supervising	12	3	2
Others	23	13	4
Total	243	88 (36.2%)	41 (16.9%)

Table 2. Prick Skin Test Reactions to Silk-worm-Derived Allergens*

Skin Test Reaction	Number of Subjects		
	Cocoon Allergen Alone	Pupal Allergen Alone	Both Cocoon and Pupal Allergen
Negative	6	11	173
Positive	11 (4.5%)	6 (2.5%)	53 (21.8%)

* n = 243

Table 3. Correlation Between Clinical Manifestation and Skin Test Reaction*

Clinical Manifestation	Number of Subjects Tested	Prick Skin Test Reaction			
		Positive		Negative	
		Number	Percentage of Tested	Number	Percentage of Tested
Nil (Control)	155	16	10.3	139	89.7
Asthma					
a. Seasonal/perennial	47	25	53.1	22	46.9
b. Occupational	41	29	70.7	12	29.3
Total	243	70	28.8	173	71.2

* The association between clinical manifestation and presence of skin reaction was found to be significant by chi-square test (0.1%).

sections of the filatures were suffering from asthma of occupational origin.

Skin Test Results

Prick skin tests were performed with crude extracts of silkworm cocoons and pupae (1:40, wt/vol) on all the randomly selected filature workers (n = 243) as well as on 30 control subjects from the urban population who had no chance of having been exposed to silk filature environment. While none of the persons from the control group elicited positive reactions to silkworm allergens, it is apparent from the results summarized in Table 2, that 21.8% of the persons employed in silk filatures responded positively to both cocoon and pupal allergens. The number of subjects who gave positive reactions to only one of the two allergens was not very significant. Hence, in all the subsequent analyses, response to either or both the allergens was taken as a positive response. From the data presented in Table 3

it can be seen that, in contrast to 10.3% of the filature workers without any clinical manifestations, 53.1% and 70.7% of the subjects suffering from seasonal/perennial asthma (n = 47) and occupational asthma (n = 41) respectively, gave positive skin reactions to silkworm allergens. Significant number of individuals engaged in different types of work in the silk filatures reacted positively to the silkworm-derived allergens (Table 4). The data presented in Tables 3 and 4 were found to be statistically significant by chi-square analysis. Though a direct relationship between the type of work and skin reactivity could not be established, it is striking that a higher percentage (52.2%) of subjects engaged in the process of boiling the cocoons were sensitized to silkworm-derived allergens.

Determination of Allergen-specific IgE

Allergen-specific IgE to crude extracts of silkworm cocoons and pupae were determined in the sera of 15 filature workers with history of occupational asthma and ten normal subjects prick tested with the crude allergen extracts (Table 5). Sera of the asthmatic patients contained allergen-specific IgE to both the silkworm-derived allergens as evidenced by a higher percentage of binding of anti-IgE labeled with iodine 125, when compared with that obtained for the control samples.

Discussion

Out of the two stages associated with the production of natural silk, viz. cultivation of silkworms and processing of raw silk, attention in the present study was focused on asthma associated with the latter occupation. Persons engaged in silk filatures are constantly exposed to silkworm-derived substances. Sensitization of individuals by inhalation of airborne antigens that originate from silkworm cocoons and pupae could occur during their occupation.

A random clinical survey revealed that 36% of the total workers were suffering from asthma characterized by cough, tightness of the chest, and wheezing. It is apparent from the clinical history that 16.9% of the total subjects suffered from asthma of occupational

Table 4. Skin Test Reactions to Silk-worm Allergens in Persons from Different Occupations in Silk Filatures

Occupation	Number of Subjects Tested	Subjects with Positive Skin Reactions	
		Number	Percentage
Sorting	8	2	25.0
Boiling	44	23	52.2
Reeling	139	37	26.6
Skeneing	17	2	11.7
Supervising	12	3	25.0
Others	23	3	13.0
Total	243	70	28.8

Analysis of the data by Chi-square test revealed that there is an association between job description and prevalence of skin reactivity (5%).

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Table 5. Determination of Silkworm Allergen-Specific IgE by RAST in the Sera of Patients

Subjects	Number	Prick Test Reaction		Allergen-specific IgE Antibodies (B/T × 100) to Crude Extracts of	
		Cocoon Allergen	Pupal Allergen	Cocoons (mean ± SD)	Pupae (mean ± SD)
Normal	10	--ve	--ve	2.26 ± 1.20 (range = 0.21 to 4.5)	2.16 ± 1.34 (range = 0.8 to 4.5)
Asthmatics	15*	+ve	+ve	13.99 ± 8.8 (range = 2.0 to 28.9) P < .01	11.90 ± 7.37 (range = 2.0 to 26.58) P < .01

* Out of the 15 samples analysed for allergen-specific IgE, 13 and 12 respectively, had values more than the mean control value for cocoon and pupal allergens.

origin. These patients were free from clinical symptoms while away from their occupation for prolonged periods.

Among workers in the silk filatures, asthma was prevalent in subjects from different occupations (sorting, steaming, boiling, reeling, and skinning). Occupational asthma however, was found to be more pronounced in subjects from sorting, boiling, and reeling sections (Table 1).

Prick skin tests are widely used in the diagnosis of type I hypersensitivity.^{10,11} They were successfully employed in the diagnosis of occupational asthma precipitated by various offending agents.¹²⁻¹⁸ In the present study, prick skin tests using crude allergen extracts derived from silkworm cocoons and pupae revealed that 28.8% of the total subjects screened responded positively to either or both of the antigens. Among asthmatics (seasonal/perennial or occupational) in the study group, a significant number of the subjects reacted positively to the silkworm-derived allergens. In the case of some of the persons suffering from seasonal/perennial asthma, it is likely that silkworm allergens, in addition to the other offending agents, may also contribute to their clinical symptoms. Although no direct relation could be established between the type of work in the filatures and skin reactions, it was observed that 52.2% of the subjects engaged in the boiling of cocoons elicited positive skin reactions (Table 4). In the boiling section, it is likely that the workers could have been exposed to an environment contaminated with the substances from silkworm cocoons and pupae carried with steam and splashed water (aerosol) during the processing of silk. This could perhaps account for the higher degree of sensitization among the individuals in this group. Sensitization of individuals, however, could occur at more than one stage in the processing of silk. Furthermore, it is possible that a given worker could have been exposed at different times to the various processes of silk manufacture. It may be pointed out that these persons work in an environment generally contaminated with airborne fragments from unprocessed cocoons carrying the allergenic constituents. In addition, the dried parts of the pupae piled in the filatures could also contribute to the etiology of asthma.

Allergy skin tests reveal the presence of reaginic antibodies in the skin. It has been demonstrated that

when epicutaneous tests are negative, the presence of reaginic antibodies is unlikely.¹⁹ Specific IgE antibodies have been demonstrated in the sera of individuals suffering from asthma of different occupational origins.^{12-14,20-23} In the present study, it was observed that sera of the skin test positive patients with occupational asthma had significant levels of specific IgE as evaluated by RAST for both cocoon (13.99 ± 8.8) and pupal (11.8 ± 7.37) allergens. A 50% to 60% correlation has been reported between skin tests and RAST for pollen allergens.²⁴⁻²⁸ In the present study, however, there was 86% and 80% correlation between skin test reaction and RAST for cocoon and pupal allergens, respectively. The present studies demonstrate that 16.9% of persons engaged in the processing of silk in India develop asthma of occupational origin mediated by specific IgE antibodies.

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GENETIC EFFECTS IN AREAS OF HIGH NATURAL BACKGROUND RADIATION IN KERALA

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Abstract

ATTN: GETHA

A cross sectional epidemiological survey has been carried out among 70,000 people living in 7 coastal villages of Kollam and Alapuzha districts of Kerala, India. 38,000 people living in the Kollam villages are exposed to a high natural background radiation emanating from the thorium deposit in the beach sand. The objective of the study was to see if there is any difference in prevalence of genetic and congenital anomalies among the radiation exposed people.

The external gamma activity in the study area ranged from 300 to 3000 millirem/yr (Mean exposure 600 mR/yr). The control areas had a more or less uniform activity with a mean reading of 116 mR/yr.

The results show that the prevalence of genetic disorders and congenital anomalies is higher among the exposed people. This includes Down's syndrome, deafmutism, mental retardation cleft lip, congenital blindness, etc. The number of childless couples is also higher among the exposed people.

Prevalence of all the mutable diseases among the unexposed people in the present study is considerably lower than that of the Western countries. The unusually low maternal age in Kerala today and the relatively low concentration of environmental mutagens seem to be responsible for this.

INTRODUCTION.

In 1957, the World Health Organisation convened a meeting of geneticists to take stock of the knowledge of radiation induced genetic hazards among humans. The human data were scanty and the experts were unanimously recommended the creation of such a data base (1). AR Gopal Ayengar, the Indian representative from the Atomic Energy Establishment, (Now Bhabha Atomic Research Centre -BARC) Bombay suggested the possibility of a long term epidemiological study among people living in coastal villages of Kollam district of Kerala, India. These villages have a rich deposit of monazite which contains thorium and uranium and hence a higher than normal background radiation also.

Besides Kollam on the West coast, there are monazite rich strips on the East coast also, in Kanyakumari and Ganjam districts of Tamil Nadu and Orissa respectively. Over 200,000 people live on the Indian High Background Radiation Regions (HBRR). Comparable control populations also exist in the contiguous coastal villages.

In 1959, another WHD committee discussed the outlines of a long term prospective epidemiological study at the Kerala HBRR. (2)

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Even today, risk estimates of radiation caused genetic disorders by the United Nations Scientific Committee on Effects of Atomic Radiation (UNSCEAR) (3) and the United States National Academy of Sciences' Committee on Biological Effects of Ionising Radiation (BEIR) (4) are based on animal data. The detailed study proposed by WHO in Kerala HBRR has not been undertaken so far.

Findings of the two earlier small scale studies at Kerala HBRR are summarised below:

AR Ayengar et.al

In the late sixties, AR Ayengar and colleagues of BARC conducted a dosimetric and demographic survey in the coastal villages of Kollam and Alapuzha in Kerala, details of which are given below :

1. Dosimetry. External exposure was measured with thermoluminescence dosimeters (TLD) distributed among 8513 inhabitants, belonging to three occupational groups - (a) employed outside the area of residence (including students), (b) wholly employed in the villages (including housewives) and (c) fishermen. TLDs were also placed in 2374 houses also. The devices were retrieved after 60 days (5). Readings reported for one village Chavara is given below (table I.)

Table I Occupation wise exposure in Chavara Village

Group of population	Annual dose rate:
Employed outside the area of residence including school going children	960 mr
Totally employed in the area of residence such as housewives and others staying in the area	891 mr
Fishermen	887 mr
House radiation	898 mr

Source : VV Kulkarni et.al. 1973, Distribution of natural radio-activity and trace elements in the soils and sands from the high radiation coastal belt of India, BARC report No : 702 page 9.

The report does not mention of the measures adopted to ensure that the people did wear the TLD throughout the study period. The dose received by those employed outside the area of residence is considerably higher than those spending all their time in and around their residences. Similarly, the exposure to fishermen who spend more than a fifth of their time in the sea (@ 8 hours x 200 days) where the only dose component is from the cosmic rays (approx. 40 mrad yr) is only 1% lesser than category (b) above. This anomaly has not been explained.

2. Demographic Survey. The demographic survey was carried out by the Bureau of Economics and Statistics of the Government of Kerala. Fertility and mortality information were sought from 2420 mothers aged 45 and above in different exposure groups. In the report presented at the International

Atomic Energy Agency meeting at Geneva in 1970, Ayengar et.al observed that there was no difference in fertility indices (abortion, still births, infant mortality and fertility rates) and gross abnormalities among different exposure groups. (6)

The study suffers from the following weaknesses:

(a) Exposure Categorisation. The dosimetric study mentioned above did reveal wide variation in exposure between villages due to non-uniform concentration of monazite. Exposure categorisation by Ayengar was based on dose received during the survey and no allowance was given for migration. The genetically significant dose (GSD) being the exposure during the fertile period, a woman born in a low background radiation region and married into a higher one would have received a considerably lower dose than her neighbor born and married in to same area. Parish records for the past six decades scanned by us show that 40% of the Christian women married into HBRR were born in normal radiation regions.

(b) Paternal Exposure. The authors did not consider the dose received by husbands pleading that "it would be considerably lower than that of wives". If one goes by the dosimetric data reproduced above, the dose received by those employed outside and fishermen is not considerably lower than that of their wives. Secondly, the dose received by a man born and living in the high dose area would be more than that of his wife born in a lower dose region. Thirdly, fathers' age is some five to seven years higher than that of mothers. Finally, ignoring the paternal dose, even if it lower than the maternal one, is untenable. According to genetic hypothesis, paternal and maternal exposures act in opposite direction in the case of sex ratio of the offsprings. (7)

(c) Gross Abnormalities. There was no medical doctor in the study. In the paper presented at the IAEA Conference, data for gross abnormalities are presented with no definition of what these abnormalities are. In two subsequent papers presented by the same authors and SD Soman, the term 'gross abnormalities' is replaced by 'congenital abnormalities'. (8,9).

(d) Infant Mortality Rate (IMR). A mean IMR of 184 [range 136-309] was observed in all exposure groups by Ayengar and colleagues. The authors say: "it is observed that values obtained are slightly in excess of 145.9, a figure estimated by the Indian National Survey for rural areas of India in 1963. A more recent estimate based on data of continuous enumeration on annual samples in 1968 gives an IMR of only 111 for the whole country." The higher rate of IMR obtained in the study area is explained away thus: "such high values are recorded in other parts of India, notably in the state of Uttar Pradesh in northern India".

The above statement is full of mistakes and misunderstandings. Let us look at them one by one.

[a] IMR in all India (rural) in 1968 was not 111, but 138. The lowest rate obtained during the sixties and seventies was 129 in 1978 as per the sample registration system. (10). Since the authors do not quote the source for their statistics, we cannot even verify its correctness.

[b] IMR in India differs from state to state. IMR in Kerala state during 1982 - 84 was 31, as against 105 for All India (11). This difference existed in earlier decades as well.

[c] The data obtained by Ayengar et.al are not comparable with the rate published by the Registrar General in 1963 or 1968. The former represents the mortality experience of children born through 1940s to 1960s to women aged 45 and above during the survey. The Registrar General's figures are for children born in those particular years. During the above decades, there was a steep decline in infant mortality in Kerala as well as India.

[d] In the decades of forties, fifties and sixties, IMR in Kerala were 150, 120 and 74 respectively. The average for the period works out to 115(12). Rates observed by Ayengar et.al. among the radiation exposed people is considerably higher than the background rate for Kerala. Is this difference due to the higher radiation exposure?

Kochupillai et.al.

In the first ever human health survey of HBRR people at Chavara-Neendakara villages in Kerala N Kochupillai et.al reported a statistically significant difference in prevalence of Down's syndrome, severe mental retardation and chromosome aberration at Chavara - Neendakara (13). Details of the study are given in table II.

Table II Kochupillai et.al's Findings.

Type	Study population (12,918)		Control population (5,938)	
	Total	per 1000	Total	per 1000
Genetic				
Down's Syndrome	12	0.93	0	0.00
SMR with physical anomalies	12	0.93	1	0.17
Idiopathic SMR	11	0.90	3	0.50
Chromosomal Aberrations(%)	1.9		0.2	

Source : Kochupillai N, Verma IC, Grewal MS and Ramalingaswami V Nature Vol. 262 July, 1976

K Sundaram pointed out that the higher frequency observed in HBRR is due to differences in demographic indices like fertility and mortality rates.(14) For proving this point, demographic rates for All India were quoted. Fertility among women above 35 years and infant mortality in Kerala in the sixties and seventies was three to four times lower than that of India. This debate has been summarised elsewhere (15,16).

The Present Study.

It is in this background that a cross sectional epidemiological study was carried out in Kerala HBRR during 1988-90, preliminary results of which are reported below:

The PEOPLE AND THE GEOGRAPHY.

Majority of the people living in the HBRR are traditional fisherfolk, both Hindus and Christians. According to available evidence, the strip has been inhabited for over 500 years. Situated at the northern end of Kollam district (lat 9 to 9.5N), the radioactive strip is almost an island with the Lakkadiv sea in the west and a backwater-canal system in the east. The region is 26 km long and 500 to 2000 meters wide. 38,000 people living in the coastal strip of 4 revenue villages - Alappat, Panmana, Chavara and Neendakara - with a background radiation level ranging from 300 to 3000 millirem form the exposed population in this study. 32,000 people drawn from fishing villages of Quilon and Alleppey district - Furakad, Ambalapuzha, Punnappa, Trikkunnapuzha and Wadi - with a normal background radiation (116 mr/yr) form the control population. The study and control populations are comparable in economic status, religion, occupation, consanguinity, marital status etc.

METHODOLOGY

1. Dosimetry.

Radiation level was measured with a portable gamma counter, calibrated at Saitama University, Tokyo before the beginning of the survey and at the Department of physics, Calicut university subsequently. Measurements were obtained from 10 cms and 1000 cms above ground. The entire strip was divided into rectangles of 500 x 250 mtrs and house numbers in each rectangle recorded. Measurements were taken at the corners, and at random points distributed uniformly. The grid was superimposed on the geographical map of the area and isolines were drawn (Figure I). The arithmetic mean of the recordings for each panchayat and the whole of the study area are given in table III.

Table III Average gamma exposures

Panchayat	Number of readings	Average dose mrem/Year
Neendakara	213	963
Chavara	151	495
Ponmana	116	339
Alappad	212	453
Control	94	116

Radon (Rn 222 and 220) concentration was measured from 10 dwelling houses. The devices were placed on walls 2 meters above ground (90 days exposure) and analysed in a US laboratory. The observed levels are not high. Due to the short half life of thorium progeny- Radon 220, the levels would not be higher than normal(17).

No attempt has been made to estimate the genetically significant dose because of the limitation of data available. This will be done at a later stage.

2. Survey

Study has features of both cross sectional and retrospective epidemiology(18). Information has been sought on point prevalence of diseases which are of genetic or congenital origin. For demographic data, details of all past pregnancies, birth, death and migration were collected.

The survey was undertaken in four stages. In the primary stage, women investigators belonging to the same locality trained by us canvassed a pretested schedule. The schedule had the following sections :

1. Questions about the socio-economic status of the household.
2. Census type information on all members of the household.
3. Details of in and out migrants.
4. Details of outcome of all pregnancies of married women.
5. Details of persons with diseases which are of congenital or genetic origin.

In the second stage of the survey, all households which positively responded to the last set of questions were visited by a nurse. History of disease, symptoms, parental illness, exposure to X ray and drugs, immunisation status etc. were collected during this stage.

The schedule canvassed by the nurse was scrutinised by the medical investigators. False positives were eliminated and patients whose symptoms and history were suggestive of genetic or congenital diseases were examined by the medical investigators. Diagnosis were confirmed by post graduates in medicine, surgery, ophthalmology, orthopaedics, laryngiology, and paediatrics. Karyograms are being made for all suspected cases of chromosomal anomalies. Details of the survey are given in table IV.

Table IV Survey details

	Study	Control
No of houses surveyed	6000	5500
Patients screened by nurses	2520	2152
Seen by Medical Investigators	1796	1487
Seen by specialists	474	318
Karyograms	55	40

FINDINGS

1. All genetic and congenital diseases

There are 510 persons suffering from diseases of chromosomal, genetic or congenital origin among the exposed people, as against 347 among the controls. The diseases include, Downs syndrome, mental retardation, cleft lip and palate, congenital heart diseases, congenital blindness and deafness, musculoskeletal anomalies etc. (table V). The difference between the study and control area is significant at 0.01 level.

Table V All genetic and congenital disease

	Study	Control
Down's Syndrome	19	5
Other genetic and congenital Diseases	490	340
Total	509	345

(The difference in the prevalence of Down's syndrome is significant at 0.5 level, Chi square : 4.83 and that of other genetic and congenital anomalies significant at 0.01 level, chi square : 6.19)

[Note : Numbers are not final as a few more diagnoses are yet to be confirmed]

2. Down's syndrome.

There are 19 cases of Downs syndrome(DS) in the study area as against 5 in control area, which is significant at 0.5 level (Chi square 4.83). The prevalence rate is 1 in 2,000 among the radiation exposed as against 1 in 6,400 in the control area. It may be recalled that the non-observance of DS in the control population by Kochupillai was attributed to underascertainment (19). This is not so.

There is no data on prevalence of DS among any Indian population. Rates reported elsewhere are: Germany 1/10,000, Copenhagen 1/4,000, London 1/3,000 (20). Compared to these, prevalence in the HBRR is more or less normal, while the control value is considerably lower. Rather than discrepancies of ascertainment, this is due to the lower birth incidence of DS in Kerala. (See table VI)

Table VI Birth incidence of DS IN Kerala and elsewhere

Kerala	1 in 2000
Delhi	1 in 800
Australia	1 in 800

Source : Kerala, Ref 32, Delhi, Ref 26, Australia, Ref 20.

Regional differences in birth incidence of DS has also been observed by Stevenson et.al(21).

The doubling dose or the relative risk per unit exposure can only be estimated with birth incidence. Estimation of the latter will be confounded by two problems - viz the higher infant and child mortality rate in the study population and more important the higher radio-sensitivity of trisomic cells. In a study of human lymphocyte irradiated in vitro (160 rads single dose) Sasaki and Tonomura report that the aberration rate among the DS is twice that of normal individuals(22).The only study by Verma et.al on samples of normal and DS patients living in the HBRR (average dose 800 mr yr approx.) in Kerala yielded an aberration rate of 1.9% for normal and 3.5% for DS patients.(23) The mean age of DS patients in this study was less than half that of the normals.

The higher rate of chromosome aberrations among the DS patients in HBRR is likely to increase their mortality due to leukemia and other diseases in infancy and early childhood. If this factor is taken into account, risk of giving birth to a DS baby among HBRR mothers will work out to be considerably higher than what is apparent from the different prevalence rates reported above.

DISCUSSION.

The Non-spontaneity of the 'Spontaneous' Load.

The prevalence of mutable diseases observed by us in the control area and also the birth incidence of Downs syndrome in Kerala is 3 times lower than the rates found in normal population in Europe and America(24,25). In response to a WHO study reporting wide variation between countries and even between centres in one country, Verma and Meharban Singh point out that the incidence of Downs syndrome birth in India is not lower than that of other countries(26). This was done by averaging the incidences at various Centres. Since there is a wide regional variation in diseases of both single gene and multifactorial origin, aggregation of statistics from different part of the country is likely to mislead the investigator. Some of the variables which are important in keeping the incidence of genetic and congenital anomalies in rural India at a lower rate are discussed below:

Maternal Age

In Australia and the United Kingdom, during the fifties when major surveys on incidence of Downs syndrome at birth were conducted, 40% the children were born to mothers aged 30 and above. In Kerala today, only 6% of the children are born to mothers above 30 years. In India, this fraction is up by a factor of four (27).

X ray and Other Environmental Mutagens.

Maternal age apart, there is also difference in exposure to mutagens between the people of developed and developing countries. In the fifties medical irradiation was growing at a high rate of 12% p.a in UK. In that country, 18,000 radio pelvimetries and 86,000 obstetrical radiographs were done annually in the 50s. (28) Today, 65% of the US population are exposed to medical irradiation every year. (29) Radionuclides from the bomb testing, concentration of chemical mutagens in environment, smoking and drinking by both sexes etc. may also contribute to the excess genetic load in the developed countries.

In India, exposures from all these sources is lower. There is also a difference between urban and rural areas. For instance, about 80% of our doctors are working in urban areas which has only 30% of the nation's population. Incidentally, all the studies on congenital anomalies which report rates closer to that of the West were conducted in big cities.

A comparable higher prevalence of Down's syndrome has been observed in the Chinese high background radiation study also(30). However, they did not observe any difference in other mutational diseases.

BEIR V estimates the genetic risk for humans from ionising radiation on the basis of animal data. It rejects a positive finding of Downs syndrome in Kerala villages because no case was found in the control area. The National Academy of Sciences of USA also reassures that the difference if any, would be undetectable due to the small number of exposed people.

CONCLUSION

Information on all past pregnancies of 18,000 mothers and baptism and burial records for the past 70 years is being subjected to a detailed analysis. The dose response relationship will also be looked into.

There are ways in which population exposure can be reduced. Verma suggested cement flooring of the houses(31). Majority of the exposed people are poor, they cannot afford this luxury. Covering the class rooms and play grounds with normal soil will also contribute to dose reduction. The disabled people need also be given medical relief and rehabilitational services.

It is obvious that a study like this can only reveal the tip of the iceberg of radiation induced genetic load. To arrive at a near accurate dose response relationship, detailed prospective studies will have to be undertaken.

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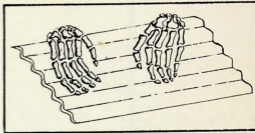
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OH-100

OH7:9

asbestos :

the dust that kills



COUNTERFACT NO. 5 A CED HEALTH CELL FEATURE JULY 1983

The killer fibre had penetrated the very essence of his being. His cough was more painful than ever. Each successive breath was a harsher rasp than the previous one. "Death's clutch", asbestosis had gripped yet another victim. This time it was S. Rajagopal, who joined Hindustan Ferado Limited (HFL), as an operator in the dust-prone breaklining and clutch facing department in 1961. Ten years later the disease struck.

