

REPORT

Study of
CHEMICAL INDUSTRY
IN GUJARAT &
MAHARASHTRA STATES

Jagdish Patel

PEOPLES TRAINING AND RESEARCH CENTRE

43, Srinathdham Duplex, Dinesh Mill – Urmi Road

VADODARA-390 00, INDIA

Study of
CHEMICAL INUDSTRY IN GUJARAT & MAHARASHTRA STATES

INDEX

Scenario of Indian Chemical Industry	03
Chemical Industry In Gujarat	14
Chemical Industry in Maharashtra	60
Recommendations	77
References	79
Appendices	81

Study of
CHEMICAL INDUSTRY IN GUJARAT & MAHARASHTRA STATES

1.1 Scenario of Indian Chemical Industry:

At the beginning of 20th century, Indian chemical industry was mainly meeting the requirement of textile industry. Development & innovation during the last century and two world wars have changed the face of the chemical industry and made it into a \$1.6 trillion business. Europe, USA and Japan are the largest chemical producers in the world. However, Chemical industry's best growth prospects are now in the developing world, especially India and China. ¹.

India's Chemical industry is growing rapidly after liberalization policies adopted by Government of India and has reached to \$28 billion per year. The industry constitutes more than 6% of India's GDP and is a major exporter of agrochemicals, pharmaceuticals, dyes & pigments and specialty chemicals. ¹

Downstream chemicals are essentially derived from basic petrochemicals. While catering to the growing demand from industries, this section of the chemical industry has shown steady growth of over 10%, with the top 13 chemicals catering to approximately Rs.2900 bn market. The chemical industry consists of over 14,000 units with a total investment of Rs.5800 bn. This investment is mainly concentrated in the five states of Maharashtra, Gujarat, Tamilnadu, Uttar Pradesh and Andhra Pradesh. ²

With liberalization, import duties have been drastically brought down on chemicals gradually. This has resulted in falling growth rate for the industry. With gradual decontrol of sugar industry, molasses was the first to be decontrolled. The decontrol led to steep rise in the prices of molasses, which proved to be unviable for many molasses-consuming units manufacturing Acetic Acid. As a result, units like SM Dyechem and Ashok Organic had to shut down their Acetic Acid units. Methanol manufacturers had to face competition from cheaper imports. National Fertilizers and Rama Petrochemicals have been closed down on this account. Phthalic Anhydride is a major down stream chemical used for paints and plasticizers used in plastics. Its prices have gone down from Rs.60-65 in 98 to Rs.30-35 in 2001. ²

On 1st January 1995, the WTO (World Trade Organization) came into existence. India was a signatory to the Agreement, and as a result we became a member of the WTO from its inception. In some industries like chemicals, plantations, household goods, toys, etc. products have been imported in a big way and are out-pricing Indian products. More and more of such goods are likely to come into India and if Indian manufacturers are not able to compete with them on price and quality, they will have to pull their shutters down. This is a real threat to Indian industry, and therefore to employment.³

At the same time, we also note that trade in chemicals to and from India in the recent years has increased substantially. Exports are targeted for growth of over 400% by the year 2000. A large chunk of the current exports is accounted for by pharmaceuticals (35%).²

Though earlier the exports were to countries of South East Asia, Africa, this is now changing. Indian Chemicals have markets in countries such as USA, UK, Germany, France, Japan etc.²

1.2 Agrochemicals:

- India is a large agricultural economy, which is the major user. Average Indian consumption is very low (1/20th of world average)
- Market size 100,000 MT (in terms of technical grade)
 - US\$ 800 million
 - Growth 10% pa
- Consumption varies depending on crop and region
- Cash crops like sugarcane, tobacco etc. are the major consumers of pesticides (above 60%)
- Two types of producers - Technical - 40 nos.
 - Formulators - above 500 nos.
- Major players
 - India: United Phosphorus, Rallis and Excel
 - MNC: Hoechst Agrevo, Novartis, Bayer etc
- Significant exports

Table:1 Production

Production ('000 MT)