The diagnosis pronounced by the Employees State Insurance (E.S.I.) medical team and private practitioners was asthma or bronchitis. But a few months later another verdict was delivered by the Sion Hospital authorities - asbestosis.

His pleas to the management for a thorough medical examination went unheeded for a long time. Finally the management decided to refer him to Dr. G.G. Dave, medical inspector of factories, (Maharashtra). Dave's diagnosis was "acute bronchitis".

Unsure of Dave's conclusion, he filed a petition to the Chairman of Turner and Newell (the transnational corporation link in Britain), for a proper medical screening. In the meanwhile, his health deteriorated and the Sion Hospital authorities advised immediate treatment. But he resigned from HFL, to collect his gratuity. Why? His wife was ill.

Rajagopal left the company but continued to fight. He filed a writ petition with the Bombay High Court, to set up an ESI medical board to examine him. The ESI board was constituted and the High Court suspended the writ petition.

In a preliminary medical interview with Rajagopal, the newly formed ESI medical board (Coimbatore) consisting of the Dean of the Coimbatore Medical College, the superintendent of the ESI hospital and a cardiac therapy specialist flatly ruled out even the remotest possibility of asthma or bronchitis. There was no mention on their part of the nature of his ailment. Rajagopal goes on to say that he even signed the papers

Asbestos derives its name from a Greek word meaning "unquenchable" an adjective that could well describe both the properties of the substance, as much as the thirst for profit that drives those who organize both men and asbestos for their commercial use. The Roman slaves who mined it in the Italian Alps 2000 years ago probably suffered from the same diseases as do workers in modern factories today. The technology may have changed but the conflict between health and profits remain.

Asbestos is a hydrous mineral silicate containing magnesium, aluminium, iron, sodium and calcium.

There are about six varieties of asbestos which can be broadly classified into 2 main groups:

- the serpentines: These are hydrous silicates containing magnesium. The white variety of asbestos called Chrysotile belongs to this group.
- the amphiboles: These are hydrous silicates chiefly containing iron and aluminium. They also contain calcium, sodium and magnesium. Crocidolite or blue asbestos which is perhaps the most dangerous variety, falls into this category.

Kinds of Asbestos

- a) Chrysotile: The most commercially used variety of asbestos is a white, fine, silky, flexible, serpentine variety called chrysotile (white asbestos). It has the longest and strongest fibres and can be spun. It is primarily responsible for asbestosis.
- b) Anthophyllite: Anthophyllite like chrysotile is white and contains magnesium. It is brittle.
- c) Crocidolite: It is also called blue asbestos, because of its colour. It mainly consists of iron. Even a short exposure of a few months, can give rise, upto 20 years later, to mesothelioma of pleura (cancer of the membranous lining of the lungs).
- d) Amosite: Amosite is a straight brittle fibre ranging from light grey to pale brown in colour.
- e) Actinolite and (f) Tremolite: They consist mainly of calcium, and are used in filters, papers, etc.

The minerals exist in several forms and differ in their physical properties and chemical composition, but they are similar in their fibrous nature and flexibility. Asbestos is a very versatile material. It is fire resistant, insoluble in water, resists corrosion by a large number of chemicals, has high tensile strength, is abundantly available, and is very cheap.

USES OF ASBESTOS

Asbestos has over 3000 commercial applications and is used for both domestic and industrial purposes - as pipes, insulation boards, protective clothing, rope production, heat and sound insulation for plant & building structures, mattresses, roof sheeting, brakelinings, clutch facings and several other articles of daily use. It is effectively integrated as a filler, binder and as a reinforcing substance with other materials like cement and rubber.

We therefore encounter asbestos on an increasing scale in several places (see box 1) and it is not surprising that industrial interests insist that there is no adequate substitute.

Box 1.

The industries using asbestos. .

1. Docks and transport - handling sacks & bells.
2. Asbestos factories - milling, weaving, turning, - manufacturing asbestos cement sheets and pipes.
3. Power stations - lagging and delagging.
4. Iron and Steel works and other heavy engineering industries - boiler furnace insulation.
5. Locomotives and rail carriage building - heat and sound insulation.
6. Ship building and repairing - asbestos insulation, lagging and delagging.
7. Paper making - filter papers.
8. Manufacture of floor tiles, mats & roofs - linoleum and asbestos sheets.
9. Adhesive and plastic manufacture - used as fillers for strengthening.
10. Automobile industry - brake shoes linings, and clutch facings, insulated under the body of cars.
11. Light engineering - gasket washers etc.
12. Packaging manufacture.
13. Construction - laying of pipes and fitting of sheets on insulation boards, asbestos spraying on walls.
14. Electrical engineering industry - insulation.
15. Insulation mattress manufacture.
16. Asbestos textile manufacture - safety clothes.
17. Chemical plants and heat treatments shops - linings of furnances, boilers & chimneys.

(Source: Asbestosis: A Killer disease: Audyogik Jeevan Manch)

HOW ASBESTOS IS PROCESSED

Before asbestos appears as an everyday commodity it is processed by human labour - an operation which consumes both the raw materials, labour and the labourer. There are basically two processes involved in the manufacture of asbestos -- the wet and the dry. In the former, water is added to a dry mixture of asbestos and cement. A slurry is formed. This is moulded and extruded with heat and pressure. In the dry process, the asbestos fibres are fluffed and combed. For instance, in the textile industry the fluff is mixed with cotton before carding; and the later is spun and woven, in a dry state. Both processes expose workers and the environment to asbestos dust, fumes, and heat. It is chiefly the dust which enters the worker's lungs that leads to the depreciation of the labourer's health and life, but a "depreciation", that never enters into the calculation of cost.

The handling and use of asbestos therefore raises two problems:

1. The problem of protecting asbestos workers from a number of asbestos-related diseases like asbestosis and cancer.
2. Protecting the environment from pollution and the risk of cancer for the population.

HOW ASBESTOS AFFECTS THE WORKER

Asbestos fibres enter a worker's body insidiously. The most dangerous fibres are those which cannot be seen by the naked eye (less than 2 microns thick). They are able to pass through the natural filter system of the nostrils and the mucous lining of the air tubes, and accumulate in the air sacs of the lungs, turning the elastic tissue of the air sacs into rigid fibrous tissues. This is called asbestosis. This condition obstructs the free exchange of gases in the lungs and thus impairs the lung function.

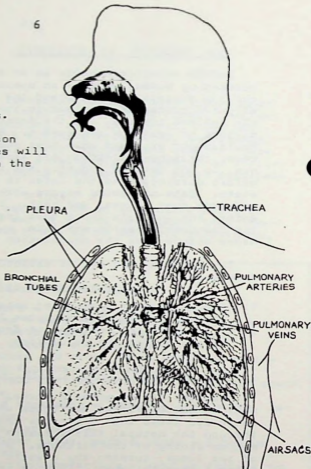
SIGNS AND SYMPTOMS OF ASBESTOSIS

- * Difficulty in breathing.
- * Crackling sound during breathing.
- * Breathlessness on exertion.
- * A Dry cough.
- * Weight loss.
- * 'Finger clubbing' - (thickening around the base of the nails.)

DIAGNOSIS OF ASBESTOSIS

There are several methods used to diagnose asbestosis.

1. The sputum test: A person inhaling asbestos fibres will show asbestos bodies in the sputum. These bodies consist of asbestos fibres surrounded by various proteins and iron particles and can be identified under a microscope. This test employed in isolation does not conclusively lead to a diagnosis of asbestosis, because people in industrial communities may have asbestos fibres in their lungs which are otherwise normal. The presence of asbestos bodies in the sputum, however, confirms exposure to asbestos.



2. Asbestos bodies in the lungs at biopsy. (severing a lung section for examination).

In asbestosis, a lung-biopsy reveals a large number of asbestos bodies in the lung. They appear in smears of fluid scraped from a lung surface.

But this is a random method of diagnosis as the severed lung section may not contain any fibres.

3. Radiographic appearances. (Xray findings)

Fibrosis (rigid fibrous lung tissue) in asbestosis occurs as a fine network in the lungs. The network resembles ground glass or fine cobweb.

4. Respiratory Functions tests.

These are tests to check the respiratory function of the lungs but are of little value in diagnosing asbestosis in its infancy. A series of readings over the previous years must be obtained. Loss of elasticity and rigidity of lung tissue, and a decreased capacity for gas exchange signify an impaired lung function.

A combined usage of these tests, together with symptom detection will lead to a more accurate diagnosis of asbestosis. In fact, the Pneumococcosis Medical Board of the U.K. has clearly laid down that any worker suffering from even two of the symptoms, of asbestosis, and has been exposed to asbestos at work, is immediately certified as suffering from asbestosis. (This is in sharp contrast to the situation in India, as indicated in the Rajagopal case).

Asbestosis, which is time and dose related, appears two to thirty-five years after the first exposure. Once the disease sets in, it progresses even after the worker is prevented from further exposure. It even paves the way for lung cancer. The risk of contracting asbestosis is minimal below certain exposure levels. Smoking increases the risk of contracting the disease extensively.

INCIDENCE OF ASBESTOSIS

Recent studies from different parts of the country indicate a high incidence of asbestosis:

1. In a survey of an asbestos cement unit in Faridabad, a Central Labour Institute (CLI) researcher found, that out of 850 workers, 58 suffered from asbestosis and 58% experienced changes in the functioning of the lungs.
2. A similar study of 800 workers of Asbestos Cement Ltd. Bombay, conducted by the National Institute of Occupational Health, (Ahmedabad) revealed that out of 800 workers, 224 suffered from more advanced stages of asbestosis. While the management flatly denied these figures, the study also noted that another 128 workers had contracted the disease as well, although it had not reached the later stages.

The widespread and as yet under-reported incidence of asbestosis is perhaps best summed up by Dr. S.R. Kamat, head of the faculty of thoracic medicine, G.S. Medical College, Bombay, who notes, "There is no doubt that one third of the workers in asbestos factories are suffering from asbestosis".

Besides asbestosis, the other diseases related to asbestos dust exposure are: pleural plaques, pulmonary tuberculosis, mesothelioma of the pleura and peritoneum, lung cancer and cancer of the stomach, oesophagus, colon and rectum.

PLEURAL PLAQUES

Pleural plaques are present in asbestosis. They appear as fibrous scars on the external lining of the lung. This is due to the irritation caused by the asbestos fibres which are lodged in the external lung lining. Pleural plaques are nodular or smooth. They are composed of firm white material, which may be seen on an X-ray if there is calcium deposition.

PULMONARY TUBERCULOSIS (T.B. OF THE LUNGS)

Research indicates a definite association between tuberculosis (T.B.) and exposure to asbestos dust. In one study in the U.K., out of 82 patients who died of asbestosis, 36% were also suffering from T.B.

MESOTHELIOMA OF THE PLEURA AND PERITONEUM

(cancer of the membranous lining of the lung and abdomen)

Mesothelioma is a tumour occurring on the membranous lining of different organs. As an asbestos-related disease, it occurs on the membranous lining of the lungs (pleura) and abdomen (peritoneum). Pleural and peritoneal tumours occur either alone or together.

The following are the signs and symptoms of mesotheliomas:

1. Breathlessness accompanied by chest pain.
2. Cough and blood in the sputum.
3. Accumulation of straw-coloured or blood-stained fluid in the lung's lining (pleura).
4. Thickening of the pleura and enlarged growths (tumours).
5. Lung Collapse.
6. Malignant cells in the lining of the lungs and abdomen.

Blue asbestos is about ten times more likely to cause mesothelioma than the white variety, and some experts claim that just five minutes inhalation of blue asbestos dust can produce mesothelioma even twenty years later. Smoking apparently does not increase the risk of mesothelioma. However, families of workers exposed to asbestos dust from work clothes do face the risk of this kind of cancer. People living near asbestos factories and mines are also in danger of contracting the disease.

This is a fatal disease. There is no drug, surgical or radiation treatment that can cure it.

LUNG CANCER

Lung cancer is yet another asbestos related hazard and often follows asbestosis. It occurs in the lower lobes of the lungs. The risk of its contraction is greatest in the workers exposed to high levels of asbestos dust, especially in those who smoke. The risk of contracting lung cancer is 90 times greater in smokers than in non-smokers.

This form of cancer was first reported by Merewether (Medical Inspector of Factories in the U.K.) in 1947, based on a study of 235 death certificates recording asbestosis. Other studies confirm this.

CANCER OF THE STOMACH, FOOD PIPE, LARGE INTESTINE AND RECTUM

These forms of cancer are also caused by exposure to asbestos fibres.

The method of diagnosis for mesothelioma and the other forms of cancer is a biopsy.

According to an article by J. Kumar in Science Today, no case of cancer due to asbestos has yet been notified in India. This can be due to the fact that asbestos workers are not followed up after they retire and occupational histories of cancer patients are not recorded. In cross-sectional studies of workers, it is difficult to find a person who is still working while suffering from lung cancer or mesothelioma of the pleura.

There are, however, several studies confirming the widespread occurrence of mesothelioma, lung cancer and cancer of the stomach, oesophagus, colon and rectum in the West.

INCIDENCE OF THE CANCERS

1. In a study conducted by Dr. Irving J. Selikoff (Mount Sinai School of Medicine, New York), of 632 asbestos insulation workers in New York and New Jersey between Jan 1943 and Dec. 1974, it was revealed that there were 35 deaths of mesothelioma - 10 pleural and 25 peritoneal. There were 42 reported deaths of lung cancer, 20 deaths of cancer of the stomach and food pipe and 23 deaths of cancer of the large intestine.
2. In another study, conducted by Irving J. Selikoff, of 17,800 asbestos insulation workers in the United States and Canada (International Association of Heat and Frost Insulators and Asbestos Workers, AFL-CIO, CLC), between Jan 1, 1961 and Dec 31, 1973, the wide prevalence of cancer was established. There were 36 deaths of pleural mesothelioma and 67 deaths of peritoneal mesothelioma. It was further revealed that there were 321 deaths of lung cancer, 16 deaths of stomach cancer, 14 deaths of cancer of the food pipe and 39 deaths of cancer of the large intestine and rectum.
3. In 1967, 17 fatal cases of pleural mesothelioma were reported in the small town of Manville in New Jersey. By 1973 there were 72 victims of this cancer in this town of 15,000 people, where the giant U.S Corporation Johns-Manville still has its largest Manufacturing Plant.

REACTIONS IN THE WEST

An avalanche of medical literature and new found public knowledge about the toxic nature of the silicates, has unleashed massive public opinion and protest in the West. This has led to a plethora of legislation to control and regulate the use of asbestos in the manufacturing process and otherwise. Technology in the west has geared itself to devising engineering controls, a variety of personal respiratory protective equipment and care in layout planning. These measures would help to effectively reduce dust levels inside the work premises to 2 fibres per c.c. - 0.2 fibres per c.c., for different varieties of asbestos fibres. (The Asbestos Working Group in the U.S. reported in 1980 that there is no safe exposure limit for asbestos and that all commercial and several non-commercial forms of asbestos cause disease. It recommended a new standard of 0.1 fibre per c.c. as the maximum exposure limit. This is the smallest quantity that can be measured by techniques currently available). (See box 2 and 3. U.K. asbestos code and U.S. occupational Health & Safety Act.)

BOX 2Asbestos Safety Code in the U.K.

1. Asbestos dust can cause lung diseases and there are strict regulations governing the manufacture and commercial use of asbestos products.

For the home handyman and domestic user of asbestos products it is very unlikely that harmful quantities of dust will escape in normal use. As a precaution they are advised to avoid creating and breathing asbestos dust.

- (1) Dampen the work: damp dust does not become airborne and is not inhaled. Do not sand wall plugging compounds unless dampened. When relining car brakes, remove the dust from brake drums with a damp cloth.
- (2) Damp any dust that falls to the floor. Pick it up as soon as possible and place it in a plastic bag and seal the bag.
- (3), Work in well-ventilated space e.g. outdoors while sawing, filing, drilling, sanding.
- (4) Use hand saws and drills which produce less dust than power tools.
- (5) Renew worn or frayed asbestos insulators.

(Source: Occupational Hazards:
Hunter)

BDX 3Basic features of the U.S. Occupational Safety and Health Act related to asbestos:-

1. Permanent structural changes to make the workplace safe.
2. Tools generating dust must have exhaust systems at the point of contact of tools.
3. Respirators to limit the amount of dust inhaled are permissible only if engineering controls are under construction. They cannot be a substitute for engineering controls.
4. Asbestos must not be used loose, waste must be sealed in polythene.
5. Warning signs at workplace and on all products of asbestos.
6. Protective clothing and separate lockers for work and street clothes.
7. Prescribed standard of an average of 2 fibres/c.c. for an 8 hour shift. Monitoring of air at a 6 month interval.
8. If a worker is exposed to excess dust (above the standard) then he must be informed within 5 days.
9. Comprehensive medical examination once a year.
10. An individual worker or Union can complain directly to the state authority. The reply must be displayed near the workplace.
11. A Union Representative in every factory (called 'walk-around' representative) will accompany the factory Inspector on his visits and sit in on all discussions between Inspector and Management.

(Source: Asbestos: The killer disease, Audhyogik Jeevan Manch)

The industry, has however, tried to skirt the stringent controls with an uncanny slyness. Litigation has uncovered proof that the industry was not only aware of the developing medical literature on asbestos, but was actively tampering with the scientific reports of the studies and suppressing reports of other studies. As a sequel to these revelations and others, there has been a move in the U.S. Congress to declare these as federal crimes.

The International asbestos industry's own view of its responsibility to label its products as potentially lethal was recently revealed by the disclosure of an internal memorandum of the Asbestos International Association dated 7th July 1978.

According to the memorandum, the industry was unanimous in the view that the best warning label was none at all. Many participants felt that if the use of a label was absolutely unavoidable it would be advisable to adopt the U.K. label which merely states "Take care with asbestos".

Workers and their unions, (particularly in the U.S.A.) still vehemently insist on managements adherence to workplace regulations, incentive payment for hazardous work, the stoppage of asbestos usage and the search for substitutes. Insurance carriers have raised workers compensation insurance rates for employers who continue to use asbestos. In courts, several thousand victims of asbestos cancer have so far sued the industry for knowingly marketing deadly products while making no efforts to inform product users of the timebomb danger of breathing in asbestos dust.

The law suits which are on the increase each day cost giant corporations like the Johns-Manville, Owens Corning, Armstrong and a dozen others and their insurance carriers several billion dollars in damages.

As a result of mounting public pressure, tight legislation, skyrocketing law suit charges and swelling compensations to workers, the consumption of asbestos has decreased in the West. By 1980, the Johns Manville Corporation had closed down four asbestos cement pipes and manufacturing plants in the U.S. alone.

But the company still persisted in sustaining itself with a dogged determination. According to a Business India article, on the 26th August 1982 the company filed for protection under Chapter II of the U.S. Bankruptcy Code, which shields a concern from creditors law suits. It is also suing for \$5 billion in damages from insurers alleging tardy settlement of its claims on them.

Multinational companies ruthlessly continue to manufacture and aggressively market asbestos to third world countries where some or all of the following factors ease their entry:-

1. The local elite are willing to import raw asbestos or use the fibre in the manufacture of various products.
2. There is a high demand for the raw fibres and finished asbestos products.

3. Labour is cheaper.
4. The political climate is stable.
5. Government legislation and controls are lax.
6. The levels of working class and public consciousness is in its initial stages of development.
7. The extent of unionization is low.

The western corporate magnate's profit is intact: The Third World capitalist makes his cut. The worker in both countries is doomed to a slow and agonizing death. India is one such example.

THE ASBESTOS INDUSTRY IN INDIA

The asbestos industry in India employs over 7000 people in twenty units, spread over Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu, and Haryana. All the large units are either subsidiaries of multinationals or collaborations. (see box 4)

BOX 4

The following table is a list of the major asbestos companies in India, their products and their linkages.

<u>Name of the Company</u>	<u>Product</u>	<u>Transnational Corporation Link.</u>
Hindustan Ferrodo.	Brakelinings, sheets, yarns, jointings, textile, mattresses, millboards, packing cloth.	Turner & Newall (U.K.) (T&F)
Hyderabad Asbestos	Sheets, millboards, pressure pipes, jointings, thermal insulation.	Johns Manville USA (T) and Societe Italiana
Hyderabad Asbestos	Sheets	Turner & Newall (U.K.) T&F
Shree Digvijay Cement Co.	Sheets and pressure pipes.	Johns Manville U.S.A. (T&F)
Sundaram Abex.	Friction materials like brake linings.	Abex Inc. USA (T&F)
Suri Asbestos Industry.	Textiles, ropes, packings, yarn, laggings, jointings.	Johns Manville (T&F) U.S.A.
Rane Brake Linings.	Brake linings and clutch facings.	Small and Parkers U.S.A. (T&F)
Reinz Talbros	Asbestos Jointings	Reinz Dichtung - A.G. West Germany (T&F)
* T: Technical		
* F: Financial		

(Source: DGTD Handbook of Foreign Collaborations 1980)

In 1977, 11 units produced 4.1 lakh tons of asbestos cement sheets. This is .4% of the total value of industrial production in India, while in the same year by comparison the total bicycle production was 15.37%.

Most of the asbestos used in India is imported and only about 20,000 tons is mined in Andhra Pradesh, Bihar and Rajasthan. (See box 5)

Box 5

Imports of Raw Asbestos.

<u>Year</u>	<u>Metric tonnes actual Imports</u>
1978-79	62,707
1979-80	75,470
1980-81	84,264
1981-82	80,854

Portwise imports are in the approximate range

- (a) Bombay - 60%
- (b) Madras - 20%
- (c) Calcutta 20%

(Source: M.M.T.C.)

BOX 6

<u>Company</u>	<u>Sales of larger companies</u>		<u>Net Profit</u>	
	<u>Metric Tonnes</u>		<u>Lakhs</u>	
	1980-81	1981-82	1981	1982
Hindustan Ferado	4000	4000	98.34	33.79
			<u>year</u>	
Hyderabad Asbestos Cement.	30,000	23,000	344.52	336.66
Asbestos Cement	18,000	18,000	-	-
			n.p. after depreciat- ion, taxation, and in- vestment allowance.	
Shri Digvijay Cement Company.	9,000	15,000	67.27	74.42
			1980 <u>year</u> 1981	
			n.p. after tax.	
Sundaram Abex.	500/1000	1500/2000	0.24	0.51
			1982 <u>year</u> 1983	
			n.p. before depreciat- ion and tax	
Rane Brake Linings.	1,000	1,500	68.64	89.80
			1979 <u>year</u> 1980	

(Source: for sales M.M.T.C.)

(Source for profit CMIE News clip-
pings)

n.p. = Net Profit.

LEGISLATION IN INDIA

With intensifying debate and growing consciousness about the health hazards of asbestos, asbestosis has been incorporated as a notifiable disease in India, in an amendment in 1976 to the Factories Act of 1948.

The following are the salient features of schedule 14 of the Factories Act, applying to asbestos workers:-

- It applies to factories in which asbestos is handled and manipulated in various processes (The provision of the schedule can be relaxed or suspended by the Chief Inspector of factories, if he is convinced (i) that the use of asbestos is restricted or temporary. (ii) and therefore will not endanger the worker's health. This certificate can be revoked at any time).
- All manufacturing and conveying machinery must be fitted with a mechanically operated exhaust draft, to suppress dust release.
- Mixing and blending of asbestos fibres should not be done by hand but with a mechanically operated exhaust draft, to prevent dust generation.
- The making or repairing of asbestos insulating mattresses must be carried out in an isolated room with adequate exhaust and ventilation equipment.
- Only workers engaged in filling, beating or levelling should be present.
- Floors, benches, covers and fibre filled mattresses should be dampened whilst filling, beating or levelling is carried on.
- Storage chambers, bins containing loose asbestos, dust filtering and setting apparatus should not be kept in a work-room. Suitable methods of storage should be found.
- Arrangements should be made to prevent dust discharge from exhaust apparatus.
- The floors, benches and plant should be kept clean and free of asbestos debris.

- The room should be well-lit.
- Sacks used as asbestos containers should be cleaned by machines and made of impermeable material.
- All ventilating and exhaust equipment should be tested at least once in six months and the defects rectified.
- A register containing these records must be maintained and should be made available to the factory inspector on demand.
- Breathing apparatus, overalls and head coverings must be provided for those engaged in handling loose asbestos, cleaning of dust settling or filling chambers and other equipment, and those engaged in filling, beating or levelling in the manufacture of insulating mattresses.
- No young person should be employed in or in connection with the manufacture of insulating mattresses, blending or mixing of asbestos by hand, in sackcleaning, in chambers or apparatus for dust settling or filtering, in chambers containing loose asbestos or in stripping or grinding the cylinders, including the doffer cylinders or any other part of the carding machines.

MEDICAL PROVISIONS IN THE LAW

- A person is employed only after a fitness certificate is awarded by the medical inspector of factories or certifying surgeon after a medical examination.
- Every worker should be X-rayed by a qualified radiologist at the cost of the employer, before he is employed.
 The X-ray should be submitted to the medical inspector or certifying surgeon within three months of the examination date.
- Medical examinations should be conducted by the medical inspector of factories or certifying surgeon at intervals of twelve months after the first medical examination.
- The Medical Inspector of factories or certifying surgeon can direct the employer to arrange for an X-ray of a worker at the employers own cost, whenever it is necessary, the X-ray must be then handed over to the medical inspector/certifying surgeon.

- A worker who is declared unfit to work on processes specified in the Schedule is banned from working on the same unless an X-ray is taken at the employers cost and the worker is once again certified fit. During such time he may be permitted by the Medical Inspector or Certifying Surgeon to work on any other process which may be safer. This is allowed if the medical inspector is convinced that the worker is not totally incapacitated.
- The Medical Inspector or Certifying Surgeon can direct a worker for radiological, clinical or pathological examinations or any special treatment at the expense of the employer, if he thinks it is necessary.
- The Certifying Surgeon should after each examination grant a certificate which the manager must maintain in a proper register or file, and produce before the inspector on demand.
- The manager should maintain the details of every medical examination and the register shall be produced before an inspector whenever demanded.

LOOPHOLES IN THE LAW

The law framed by a government which represents the interests of private enterprise, is bound to mirror the interests of private industry and management. Both in its formulation and implementation, the schedule is ridden with loopholes, which are taken maximum advantage of by industrialists in their drive for profit.

The following are the major loose ends in the Schedule:-

- More dangerous diseases, like lung cancer and mesothelioma continue to be left out of the scope of the Schedule.
- The power of the Chief Inspector to relax or suspend provisions can be misused at the behest of the management or in his "own interests".
- While the Schedule states that "no young person" should be employed in or in connection with certain manufacturing processes, the term "no young person" smacks of gross ambiguity.

- Provisions have been laid down for the suppression and control of dust within the factory premises but not outside the plant. This is likely to affect the people in the vicinity of the factory.
- A provision for separate lockers for work uniforms and ordinary clothes has not been made, leading to contamination of the latter.
- There are no clear cut technical specifications outlined for the nature and quality of the respiratory apparatus, protective clothing and engineering controls. Managements therefore have no qualms about providing inferior quality and inadequate equipment.
- There is no mention of a ban on blue asbestos which is banned in other parts of the world.
- There is no indication for fixing warning labels on the asbestos products.
- There are no provisions for workers' access to their own medical reports and the factory inspection assessments.
- Furthermore, workers do not have the right to information regarding the materials they use and the production process itself.
- The activities of asbestos companies are veiled in secrecy and the only people who can examine them are the factory inspectorates. The government and its related agencies and institutions are also fighting shy of exposing 'revealing' and 'controversial' research reports on occupational health hazards.

A case in point is Central Labour Institute, which has been withholding from the public its detailed studies on the Shree Digvijay Asbestos Plant in Ahmedabad and others. A provision should be made in the law to grant permission to journalists, researchers (govt. and private), social workers and the like to conduct surveys and publish their reports for the public. Permission to take photographs of the plant must be granted.

- Constitutional litigation is frustrated by redtape, nepotism, bribery, and unending delays making a myth of justice. The petitioner often loses faith in the judiciary and his will is ground to a halt.

- As per the provisions of the Factories Act it may be pointed out that the inspector has a series of functions ranging from checking of licenses to health and safety measures. He has to conduct inquiries in the case of accidents and attend courts too. It is ironic that, the last National Labour Conference, 10 years ago recommended 1 inspector for 150 factories. In Maharashtra there are instances of the ratio of inspectors to factories approximating 1:190. It is no wonder then, that among other things, a facile circumvention of an already impotent law is possible.

CASE STUDIES

Not only are there blatant shortcomings in the law, it also remains a paper tiger which is flagrantly abused and flouted at every stage. It may be interesting to note that 2 years ago there was a fiery debate in the U.K. on the conditions in Indian asbestos factories and the double standards adopted by multinationals to which these Indian Companies were linked. This was sparked off by a report in a popular scientific journal in the U.K. The heated debate left the Indian public and worker untouched. Public and worker's consciousness about the health hazards of asbestos continues to be in its infancy here. Besides being unaware about the health problems caused by asbestos, workers are blissfully ignorant about the materials they handle and the production process they are engaged in. They are un-informed about their legal rights and have no access to their medical reports. Due to the legal implications involved, factory medical officers rarely identify asbestosis. A Times of India report dated February 11, 1983, states that asbestosis is even deliberately confused with T.B. and bronchitis to avoid legal implications and compensation costs. More often than not, when asbestosis is diagnosed, the management retrenches the worker.

Case studies of the Asbestos Jointing Unit at Andheri, the Shree Digvijay Asbestos Cement plant in Ahmedabad and Hindustan Ferado Limited in Bombay, are examples of the appalling conditions and brazen evasion of the law found in asbestos factories in India.

I The Asbestos Jointing Company at Andheri employs 70 workers. It manufactures joints for insulated pipes. The hazards in this unit are primarily of materials handling. There are 5 basic processes involved in the manufacture of joints:-

- Fibre storage and handling which exposes the worker to dust.
- Mixing of fibres with rubber, petrol and benzene in high heat conditions. The emission of benzene and petrol fumes and the generation of asbestos fibres in cleaning and maintenance operations is hazardous.
- Sheet making and cutting under high heat conditions, resulting in fatigue and exhaustion.

- * Shearing which generates dust and
- * Shredding operations. Two cyclone machines are involved in the shredding process. The loading into the machines is done with bare hands. Spillage occurs at two points:-
 - (a) when the cyclone works at the loading bay and
 - (b) where bags are filled by a vaccum system. The bags are coated with a film of fibre which gets lodged beneath the worker's skin to form a corr.

The Asbestoa Jointing Company outrageously violates the conditions and regulations laid down by the Factories Act.

1. Though the plant has stopped using blue asbestos, piles of white and blue asbestos are heaped outside the unit, polluting the environment. This is in contravention to the storage norms prescribed by law.
2. The workers are not provided with gloves and there are no washing and changing facilities.
3. Though the law provides for the provision of proper breathing apparatus, and head covering, the management has provided them with cloth masks which is a piece-meal measure. The cloth masks have no filter system. They get clogged with asbestos fibres which the workers inhale. Often the workers find the mask so uncomfortable that they remove them.
4. There is no local exhaust system (vaccum suction device) general exhaust fan or shower to dampen the floor.
5. The workers claim that there has not been any inspection by the factories inspectorate and no genuine records have been maintained.
6. The medical tests seem very perfunctory. The workers report that their nails are just superficially checked and they are sent back.
7. According to the workers, the management has refused to discuss the problem of health hazards with them. This is an outright denial of the right to collective bargaining even after the issue has been raised before the management and the factory inspector.

Further developments have occurred after a letter was sent in recently by the union to the Management and Factory Inspector demanding a medical check up of the workers. The management has insisted on a medical check up. But no official written reply has been received from the factory inspector. What develops further remains to be seen.

II Shree Digvijay Asbestos Cement Plant (Ahmedabad)

According to a study conducted by J. Kumar of the Central Labour Institute Bombay and the annual report of the National Institute of Occupational Health 1980, the Ahmedabad - based Shree Digvijay Asbestos Cement plant's safety record is no better. The studies revealed that:-

1. The fibre concentrations in the yarn unpacking, mixing, spinning, weaving and rope divisions were 367 fibres per c.c., 418 fibres per c.c., 225 fibres per c.c., and 216 fibres per c.c., respectively. This is far above the statutory permissible level of 2 to 0.2 fibres per c.c. for different kinds of asbestos.
2. Out of 320 workers selected at random, 6.5% suffered from asbestosis due to exposure.
3. The plant continued to use crocidolite which causes mesothelioma. Perhaps it should be pointed out here that manufacturers in the U.K. imposed a voluntary ban on the import of crocidolite fibres in the early seventies.

Another study of the same plant conducted by Barry Castleman, and published in the "New Scientist" said that:-

4. The road leading to the unit was lined on both sides by asbestos cement waste.
5. A high wall surrounded the factory and beyond it untreated waste water was emptied into a trench and piled with solid asbestos waste on either side. Children played on the waste around their homes.
6. Some of the houses were made from hunks of asbestos cement pipes and scraps of corrugated asbestos waste sheets.

III - Hindustan Ferado Limited (HFL) in Bombay is a subsidiary concern of the British Asbestos Company Turner and Newell. The Indian plant which opened in 1956 manufactures clutch linings and asbestos textiles. A collation of reports from the Times of India, India Today, Business India, New Scientist and Science Today paint a dismal picture of the health and safety conditions in the unit.

The Company brazenly abuses the law in several ways:-

1. Dust levels stand above the statutory permissible standards and the heat is so oppressive that the workers are unable to wear respirators because they feel suffocated.
2. Simple housekeeping measures are not employed.
 - (a) Floors are swept dry creating dust.
 - (b) The some lockers hold overalls and the workers clothes, which are thus contaminated.
3. Labourers who work in the dry process and carry the waste from the ventilation traps have no protection. They are covered with asbestos dust.
4. As a result, many employees have been found to be suffering from asbestosis. At least 35% of those still on their jobs are afflicted and not compensated.
5. The ESIC is another eyewash. When a worker is not in service, ESIC contributions stop and he can avail of medical treatment only for a period of 6 months. When a worker dies in service, the ESIC provides for compensation of upto Rs. 80,000 maximum, payable in instalments of Rs. 300 p.m. But as soon as it is proved that he has asbestosis he gets retrenched. Further if he dies of the same disease, say two years after he retires from service, neither the management nor the ESIC takes on the liability.

Union representatives have been demanding an improvement in HFL, viz the provision of proper ventilation facilities, separate lockers and bathing facilities for workers. Under such pressure the management has taken the following measures:-

1. In 1980 HFL introduced personal respiratory protection equipment on the shop floor. These form the second line of defence, the main precautionary measure being engineering controls.
2. Raw asbestos is now packed in polyethelene bags which are placed in another polyethelene bag. This is an improvement over the original packing in jute bags, many of which were damaged, leading to fibre spillage. This decision probably followed Britain's refusal of shipments of asbestos products as they were not triple packed in polyethelene bags as a safety measure.
3. According to government regulations, cleaning and grinding of asbestos fibres in the caiding sections as in several other departments should be a mechanical process. Under a recent Union agreement, the management has decided to import some new equipment from Germany.

4. Though the management has introduced plastic strip curtains to separate the dust prone carding section from other sections, much is left to be desired. Plastic strip curtains together with a plywood door, or better still, an air curtain (engineering device, by which air can be blown in a particular direction) would be a safer measure.
5. HFL's contract department used to handle another dangerous area. Workers had to go out and spray asbestos fibres for insulation. This activity finally stopped when many workers began suffering from chest ailments.
6. Workers in the carding and fluffing sections get an "inconvenience" allowance for working in these sections. The point in question is whether workers should accept such an allowance.

After much feet dragging the management has been forced to concede to several of these demands under union pressure. It still tries might and main to diffuse issues and evade its responsibility. Its line of defence is that improvements cost money. The HFL management complains that its wage costs are 28% of the manufacturing costs, while that of Sundaram Abex, another asbestos unit is only 17% of the manufacturing costs. Such costs however should be counted under capital expenditure and not under wages as they are not perks given to workers but are an essential pre-requisite for the manufacture of asbestos.

WHAT CAN BE DONE

History bears evidence of industry's reluctance to give up the use of such a versatile material, without a massive amount of public opinion and worker pressure.

- * A move to use appropriate substitutes in lieu of asbestos must be initiated.
- * As long as it continues to be used, its use must be regulated by the most rigorous control.
- * While it is necessary to use the existing law for some protection, it is necessary to ask for new provisions to be incorporated (as pointed out in the loopholes of the Act).
- * Pressure must be brought to bear on the management, for the proper implementation of the Factories Act.
- * Workers must demand the right to appoint "safety representatives" from among workers at the factory/plant level and union representatives who have access to facilities and records, both administrative and medical.
- * They must also insist on the right to information regarding

details of materials/chemicals used, processes and hazards involved, and such other information as is relevant to the health of workers in the industry.

- * Workers must press for the revision of compensation rates according to current price levels.
- * If a worker who contracts an asbestos related disease is retracted after the disease is identified, then the management should be pressurized to pay a compensation till his death. Workers must in addition demand compensation from the Company, in instances of deaths resulting from asbestos related diseases, even after retirement.

* * * * *

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 - (c) workers of asbestos units.
 - (d) Mr. K.P. Menon, Labour advocate.

they presented to him ruling out asthma or bronchitis.

The examination consisting of a chest Xray and a blood and urine test was completed in September 1982, and Rajagopal watched and waited anxiously for the results. To his utter amazement, the medical board's diagnosis was "chronic bronchitis" and not "asbestosis".

Finding the results suspect and believing his ailment to be asbestosis, Rajagopal has filed a case before the ESI Court Bombay under section 75 of the ESI Act. He has questioned the credentials of the ESI Medical Board and demanded an examination by experts in occupational diseases, unless it is proved that the constituents of the ESI Medical Board were experts in occupational disease. He also demanded a submission of all his papers (case history/medical reports and certificates) by the Coimbatore ESI hospital to the ESIC court. If after a careful consideration of the case, the Court can prove that the medical board did not consist of experts in occupational diseases, Rajagopal is adamant that it should direct the ESI authorities to get him examined by experts in occupational diseases and grant him the consequential relief.

The hearing of the case came up on the 28th of April 1983, after which the Corporation appealed for time upto the 28th July 1983, to file in its written statement.

A long arduous protracted struggle already begun, will continue: the respondent - the ESI medical board (Coimbatore) the petitioner - a dying Rajagopal, trying to keep alive the last flicker of hope, that his success will not only vindicate him but also pave the way for thousands of similarly afflicted workers.

* * * *

What is this monster called asbestos? Where is it found? How does it endanger a worker's health? What is asbestosis? How does it affect a worker? What are the laws and controls for the regulation of the use of asbestos? How are they implemented? The following piece entitled, "Asbestos: The dust that kills", attempts to explore the answers to the above questions.

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INTRODUCTION: OCCUPATIONAL DERMATOSES

Occupational dermatoses, those skin diseases induced or aggravated by work-related exposures, include a wide variety of conditions; those that develop as the result of contact with certain substances, and those that develop from the harmful effects such substances may have on preexisting skin diseases.

Work-related dermatoses have long been recognized, but only recently has the problem been given special attention. As industrialization developed and new chemicals were used, the number of cases of skin eruptions increased dramatically. It soon became imperative for members of the medical profession to improve their knowledge of the causes of these dermatoses and, more importantly, their prevention. Some of the common causes of dermatoses related to various occupations appear on page 29.

CAUSATIVE MECHANISMS

Occupational dermatoses are usually grouped according to the mechanisms that produce them—mechanical, physical, biological or chemical.

1. Mechanical Factors:

Friction and pressure from the constant use of a tool or instrument often produce thickening of the skin, callosities, abrasions, and ulcers.

2. Physical Factors:

Environmental factors, such as heat, humidity, cold, fumes, plants, woods, and solar and ultraviolet light are responsible for many skin disorders. Phototoxic or photoallergic reactions may also develop from certain exposures.

3. Biological Agents:

Bacteria, yeasts and fungi, viruses and parasites may cause primary skin diseases in many work environments. Secondary bacterial infections may complicate the course of eczematous eruptions. Types of infectious dermatoses related to certain occupations are listed on pages 30 and 31.

4. Chemicals:

Chemicals are the most common cause of occupational dermatoses, and these are usually classified according to their effects on the skin either as irritants or as sensitizers.

Irritants. These substances are grouped according to their action on the skin.

- Horny layer damaging agents: alkalies, soaps, most organic solvents.
- Surface lipid solvents: inorganic and organic solvents, detergents.
- Dehydrating agents: inorganic acids, anhydrides, alkalies.
- Oxidizing agents: bleaches, chlorine, peroxide
- Protein precipitating agents: chrome, arsenic, zinc salts
- Hydrolyzing agents: calcium compounds (lime)
- Reducing agents: oxalic acid, formic acid.
- Photosensitizers: coal tar, dyes, plants
- Keratogenetic substances: arsenic, coal tar, petroleum, sunlight, ionizing radiation.

Sensitizers. In susceptible individuals, an allergic reaction may follow exposure to a chemical. This specific, acquired alteration of the capability to react is thought to be caused by an antigen-antibody mechanism. Clinical signs of sensitivity do not develop on the initial exposure but, after an incubation period of approximately two weeks, subsequent exposures cause an allergic eczematous contact dermatitis. Fortunately, only a small number of workers become allergic to substances in their environment.

Industrial allergens are numerous and specific to each industry. Some of the more common ones are nickel salts, alkaline dichromates, ethylenediamine, mercurial compounds, resins (epoxy, phenolformaldehyde), dinitrochlorobenzene, and *p*-phenylenediamine.

MAKING A DIAGNOSIS

The diagnosis of occupational dermatitis is based on history, physical examination, the course of the eruption, and laboratory investigations (patch tests, biopsy).

History

The salient information that may help to pinpoint the diagnosis includes:

- Type of work.
- Condition of the skin before the onset of the eruption.
- Substances handled directly or present in the work environment.
- Protective clothing and measures, and cleansing agents used.
- Onset and course of eruption (improvement or disappearance of lesions when away from work for a period of time).
- Previous treatment (professional or self).

Physical examination

The clinical appearance of the eruption and its location may provide definite clues to probable cause. The entire body should be examined for other sites of the eruption.

Laboratory investigations

Patch tests. A minimal amount of the suspected causative agent in proper dilution is applied to the skin. A patch test reaction is positive when redness, edema or vesiculation appears within 24 to 48 hours. Both the performance and interpretation of patch tests require specialized knowledge. To avoid causing exacerbations of patients' eruptions, only physicians experienced in patch testing should perform them.

Biopsy and histopathological examination. This procedure may be helpful in identifying some occupational dermatoses and is indicated in all cases of suspected malignancy. It is of little value, however, in eczematous eruptions because findings are nonspecific.

CONTACT DERMATITIS

Contact dermatitis accounts for about 75% of all dermatoses and is caused by allergic sensitization or skin irritation.

ALLERGIC CONTACT DERMATITIS: Sensitization occurs after contact with a substance (allergen) without the development of visible skin changes. Sensitivity usually develops within several weeks after the original exposure and subsequent contacts with the allergen, even in small amounts, cause an eczematous dermatitis. Sensitivity may persist for months, years, or even a lifetime. **IRRITANT CONTACT DERMATITIS:** Inflammation of the skin develops at the site of contact with the provoking substances, classified as either absolute (strong) irritants or relative (mild) irritants. Absolute irritants—substances that injure the skin and produce severe inflammation on first contact—include strong acids and alkalis, some metallic elements and their salts, and many essential oils. Relative irritants—less toxic substances which require repeated or prolonged contact to cause inflammation—include detergents and most organic solvents. Some substances are both sensitizers and irritants.

Factors that contribute to the development of both allergic and irritant contact dermatitis are preexisting dermatoses (atopic dermatitis), heat, humidity, and friction.

SIGNS: ACUTE DERMATITIS shows redness, edema, papules, vesicles and, occasionally, bullae. Patches are ill-defined, single or multiple, and of various sizes and shapes, but are often discoid. By coalescence, large areas may be affected. **SUBACUTE DERMATITIS** characterized by redness, minimal edema, dry vesicles and crusting. **CHRONIC DERMATITIS** appears as dry thickened, scaly and, occasionally, fissured patches of skin.

SYMPTOMS: Pruritus is occasionally severe. A dry, fissured eruption on sites of pressure (tips of fingers) or on areas of flexion (palms) is usually tender and painful.

CAUSE: Chemicals in various forms are the most common offending agents. Acute eczematous dermatitis is most frequently caused by irritating and sensitizing chemicals, such as industrial detergents, metallic compounds (chrome, nickel), diluted acids or alkalis, resins, solvents, and substances used in the manufacture of rubber (accelerators, antioxidants). Chronic eczematous eruptions are often caused by cement used in the construction industry, cleansing preparations and resin products. Specific information on four of the most common causative agents—chromium, nickel, plants and woods, and plastics—is given on pages 12 to 17.

COURSE: Most occupational dermatoses improve or heal when the exposure is eliminated. Acute dermatitis usually heals in 1 to 4 weeks. Most cases of irritant dermatitis begin with a low-grade, acute stage of eruption that rapidly becomes chronic. This chronic stage may last months or even years, with occasional periods of exacerbation.

HISTOPATHOLOGY: Not diagnostic. The histologic findings are those of eczematous eruptions, making it impossible to differentiate allergic contact dermatitis from the irritant type. **ACUTE DERMATITIS:** Epidermal changes are pronounced intercellular edema (spongiosis) and intracellular edema around vesicles and bullae. Dermal changes include vascular dilation, edema and a perivascular mononuclear cellular infiltrate. **SUBACUTE DERMATITIS:** Similar histology is seen—vesicles are smaller, and there is moderate acanthosis, occasional parakeratosis, and crust formation. **CHRONIC DERMATITIS:** Pronounced acanthosis, hyperkeratosis, parakeratosis and some spongiosis are seen, but vesicles are absent. In the dermis, there is perivascular infiltration, abundant capillaries, and increased collagen (fibrosis).

DIFFERENTIAL DIAGNOSIS: NON-OCCUPATIONAL CONTACT DERMATITIS: Not all contact dermatoses in workers are caused by occupational exposures. Investigate such offending agents as household cleansing products, substances handled in hobbies (photography, woodworking, painting), or exposure while at leisure (gardening, hiking). **NUMMULAR ECZEMA:** These chronic, coin-shaped, eczematous lesions of unknown etiology are seen on the extensor aspects of the extremities. Similar discoid lesions may occur in chromate dermatitis produced by contact with cement. **ATOPIC DERMATITIS:** This is a dry, lichenoid, chronic eruption of the hands and flexural aspects of the elbows and knees. Usually, there is a history of atopic diseases, such as hay fever or asthma, either in the patient or in members of his family. The skin of such individuals may become irritated by chemicals handled at work. Contact dermatitis may be superimposed on atopic dermatitis. **DYSHIDROSIS (POMPHOLYX):** This eruption of clear vesicles without erythema appears on the sides of the fingers, on the palms and on the soles of the feet. It is often associated with emotional stress and hyperhidrosis. **SEBORRHEIC DERMATITIS:** This condition presents as a chronic eczematous eruption of the scalp, postauricular region, middle of the chest, axillae or groins. Exacerbations may be work-related, in particular among workers exposed to heat, grease and oils. **PSORIASIS:** Palmar psoriasis appears as sharply defined, thickened and fissured, scaly

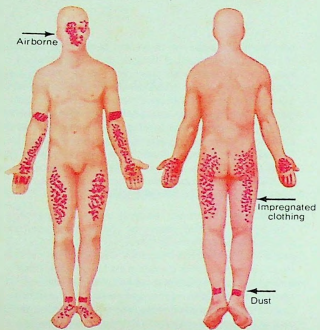
patches. Nail changes may be present, or there may be evidence of psoriasis in other parts of the body. Work-related factors, such as friction, pressure or chemical irritation, may aggravate the condition. **FUNGAL INFECTIONS:** Tinea pedis may cause a vesicular eruption of the hands (dermatophyid). A fungal infection of the palms may cause pink, dry, thickened patches. Maceration of the skin as a result of wet work, heavy boots and a hot environment are aggravating factors. **SCABIES:** This contagious disease is characterized by a vesicular eruption on the sides of fingers, flexural aspects of the wrists, axillae, trunk and genitalia, as diagnosed by nocturnal pruritus. Finding the scabies burrow is confirmatory.

DIAGNOSIS: This is based on history, clinical appearance, location of the eruption (suggesting whether the mechanism is allergic or irritant), course of the eruption, possible cause and a patch test. Suspect in a worker who develops a dermatitis of the fingers or hands that spreads to the forearms and other parts of the body. Inquire as to the nature of his work, and whether the dermatitis improves on weekends or vacations. Eruptions that improve when the patient stops working and relapse when he returns to work strongly suggest an occupational cause.

TREATMENT: SEVERE AND EXTENSIVE ERUPTIONS: Administer systemic corticosteroids for a short course (3 weeks) in decreasing doses. The patient should stop working. Cool wet dressings and topical corticosteroid sprays are indicated. Oral antihistamines control pruritus. Treat secondary bacterial infections with antibiotics, topical and systemic. **LESS SEVERE ERUPTIONS:** Prescribe corticosteroid and tar ointments. **CHRONIC ERUPTIONS:** Prescribe a low-potency, topical corticosteroid.

SITES: The hands are affected in the majority of cases, dorsal surfaces, sides of fingers, palms (nickel exposure), or interdigital spaces (wet work). Lesions of the arm may occur in patients using short protective gloves or may reflect extension of the eruption from the hands, those on the flexural aspect of elbows reflect exposure to nickel, textiles, cement, or wood dust. Facial eruptions suggest airborne substances, the eyelids may be affected by contaminated fingers. Lesions on the trunk, buttocks, or legs may develop from impregnated clothing. The feet often become involved from the use of rubber boots. Cement and irritating dusts may penetrate socks and produce lesions of the ankles.

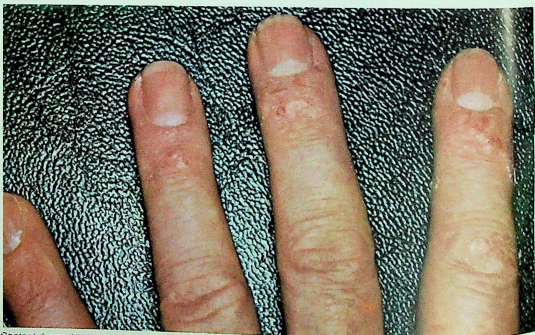
Contact dermatitis/Continued



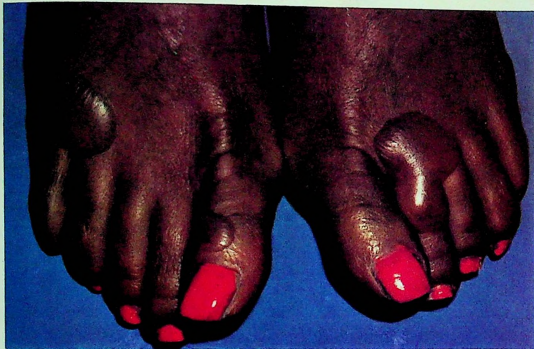
Shampoo-induced dermatitis in a hairdresser.



Violin chin rest dermatitis.



Contact dermatitis from p-phenylenediamine in hair dye where beautician wrapped hair around fingers.



Contact dermatitis in a household worker from floor cleansing compound.



Allergic contact dermatitis on a barber's hand from rubber strap of scalp vibrator.



Allergic reaction to organic solvent in a paint industry worker.



Hydrocarbon-induced dermatitis with secondary bacterial infection.

Contact dermatitis/Continued



Fingertip dermatitis from dyes used in fabrics industry



Contact dermatitis in a printer from newspaper color ink



Formalin sensitivity from impregnated clothing



An irritant reaction to varnishes and solvents in a cabinetmaker.



Dermatitis in a lumberjack produced by rubber boots

MOST COMMON CAUSATIVE AGENTS IN OCCUPATIONAL CONTACT DERMATITIS

- CHROMIUM
- NICKEL
- PLANTS AND WOODS
- PLASTICS (UNCURED)

CHROMIUM

A large number of occupational dermatoses are caused by the irritating and sensitizing properties of chromium compounds. Sensitization is gradual and may take years to develop. Workers in construction and other industries are exposed to a wide range of chromate-containing substances, such as paints with yellow and green pigments, photographic and offset printing materials, anticorrosive agents, and welding fumes. In particular, chromate in cement is an important cause of sensitization in bricklayers and cement workers.

Not all chromium-induced dermatoses are work related. Exposure to chromates may occur while handling chrome-tanned leather objects (shoes, handbags, gloves, paints, matches, and some bleaching agents). Individuals who work with wet rubber gloves and those with hyperhidrosis of the hands often develop chrome sensitivity.

CLINICAL APPEARANCE: A dry dermatitis of the fingers develops with edema, some vesiculation, and a tendency to lichenification and fissuring. Onset is gradual. The eruption spreads to the dorsa of the hands and forearms. Cement dermatitis often affects the flexural surfaces of the arms and the trunk in a diffuse or discoid pattern.



Deep burn from splashing of cement while making a sidewalk.



Contact dermatitis with secondary eczematization in a cement worker.



Pyoderma in a metal worker due to chromate.

NICKEL

Exposure to nickel and its salts is the most common cause of metal-induced allergic contact dermatitis. Nickel is widely used in the manufacture of many metal objects and as an alloy in other metals to increase their hardness. Exposure may be work related or stem from non-occupational environments or activities. Sensitization in men is usually by occupational exposure, but occasionally develops from contact with wristwatch bands, clasps, or eyeglasses. In women, common sources are metal clips on undergarments, and costume jewelry, in particular, pierced earrings. Once sensitized, individuals may develop eruptions years later when exposed to nickel or its salts in a work environment.

Workers most commonly affected are those who refine nickel or handle nickel-plating solutions, such as printers or producers of telephone and electric wires. Sensitization may also occur in those who use nickel-plated metal tools and instruments, such as hairdressers, tailors, seamstresses, and office workers. Cashiers may develop eruptions from nickel alloys in coins. Trauma, pressure and excessive perspiration, which leaches nickel from metallic objects, are important predisposing factors.

CLINICAL APPEARANCE: Characterized by redness, swelling, papules and oozing vesicles. Only about half of all cases involve the hands. Occupation-related dermatoses usually begin on the sides of the fingers or palms (use of nickel-plated tools or instruments). Autosensitization or direct contact with nickel-contaminated fingers may cause secondary spread of the eruption to the antecubital region, upper extremities, upper chest, inner thighs or face, particularly the eyelids. Secondary eruptions are dry and papular but may be oozing, often in a discoid pattern.



Nickel dermatitis. Sensitization later prevented employment in a factory producing nickel-plated products.



Contact dermatitis in a fabric cutter due to nickel-plated shears

PLANTS AND WOODS

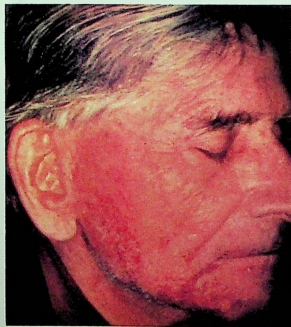
Plants, plant pollens, lichens, woods, vegetables and substances of vegetable origin, such as turpentine, are associated with contact dermatitis in various occupations. *Plants and plant pollens.* Farmers, gardeners, florists, park attendants, road builders and those engaged in other outdoor occupations. Foresters are prone to allergic dermatitis from contact with lichens. *Woods.* Lumberjacks, carpenters, furniture builders, cabinet makers, shipbuilders, and construction workers. *Bulchers, cooks,* and others may develop contact dermatitis from the wooden handles of knives or tools. *Airborne sawdust,* especially from exotic woods, may also produce dermatitis among carpenters and cabinet makers. *Vegetables.* Cooks, kitchen workers, and those employed in vegetable stores. Turpentine (a balsam derived from pine) may be the source of dermatitis in artists, painters, engravers, lithographers, and others using it as a solvent in cleaning activities.

COMMON CAUSES: Types of plants and woods vary according to geographic location. Europe—the common cause is *Primula obconica* (primrose). United States of America—the most common offenders are plants of the Rhus group (poison ivy, poison oak, poison sumac) that contain a phenolic oleoresin, an irritant and sensitizer. Other common causes: flowers and decorative plants, such as philodendron, ivies, chrysanthemums, hyacinths, and tulips, and woods, such as acacia, ash, chestnut, elm, maple, oak, pine and spruce, or tropical varieties (coco-bolo, teak, mahogany, satinwood). Eruptions may develop from contact with some plants or fruits containing psoralen, such as parsley, lime, parsnip, bergamot, and pink rot in celery, followed by exposure to sunlight (phytophotodermatitis). Airborne ragweed pollen may produce dermatitis during particular seasons.

CLINICAL APPEARANCE: Severe eruptions show redness and swelling with papules, vesicles and bullae. The usual sites of exposure are the hands, forearms, ankles, and legs. Allergen-contaminated fingers may cause spread of the eruption to other parts of the body, such as the face and genitals. Linear lesions are characteristic of plant dermatitis. A dry, lichenified dermatitis of the face, V of the neck, waistline, and ankles suggests airborne pollen. A dry, scaling dermatitis with fissuring of the fingertips is produced by tulip bulbs and other plant bulbs.



Typical lesions from poison ivy in a gardener.



Allergic dermatitis due to turpentine in house painter.



Sawdust dermatitis resembling photodermatitis in a carpenter. cap protected upper forehead and scalp.



Ragweed dermatitis of 35 years duration in a farmer, eruptions heal almost completely each winter.



Wood-contact dermatitis in a carpenter.



Acute allergic vesico-bullous dermatitis in a painter due to turpentine.

PLASTICS (UNCURED)

Uncured plastics are increasingly being used in different industries and are responsible for a growing number of dermatoses. Fully cured or synthetic plastics polymerized by the addition of curing agents, stabilizers, catalysts and plasticizers are rarely implicated.

COMMON CAUSES: Major offending substances are epoxy resins, urea (carbamide)-formaldehyde, phenolformaldehyde, and acrylic plastics. Sensitivity to formaldehyde resins is independent of allergy to formaldehyde. **EPOXY RESINS** These are strong irritants and potent sensitizers that are widely used in the manufacture of electrical equipment, as glues for office and household use, as adhesives (rubber, ceramics, metals), for painting and for a host of other purposes.

UREA-FORMALDEHYDE PLASTICS These plastics are used in the lamination and finishing of woods and as adhesives (textile industry). **PHENOL-FORMALDEHYDE PLASTICS** These are used in the production of Bakelite* and as glues (shoes, wood). **ACRYLIC PLASTICS** These plastics are used in paints and in the manufacture of dentures, artificial fingernails, contact lenses and orthopedic prostheses.

CLINICAL APPEARANCE: Characterized by redness, edema and vesiculation. Eruption usually starts on the fingers and hands; may spread to the face, arms and trunk.



Severe allergic contact dermatitis in an electronics worker due to epoxy resin amine hardener.



Allergic dermatitis triggered by entering a factory room where epoxy resin was used.

*Trademark



Fingertip dermatitis in a dentist due to acrylic monomer used to adjust acrylic dentures



Severe contact dermatitis in a wood finisher due to urea-formaldehyde.



Severe allergic dermatitis in a plastics worker due to phenolformaldehyde.

CANCERS

Occupational skin cancers are usually basal cell or squamous cell carcinomas that develop as a result of prolonged exposure to industrial carcinogenic substances or excessive exposure to solar radiation, X-rays or radium. Fortunately, work-related skin cancers are still rare, despite the use of a large number of industrial chemicals that have carcinogenic properties.

Most skin cancers develop in workers who had prolonged, close contact with by-products of coal or petroleum derivatives. Medical and dental personnel who have been unduly exposed to X-rays or radium may also develop occupational cancers.

Not all skin cancers that occur in workers exposed to carcinogenic substances are related to work. The age and skin type of the patient and the degree of sun exposure unrelated to work should be considered during evaluation.

Carcinomas may develop on scars, especially those caused by burns, and, possibly, on areas exposed to trauma, and chronic irritation. Characteristically, occupational skin cancers appear on the parts of the body in contact with carcinogens only after years of constant exposure. Often, they are preceded by precancerous lesions which tend to be multiple and recurrent.

SIGNS: BASAL CELL CARCINOMA begins as a waxy papule which slowly enlarges to become a button-like, pale, smooth and shiny nodule with a depressed or ulcerated center. The border is elevated, firm, translucent or "pearly," often, scattered tiny vessels (telangiectasias) are apparent. There are several varieties including pigmented, superficial and morphea-like types. SQUAMOUS CELL CARCINOMA may begin from a site of solar keratosis which becomes thickened and erythematous, or appear as a fissure, a warty nodule or an ulcer.

SYMPTOMS: Lesions are usually asymptomatic, those on fingers or areas of pressure and flexion may be tender.

CAUSE: The most common industrial carcinogenic substances implicated in occupational skin cancers are by-products of coal (soot, tar, anthracene) and petroleum derivatives. Excessive exposure to sun and wind causes skin changes ("sailor's" or "farmer's skin") which may lead to the development of a solar keratosis and carcinoma.

COURSE: Chronic. Basal cell carcinomas develop more slowly than squamous cell carcinomas. If untreated, both lesions extend locally, ulcerate and become destructive. Squamous cell carcinomas occasionally metastasize; basal cell carcinomas metastasize rarely.

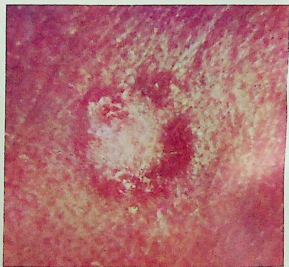
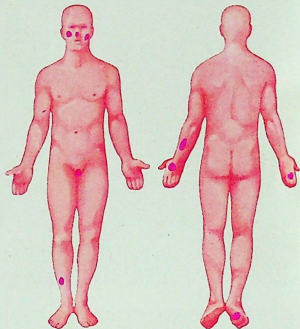
HISTOPATHOLOGY: Diagnostic. BASAL CELL CARCINOMA: Uniform local invasion of the dermis by cells resembling the basal cell layer of the epidermis. The nucleus is deeply stained and the cytoplasm is scanty. SQUAMOUS CELL CARCINOMA: Downward proliferation of the epidermal cells altering the dermo-epidermal junction. There is a variable number of differentiated and undifferentiated keratinized squamous cells. Well-differentiated tumors show concentric layers of squamous cells with increasing keratinization toward the center (horn pearls).

DIFFERENTIAL DIAGNOSIS: BASAL CELL CARCINOMA: Hypertrophy of sebaceous glands, melanoma, morphea, intradermal melanocytic nevus, Bowen's disease (intraepidermal squamous cell carcinoma). SQUAMOUS CELL CARCINOMA: Granuloma pyogenicum, keratoacanthoma, amelanotic melanoma, pseudoepitheliomatous hyperplasia.

TREATMENT: Small basal cell carcinomas can be eradicated by curettage followed by cauterization. Larger lesions require more extensive surgery, perhaps followed by skin grafting. Radiotherapy is helpful for lesions in certain locations, such as those on or near the nose. Chemosurgery may be used for extensive or recurrent lesions. Squamous cell carcinomas and any involved lymph nodes may be treated by radiotherapy.

CLUES TO DIAGNOSIS: Suspect in a patient presenting with a nodular, warty, eroded or ulcerated lesion. Inquire about exposure to carcinogenic substances at work or to ionizing radiation.

SITES: BASAL CELL CARCINOMA: Face, upper extremities. SQUAMOUS CELL CARCINOMA: Face, hands, upper and lower extremities, scrotum, or wherever scars are located.



Facial basal cell carcinoma in a sailor.



Squamous cell carcinoma in area of radiodermatitis in a radiologist.



Squamous cell carcinoma in arsenical keratosis due to arsenic exposure.



Squamous cell carcinoma due to pesticide in a nursery worker.



Radiation-induced squamous cell carcinoma in a dentist.

FOLLICULITIS AND ACNEIFORM ERUPTIONS

These common industrial dermatoses are often seen in workers handling coal-tar and petroleum derivatives: machinists, oil field and refinery workers; those who manufacture and distill coal tar; and roofers and road workers. Acneiform lesions (chloracne) caused by chloronaphthalenes and chlorodiphenyls (chloracne) caused by chloronaphthalenes and chlorodiphenyls occur in workers who manufacture or use insulating wires, condensers, and herbicides.

SIGNS: Folliculitis is manifested by papulopustular lesions at hair follicles. Acneiform lesions resemble those of acne vulgaris, manifesting as comedones, papules, pustules and cysts. Cutting oils and crude petroleum cause large inflammatory lesions and numerous acne comedones, coal-tar derivatives produce melanoses and minimal inflammation. Eruptions from chlorodiphenyls characteristically appear as cysts filled with straw-colored fluid.

SYMPTOMS: Asymptomatic.

CAUSE: Cutting oils, crude petroleum, derivatives of coal tar (distillate and pitch), chlorinated di- and triphenyls, and solid chlorobenzene and chlorophenols.

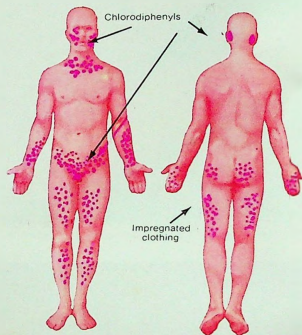
COURSE: Chronic. Lesions heal slowly, often with scarring.

HISTOPATHOLOGY: Suggestive. Lesions caused by cutting oils and crude petroleum show pronounced inflammatory reactions about the hair follicles. Lesions produced by coal-tar derivatives show increased melanin, little inflammatory reaction and follicular openings plugged with keratin. Eruptions caused by chlorodiphenyls show a predominance of cystic lesions.

DIFFERENTIAL DIAGNOSIS: Acne vulgaris, seborrheic dermatitis, bacterial folliculitis, iodide and bromide eruptions.

TREATMENT: FOLLICULITIS: Topical applications of drying agents, such as calamine lotion, may be beneficial. ACNEIFORM ERUPTIONS: Topical preparations used for the treatment of acne vulgaris are often helpful (benzoyl peroxide, vitamin A acid). Drainage of cysts, intralesional injections of a corticosteroid, and systemic administration of tetracycline may also be helpful.

CLUES TO DIAGNOSIS: Suspect in a patient presenting with an eruption resembling acne vulgaris, perhaps with melanosis. Inquire as to the patient's history of exposure to oils, petroleum and coal-tar derivatives, or herbicides.



SITES: FOLLICULITIS: Extensive on face, trunk and extremities. ACNEIFORM LESIONS: Predominately on areas of greater sebaceous activity, such as the face and chest. ERUPTIONS DUE TO OIL AND COAL-TAR DERIVATIVES: Areas that are exposed (face, dorsa of fingers, forearms) and those in contact with contaminated clothes (lower abdomen, buttocks, thighs). ERUPTIONS DUE TO CHLORODIPHENYLS: Face, back of ears, abdomen, groin, genitals.



Early stage of chloracne, from clothing contaminated with diesel fuel, shows acneiform and pustular lesions.



Folliculitis due to oil used for paper cutting machine.



Oil folliculitis from repairing paper cutting machines.

GRANULOMAS

Granulomas of occupational origin can be infectious and noninfectious. Infectious granulomatous diseases are found mainly in rural workers, especially in tropical and subtropical regions. The causative organism is directly inoculated through abrasions or injuries, or introduced into the skin by the bite of an insect. Infectious granulomas and other infectious dermatoses related to occupations are presented in the table on pages 30 and 31. Noninfectious granulomas are often caused by particles of foreign material penetrating the skin. The most common industrial offender is silica; however, beryllium, zirconium and other substances also produce granulomas.

SIGNS: Infectious and noninfectious granulomas often develop in wounds and at the site of tissue injuries. In beryllium granuloma, the wound fails to heal, becomes swollen, indurated, and the center ulcerates. Conversely, wounds contaminated with soil or glass heal normally, but months or years later the site becomes indurated, nodular or verrucous. Zirconium causes a persistent eruption of soft, reddish-brown papules.

SYMPTOMS: Lesions may be tender.

CAUSE: SILICA GRANULOMA: Contamination of lacerations or wounds with particles of soil, sand, or glass containing silicon dioxide. **BERYLLIUM GRANULOMA:** Occurs among individuals working with fluorescent light tubes. **ZIRCONIUM GRANULOMA:** Use of products containing zirconium; workers in the zirconium industry.

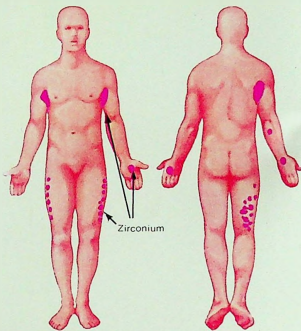
COURSE: Chronic. Lesions heal slowly, often with scarring.

HISTOPATHOLOGY: SILICA GRANULOMA: A diffuse inflammatory infiltrate with multinucleated giant cells and epithelioid cells that do not form tubercles. The finding of silica crystals is diagnostic. **BERYLLIUM GRANULOMA:** A granulomatous reaction with central caseation necrosis. **ZIRCONIUM GRANULOMA:** Large groups of epithelioid cells forming tubercles without caseation, identical to the findings in sarcoidosis.

DIFFERENTIAL DIAGNOSIS: Secondary bacterial infections, foreign body reaction from other causes, malignancy.

TREATMENT: SMALL LESIONS: Destroy by electrodesiccation or cryotherapy. **LARGE LESIONS:** Surgically excise.

CLUES TO DIAGNOSIS: Suspect in a patient who has had an injury which fails to heal, becomes indurated and tender (beryllium); who develops induration and tenderness of an area injured months or years ago (silica); or who uses zirconium products or works in the manufacture of zirconium. Inquire as to the details of the injury and possible types of contaminating substances.



SITES: SILICA AND BERYLLIUM GRANULOMAS: At the site of injury, usually the hands or forearms. **ZIRCONIUM GRANULOMAS:** Hands, axillae or at the site where a preparation containing zirconium was used.



Beryllium granuloma at site of cut.



Beryllium granuloma following cut with fluorescent tube.



Zirconium granuloma resembling sarcoid in a chemist.

LICHEN PLANUS-LIKE ERUPTIONS

Chemicals containing salts of *p*-phenylenediamines used in the photographic industry often produce sensitization and the development of a papular dermatitis resembling lichen planus. Several years ago, the incidence of this eruption was high among color film processing workers, but the number of cases has decreased with the implementation of more effective measures of prevention.

SIGNS: The eruption may begin on the hands and forearms as an acute dermatitis which soon becomes dry and papular, or it may be papular from the onset. These papules resemble those of lichen planus—smooth, often flat, shiny and angular. The color varies from reddish purple to purplish brown or to a slate hue. The bilateral and symmetrical distribution of the eruption is characteristic and helpful in diagnosis. Residual pigmentation occurs despite resolution of the lesions. Lesions on other parts of the body may have annular or reticulated configurations. The mucous membranes are rarely involved.

SYMPTOMS: Pruritis, its severity depends upon the degree of sensitivity and amount of exposure.

CAUSE: Sensitivity to a substance containing salts of *p*-phenylenediamines used in processing color film.

COURSE: Chronic. When exposure to the chemical is discontinued, the eruption clears slowly. Flare-ups may occur with subsequent contacts. Residual pigmentation may last for a year or more.

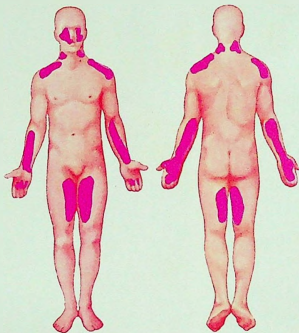
HISTOPATHOLOGY: Acute eruptions show spongiosis and evidence of eczematous reaction. Papular lesions appear similar to lichen planus: acanthosis, washing out of basal layer, and a band-like dermal infiltrate.

DIFFERENTIAL DIAGNOSIS: Lichen planus, lichen planus-like eruptions caused by medications (gold, quinacrine, *p*-aminosalicylic acid).

TREATMENT: Corticosteroids, systemically and topically.

CLUES TO DIAGNOSIS: Suspect when a patient who works in a color film developing laboratory presents with a papular eruption of the hands and forearms.

SITES: Fingers, dorsa of hands, forearms, shoulders, sides of neck, face, inner aspect of thighs.



Close-up view of lichen planus-like eruption from photographic color developer



Lichen planus-like eruption in a worker due to photographic color developer.

PIGMENTARY DISORDERS

Occupational pigmentary disorders are alterations of the color of the skin caused by various substances. The changes most often seen are darkening (melanosis), depigmentation (leukoderma), or simple stains of the skin. Discolorations occur in workers in numerous occupations, mainly the rubber industry and the manufacture of explosives, and in individuals exposed to crude oils, cutting oils, coal tar and their derivatives.

SIGNS: CHEMICAL DISCOLORATIONS: These may be diffuse or localized. Large areas of the body may be discolored in individuals in contact with quinacrine hydrochloride, tetryl and trinitrotoluene (TNT). Amines in epoxy resins cause yellowish discoloration of the palms. Stains caused by silver nitrate and antiseptics occur mainly in physicians and medical personnel and are often present in bizarre patterns. **MELANOSIS** A darkening of the skin caused by increased melanin is manifested by dark brownish-grey patches with ill-defined borders, occasionally associated with chloracne. Melanosis also may follow inflammatory processes of the skin.

LEUKODERMA: Characterized by depigmentation of the skin in a vitiligo-like fashion. It may occur following contact with monobenzyl ether of hydroquinone (agerite alba), the antioxidant used in the rubber industry. The borders of the patches are well defined and there is no peripheral hyperpigmentation. The hands and forearms are usually affected, but other parts of the body in direct contact with finished rubber products, such as gloves or sandals, may also be involved.

SYMPTOMS: Asymptomatic. Patients with leukoderma burn easily when exposed to sunlight because of the absence of melanin protection.

CAUSE: Most pigmentary disorders result from direct contact of the skin with chemical agents, occasionally from their ingestion or inhalation. Stains and discolorations are usually caused by dyes or colored substances (silver nitrate, potassium permanganate, and others). Alkylphenols, used as antioxidants, have caused vitiligo-like depigmentation. **MELANOSIS** Often produced by arsenic, tar and tar oils, crude oil and insoluble cutting oils, chloracrogens, sunlight and vegetable photoreactives. **LEUKODERMA:** Usually monobenzyl ether of hydroquinone (agerite alba), which is also a sensitizer, and some phenolic detergent germicides and antioxidants, such as tertiary butyl-catecol used in cutting fluids. Depigmentation also may follow severe dermatitis and burns.

COURSE: Chronic. Discolorations last months or years. Postinflammatory pigmentation and stains gradually disappear.

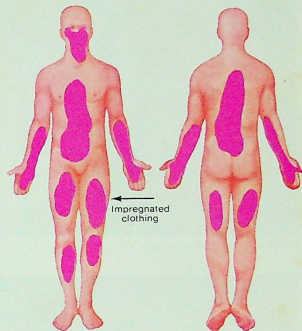
HISTOPATHOLOGY: Not diagnostic. **MELANOSIS:** Increased activity of melanocytes. Abundant melanin granules are found in the basal layer and scattered throughout the prickle cell layer and dermis. **LEUKODERMA:** Melanin granules are few or absent.

DIFFERENTIAL DIAGNOSIS: MELANOSIS: Melasma, Addison's disease, hemochromatosis. **LEUKODERMA:** Vitiligo, guttate morphea, piebaldism, pinta, yaws, leprosy

TREATMENT: MELANOSIS: The bleaching properties of monobenzyl ether of hydroquinone 2% may have a beneficial effect when used with appropriate caution. **LEUKODERMA:** Systemic and topical psoralens followed by exposure to sunlight or ultraviolet radiation may help restore pigmentation. Special cosmetics may help patients with melanosis and leukoderma hide their pigmentary abnormalities. Advise patients to use a sunscreensing agent.

CLUES TO DIAGNOSIS: Suspect in an individual presenting with discolorations of the skin. Inquire as to the nature of work and substances handled or present in the work environment.

SITES: Face, hands, forearms, and other exposed sites; areas of the body in contact with impregnated clothing



Dermatitis and melanosis in a nursery worker due to insecticide spray (arsenic).

Pigmentary disorders/Continued



Leukoderma due to rubber gloves.



Leukoderma from p-tertiary butyl phenol in phenolic detergent in a hospital worker.

ULCERS

Occupational ulcers may be caused by a single exposure to a caustic agent, by constant exposure to a chemical, by constant irritating pressure, or they may occur secondarily to other dermatoses. Accidental contact with strong acids will cause a severe burn that may ulcerate. More commonly, however, the cause is constant exposure to certain chemicals or substances, such as chrome, which are used in a wide range of industries. Persistent contact with strong chromate solutions may eventually lead to skin ulcerations (chromeholes), or inhalation of chrome dust or vapors may result in ulceration of the nasal mucosa. Ulcerations may also develop secondarily to other occupational dermatoses either from trauma or secondary bacterial infection, or from the breakdown of skin tumors.

SIGNS: Chrome ulcers develop rapidly after a variable period of exposure and do not appear to be related to the patient's sensitivity to chrome, manifested by dermatitis (see page 12). They usually occur on the hands, wrists and forearms, and appear as round or oval, punched-out lesions with bases bathed in an exudate that dries forming a crust. The borders of the ulcer may be thickened and undermined. An atrophic scar remains after healing. When the nasal mucosa is affected by airborne substances, necrosis and ulceration develop. A depressed scar remains after healing. Perforation of the nasal septum may also occur with ulceration.

SYMPTOMS: Chrome ulcers are usually painless; ulcers of the nasal mucosa may be painful and affect the patient's breathing and speech.

CAUSE: Chrome ulcers are caused by hexavalent salts of chrome. They may develop in tannery workers, and in workers in electroplating, chrome-producing and other industries. Other causes of skin ulcerations are arsenic trioxide, calcium arsenate, calcium nitrate and slaked lime (calcium hydroxide).

COURSE: Chronic. Continuous exposure, trauma and secondary bacterial infection perpetrate the ulcers. When exposure to chrome is discontinued, ulcers heal slowly with scarring. Perforation of the nasal septum leaves a permanent defect.

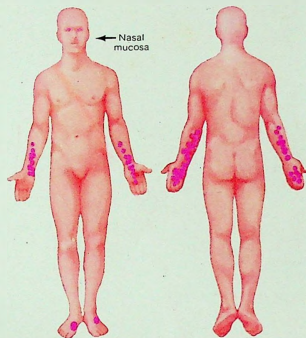
HISTOPATHOLOGY: Not diagnostic. Ulceration destroys the epidermis, part of the dermis and may penetrate even deeper. There is a nonspecific, necrotic reaction.

DIFFERENTIAL DIAGNOSIS: SKIN LESIONS: Traumatic and factitial ulcers, pyogenic ulcerations, carcinomas. **NASAL LESIONS:** Traumatic and pyogenic ulcers, carcinomas. In tropical regions: rhinoscleroma, leishmaniasis, leprosy.

TREATMENT: Topical and systemic antibiotics are indicated if the ulcer is secondarily infected; otherwise, no specific treatment is required. Prophylactic measures include use of long rubber gloves, boots and aprons, and application of 10% ascorbic acid ointment or solution.

CLUES TO DIAGNOSIS: Suspect in a chemical or industrial worker with a painless, punched-out ulceration of the skin. Examine the nasal mucosa; inquire about the patient's work and his exposure to chromates, arsenic trioxide, calcium salts, and slaked lime.

SITES: Hands, wrists, forearms and feet. Also, nasal mucosa, septum.



Chrome ulcer from spilling of strong chromate solution used in tanning of leather.



Ulcers from pressure in a woodcarver.

TABLE OF COMMON CAUSES OF DERMATITIS IN VARIOUS OCCUPATIONS

AGRICULTURAL LABORERS: Plants, woods, lichens, fertilizers, insecticides, leather gloves (chromium), animal feed additives (antibiotics, preservatives), rubber (gloves, boots)

Diseases: Harvest itch (trombiculiasis), grain itch (acarodermatitis urticaroides), sporotrichosis. In endemic areas: ground itch (hookworm), chromomycosis, mycetoma, onchocerciasis

ARTISTS: Painters—turpentine, oil thinners, azo dyes, nickel and chromium pigments, glue, epoxy and acrylic resins, linseed oil, woods. Sculptors—clay, stone dust, metals, welding fumes, modeling plastics, plaster. Print makers—acids, metals, glues, solvents. Potters—clay, dyes. All artists—hand cleansers.

AUTOMOBILE MECHANICS: Oil, grease, gasoline, kerosene, rubber, nickel, chromates (primers, anticorrosives), lead, antifreeze, tetraethyl, paints, paint remover solvents, epoxy and acrylic resins, glues, hand cleansers.

BAKERS AND PASTRY MAKERS: Sugar, flour, flour conditioners, lemon, spices (cinnamon), vanilla, azo dyes.

Diseases: Grocer's itch (Tyroglyphus mite infestation), grain itch.

BARBERS AND BEAUTICIANS: Shampoos, soaps, hair dyes, hydrogen peroxide, oxydizing agents, bleaching agents, permanent wave solutions, nickel (scissors and other instruments), hair sprays, perfumes.

CONSTRUCTION WORKERS: Cement (chromium, cobalt), lime dust, epoxy resins, glues, chromium compounds, paints, paint removers, turpentine, woods, varnish, wood preservatives, ammonia, fiberglass material.

CANNING AND FOOD PRESERVING INDUSTRIES: Citrus peels (orange, lemon, pineapple), chromium, preservatives, irritating juices and essential oils (asparagus, celery, fig, lemon, tomato, grapefruit), insecticides, shellfish.

Diseases: Anthrax, erysipeloid.

DENTISTS AND DENTAL TECHNICIANS: Uncured acrylic monomer, local anesthetics (procaine, benzocaine), antiseptics, essential oils (eugenol, clove oil, basalm of Peru, eucalyptus oil), formaldehyde, epoxy resins, impression paste, mercury, nickel.

Diseases: Syphilis, radiodermatitis.

DRY CLEANING INDUSTRY: Glycerin, glacial acetic acid, acetone, benzene, strong alkalis, carbon tetrachloride, ammonia, hand cleansers.

ELECTRICIANS AND ELECTRICAL EQUIPMENT INDUSTRY: Carbon monoxide, Bakelite[®], lacquer, acetone, bitumen, epoxy resins, insulating tape, nickel, soldering flux and fumes.

FLORISTS, GARDENERS, NURSERY WORKERS: Plants, bulbs, woods, fertilizers, insecticides, manure, earth, molds.

Diseases: Sporotrichosis, paronychia.

GARMENT AND MILLINERY INDUSTRIES: Dyes, nickel, formaldehyde, bleaching agents, solvents, carbon tetrachloride, feathers, glue, chromium salts, wool.

HOUSEHOLD WORK: Flowers, plants, polishes, cleansing agents (for woods, floors, carpets, and others), vegetables, woods, (handles of knives, other tools), insecticides, soaps, detergents.

HOTEL, RESTAURANT, AND FOOD INDUSTRY: Borax, formaldehyde, disinfectants, spices, vegetables, fruit juices, soaps, detergents, rubber gloves, woods (handles of knives, other tools).

INSULATING INDUSTRY: Fiberglass, mineral wool, solvents, spray dust of insulating materials, glues.

JEWELRY INDUSTRY: Nickel, platinum, hydrochloric acid, sulfuric acid, shellac, glues, chrome salts, lacquer solvents, cleansing agents.

LUMBER AND WOODWORKING INDUSTRIES: Creosote and other preservatives, plastics, tar oils, lacquers, varnishes, balsam, turpentine, woods, glues.

MANICURISTS: Nail enamel (toluene sulfonamide resin), nail enamel removers (solvents, acetone), artificial nails (acrylic monomer), nail hardeners (formaldehyde).

MEDICAL AND ALLIED PROFESSIONS: Anesthetics (procaine, benzocaine), antibiotics (neomycin, penicillin, streptomycin), plaster of Paris, formaldehyde, soaps (borax and others), detergents, acrylic plastics, epoxy resins, rubber gloves.

METAL WORKERS: Antioxidants, chromates (antirust agents), cutting and drilling oils, sulfuric acid, turpentine, solvents, rubber, cleansing agents.

OFFICE WORKERS: Glues, typewriter ribbons, carbon paper, photocoppying papers, plastics (pens, calculators), nickel (paperclips), rubber.

PHOTOGRAPHY INDUSTRIES: Developers, including color developers (azo compounds), hydroquinone, chromates, reducing and oxidizing agents

ROAD BUILDERS AND REPAIR WORKERS: Tar, asphalt, coal tar, cement, cleansing agents.

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TABLE OF INFECTIOUS DERMATOSES RELATED TO VARIOUS OCCUPATIONS

DISEASE	CAUSATIVE AGENT/VECTOR	OCCUPATIONS
BACTERIAL		
Anthrax	<i>Bacillus anthracis</i>	Butchers, handlers of hides and wools, ranchers, leather industry workers
Bartonellosis (Carrion's disease)	<i>Bartonella bacilliformis</i>	Farmers, rural construction workers, road builders (in endemic areas)
Diphtheria	<i>Corynebacterium diphtheriae</i>	Farmers, rural workers (in endemic areas)
Erysipeloid	<i>Erysipelothrix rhusiopathiae</i>	Persons handling fish, meat, poultry or hides, veterinarians
Glanders	<i>Malleomyces mallei</i> (horses, mules, donkeys)	Animal farmers, stable workers
Paronychia	<i>Staphylococcus aureus</i> , <i>Candida albicans</i>	Bakers, butchers, cement workers, dishwashers, engravers, cleaning personnel
Pyoderma	<i>Staphylococcus aureus</i> and/or group A beta-hemolytic streptococcus	Persons engaged in dirty work: streetcleaners, handymen, automobile mechanics, garage workers, junk dealers
Tuberculosis cutis	<i>Mycobacterium tuberculosis</i>	Physicians (pathologists), medical personnel, embalmers
Tularemia	<i>Pasteurella tularensis</i>	Persons handling rabbits or rodents
VIRAL		
Cat Scratch Disease	Chlamydiae, possibly (cats)	Pet store workers, veterinarians
Cowpox	Poxvirus (cows)	Milkers, dairy farm workers
Foot-and-Mouth	Coxsackievirus, group A (cattle, sheep, goats, pigs)	Farm workers
Milkers' Nodules	Poxvirus (cattle)	Milkers, dairy farm workers
Orf	Poxvirus (sheep)	Shepherds, sheep farmers, veterinarians
Psittacosis	<i>Chlamydia psittaci</i> (parrots, parakeets, ducks, pigeons, turkeys)	Pet store workers, zoo employees, leather workers

A N O T H E R

SEXUAL HARASSMENT

O C C U P A T I O N A L

AND THE WORKING WOMAN

H A Z A R D

A *Saheli* REPORT
OCTOBER 1998

446
9/10/2K

This report would not have been possible without the ready co-operation of the many women we interviewed.

We would also like to especially acknowledge the support extended by several others who helped us gain access to the many workplaces we visited for this study.

In solidarity,
The Saheli Collective

October 1998

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Suggested Contribution: Rs.20/- . (Students and Activists: Rs.15/-)

Saheli Women's Resource Centre

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ANOTHER OCCUPATIONAL HAZARD

SEXUAL HARASSMENT AND THE WORKING WOMAN

SEXUAL harassment at the workplace is a form of systematised violence against women. Most working women at some time or the other face this kind of violence from their colleagues, bosses or employers. Every mode of production has thrown up specific forms of sexual harassment. Women working in fields and mines are often sexually exploited by landlords and *thekedars* (contractors). Women industrial workers also face sexual harassment from factory owners, supervisors, and even from their male colleagues, while women employed in the service sector face harassment from their office colleagues, bosses and clients.

Despite increasing participation of women in all fields of work, changes in social attitudes towards women have not shown much progress. If anything, they have worsened, with violence at the workplace probably on the increase. Women in the labour force are viewed as a threat to the institution of patriarchy. They are seen as 'snatching' men's jobs. 'Women's place is in the house', is the stated as well as unstated dictum. The impact of growing consumerism, the media and the mindless race of profiteering to 'capture the market' have further promoted sexist images of women and a blatant display of male power aimed at subjugating women.

Sexual harassment is any unwanted attention imposed upon a woman. This form of harassment which constitutes acts of mental, emotional and physical violence against women, is often trivialised as 'eve-teasing'. By categorising this intrusive and objectionable behaviour as 'light flirtation' or 'harmless jokes', the seriousness of the offence is masked. The fact that sexual

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— . —

harassment can leave a deep and adverse impact on the psyche, is totally overlooked. A woman's sense of security is shaken by such humiliating acts. Any woman objecting to sexual harassment is looked upon as 'hypersensitive', a spoilsport and lacking in a sense of humour. Raising objections against such behaviour often results in a hostile work environment for the woman, delay in promotion, or even loss of the job. Such implications have discouraged many women from taking action. They find no outlet or expression for their anger and humiliation, and at times, find it difficult to be creative and productive at work. This, again, hampers their chances at promotions and other career opportunities.

SEXUAL HARASSMENT AT THE WORKPLACE:

GAINING MORE VISIBILITY

OVER the past twenty years, the autonomous women's movement has politicised the issue of violence against women and consistently campaigned against it. This violence, in the form of sex-selective abortion, female infanticide, child sexual abuse, incest, molestation, rape, wife battering, dowry murders, widow immolation and witch-hunting has been brought into the public consciousness through protests and campaigns. Though sexual harassment at the workplace is also an age-old problem, women have been left to deal with it on their own, or sometimes with the support of women's organisations. However, there have been no effective legal measures to counter it. The problem received judicial recognition when, on August 13 1997, a three-judge bench of the Supreme Court headed by the Chief Justice delivered a significant judgement on sexual harassment at the workplace, ratifying guidelines drawn up by women's groups.

This non-adversarial petition was filed in 1992 by Visakha, Kali for Women and other women's groups following the brutal gang-rape of Bhanwari Devi, a *Sathin* (village-level worker) in the government-run Women's Development Programme in Rajasthan. Bhanwari Devi, as part of her work, was implementing the official campaign to prevent child marriage, in her village. She incurred the wrath of a group of high-caste *Gujars* when she attempted to prevent them from marrying off their minor daughters. In retaliation, they gang-raped her to 'teach her a lesson'.

The Supreme Court held that sexual harassment at the workplace is violative of Article 14 of the Constitution which guarantees the Right to Equality as well as Article 19(g) which guarantees the Right to Practice any Profession or to carry on any occupation, trade or business. Since the right to work depends on the availability of a safe working environment, and the Right to Life (Article 21) means a life with dignity, the hazards posed by sexual harassment need to be removed for these rights to have any meaning. The Court also directed that in particular, it should be ensured that the victims are not victimised or discriminated against while dealing with complaints of sexual harassment. The Court noted, *It is discriminatory when the woman has reasonable grounds to believe that her objection would disadvantage her in connection with her employment or work, including recruitment or promotion, or when it creates a hostile work environment.* In the absence of specific laws to deal with sexual harassment at the workplace, the Court issued a set of guidelines to deal with the problem.

These guidelines (quoted in italics in this report) are significant from several points of view. First, sexual harassment at the workplace has been recognised as a serious problem. Thus, these guidelines, which are enforceable in law, are a vindication of the struggle to get sexual harassment at the workplace the serious attention it deserves. Secondly, the Court made it mandatory for all workplaces to adopt the guidelines. In addition, the guidelines provide a comprehensive definition of sexual harassment and a redressal mechanism for handling complaints.

As women working in different fields, all the members of Saheli too have experienced harassment of various kinds. At some point of time, most of us have had to deal with frustration, humiliation,

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◆ hostility or uncomfortable and tense working environments. With each situation, ways of coping with the problem have emerged individually and collectively. With the initiation of an institutionalised mechanism of dealing with sexual harassment, we wanted to analyse how far the situation was going to change. We wanted to look into the problems actually faced by women, how they cope with them, and see how far the Supreme Court Guidelines would actually help working women.

◆ The purpose of the present survey was to elicit responses of women in different occupations and professions. The focus was on their own experiences, how they perceived the problem and how they handled it. We also sought their opinions about the Supreme Court Guidelines, the definition it put forth, and the redressal mechanisms envisaged. Women's suggestions and comments about redressal mechanisms like, the Complaints Committee, in order to ensure effective implementation of the guidelines, were also discussed. Alongside, the purpose of spreading information and awareness about the guidelines among working women was also fulfilled.

While we were not aiming for a uniform statistical representation of all sectors, we attempted to cover women in a wide range of occupations and from different class backgrounds. Since the nature, form and degree of sexual harassment varies according to the nature of the job, we tried to talk to women in a wide variety of occupations.

We interviewed 62 women from different areas of work. These included hawkers and vendors (2) and domestic workers (3) from the unorganised sector; factory workers (6) in the export garments industry and a tyre company; nurses (5); doctors (3); a lawyer; bank clerks (4); an advertising agency employee; Non-Government Organisation employees (2); university and college teachers (5); editorial staff in publishing houses (2); journalists (4); scientists (5); junior executives and secretarial staff of small private firms (5); airlines employees (2); clerical staff in Ministries and government departments (11); Class IV government employees (2). The women interviewed were mainly from Delhi, with a few from outside via e.mail. We have also included our personal experiences from the different professions we have worked in. These accounts are not part of the formal interviews. In addition, we have included, where relevant, our experiences of helping a woman pursue her complaint of sexual harassment, which occurred after the Supreme Court judgement.

How we went about it: Every interviewee was given a handout (in Hindi & English) in which the Supreme Court Guidelines were presented in a simple language. A few broad questions were included. Initial contacts were made through Unions, Employees' Associations, friends working in different establishments, and by directly approaching women in various offices and working women's hostels. At certain places, the handout was distributed in advance, and subsequently followed by visits to carry out interviews. We talked to women individually, as well as in groups, depending on the situation.

While some women were very open, many were initially hesitant to talk. A few denied the existence of the problem, and others were reluctant to dwell on the subject. The hesitation to speak stemmed mainly from the shame and social stigma attached to being a 'victim' of sexual harassment, and the social conditioning regarding what is considered to be a 'private' matter. However, a little

prompting and sharing of our own experiences helped to break the ice. Women were then forthcoming and talked about their own or their colleagues' experiences. They spoke of their frustrations, their despair and their struggles. The range of information we gathered and the variety of experiences shared by the women speak of the subtle nature of the problem, and the need for various strategies to deal with it. We hope that this survey can contribute to chalking out strategies towards making the workplace secure for women.

DEFINITION OF SEXUAL HARASSMENT IN THE GUIDELINES

FOR this purpose, sexual harassment includes such unwelcome sexually determined behaviour (whether directly or by implication) as: (a) Physical contact and advances (b) A demand or request for sexual favours (c) Sexually coloured remarks (d) Showing pornography (e) Any other unwelcome physical, verbal or non-verbal conduct of sexual nature.

Many women we interviewed found the definition adequate and inclusive. However, some said, "though it sounds broad, it is very vague." A lawyer we interviewed pointed out, "It leaves too much to interpretation and depends heavily on the person who is adjudicating. For instance, the word 'unwelcome' is not very clear, and notions like 'sexual' and 'non verbal' are open to interpretation and can very easily be struck down."

Some women opined that it is not possible for any legal definition to anticipate the kinds of situations women find themselves in. According to a member of Saheli, who is also a journalist, "Travelling alone at odd hours, landing up in new places in the middle of the night or staying alone in lodges in small towns are all more difficult for women. To feel secure in these situations, one needs an overall change in attitudes to women rather than only legal provisions."

Some women opined that discrimination against women at the workplace does not necessarily constitute sexual harassment. Said a scientist, "The difference between gender based discrimination and sexual harassment is very difficult to define." (See Box on page 15)

One opinion was that the psychological impact of sexual harassment on women should be reflected in the definition - the humiliation, the insults and the emotional injury caused by such harassment should be made visible.

It is assumed that all categories of workers in the unorganised sector are covered by the guidelines. While this is implicit in the definition, we need to be alert that it is applied in practice, because the unorganised sector comprises the largest section of working women who are very vulnerable to this form of harassment amongst many other hard working-conditions.

Having talked to women who do not have a well-defined 'workplace', we also feel that the definition of 'workplace' should be widened. For instance, in the case of hawkers and vendors, the streets



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become the workplace. Also, for some categories of self-employed women, their homes are also their workplaces. In the context of sex-workers demanding recognition of sex-work as a profession, the issue of sexual harassment at the workplace also needs to be addressed.

DIFFERENT WORKPLACES, DIFFERENT EXPERIENCES

WOMEN narrated a wide range of experiences of the nature of sexual harassment they have faced at work. They spoke of 'explicit' or direct sexual harassment as well as 'subtle' and indirect forms of sexual harassment. Most women have experienced the potential threat of sexual harassment and many spoke of its very frequent occurrence.

Women in the public sector and in government jobs had a mixed reaction to the nature of harassment they, their friends and colleagues faced. While a few denied its occurrence in their offices, most accepted that it does take place, and expressed a need to do something for its redressal. Even those who denied the occurrence in their offices, agreed that they had heard of such cases through friends or newspapers. Among the reasons cited for the non-occurrence of such cases were : job security which gave them a certain level of protection; strong unions; strict service rules and transferable jobs. **Bank employees**, for instance, with transferable jobs, claimed that they do not fear prolonged harassment or blackmail. The level of protection that women in the public sector enjoy is equally applicable to offenders. One woman pointed out, "the reverse too is true: even offenders enjoy protection." Nevertheless, the bank employees we interviewed, said that they constantly face a subtle level of harassment in the form of comments about their dress, make-up or hairstyle. One bank employee complained of male colleagues deliberately discussing film heroines in a "not-so-decent" manner, especially in the presence of women. Staring fixedly at women colleagues till some eye contact is made, or the person gets noticed for his stares, is yet another common experience faced by many.



"Looks and comments are constantly directed at us. Men crack jokes with sexual innuendoes, and laugh heartily at small jokes, especially when women are around"

We interviewed **clerical staff from six different Ministries**. One secretary said, "Looks and comments are constantly directed at us. Men crack jokes with sexual innuendoes, and laugh heartily at small jokes, especially when women are around." She also related another incident where her male colleague went around showing a news item of an American woman teacher having raped her male student who was a minor. He discussed it over and over again with women colleagues. The woman who shared this with us frustratedly said, "This is nothing but

harassment. But it is so difficult to prove, or pin point. Men do all this in a light manner to enjoy themselves, and if you confront them, they deny that they are doing it to harass women." Especially when they are new recruits, women are unable to raise the issue. In another instance, a Director wanted a South Indian secretary in particular, because "Southies" are generally assumed to be more docile. As migrants being away from home in a city like Delhi, they are more vulnerable

due to a lack of a social support structure. The Director would stare at his secretary all day long, through a mirror placed at a 'suitable' angle. In due course, he shifted his desk in front of her. Unable to take it anymore, the woman complained and sought an internal transfer. The Director was given only male secretaries after this incident!

These experiences indicate that although women do enjoy job security in permanent government and public sector offices, they nevertheless face sexual harassment. The atmosphere in many of these offices can be emotionally and mentally quite disturbing.

In the private sector, job insecurity, because of the nature of employment and the lack of enforcement of labour laws, contributes to the occurrence of sexual harassment, as well as making the victim more vulnerable to such harassment. They stressed the problem of job insecurity because their jobs in many instances were ad hoc, temporary or on contract. An office assistant in a private firm said, "Sometimes women are unable to resist advances from male seniors or employers because of the fear of their losing jobs." The unstable nature of their contract and the scarcity of jobs renders women in the private sector much more vulnerable to sexual harassment. In a job interview, one woman was told, "You look beautiful in this red dress." Nothing else was asked! Although she got the job, she did not join. In another case, a woman was gifted a mobile phone by her boss. He uses it at all odd hours to chat with her. Though he had not made any objectionable remarks until then, she had begun to realise the price she had to pay for the 'gift'.

A computer professional in a private firm mentioned harassment by colleagues of the Accounts Section before passing bills. Unnecessary and embarrassing questions were asked, putting her in a very awkward position. In several instances, women complained of having to unnecessarily stay back late. One employee described how only girls are asked to stay back after office hours. In another office, all work was brought to the woman only towards closing time, leaving her with no option but to stay back. A member of Saheli, who worked as a personal assistant in a renowned private firm recalled that she was never given any work during the day. Towards evening, she was asked to stay back. If she refused, the following day she was held responsible for the firm having lost out a contract because of her absence. "This kind of behaviour was obviously aimed at forcing me to stay in the office in the evening, and make me feel guilty if I refused," she said. In general, women in private firms are much more secretive and share these experiences less openly with each other as compared with women in the public sector. The fear of reprisals and insecurity of their jobs contributes to this culture of silence.

Airlines professionals whom we interviewed said that they did not face any sexual harassment. This could possibly be because most of the supervisory and managerial-level staff, especially in international airlines, are women. Moreover, women employees are on par with male colleagues vis-a-vis grades, seniority, responsibilities, positions and salary. However, the same is not true for flying staff, now called 'flight attendants' rather than airhostesses. Despite unionisation, and the

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move to enhance their respectability, flight attendants continue to be easy prey to senior flight crew, ground crew, male rostering officers as well as passengers. According to a member of Saheli working in the Airlines industry, "Female flight attendants are harassed in various ways - from subtle sexual advances and over-friendliness to passing remarks on their looks, about their uniforms; frequent calls to attend passengers or cockpit crew; phone-calls in their hotel rooms etc." Often duty rosters are manipulated in order to harass the flight attendants. "They are more vulnerable since they are away from home, alone and unprotected in strange foreign lands, confined to hotel rooms with no support systems. Another aspect is that most of the flight attendants are young and attractive, earning very well, and have gained sudden freedom. Some of them may find it difficult to distinguish the range from friendliness to sexual advances and exploitation, leaving them vulnerable to sexual abuse."

The academic world is not free from sexual harassment. A Reader in a college in Delhi University reported how in a Pali language class that she was attending, the teacher used examples that could not be taken in 'good taste'. "I used to feel very uncomfortable about it," she said. She also described how the power relationship between teacher and student is utilised to harass students, especially research scholars. However, cruder forms of harassment also occur on the campus.



Another Reader in a Delhi University campus college has had to face severe harassment because of the support she extended to a female employee who had complained against sexual harassment. The Reader was verbally abused by one of the culprits, and one of her male colleagues even tried to assault her in the staff room.

The scientists we interviewed spoke about how harassment takes place at a more general level with inane sexist humour and gossip. Individual instances were reported of male colleagues forcibly seeking a friendship to the point of harassment. A scientist talked about how a colleague tried to get close to her, and in a drunken state made advances to her at an official party. Though she did bring it to the notice of the senior scientists present in the gathering, she was told to calm down and not make a 'big deal' out of it. A scientist of a premier research institute had once submitted a list of items to be provided in the "Ladies Toilet". A huge discussion ensued in the Administration Section as to whose job it was. She was summoned and questioned in detail about what each item - mug, bucket, dustbin - was needed for. In her words, "Needless to say that the matter was discussed and made fun of for almost a month in the corridors by all classes of employees - from peon to the head of the institution." This was in 1996, and until the date of interview, the request was unfulfilled. Scientists generally tend to work late hours, especially if campus-based accommodation is available. In such a situation, unless adequate security measures are provided, the chances of sexual harassment are quite high, said one scientist. For instance, a senior scientist reported that her junior female students complained about a sweeper who would stalk them on campus, and look at them peculiarly. She talked to the concerned authorities, who ensured that the man was posted for duty in places where his interaction with female students was minimal.

Women in the legal profession have to face various kinds of discrimination. According to a lawyer we interviewed, "Senior male lawyers wield a lot of power. The whole atmosphere among

the legal 'fraternity' is male-dominated, and can be quite intimidating, especially for a young woman lawyer." The attitudes of judges, male colleagues and seniors is 'non-serious', according to this lawyer, "Many of them 'lech' at you all the time". Lawyers are also not exempt from physical molestation. In one extreme case, a woman lawyer was manhandled by the Bar Association President in front of a number of people. Following this incident and her subsequent complaint, she faced severe hostility from other lawyers, and found it very difficult to practice.

Journalists stressed that it is the younger and newer entrants into the profession who get targeted for harassment. They are very often not in a position to judge the implications of what may appear to be a simple thing like being invited to the boss' room for a cup of tea. In one instance, a journalist was constantly proposing an affair to a woman colleague. Though there was no touching or vulgar language, the fact that it went on with unflinching regularity despite her brush offs, led her to complain about him.

Another journalist spoke of an incident that occurred several years ago. A well-known senior journalist once asked her, "Do you know what it means when a woman wears lipstick of that colour..? It means you're willing to do a blow job." She recalled how naive and young she was then - she did not even know exactly what it meant, apart from the fact that it had some sexual connotation. She never again wore lipstick to office. It is extremely traumatic for young inexperienced journalists embarking on their careers to have such encounters with their seniors. Pointed out one journalist, "Editors are far too powerful." Some editors are notorious for seeking out every young female trainee to sleep with them. Besides, journalists often have to deal with advances made to them by men they go to interview. Celebrities, assuming that their status gives them license, sometimes make advances to young journalists, who least expect such behaviour from 'well-known personalities.' What is worse, according to one journalist we interviewed, is the attitude of male editors who tell them not to make a fuss, and take it in their stride as part of the profession. Out-of- town assignments could lead to awkward situations like having to share a hotel room with a male colleague/boss, and are often the source of tension and heighten the likelihood of harassment. The vulnerability is more because of the lack of support when one is out of town. Late night shifts also leave women journalists more vulnerable, especially when the office vehicle is not made available.

"Some editors and celebrities are notorious for making advances to young journalists"



A woman working in an advertising agency revealed several traumatic incidents she had gone through. One incident she narrated involved the owner of the agency who used to make passes at her, since she was young and unmarried, or 'available' in his eyes. Her boss, though sympathetic, was unwilling to take any action. "The 'brotherhood' always protects each other," she said bitterly. As a result, she left that agency.

Speaking about another incident helped her to understand and analyse that what she had gone through was sexual harassment, and not merely a relationship gone sour. In another agency, her boss, the Branch Manager, began flirting with her right from the interview. "I didn't think much of it, since men in advertising are like that - flirtatious, familiar and 'cool', but they don't really do anything." Professionally, this woman was having a tough time, so her boss would spend a lot of time with her.

To show his concern he would drop the women colleagues at the autorickshaw stand. He would also take them out for a drink now and then, on the plea of 'developing' his staff. "Actually, in the beginning, I was flattered that he was talking to me, privileged that a senior in the agency was taking interest in me and my work. He was a kind of demi-God figure." But when she talked once to another colleague, she realised that he was playing up to her as well, sharing confidences about his troubled marriage etc. "This 'moulding' of young minds works as an aphrodisiac for these middle-aged men. How come they always try it with juniors, never with women who are on an equal footing? Soon, I began to feel cheated, and didn't want to be part of his power play." She then started shying away from him, but things at work got unpleasant. So much so, that she finally had to leave this job as well. "Even in consensual relationships which develop in the office, there is an element of inequality when bosses get involved with their juniors," said this advertising professional. These unequal relationships also have a bearing on one's professional development, she said.

A member of Saheli who has been in advertising since long and also makes documentary films, drew attention to some other situations in this field. "My first exposure to the ad-agency set up was as a young trainee in Bombay. In a matter of days, I realised that on one hand it was great to be in a place which didn't expect you to behave in a formal, stuck up way, because the average age in most agencies, especially in the creative department is barely mid/late twenties - so the atmosphere is sort of college-y. But the flip side of this was that being there entailed bearing with the bratty behaviour of young men which also included constantly tolerating a lot of dirty jokes [read dirty male jokes] that you weren't quite sure were not directed at you. Those are my earliest memories of feeling uncomfortable in the workplace."

She added that clients also could be lecherous. "One of our biggest clients was the sleazy kind who would be chivalrous enough to hold the door open for you, while of course laying his hand on your back." Both advertising professionals also pointed out that since timings in the advertising business are also haphazard with late nights, working at studios etc., it is imperative that women have a sense of security among colleagues, adequate transport arrangements, etc.

According to a woman running a Non-Government Organisation (NGO), women working in the 'voluntary sector' or NGOs are very vulnerable to sexual harassment because they are already beyond the conventional social norms, working ostensibly to change the existing situation. They work during odd hours, travel to remote places, and interact with men at different levels. "The power relationships are more personal based, since the structures of NGOs are more flexible and there is an air of informality. Here, the boss also has an 'ideology' on his side to impress the juniors with and take them to bed." She further added that women in this sector are more vulnerable because they expect to be 'safe' in such workplaces and among supposedly progressive colleagues.

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Because women in this field are usually less conservative, men feel they can take liberties with them. "With the personalised relationships in the office, speaking about sexual harassment becomes more difficult, because it is viewed as disloyalty, and exposing the whole voluntary sector, which is supposedly more sacrosanct than the corporate sector."

An NGO consultant working in a funding agency narrated an incident that occurred when she was attending a meeting out of town. The woman she was sharing her room with, broke down in the middle of the night. While sobbing, she related a harrowing story. This woman, who worked

alongside her husband in an NGO in a rural area, told her that her husband was constantly making advances to young village girls. He openly seduced the girls with his charisma and charm. Nobody dared to confront him, especially not his wife. "She made me promise not to tell anyone in my office. In any case, I do not have enough power to do anything. I do not know what can be done if those who are being victimised do not expose him," said the consultant.



She related another incident, which occurred during a training workshop in Bihar. "A 20 year-old unmarried village girl suddenly started bleeding profusely, and became incoherent. We rushed her to hospital, and found out that it was a miscarriage at an advanced stage of pregnancy." When the girl was a bit better, she began talking, but denied the pregnancy, and kept on crying. Her friends consoled her, and told her to admit that the Director was responsible for making her pregnant. But the girl was in a state of shock and did not disclose anything. "I was helpless. The workshop had got over by then, and none of the senior-level people of the NGO were around, so once the girls left for their village, I returned to Delhi." In Delhi, the consultant, on hearing that the Director of that same NGO was in town, informed him of the incident, suggesting that he rush back, or at least send some money to cover the hospital bills. "But he was very casual, and didn't do anything. Since the girls had not admitted anything to me, I could not confront the Director. Even if it was a consensual relationship, it is so unequal and exploitative. But his extreme indifference confirmed that it was not a relationship to him - just using her for sex." According to this consultant, such occurrences are quite common in large NGOs with field staff. Employees are terrified to speak out, since they are usually young and unmarried, coming from poor backgrounds and jobs are not easy to find.

"A pat on the cheek or the shoulders by doctors in the operation theatres or wards was very common. But we were too timid and scared to complain"

This is confirmed in the first hand experience of a field-level staff member of a well known NGO in Orissa, who has been arbitrarily dismissed from work. In a public appeal for support, she has drawn attention to women facing sexual harassment in NGOs. In her words, "Many heads of voluntary organisations and senior employees sexually exploit women workers by threatening them with the loss of jobs if they do not comply. I myself know of many such incidents. These women are not able to reveal anything for fear of losing their jobs, social stigma and further sexual assault. It is tragic that those who are appointed in voluntary organisations to work for people's well being and empowerment are themselves denied conditions of minimum security" (Translated).

We interviewed one of the five junior **doctors** of Maulana Azad Medical College, who in 1996 filed a case of sexual harassment against the Head of the Department of Dermatology and Venereal Diseases. The doctors had been tolerating his dirty jokes, obscene remarks and light talk with sexual innuendoes for a long time. They finally decided to take him to task when he locked one of them in an OPD-room with a naked male patient. A long protest action and campaign ensued and the case is still pending in the courts.

A member of Saheli, who is a doctor, related many instances of harassment that she and her colleagues faced in the beginning of their internship. A pat on the cheek or on the shoulders by seniors and consultants in the operation theatre or wards used to be very common. "We never complained to the HOD or the MS, as we were scared, timid..." Light jokes would be made by male colleagues while they used to be on 24 hours duty. Since there would be only one Doctors' Duty

Room, a senior had once joked that they could all sleep together! Such instances used to be very unnerving for her. Two other doctors of a premier government institution said that women doctors do face harassment when they are new in the profession. One of them related a harrowing incident she had faced in her early years. An Associate Professor once started talking about penile erection, completely out of context when she was meeting him alone in his office. He went further to explain to her the functioning of an instrument that is used to measure erection in cases of male infertility and impotency. She felt extremely disgusted with the man. It was only after a long time that she realised that the incident was nothing short of sexual harassment.

Some of the nurses in a government hospital were hesitant to admit that sexual harassment does take place. They repeatedly emphasised the protection of being unionised. The reluctance to speak could possibly be because they felt that their profession does not get the respect it deserves. They felt that they are accorded lower status than doctors, even though they too go through rigorous training. Moreover, there is an underlying speculation that nurses are romantically



"I once heard the relatives of a patient discussing me. They said, Isn't she nice? Would you like to have her?"

involved with doctors they work with. An office bearer of a nurses' union at a premier medical institute said that their demand to scrap western style uniform and adopt saris as their uniform was linked to the denigration and trivialising of the nursing profession. Despite initial reluctance, the nurses came up with all kinds of incidents that occur. In one instance, a young resident doctor caught hold of the nurse on duty in the ICU and kissed her. An enquiry was conducted, and finally his services were terminated.

A shocking incident involved a nurse who had sent an acquaintance of hers to the Medical Superintendent (MS) for a job in a premier government hospital. The MS promised the job on condition that the applicant went out for dinner and spends the night with him. She fled, and informed the nurse, who complained against the MS. The MS then claimed that the nurse was suffering from psychiatric problems and got her admitted into the ward. The MS is apparently well-known for seeking a night out with every young woman he comes across at work. Very recently, he has been suspended on charges of corruption.

Nurses face harassment from outsiders too. One of the nurses narrated how, when she was attending to a patient, she overheard the patient's relatives talking about her, "Isn't she nice? Would you like to have her?" She added that such experiences are common, but they have to learn to ignore such remarks.

These nurses stressed that their employment in a government institution offered a relatively high degree of security from sexual harassment. This protection was sorely lacking in private nursing homes characterised by low wages, longer working hours and no job security. Moreover, since many of the new entrants into the profession are migrants from Kerala, they are less capable of defending themselves from sexual demands linked up with job security. Being new to the city, unfamiliar with the language, and often dependent on the job for their housing too, leaves them more open to exploitation. Unfortunately, we were not able to speak to any of the nurses currently employed in private nursing homes, though some of the nurses we interviewed had at one time worked in private nursing homes.

A Class IV employee of a government hospital narrated how friendliness with a male colleague at the workplace leads to jealousies. Other male colleagues then try to play up to the woman,

and if she does not respond 'positively' to them, they take revenge by spoiling her image, giving her useless tasks and tampering with her records. She added, "Male colleagues would play games like messing up hand-over procedures at the time of shift change, and try to damage my professional record." She also pointed out how men would use "*ma-behen ki gaali*" (sexist abuse) and always address women as '*tu*' instead of the more respectful '*tum*' or '*aap*' - forms of address typically used by women to men. All this, she felt, contributed to a threatening and unpleasant atmosphere at the workplace.

We found that the frequency and severity of sexual harassment tends to increase as the security of the job and income levels go down. The industrial workers we interviewed spoke very openly, without the least hesitation. A couple of women were actually amused by our questions as it is such a routine matter in their lives. Some others spoke with anger and humiliation, almost breaking down as they related their experiences. The extreme case is that of a tyre company in Jhilmil Industrial Area where women workers are always addressed in filthy language full of sexual abuses, and are treated as sex-objects. They also face physical assaults. The 'normal' conversations are also very humiliating. Said one of the women, "If any man is seen talking to us, he is asked, "*Pata rahe ho kya? Bahar le jana hai kya?*" ("So, you are playing up to this girl...do you want to take her out?") If anyone is wearing a new dress, she is told, "Some man must have given you this dress." Similarly, when any woman asks for leave, she is asked, "So, you want to meet your lover? Are you feeling all heated up?" A 54 year-old woman, upon applying for one day's leave, had to hear the manager telling the supervisor, "*Uske peechey 6 laundon ko lagaa do. Bahut aag lagee hai. Aur chutti nahi legee*" ("Set six guys after her so that the heat cools off and she won't ask for more leave").

We found that sexual harassment as a form of control over women workers is a common practice. In another extreme case, a worker who was suspected of theft, was stripped and sent out of the factory completely naked. Women also spoke of security guards unnecessarily touching their breasts and genitals while conducting security checks. While male workers are slapped and kicked, women are sexually assaulted. "When they attack us, sometimes they pull our bra straps. Supervisors also catch hold of our breasts." The management uses all kinds of methods to humiliate the workers, through their supervisors. As commented a woman worker, "If they did not encourage it, why would supervisors do it?"

The above point was reiterated by a woman worker in an export-garment factory in the industrial area of Okhla. "Managers give a long rope to supervisors to keep us in place. And constant verbal abuse is part of it all. Managers never tell supervisors to behave properly towards us." Women in these garment factories are per force putting up with provocative comments, casual remarks in passing, vulgar film songs, comments on their looks etc. Use of derogatory names, the age-old tactic of brushing past them, vulgar gestures and loose talk about women in their presence is an every-day affair. These workers said, "Men laugh at us for no reason, and their gazes remain fixed on us."



"In the export-garments industry, they see our faces and give us jobs. We have to be young, good-looking and smiling"

Women's skill often seems to matter less than physical appearance. "In the export-garments industry especially, they see our faces and

give us jobs. We have to be young, good-looking and smiling." Women are hired for their looks, despite years of work experience. One woman who went for a job interview had this to say: the Manager, after one look at her told the person who had brought her, "*Hamne ladki laane ke liye kaha tha. Tum is budhiya ko utha laye ho?*" ("We had asked for a girl, and you have brought this old woman?") This woman, in her early thirties, is facing difficulty in finding work because of the preference for young and docile girls. In a similar situation, when a woman questioned the manager, "Why don't you ask me about my work?", she was told, "*Kaam to aadmi sambhaal hi lete hai. Dekhne ke liye koi sundar chehra bhi to chahiye*" ("Work can be taken care of by men but they need a pretty face to look at too").

The supervisors are constantly in pursuit of some girl or the other. Penalising the other workers or terrorising them into silence goes along with it. In one factory, the manager would take one of the young women workers under a huge table and be there for 3-4 hours. The electricity would be disconnected to darken the place. Everybody knew what was happening, but nobody could complain against the manager. As a result, the output of the workers would also suffer.

The three domestic workers interviewed spoke openly about having to put up with offers of money in return for sexual favours from their employers or their relatives. A domestic worker was repeatedly approached by the male employer who would catch hold of her hand and urge her to sleep with him. One day, he thrust a Rs. 100 note in her hand and pressurised her further. She finally threatened him, "If you insist, I will tell your wife," and the employer immediately backed out. In one posh apartment building, an employer insisted that the woman give him a body massage

The frequency and severity of sexual harassment tends to increase as job security and income levels go down



with oil. She avoided it a couple of times. When he plainly told her that it was part of her work to keep him happy, she got very scared and quietly slipped away from the house. She did not go back even for her salary. In another case, a domestic worker related how she was quite content working for a family, which was very decent. The arrival of a male relative for a few days brought trouble. He looked at her from head to toe and in a short time made her an offer. He said he would give her the same amount of money she was earning if she would sleep with him. She reported this incident to her employer, who believed her but did not take any action. This domestic worker chose to leave that house. She never felt secure in any house for years after this incident.

The hawkers and vendors we interviewed said that they do not specifically face sexual harassment. However, they spoke of regular harassment by the police, private security guards of shopkeepers, and staff of the New Delhi Municipal Corporation (NDMC), all of who try to prevent them from selling goods on the pavements. "They pull our arms, and while confiscating our goods, there is usually a scuffle, during which we sometimes get hurt."

Although we were unable to cover each and every area of women's work, yet, this modest number of interviews has provided a broad spectrum. We found that despite the wide prevalence of the problem, this systematised form of violence is yet to get more recognition. While fewer women face the fear of job insecurity, it is a major obstacle for the majority employed in small private firms and factories to directly take action against such harassment. Women in the unorganised sector are particularly more vulnerable in the absence of any protective legislation. Needless to say, the

frequency and severity of harassment increases as we go down the income levels of working women. While some confront the harasser openly, many women choose to ignore, take precautions, modify or regulate their interaction at the workplace. For a larger section of women there is no other option but to tolerate harassment - with anger and humiliation. These coping tactics speak of both resistance and the fight for survival in a hostile work environment.

SEXUAL HARASSMENT AND GENDER DISCRIMINATION BLURRED LINES OF DISTINCTION

Discrimination against women, although prohibited under the Constitution, is rampant at all levels in different professions and occupations. This inequality assumes many forms, such as denial of opportunity in a range of typically male-dominated fields like science, medicine and engineering. Women are often not taken seriously, and their work contribution is not given due weight. Women labourers do not get equal wages as men, despite laws declaring that women should receive "equal pay for equal work". Agricultural labour, construction labour, even labourers in the government's employment guarantee schemes do not receive equal wages.

The issue of gender discrimination at the workplace was raised by a number of women in the course of our interviews. A lawyer said, "As soon as I joined the profession, I faced a gender bias. The attitude of male colleagues and judges is non-serious. Either they don't take you seriously or they laugh at you. Many times junior women lawyers are not given work by seniors." She felt that this type of harassment causes a lot of mental tension but that it is difficult to relate it to the definition of sexual harassment in the workplace, as given in the guidelines. She further added that once a woman is able to establish herself and gets an equal footing, gender discrimination is a way to keep her down. An employee of a small private firm pointed out that in many offices women are asked or made to do more work than men. The new entrants especially, are asked to work for longer hours. This may not directly be sexual harassment, but the fear of such harassment is ever present. An editor of a publishing house said, "My own experience suggests that for many women the issue is more about gender discrimination than sexual harassment as such: being passed over for promotions, being paid lower wages, being on less secure contracts, fighting for acceptable maternity leave, child care provisions, etc." A scientist said that discrimination at the workplace is quite often anti-woman and does not necessarily constitute sexual harassment. These and many other observations in the interviews emphasised on a strong gender bias, which is equally damaging and traumatic for women. It trivialises women's work and is a total non-acceptance of women on an equal basis.

In our understanding, when gender discrimination is so rampant in almost every area of work, sexual harassment finds an easy ground. This structured form of violence occurs in a context of unequal power relationships. Thus women do get victimised by the employer, the boss, the contractor, the manager, subordinates and colleagues too. Focusing on this form of violence in no way reduces the vast spectrum of gender discrimination. Highlighting sexual harassment is a concerted attempt to give recognition to a specific form of violence women face at the workplace. We have to confront it directly as part of our struggle to put an end to all forms of discrimination against women.

EVERYDAY STRATEGIES FOR SURVIVAL

WOMEN grow up having faced sexual harassment ever since they are very young. In varying degrees, women learn to cope with it in their own ways. A feminist sociologist opined, "As we all grow up accepting in some way or the other this kind of intrusion in our physical and private space, we take it for granted (unfortunately), and learn to accept it to some extent." A 29-year-old lawyer confirms this view, "I have faced a lot of harassment and teasing in school and later in the Law Faculty. In a way, you get used to it..... If I want to stay in this profession, I have to learn to deal with it." 'Learning to deal with it' comes with the experience of coping. At the workplace, there is no escape from the perpetrators of this form of harassment. As our interviews confirmed, women evolve a variety of ways to deal with it.

A senior journalist suggested, "It is better to try to establish equations at the workplace differently. Then you get treated with more respect. For instance, calling seniors 'sir' to avoid

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familiarity, dressing conservatively, etc." Another way of coping seems to be to act hostile. A woman working as an UDC in a Ministry said, "I simply snub men. It works. Be hostile. Give dirty looks. Snap at them. You do not need to do more than that." A Class IV employee in a government hospital said that offence was her first defence. "You have to be careful not to be too friendly with men. I always behaved with coldness to create a distance between us." Altering one's own behaviour, emerged as a common method of coping. A curb on one's natural behaviour becomes essential to keep male colleagues at a distance. A clerk at the Ministry of Railways says that she does not engage in verbal fights. She suggested, "Give a cold and stern look ... sit like that. It's painful, but it works." This

idea is echoed by a nurse at the AIIMS, "Be stern. Dress simply. Laugh less. Giving a blank look also helps." In this way, each woman discovers 'what works'.

Many women simply ignore all kinds of harassment without showing any visible reaction, which, needless to say, is a difficult proposition. Another Ministry employee said, "It is better to ignore than to fight..." Women usually give vent to their feelings when they meet for lunch or as they leave their workplace. Finding some outlet for their anger and humiliation with friends, gives some relief. "We have our own circle of friends in the office. We share and discuss everything. If one of us is feeling low or disturbed, she is cheered up by the others." One journalist said that she made a special effort to have a number of friends at the office. A couple of women workers stated that they could only talk about it while walking back home. "We crib about it on our way back. We abuse them amongst ourselves. It takes care of our tension. What else can we do, other than share in this manner?" What emerged was that middle-class employees do not usually confront colleagues, but resort to more passive ways of coping, such as ignoring and giving stern looks.

In contrast, factory workers said that they often settle disputes there and then if it involves a co-worker. It is mostly harassment caused by supervisors or the management that they feel helpless

against. Workers in a tyre company in particular feel terrorised by the daily sexual harassment by their 'superiors'. When asked how they cope with it, the answer was simple - hope and prayers. In the absence of any source of support, this is the only option. As one worker put it, "Everyday, every second, we keep hoping that we are not humiliated. It can happen any time to any one. So we keep praying to God, 'don't let it happen today'." The humiliation and shame women feel in the oppressive atmosphere of this factory is described by another woman, "This factory is notorious for all this. I don't tell my neighbours that I work here. If my children are asked, they have been told to say I work in a hospital."

In the absence of laws and guidelines, women have over the years developed their own mechanisms to cope with this menace. One reason for evolving such coping strategies is the general sense of futility in making complaints or from the feeling internalised by social processes that such incidents are a part of life. It remains to be seen whether the Supreme Court Guidelines can complement such coping tactics and strengthen these ways of resistance.

TO SPEAK OR NOT TO SPEAK ? A PERENNIAL DILEMMA

Sexual harassment has for long been shrouded in silence, not just at the workplace, but in the home, the community and on the roads. In the workplace it has been portrayed as a 'natural' corollary of stepping out of the home and entering the 'big bad world'. Women have been conditioned to believe that they should prepare themselves mentally to face such incidents and not make a big deal of it. Women are reluctant to come out openly and complain against sexual harassment for a number of reasons.

One major reason is the shame associated with such harassment and the fear of being blamed for it or looked down upon by others. There is also an overwhelming sense of guilt imbibed over the years through social conditioning. Women feel that somehow, they are themselves responsible for what has happened. As in the case of rape, where the victim is made to suffer socially and psychologically, a sexually harassed woman also lives with a number of apprehensions. One nurse, for instance, said, "If we make too much noise about these incidents, we may not be able to get married." The stigma attached to the victim of sexual harassment is enough of a deterrent, which leaves women with little choice.

In addition to social humiliation, women do not complain because they feel that no one will believe them. It was pointed out by many women that both, male and female colleagues, tend to find fault with the woman complaining of sexual harassment, for instance, calling her aggressive, a trouble maker, a drug addict, etc. In one instance, the MS of a premier hospital who was charged with sexual harassment retaliated by declaring that the complainant, a nurse, was insane. He got her admitted into the psychiatric ward. A woman who dares to complain against sexual harassment is seen as bold and aggressive - traits which are not regarded as positive for a 'feminine' personality. On the other hand, seniors, bosses and employers when accused of sexual harassment, allege that the woman complainant is inefficient or lazy, and in order to cover up her



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own faults is making out a case of sexual harassment. A member of Saheli who has worked in an advertising agency also pointed out that in the male-dominated world, professional women feel that raising the issue of sexual harassment may detract from their 'professionalism'. In order to mix in as 'one of the boys', women often attempt to avoid projecting their identity and their problems as women.

Many women pointed out that women who complain of harassment are never taken seriously. Instead they are laughed at and become objects of ridicule. One woman said that people start looking for excuses for not taking an unequivocal stand in favour of the victim. For instance, they may say, "Her character may be dubious, she might have provoked the man, she may actually be involved with him sexually, etc." Unfortunately, there is a general presumption that those who face such harassment are some kind of 'bad' women, while 'good' women would never find themselves in such a situation. Women colleagues too are reluctant to get identified with such a woman. This seems to stem from a belief that if women behave in accordance with the limits set by a male dominated society, they can save themselves from such harassment.

Women who complain also become the subjects of office gossip - a fate that many wish to avoid. Lack of support within the office was also cited as one of the reasons why women do not protest against sexual harassment. Colleagues - both male and female - hesitate to support the woman for fear of inviting disfavour of their boss or accused colleague and hence the woman is usually isolated and left to fight a lone battle.

A feminist university professor pointed out that opposition comes from those who refuse to recognise that such things happen. When anyone points out such harassment, there is a general feeling, "This person wants to create a problem for her colleagues and for the institution." She also observed that this could also be viewed as part of the process of the decline of democratic traditions, for example, of trade unionism in colleges. This contributes to the isolation of women who then have no space to protest against injustice.

The repercussions of raising the issue of sexual harassment also act as a deterrent against complaining. This feeling was echoed by many other women who had tried to pursue their own cases of sexual harassment or had tried to help a colleague or friend who had gone through such experiences. A senior lecturer in a Delhi University campus college narrated how she almost single-handedly pursued the case of a Class IV female employee in her college who was sexually harassed. As a result, the President of the college Karamchari Union tried to hit her. Since she tried to mobilise outside support for putting pressure on the college Governing Body and the Inquiry Committee, she was viewed as a threat to peace on the campus. Matters reached such a head, that a case was registered against her. Thus, besides the stress and strain of following the complaint through, she had to deal with criminal cases too. Many women pointed out that working life becomes so uncomfortable once you raise the issue that it is difficult to continue in the same workplace. "Especially in small organisations, once you make a complaint of this nature, you have no future."

Another major reason for not complaining against sexual harassment is the fear of dismissal and lack of job security. In the private sector and amongst women working in the unorganised sector, the possibility of losing the job acts as a major deterrent in reporting such cases. Women working in garment factories on piece-rate basis told us that though the harassment they face is open and routine, they cannot complain. If they do so, the supervisor rejects their pieces and finds unnecessary fault with their work. The management refuses to listen to their woes and sides with the supervisor, claiming that it must be the woman's fault. Women workers are threatened that they will be chucked out of their jobs if they persisted in their complaints. Co-workers, although they witness harassment, do not intervene because of economic necessities and fear of losing the job: "Why invite trouble unnecessarily?".

At a practical level, women stated that it would be very difficult to prove this kind of harassment, given the nature of evidence required. Taking the issue to court or any redressal committee only adds to the harassment of the women, it was felt. The fact that the complainant has to keep repeating what happened is another deterrent. In addition to the trauma of sexual harassment, the woman has to 'expose' herself to everyone she approaches for redressal - the boss, the police, the lawyer, the press, and the judges. The endless number of dates and appearances is seen as a source of protracted harassment. Taking leave from work to attend to the follow up of the complaint is also seen as impractical. Given all these hassles, it is no wonder that women think twice before making a complaint against sexual harassment. With our own experience of the legal system, it is also not surprising that even though women do make complaints, the obstacles in the way of pursuing the case till the end often forces them to drop it somewhere along the way. Moreover, there is also a general feeling that even after all the bother, nothing comes out of such complaints.

REPERCUSSIONS OF COMPLAINING: THE TRIALS AND TRIBULATIONS

The repercussions following the lodging of a complaint usually add to the mental torture of the woman who is sexually harassed. For instance, a lawyer who was molested some time ago, by the then Bar Association President and his associates, was made to suffer even more after she tried to file a case against him. Not only that, the police refused to intervene. Her career too suffered, since she was thrown out of the Bar Association, and had to face a hostile atmosphere at the Sessions Court where she practised. Both male and female colleagues labelled her as frustrated and aggressive and speculated about whether she was a drug addict. Her entry into the toilet was barred, her workplace was taken away. Despite all these odds, she has continued to pursue her case, with no support from women's groups or other progressive groups.

A junior doctor who complained against her head of department, shared with us how she faced censure from the rest of the medical community for 'daring' to complain against such a senior person. Her M.D. thesis, as well as those of her colleagues supporting her, was held up since their supervisor was the offender himself!

Women in the private and unorganised sector revealed that making a complaint against sexual harassment can invite severe reprisals in the form of whipping with a rope, pulling their hair, kicking etc. In one case cited earlier, a woman who complained was badly hurt when the supervisor pulled out her stool just as she was about to sit. When the wages are piece - rate, pieces produced by women who dare to protest are rejected, leading to loss of wages. In many other cases, women are simply removed from their jobs on the pretext that the company does not need them anymore.

In the case of a Reader mentioned earlier, one of the accused abused her and attempted to hit her in the staff-room. Later, a colleague used sexually abusive language against her. Criminal cases were put up against her and her husband, also a senior lecturer. On top of this, the Karamchari Union (to which the accused belonged) passed a resolution demanding action against her. Further, a karamchari was suspended from the Union for his support to the employee who had been sexually harassed.



**THE FACT THAT
THE INSTITUTIONS OF
LAW AND ORDER
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OF WOMEN
SEEKING JUSTICE**

In a case taken up by Saheli, a woman employee with a permanent job was suspended, and later dismissed for daring to complain against sexual harassment. Criminal cases were filed against her by the accused, while the police refused to even register her case. In addition to the trauma of the incident, and the social and psychological consequences of coming out in the open, this woman had to wage battles on several fronts: the labour dispute, criminal charges, and contempt petition against the company.

Dealing with the police and legal system can be an exhausting and frustrating experience, as expressed by the junior doctor who registered a criminal case against her head of department. The fact that these institutions are bastions of male domination adds to the trauma and stress of women pursuing cases. In addition to this ordeal, a lot of money and time is also spent, which becomes an additional burden.

DO WOMEN GET THE SUPPORT THEY NEED ?

The previous sections indicate that there are a number of factors, which make women hesitant to talk about the problem of sexual harassment at the workplace and seek redressal. When a woman picks up courage to speak about it, help and support, especially at the workplace, is crucial. The absence of support not only compounds her emotional trauma but also leads to a loss in self-confidence. A woman's credibility is itself questioned. Support from colleagues, friends and even family members is thus critical. Many times such support helps to pursue the case rather than fighting a lone battle. The sense of solidarity that builds up during the whole struggle may turn out to be an effective deterrent, for all potential harassers.

Though many women felt that there is a great need to support and help women who face sexual harassment, it was clear that such support is not always forthcoming. Unfortunately, many women we talked to gave a very pessimistic account of the type of support they got. The general feeling we got from talking to women was, "No one supports the woman, and the victim gets isolated and is told to keep quiet about these matters." Supporting a woman who raises the issue of sexual harassment can have several adverse consequences such as: threat to the job; spoiling the service book or confidential report; stopping promotions or increments; false cases; jeopardising relationships with colleagues, including the offender and subtle forms of harassment at the workplace. It is therefore not surprising that colleagues try to find reasons for not supporting a victim. "No one wants to add more problems to their own lives," said many women.



**THE SENSE OF SOLIDARITY
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ALL POTENTIAL HARASSERS**

A scientist we interviewed observed that there was no single trend on the question of support to the woman. Some colleagues unconditionally support the woman, while others support only in return for help rendered to them by the victim in some other situation. There are also many who openly support the offender. Sometimes, jealous colleagues end up enjoying the whole incident. Not only male colleagues, women colleagues too, are often not supportive. One woman stated that women are also competitive and suspicious, so they do not help other women. If at all support is available, it is at a very personal level. According to one woman, "If one has a good friends' circle, one may get support."

In situations where all women are placed in an equally vulnerable position, for example in factories and private firms, it is difficult for them to support each other openly. Women working in such situations said that they fully understood the pain and humiliation that each of them had to undergo, but they were unable to help each other for fear of losing their own jobs. One woman worker admitted, "If anyone is harassed, other workers will not say anything. All are concerned only with their own work and earning their own bread. I am also like that. No one helps or cares for anyone." Even where emotional and moral support is given, it has to remain invisible to the management. No one can individually dare to support - if at all it is done, it has to be done as a group. Reiterating this view, a nurse in a government hospital said, "Why will colleagues help? Everybody lives in their own world. At least there is a Union to keep us together, otherwise nobody gives a damn for anyone else." The helplessness of workers in such situations is articulated by a worker in a tyre company, "Working on two shifts from 9 am to 6 p.m. and 9 p.m. to 2 am - where is the time to help the girl or even complain?"

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Amongst other reasons for the lack of support from colleagues in the workplace is the prevailing social attitude, which blames the woman and holds her responsible for the incident. The assumption seems to be that such women do not 'deserve' to be helped. Aspersions are cast about her character, nature etc. This victimisation of the woman is extended to those who support her. Not surprisingly, women do not want to be branded in such a manner and thus they hesitate to openly support a colleague.

A worker in an export-garments factory spoke of the futility of making complaints, since nobody, not even women, stand by her. "Complaints boomerang. Some women workers side with the management and supervisors against anybody who complains. That will bring them the favour of the management." Why do women side with the management? Is it simply fear of losing the job? It is apparent that in a situation torn with conflict, insecurity, and oppressive conditions, a woman who dares to speak up is

seldom understood or respected. Even female co-workers fail to see this structured form of oppression. It cannot be assumed that a woman will understand a woman better.

As our interviews revealed, many women did receive support in several ways from their colleagues in the workplace. For instance, a worker in a garment factory declared that she always stood up and spoke for young girls who were harassed but were too scared to speak about it. Similarly, the Class IV employee in a campus college received unstinting support from the Reader mentioned earlier. A doctor who is pursuing a case of sexual harassment against her head of department spoke of the immense support she initially got from her colleagues, both female and male. This initial support for the doctors' struggle however, did not remain sustained. In one case, the matter of sexual harassment could be taken up because of a sympathetic senior woman manager. If there is a sympathetic third party in authority, victims can pick up the courage to lodge complaints with greater chances of getting heard. Moreover, we also found that in a few cases, for example, the Reader, though colleagues at the workplace did not help, other friends and women's groups from outside the institution extended support in different ways.

The active support of Unions can be extremely energising for a complainant. In a premier government hospital, the nurses' union successfully pursued the case of a nurse who was harassed by a doctor in the ICU. In another instance, the union of an international bank had fully supported the complaint of sexual harassment made by employees against the management. Union members told Saheli that they perceived the problem of sexual harassment as a grave threat to women, and were conscious of such violations experienced by their women members.

Family support also counts in how far the woman is willing to fight it out. If husbands and fathers are disbelieving, a woman who is sexually harassed finds it more difficult to take up the matter. An employee of a private company who was suspended for complaining against sexual harassment said that her mother's support was very important in her decision to go ahead and fight it out, especially since she was isolated in her workplace and received no support from her colleagues.

WHY BLAME THE VICTIM?

It is unfortunate but true that very often, the woman who is harassed is the one who is held responsible. Blaming the victim is a way of evading the real issue, since confronting the problem is not easy. The patriarchy inherent in society allows 'men to be men', and makes women bear the onus of male behaviour, however objectionable it may be. In fact, in our interviews we found that even women often hold women responsible for the harassment they are subject to. Some of the remarks were: "Women provoke it", "Why should women support each other? They are also competitive and suspicious."

A couple of nurses stressed that 'good behaviour' can prevent such incidents. One of them said, "If we behave well, nothing will happen". A number of women shared their views about the way some women 'behave'. A government employee equally blames women for the overall situation where harassment occurs, "Had it not been for flirtatious women, I know how to keep men in their place. I am so anti-men - therefore, when I say women mess up things - I mean it. If all women could see how they are treated in a male world - our work would be done." A woman in a private firm said, "Some girls do not resist advances of their seniors or employers in exchange for favours. This generation is more materialistic. It is a race to get ahead of others ... very few girls have self-respect." While there can be no moral judgement on how women ought to behave, there is a need to be cautious of the power dynamics in operation. As an advertising professional said, "Even in a consensual relationship with someone in the office, it may not always be an interaction of equals."

Quite a few women spoke about women deliberately using flirtation or feminine charms to get ahead in their professions. While men use different means to get into the good books of a senior, or manipulate certain situations to their advantage, some women choose to use their sexuality. Our interviews revealed that other women colleagues often resent this. They hold such women responsible for the way men perceive all women. These judgemental views are typical of a patriarchal society, whose norms are weighed heavily against women. In certain workplaces like advertising agencies, media/press agencies and NGOs, sexual norms are not as rigid and conservative as elsewhere. Here, interpreting the 'use' of sexuality becomes even more sensitive an issue. Unless women follow traditional stereotypes of being 'chaste and pure', freer body language or unconventional dress codes may invite censure even from women colleagues.

Incidents of violation are dismissed as individual events and chance happenings, and it is the woman who is held responsible. And if the situation or event assumes significance, the victim is further isolated. A woman who stands up for her ideas or speaks her mind is opposed. As a scientist observed, "male employees often take the liberty of behaving as they like but criticise women who are bold and assertive. Unfortunately, women themselves criticise or oppose such assertive behaviour". A lawyer narrated the incident of an advocate who had faced severe harassment in the Tis Hazari Courts in Delhi, when she had opposed the lawyers strike against Family Courts. Women lawyers themselves called her frustrated and aggressive and denied her entry to the toilet in the women's lounge. According to a professor, "Even women do not seem to understand the issue within the context of power."

It is clear that a woman is expected to adhere to the norms of a male dominated society. She bears the onus of 'appropriate behaviour', while exploitative male behaviour is assumed as a given. The assumptions and biases nurtured in a patriarchal society are also imbibed by women. In any oppressive system, victims also internalise the dominant ideology and thus contribute to the thriving of the oppression. It is this dominant ideology that the women's movement seeks to challenge.

**BLAMING THE VICTIM ABSOLVES THE HARASSER
FROM THE RESPONSIBILITY FOR WHAT HE HAS DONE**

COMPLAINTS COMMITTEE:

SOME REACTIONS AND SUGGESTIONS

Complaint Mechanism: Whether or not such conduct constitutes an offence under law or a breach of the service rules, an appropriate, time-bound complaint mechanism should be created for redressal of complaints.

Complaints Committee: The complaint mechanism should provide, where necessary, a Complaints Committee, a special counsellor or other support service. Confidentiality should be maintained in all these dealings.

The Complaints Committee should be headed by a woman, and not less than half of its members should be women. To prevent the possibility of undue influence from senior levels, such Complaints Committees should involve a third party such as an NGO or other body familiar with the issue. This Committee must make an annual report to the concerned Government Department regarding the complaints received and action taken.

Failure to comply with this Court Directive would amount to contempt of court.

A few women had a clearly negative reaction to the proposal of a Complaints Committee. It was for two reasons: first, that the guidelines seem to place too much trust on the employer for the formation of a Complaints Committee assuming that the employer is the best protector of employees' interests. It overlooks the situation where an employer, a manager or an owner of a firm himself is the perpetrator of sexual harassment.

THE GUIDELINES PLACE TOO MUCH TRUST ON THE EMPLOYER FOR THE FORMATION OF A COMPLAINTS' COMMITTEE AND ASSUME THAT THE EMPLOYER IS THE BEST PROTECTOR OF EMPLOYEES' INTERESTS

Secondly, the general experience of women with law and legal procedures has not been very positive. Thus they feel, that little or nothing would be achieved. For example, a clerk in the Ministry of Railways said, "Even rape cases are difficult to prove - despite medical examination and other evidence. When something as blatant as rape does not get 'proved' and rapists are not punished, in cases of sexual harassment it would be much more difficult to prove a case because of the nature of evidence."

However, the majority of the women interviewed expressed the need for such committees, though they were equally doubtful about their efficacy. In the words of an employee of a private computer firm, "It is useless. Just a waste of time." An employee of a publishing house said, "I don't think that a Complaints Committee would be acceptable to many women or the management if it's focus was purely on sexual harassment. It would be better to combine various issues of discrimination under one umbrella....because other forms of discrimination perhaps play an equally important part of their (women's)

experiences and the two issues may not be unrelated." A scientist reiterated this view also. A feminist activist and journalist opined, "rather than just setting up a Complaints Committee, work conditions should be defined. Appropriate security should be part and parcel of working conditions."

A few women expressed their fears and reluctance in approaching a Complaints Committee. The reasons given by them reflect the general prevalent social attitudes on the issue. Said an executive of a private firm, "Complaints Committee is a good step - but people may not want to complain because social image/status may get destroyed." According to a scientist, "women may not want to approach for the fear of standing out, being identified as a victim." "But young and unmarried nurses won't go there", professed a nurse working at a government hospital.

"It's of no use to us.
Who will sit in it?
All the same people who
harass us!"



Some women from the unorganised sector were also vehement claiming that "It's of no use to us. Who will sit in it? All the same people who harass us !" (Women hawkers in Connaught Place). They felt that if their livelihood is made secure and they are allowed to earn a decent living there's no need of any committee. They can deal with other things on their own. We feel that such a reaction to

the formation of Complaints Committee came mainly because, for these women the primary issue was of their survival. All other problems including the problem of sexual harassment came after that. Thus for these women, harassment by police and MCD officials or goondas was the main issue. While for others, the general experience about the ineffectivity of such mechanisms, which emanate from management being part of it, lack of support to the complainant, not believing the victim and the problems of proving such harassment was the major cause for doubting the efficacy of a Complaints Committee.

Some women also responded positively to the idea of a Complaints Committee. Many women voiced the need for a redressal mechanism. To quote a few examples :

- A domestic worker felt that the mere existence of a Complaints Committee would make women feel encouraged to come out openly and go there with their problem/complaint.
- Another domestic worker said that a Complaints Committee will be effective as a first step. "If there is no Committee, who will women talk to ?"
- A worker emphatically said, "Every factory should have it - every working place."
- A Reader in Delhi University said, "The long time that it takes to pursue such cases and that too, without any success is quite frustrating. It takes out your time, energy and money too, disrupts mental peace and family life. In such a situation, the total absence of any redressal mechanism takes up your energy even to get such types of mechanism created, before one can proceed on to other steps."
- Another Reader opined that a Complaints Committee is important as a first step towards recognising the existence of such a problem, as well as a place where women can lodge complaints.
- An employee of the Ministry of Railways felt, "If it is the boss himself who is harassing - there is all the more reason to have a Complaints Committee."

The need for a Complaints Committee was expressed, both in the organised and the unorganised sector, even if it is for 'name sake' as opined by a journalist. A scientist opined that the existence of the guidelines and a Complaints Committee would help women to articulate the



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problem and seek its redressal. "Even though I raised my voice against a senior colleague who harassed me at an official party, I was not clear about what action I could take. If this incident had occurred after the Bajaj vs Gill case, or after the Supreme Court judgement, I would definitely have lodged a formal complaint against him." In the absence of a Complaints Committee, women do not know who to complain to, whom to approach - the police or a women's group. Women are hesitant to go to the police station for reporting the matter because of the police constantly try to prove the woman wrong.

Overall, quite a few women interviewed were hopeful that a Complaints Committee could be effective and that it could work as a deterrent. Some of them were cautious saying that "we should try and see" and that it could be effective if it is free of vested interests! Supporting the general view of being effective as a first step, a government employee aired her view in these words - "At least extreme cases can come to the Complaints Committee. There has to be some redressal. It can't be like it has been so far. A change is needed. How it will work is left to be seen." She also warned that

"the inquiry should not delve into detailed questioning and asking stupid questions. That's the beginning of invalidating a case. It should not work like the police or the courts who try all the time to prove the woman wrong ... what will be the use then ?"

Functioning of the Complaints Committee: Those who spoke about the futility of having a Complaints Committee at the workplace as well as those who strongly felt the need of it even as a first step, expressed their apprehensions about the functioning of such a committee. Most of them expressed a fear about biased, pro-management functioning, especially if it was an internal Complaints Committee, i.e., a committee at the workplace constituted by the employer for probing into cases where the employer/boss or senior officers could also be the culprits. Hence, the majority voiced the need for an External Committee, so as to keep it out of the firm's/management's power structure and influence. This is especially true in case of small private firms. To quote an employee of one such firm, "A centralised type Complaints Committee might help more than every firm having itOn the lines of Consumer Redressal Cells. In this way, the Complaints Committee would remain outside the firm's power structure." A journalist suggested an independent, external Complaints Committee on the lines of the Press Council, to cater to all media personnel. This would be an attempt to ensure that in-house Complaints Committees are not influenced by editors and senior staff within newspaper establishments.

Who should constitute the Committee? The objective is not just to have a Complaints Committee, but also to make it function impartially and effectively. A number of suggestions came as to who should constitute the committee. There were suggestions to make it mandatory to include a representative of the Unions or Employees' Associations (wherever they exist) in the Complaints Committee. Some of them agreed with the Supreme Court Guidelines for including members of NGOs, women's groups or social organisations in the Complaints Committee. There were further suggestions of including a member from the media, which they feel will act as a

deterrent. In addition it was suggested that retired judges, lawyers, retired female police officers, administrative officers, clinical psychologists, a senior member of the concerned organisation/institute; professionally trained people, feminist psychologists, a socially conscious outspoken local representative from the city/town, should be part of the Complaints Committee.

The main concern expressed was that a Complaints Committee should have members not just with knowledge of the issue but they should also have good intentions and motives. Another concern was that a Complaints Committee should be effective and take decisions expeditiously. It should be neutral and fair and just. Voiced two factory workers, "*Insaaf waala insaan chahiye*" ("There should be people with a sense of justice").

An employee of a publishing house is of the opinion that Complaints Committees will not work in a private firm, because employers would be part of the committee. An employee of a garment factory said, "it is pointless to have the management, including supervisors, in the Complaints Committee. They will always compromise in favour of the company and attempt to salvage the reputation of the company". According to an employee of a private company, "The Complaints Committee is another typical example of ignoring the management-employee conflict. The committee consists of people hand-picked by the management. For instance, one of the so-called 'independent' committee members was present during the domestic inquiry held to inquire into my alleged misconduct. The impartiality and good intentions of a Complaints Committee constituted entirely by members of the management's choice is questionable. Even the NGO members in the present case, are friends of the management. Expecting justice in such circumstances is like asking for the moon!"

"The impartiality of a Complaints Committee constituted entirely by members of the management's choosing is questionable. Expecting justice would be like asking for the moon"

A number of women endorsed the provision in the guidelines regarding the presence of NGOs in the Complaints Committee. However, the legitimacy enjoyed by NGOs is often only a mask. The mass institutionalisation and commercialisation of social and development issues has also given rise to unfair labour practices and corruption in these bodies. Further, there is an increasing incidence of sexual harassment of employees in NGOs, as confirmed in our interviews. In our opinion, the heads or representatives of such NGOs are least qualified to play the role of independent arbitrators in Complaints Committee of other institutions.

Presence of Women in the Committee: There was a general consensus on having female members in a Complaints Committee with percentage varying from 50-70%. The various reasons given were - the complainant women will feel more free to talk to female members; that the latter would understand the problem better; women gossip less than men would on such an issue; their presence would ensure that women will not be doubly victimised or harassed further and that the victims will get a fair hearing.

Two bank employees were, however, sceptical about the presence of female members in a Complaints Committee saying that "it is not necessary that the presence of women will help. Sometimes women play games too, to seek favours. Their presence will only ensure that they

understand our problems. Men may not even consider this as a problem." A young doctor at Maulana Azad Medical College involved in the case against her head of department accused of sexual harassment by several junior doctors, opined bitterly that women are women's worst enemies. "We had an Inquiry Committee with two men and two women. The women were worse." The women committee members were friends of the culprit, and not surprisingly, the Committee gave him a clean chit.

Except for a scientist who is of the opinion that a Complaints Committee should only have female members, no other woman was against having male members in a Complaints Committee. Opined a lawyer, "it should have equal representation of men. Strategically, it would be better to have men also in it, otherwise they (men) will tend to dismiss the Committee as 'a bunch of hysterical women.' Also sensitive men may be more understanding." A journalist too expressed that "a compassionate or well-meaning man will also be effective."

In our experience, the mere presence of a woman in a Complaints Committee does not guarantee a pro-woman perspective. In several instances, even senior women members in such committees have preferred to protect the reputation of the institution rather than give a fair hearing to the woman concerned. Besides, it is a fact that they themselves may not be free from patriarchal attitudes and biases.

Support Networks: Considering the hesitation in lodging a complaint due to the fear of social stigma and/or losing the job, etc., the need was voiced for building up popular support and support networks for mutual counselling and confidence-building amongst the victims to encourage them to lodge a complaint and pursue it. A lawyer stressed this point on the basis of her own experience. She said that with popular support - especially of male colleagues, there are more chances that the culprit would amend his ways. She feels that going to bodies like Bar Council is useless as they are male dominated and are full of 'boss-like' characters. In the absence of support, whether it comes from friends, family, colleagues or a women's organisation, the victim loses courage and it becomes a lone battle. Said a domestic worker, "Even if there is a Complaints Committee, people should go in a group ... it is useless for a woman to go alone. She will not be believed and only be further victimised." The basic feeling behind these opinions was that the victim gets isolated in such situations and unless that situation is changed, nothing can be achieved by merely making a law or constituting a Complaints Committee.



"Efforts must be made to propagate the view that the culprit must be denounced, and not the woman"

In addition some women also felt that there is a need to make this a public issue and have more dialogue with men on this problem. A journalist suggested having regular meetings of women employees for discussing sexual harassment and other similar complaints. A scientist reported how her colleague who was being harassed by a male colleague gathered enough courage to complain after she attended a meeting held on campus to publicise the Bajaj vs Gill case. Since the offender was a contract employee, he was verbally reprimanded and his contract was not renewed. According to a

University Reader, "Train the society to unite on these issues and fight for the rights." The need for a campaign was also voiced by a feminist university professor, who added, "There should be a movement that will confront and attempt to change the culture regarding this issue." It was generally felt that rather than ignoring the existence of this problem, efforts have to be made to make people aware of it and propagate the view that it is the culprit who is to be denounced and not the victim!

To sum up, a need was felt, in general, to have some redressal mechanism to deal with sexual harassment matters. A mechanism that will be expeditious, time-bound, sympathetic, and understanding not only to the woman complainant but also towards the issue. It should be free of lengthy procedures and unwarranted questioning. The people constituting a Complaints Committee should be impartial and be able to render justice to the complainant.

Note should be taken to widen the scope of the Complaints Committee to include harassment due to gender discrimination along with sexual harassment. Steps should be taken to define the work conditions to free it from any kind of harassment and provide appropriate security at workplaces. In addition the campaign has to be taken further for changing the prevalent social attitudes, especially among men. We should work towards a future when the perpetrators of sexual harassment have to be denounced and not the concerned women. In the end, women should muster the courage to expose the culprits and raise their voice. "A wrong is a wrong. One should not remain silent", as aptly voiced by a worker from a garment factory.

**IF YOU, OR SOMEONE YOU KNOW, IS BEING SEXUALLY HARASSED,
HERE ARE SOME TIPS THAT MAY HELP YOU CONFRONT THE SITUATION:**

- ♦ *Don't blame yourself or feel guilty. The man harassing you is entirely responsible.*
- ♦ *Don't try to ignore the problem. Harassers don't get the message easily.*
- ♦ *Let the harasser know as directly as possible that his attentions are absolutely unwanted.*
- ♦ *Keep a diary of events and instances. Save any note from the harasser as evidence. Try to enlist the help of any witnesses.*
- ♦ *Be brave about talking to friends and colleagues. Generate their support for any action you want to take. Publicly exposing the harasser, even through the media, can often be effective.*
- ♦ *If there is a trade union or employees' association at your workplace, get them involved.*
- ♦ *Make a written complaint to your senior/employer. Remember that the Supreme Court Guidelines compel them to take immediate action.*
- ♦ *You can also register an FIR with the local police and pursue legal action.*
- ♦ *Whether or not you decide to take such action, you can also contact a women's organisation which can offer you help and support.*

INFORMATION ABOUT THE GUIDELINES

A GAP TO BE BRIDGED

Awareness of the rights of female employees in this regard should be created, in particular by prominently notifying the guidelines (and legislation when enacted) in a suitable manner.

Barring one or two exceptions, this provision had not been complied with by employers in any workplace at the time we began our survey. According to a woman in a private company who had complained against sexual harassment, "It is not likely that the management will raise awareness about this issue, because the management will allege that women employees will 'unnecessarily' keep bringing 'false' complaints against men in the office. In order to counter this view, a mechanism to sift out genuine cases can be evolved."

Preventive Steps: All employers or persons-in-charge of workplaces, whether in the public or private sector should take appropriate steps to prevent sexual harassment :

- a) Express prohibition of sexual harassment at the workplace should be notified, published and circulated.*
- b) The Rules/Regulations of Government and Public Sector bodies relating to conduct and discipline should include rules/regulations prohibiting sexual harassment, and provide for penalties against offenders.*
- c) Steps should be taken by private employers in the standing orders under the Industrial Employment Act, 1946.*

Most of the women we spoke to were not aware of the Supreme Court Guidelines prohibiting sexual harassment at the workplace. In fact, the survey was combined with an attempt to raise awareness on the issue and disseminate information on the guidelines and also inform women about the redressal mechanisms available. Our interviewees put forth several ideas on ways to popularise the guidelines so that more and more women know about them.

Many women suggested making effective use of both print and electronic media to spread the information. They felt that women's groups should make special efforts to popularise these guidelines by distributing pamphlets and leaflets on a big scale. Some women strongly felt that talking personally to women helps instil confidence and that it is more important than simply disseminating information. A government notification and propaganda could help in making all employers, managers, bosses, supervisors and contractors aware of the existence of such guidelines. The personnel department of every office should be responsible for providing all workers with information about their rights and terms of employment and methods of redressal of grievances. Guidelines on "rules of conduct" should include sexual harassment as a punishable crime and be given to each employee at the time of joining. Every organisation should have a women's grievance cell which should arrange meetings, lectures and seminars which are open to all employees. In addition, posters and notices should be put up in all public places announcing that "Sexual harassment at the workplace is a criminal offence." It has to become a subject of daily talk and deliberation so that everyone is forced to recognise it.

Popularising the guidelines does not simply mean making women aware of their legal rights. The guidelines could additionally be used to bring consciousness in society that such harassment at the workplace is nothing short of a criminal offence.

SUSHEELA'S STRUGGLE: THE GUIDELINES ON TRIAL

DURING the course of the survey, Susheela approached us for help in dealing with sexual harassment she had undergone at the workplace. We are presenting the case in detail so that we can share with others in the field the experience of attempting to operationalise the guidelines.

Susheela (name changed), employed as an EDP (Electronic Data Processing) Executive since two and half years in a pharmaceutical company located in Ghaziabad, approached us for help to deal with sexual harassment which she faced at her workplace. Ramesh (name changed), the cleanliness and sanitation contractor of the Company, used to repeatedly harass Susheela, but she tried to ignore it and continue with her work. However, the situation was becoming intolerable. On 3.11.97, he sang sexually suggestive songs, used foul language, and made obscene gestures at her. He also made physical advances to her, despite her strong objections. Following this incident, Susheela made a written complaint to the Manager (Administration).

THE ROLE OF MANAGEMENT

Although the offender was not an employee of the company, the guidelines do cater to this situation: *Where sexual harassment occurs as a result of an act by any third party or outsider, the employer and person-in-charge will take all necessary steps to assist the affected person in terms of support and preventive action.*

— • —
IN A CLEAR CASE
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— • —

Ramesh, though not an employee, had access to the workplace (being a contractor). Following the complaint lodged by Susheela, Ramesh was prohibited from entering the company premises, but his contract was not cancelled. On the other hand, in a clear case of victimisation, Susheela was suspended on the very day that she lodged the complaint. The management of the company, instead of dealing with her complaint in accordance with the guidelines laid down by the Supreme Court in cases of sexual harassment, issued a letter alleging that she had used abusive language against Ramesh and had beaten him up with a chappal, stating that this constituted "serious misconduct and breaking the discipline of the company". Clearly implying that the management expects women facing such harassment to suffer it quietly and not raise their voice against it.

It shall be the duty of the employer or other responsible persons in workplaces and other institutions to prevent or deter the commission of acts of sexual harassment, and to provide for the resolution, settlement and prosecution of sexual harassment by taking all steps required.

In the present case the Company not only failed to carry out its duty, it went a step ahead by turning a blind eye to the real issue of sexual harassment and portrayed the case as that of a labour dispute i.e., a case of misconduct. Susheela was penalised.

ENACTING
A FARCE,
THE MANAGEMENT
SET UP
A COMPLAINTS
COMMITTEE
AFTER HAVING
DISMISSED
SUSHEELA

Saheli attempted to pressurise the management to view the case in its proper perspective, i.e., as a case of sexual harassment and also apprised them of the Supreme Court Guidelines in dealing with such cases. But all along the management refused to concede that sexual harassment had occurred. They also didn't like the idea of a women's group intervening and questioned Saheli's credentials, insisting that we have no locus standi to intervene in what they perceived as a 'labour case'.

Negotiations were held with the management, alongside attempts to initiate criminal prosecution for contempt of court, while at the same time we also tried to deal with the criminal charges instituted against Susheela by the offender.

The management held a domestic inquiry. Three other women employees, who were witnesses to the incident gave evidence against Susheela. Following the domestic inquiry, the conclusion was reached that she was guilty of misconduct. Although the Supreme Court Guidelines clearly specify: *during the period when a woman's complaint of such harassment is being processed, care should be taken to prevent her further victimisation*, Susheela was dismissed on 2.4.98.

EXPERIENCE AT THE LABOUR COURT

Susheela had made a complaint at the office of the District Labour Commissioner (DLC). Saheli raised the issue of the Supreme Court Guidelines, but the Assistant Labour Commissioner was hostile. He claimed that he had nothing to do with the Supreme Court Guidelines and sexual matters are 'not applicable' to him !! Before our intervention the DLC was ready to close the case, and wait for Susheela to get terminated after which it would become a 'proper' case. Since the DLC's office is only an arbitration body, it does not have powers to enforce anything. Following our intervention the DLC was compelled to hold another inquiry and bring out a report. The first time when Saheli met the DLC, who was a woman, she was quite interested in the guidelines, about which she herself had no previous knowledge.

The lack of sensitivity of institutions such as the DLC's office is too well known to need repetition. It is a moot point whether such anti-worker and anti-women institutions can at all help women. The labour case is usually handled by lawyers who are unaware about the Supreme Court Guidelines. In Susheela's case, her lawyer, despite suggestions from Saheli was unable to creatively interpret and use the guidelines in the labour case. The judges in the Labour Court, too, are not aware of this judgement, and are not very receptive to the intervention of women's groups either.

PENALISING THE VICTIM

In a bizarre turn of events, the offender had lodged a complaint through the Judicial Magistrate and got a criminal case registered against Susheela under section 325 of IPC (voluntarily causing hurt), 500 (defamation), 501 (printing defamatory statements) and 506 (criminal intimidation). A

warrant was out for Susheela's arrest. She had to run around for getting bail and the case is now pending in the Sessions Court.

Since the criminal cases against her are motivated, false and without any basis, it is obvious they have been filed with the intention of harassing her further. She has now approached the High Court to ask for the quashing of these baseless cases against her.

On the other hand, the difficulty faced by women in pursuing criminal cases is illustrated by Susheela's inability to get even an FIR registered despite intervention from Saheli by way of meeting high ranking police officials, the city magistrate and letters to the District Magistrate. Following an incident when the security personnel of the company tried to forcibly make her sign a document without allowing her to read it, Susheela had made another written complaint at the police station. This too was not registered as an FIR.

THE COMPLAINTS COMMITTEE

The Complaints Committee came into existence the very day Susheela was dismissed. The reason for this much belated action was a legal notice from a Supreme Court lawyer, who has also been helping Susheela. It stated that failure to fulfil and discharge the obligations and duties imposed by the law laid down by the Supreme Court would amount to gross contempt of court, inviting penal action.

A farcical situation ensued, whereby the Committee was inquiring into a complaint of sexual harassment committed on a woman who had by that time been dismissed by the management. However, now that the Complaints Committee had been set up, the management expected Susheela to attend the proceedings. Susheela gave the Complaints Committee a plea in writing that this procedure was not in keeping with the Supreme Court Guidelines, and that Complaints Committee is meant to look into cases only of the employees of the organisation. Susheela requested them that she should first be reinstated and repeatedly assured them that once they have fulfilled this basic requirement, she would be happy to appear before the committee.

Without paying any heed to Susheela's plea and the legal validity of her demand to be reinstated, the management went ahead with the inquiry. The setting up of this Complaints Committee was just an eyewash, aimed at protecting the company's own interests by appearing to be a fair and just organisation. Not surprisingly, the Complaints Committee came to the conclusion that there had been 'no incident' of sexual harassment against Susheela.

This initial experience of dealing with sexual harassment at the workplace provided us with a few insights into the working of the Supreme Court Guidelines. In our first attempt to make use of the guidelines, several of our assumptions and apprehensions about the working of the law enforcing machinery were confirmed. The law must be used with extreme caution in a context where anti-women prejudices dominate, lest the struggle to gain justice backfires.

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OPTING FOR CRIMINAL PROSECUTION

WILL JUSTICE BE DONE?

Where such conduct amounts to a specific offence under the Indian Penal Code or any other law, the employer shall initiate action by making a complaint with the appropriate authority.

The employer, has a duty and responsibility to initiate criminal prosecution in case the sexual harassment perpetrated amounts to an offence under the Indian Penal Code.

These directions would be binding and enforceable in law until suitable legislation is enacted to occupy the field.

In operation, however, a woman who decides to pursue a complaint of sexual harassment at the workplace has to take recourse to already existing laws. In the first place, given the corruption and anti-woman biases of the police, even getting a FIR registered is a Herculean task, requiring enormous perseverance and dogged determination. Subsequently, the penal provisions applicable to such cases are IPC 509 (insulting the modesty of a woman), and section 354 (assault or use of criminal force to a woman with intent to outrage her modesty). As is evident from the wording of these provisions, the offence is rooted in the patriarchal notion of a woman's 'modesty'. Past experience with prosecution in rape trials has shown that legal provisions and procedures are weighed heavily against women.

In terms of a criminal prosecution for sexual harassment at the workplace, three crucial issues are brought to bear on the complaint:

1. **Consent** : The woman has to establish that she did not consent to the offender's behaviour. This is extremely difficult to prove, since it is usually the woman who is judged and blamed, and not the offender. The burden of proof is on the woman to establish that she did not consent to the offender's behaviour.
2. **The complainant's past sexual history and conduct** is brought into the picture. If she does not conform to society's male-defined notion of a 'good' woman, she is automatically held responsible for having 'invited' the harassment. The evidence of such a 'bad' woman is then discredited.
3. **Corroborative evidence/witnesses** : Since evidence in cases of sexual harassment is subjective (e.g. was the behaviour 'objectionable' or not, was the advance 'unwanted' or not) a lot depends on the perception of the witnesses (if any). If a woman has got no support at the office, she will find it extremely difficult to prove her case. In Susheela's case all the witnesses, though women, gave evidence against her. Thus, if witnesses are hostile and decide to side with the management because of office dynamics or because of job insecurity, the woman's own statement will not be corroborated. In such circumstances, expecting justice by filing criminal charges may well turn out to be a mirage.

CHALLENGES FOR THE WOMEN'S MOVEMENT:

WHERE DO WE GO FROM HERE?

It is yet to be seen how best these guidelines can be used to the advantage of women in the labour market. In Saheli, our healthy scepticism about law and legal procedures persists. At the most, the guidelines can be seen as providing one concrete step towards registering a complaint or seeking redressal if a woman wants. It is a ready mechanism for the woman who decides to take a culprit to task. In implementing these guidelines, there is bound to be a sea of obstacles, as even our limited experience of handling cases shows.

As many of our interviewees also said, the guidelines can also act as a deterrent amongst potential harassers. There is no doubt that the Supreme Court judgement has lent visibility to the issue of sexual harassment at the workplace. Gaining media attention, the issue has been brought into the open as a common problem faced by women, rather than being reported as sporadic incidents.

The various definitions used in the guidelines are yet to undergo the rigour of legal arbitration. Women's long experience with the law has shown that rigid and specific definitions have been counter-productive in seeking justice. Most often, the legal domain has been used to reinforce the domination of male, upper class, upper caste and other powerful interests. Law is only one crucial area of redressal for violence against women amongst other strategies of resistance that women evolve. It is an arena of contending claims and realities. It is here that we seek to define and assert the realities women face in all their complexity. Actively implementing the guidelines, to test out their efficacy and loopholes, would be effective in re-defining or bringing about amendments.

It is clear that the guidelines place too much faith on the employers and places on them the onus of resolving the matter of sexual harassment. Such a position does not recognise the fundamental conflict of interests between employer and employee, or management and worker. It is assumed that the employer has the best interests of the employee at heart, and will do all that is needed to establish and resolve a case of sexual harassment. In reality, this is far from the truth. In fact, the management refuses to acknowledge the incident of sexual harassment because it wishes to disengage itself from the responsibility put on it by the Supreme Court Guidelines. The employee's assertion results in a conflict with the management which uses its power position to suppress the matter and pressurise not only the subordinates but also other authorities, like the police, courts etc.

Moreover, filing a 'labour' dispute or allegation of 'misconduct' is a diversionary tactic to sidetrack the matter, since the labour dispute becomes important for economic survival.

While the guidelines can be an important tool to counter this menace, we need to improve our coping strategies and other forms of resistance too. Efforts can be geared towards creating an awareness of the problem and a willingness to act upon it because the creation of a non-threatening atmosphere is an intangible that no law can achieve. In the case of routine harassment faced by

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• —————

workers, the guidelines will not help, when harassment is so rampant and on such a wide scale. The culture of the workplace needs to be entirely changed. We need to pressurise authorities and managements to the extent we can, in an organised manner, to act upon this issue. Trade Unions and Employees' Associations, wherever present, need to take up this issue with serious commitment.

The fight against such harassment in the workplace is also a challenge to change the dominant notions of women's sexuality. It is not upto women alone to preserve their 'izzat', and be responsible for its 'protection'. Oppressive acts by men should not have the power to shatter this 'izzat', and damage women's self-confidence and self-worth. The workplace also reinforces this structured

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————— •

form of violence, which denigrates women as sexual objects. Our professional status and competence are constantly undermined by attention being directed at our looks only. Moreover, it is only women who conform to male defined notions of 'the ideal woman' who are considered victims worthy of sympathy. Assertive and confident women who defy male stereotypes of 'femininity' are themselves blamed for any oppression they are subjected to. Challenging these assumptions and notions is a simultaneous battle with the struggle to secure better working conditions and wages.

Our interviews and discussions indicated certain important areas that those of us engaged in the women's movement, need to actively work in. The response of women's groups to women seeking support is varied. The young doctors of Maulana Azad Medical College felt strongly that the intervention of women's organisations could have been more

decisive and strong. Especially, when the National Commission for Women was doggedly diluting the issue, discouraging and demoralising the doctors. In the case of the lawyer who refused to participate in a strike protesting the introduction of Family Courts, women's organisations should have been more responsive to her fight against sexual harassment by Bar Association members. This is especially so since women's organisations have been agitating for setting up of Family Courts. We need to be as alert as we can to intervene in time and effectively do so. Women's organisations' interaction with each other in actively dealing with such issues needs to be more dynamic and productive.

The responses, attitudes, biases and dilemmas voiced by our interviewees as well as the many questions we ourselves have indicate the complex level of issues involved while coming to grips with sexual harassment at the workplace. Having more discussions would make the issue more visible and build solidarity amongst women. As long as the menace of sexual harassment persists, the interests and well being of all of us as working women is in jeopardy. It is a structured form of oppression, inherent in every institution, office, factory or market place, that is integral to upholding male supremacy.

To fight against sexual harassment and create a safe and healthy workplace, is one step towards our vision of a society free of violence against women.

THE SUPREME COURT GUIDELINES IN BRIEF

1. It shall be the duty of the employer or other responsible persons in workplaces and other institutions to prevent or deter the commission of acts of sexual harassment, and to provide for the resolution, settlement and prosecution of sexual harassment by taking all steps required.

2. **Definition:** Sexual harassment includes such unwelcome sexually determined behaviour (whether directly or by implication) as : a) Physical contact and advances; b) A demand or request for sexual favours; c) Sexually coloured remarks; d) Showing pornography; e) Any other unwelcome physical, verbal or non-verbal conduct of sexual nature.

The Court noted "It is discriminatory when the woman has reasonable grounds to believe that her objection would disadvantage her in connection with her employment or work, including recruitment or promotion, or when it creates a hostile work environment."

3. **Preventive Steps:** All employers or persons-in-charge of workplaces, whether in the public or private sector should take appropriate steps to prevent sexual harassment :

a) Express prohibition of sexual harassment at the workplace should be notified, published and circulated.

b) The Rules/Regulations of Government and Public Sector bodies relating to conduct and discipline should include rules/regulations prohibiting sexual harassment, and provide for penalties against offenders.

c) Steps should be taken by private employers in the standing orders under the Industrial Employment Act, 1946.

d) Work conditions should be provided in respect of work, leisure, health and hygiene to further ensure that there is no hostile environment towards women at workplaces.

4. **Criminal Proceedings:** Where such conduct amounts to a specific offence under the Indian Penal Code or any other law, the employer shall initiate action by making a complaint with the appropriate authority. In particular it should ensure that the victims or witnesses are not victimised or discriminated against while dealing with complaints of sexual harassment. The victims of sexual harassment should have the option to seek transfer of the perpetrator, or their own transfer if they so desire.

5. **Disciplinary Action:** Where such conduct amounts to misconduct as defined by the relevant service rules, disciplinary action should be initiated by the employer.

6. **Complaint Mechanism:** Whether or not such conduct constitutes an offence under law or a breach of the service rules, an appropriate, time-bound complaint mechanism should be created for redressal of complaints.

7. **Complaints Committee:** The complaint mechanism should provide, where necessary, a Complaints Committee, a special counsellor or other support service. Confidentiality should be maintained in all these dealings. The Complaints Committee should be headed by a woman, and not less than half of its members should be women. To prevent the possibility of undue influence from senior levels, such Complaints Committees should involve a third party such as an NGO or other body familiar with the issue. This Committee must make an annual report to the concerned Government Department regarding the complaints received and action taken.

8. **Workers' Initiative:** Employees should be allowed to raise issues of sexual harassment at workers' meetings and in other appropriate forums. It should be affirmatively discussed in Employer-Employee meetings.

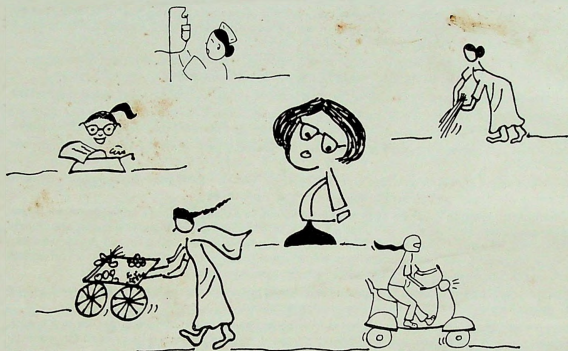
9. **Awareness:** Awareness of the rights of female employees in this regard should be created, in particular by prominently notifying the guidelines (and legislation when enacted) in a suitable manner.

10. **Third Party Harassment:** Where sexual harassment occurs as a result of an act by any third party or outsider, the employer and person-in-charge will take all necessary steps to assist the affected person in terms of support and preventive action.

11. **The Central/State Governments are requested** to consider adopting suitable measures including legislation, to ensure that the guidelines laid down by this order are also observed by the employers in the private sector.

ANOTHER OCCUPATIONAL HAZARD

SEXUAL HARASSMENT AND THE WORKING WOMAN



This is a report of a survey carried out among women in different professions and occupations. While recounting varied experiences of sexual harassment at the workplace, women talk of how it affects their lives and the many ways in which they confront it.

The report looks at whether the Supreme Court Guidelines adequately define the problem, and assesses the proposed redressal mechanisms in the light of women's responses. It reveals that while some women remain sceptical about the introduction of the Guidelines, others look upon it as a much-awaited recognition of an age-old problem. Simultaneously, it also questions the parameters of law and the legal options available.

This is also an attempt towards planning strategies and strengthening on-going struggles to make the workplace safe for women.

Saheli

WOMEN'S RESOURCE CENTRE