Product	Installed Capacity	92-93	93-94	94-95	95-96	96-97	97-98	98-99
Insecticides	81.9	73.4	71.8	75.6	77.7	84.1	60.4	66.0
Fungicides	10.7	5.3	5.5	6.0	6.6	7.3	9.2	8.0
Herbicides	4.8	2.0	1.3	1.5	1.4	1.6	1.9	1.7
Weedicides	10.3	2.2	2.7	5.1	8.5	7.3	7.3	6.7
Rodenticides	0.9	0.3	0.5	0.5	0.4	0.4	0.5	0.5
Fumigants	1.6	1.0	1.5	1.8	1.8	1.9	1.6	1.8
Total	110.2	84.2	83.3	90.5	96.4	102.6	80.9	84.7

Technical grade pesticides have been growing at the rate of 10% in the last few years.²

Above information is purely business information, in plain terms. It does not give us a full picture of the trade in relation to toxics. Following information help us know the details and how workers are affected.

India manufactures many toxic chemicals, particularly, persistent organic pollutant chemicals (POPs), which are no longer produced by their developed country counterparts.⁴ In other words, developed countries have shifted their burden on developing countries.

In India, both the pesticides industry and its associated problems have grown rapidly since 1948 when, for the first time, DDT was imported for malaria control. Chemical pesticide usage in agriculture began in 1949. In 1954, the first factory for the manufacture of DDT and BHC was established outside Delhi. Subsequently, a second factory was opened in the south Indian state of Kerala. The public sector Hindustan Insecticides Limited has an established capacity for manufacturing up to 10,000 metric tones of DDT. However, the Delhi plant was ordered shutdown by the Supreme Court in 1996 as part of a judgment directing polluting industries in Delhi to relocate outside the National Capital Region. DDT continues to be manufactured solely for the National Malaria Eradication Program. Usage of all other POP pesticides—aldrin, campechlor (toxaphene), Dieldrin,

Chlordane and Heptachlor—have been banned, including BHC which was banned in 1997.⁴

How lax is the governance can be seen from this quote: Even now, what is banned is not necessarily out of the market. According to one farmer, the production technology for BHC and aldrin are so simple that even small producers can clandestinely manufacture it to order. Moreover, many of the “banned” pesticides, particularly aldrin, show up regularly in Government records of exports.⁴

According to GREENPEACE, India is major exporter of life-threatening chemicals. Reports indicate that clandestine manufacturing of several POPs pesticides may be contributing to illegal exports to Bangladesh and Nepal. Data gathered by Greenpeace also links Indian companies to exports of POP pesticides including aldrin, chlordane, heptachlor, DDT and BHC to a number of countries including nations where their use has long since been banned.⁴

Between April 1997 and January 1998, India exported 175,795 kilograms of DDT to Bangladesh, Japan, Nepal, New Zealand, Sri Lanka, Switzerland and U.A.E. Aldrin exports, which totaled 259,952 kilograms, were sent to 20 countries, including Australia, the Netherlands and the U.S.A. However, officials from the Netherlands and Australia report that their records do not reflect these imports.⁴ Question is, which information should be believed. This also shows double standards of developed countries.

Interestingly, no single government agency is able to provide a comprehensive picture of the status of production, usage and export of the POP chemicals. Only part of this has to do with their traditional reluctance to part with information that ought to be in the public domain. For instance, registration of aldrin was withdrawn in 1996. But, it is unclear whether production-for-export can continue legally. In fact, according to chemical industry databases, aldrin is not manufactured in India. However, aldrin continues to be exported regularly. In November 1998, Greenpeace confirmed the availability of aldrin formulations in hardware stores in New Delhi.⁴

India’s ongoing manufacture and exports of POP pesticides raises three important issues:

1. Continued environmental contamination around pesticide manufacturing or formulation units;
2. Continued exposure of workers to POPs in the work environment;
3. India’s direct contribution to global environmental POPs contamination.

Unfortunately, chemical industries and their proponents in the government see stricter environmental norms as a hurdle placed in the way of realizing the country's full potential in the exports of chemical products.⁴. Besides the acknowledged POPs chemicals, India is also known to export other pesticides, which either are potential POPs or may be contaminated with known POPs such as dioxins. Such chemicals include 2,4-D, Endlosulfan, Sodium Pentachlorophenate and Lindane. India's exports of these chemicals in the period April 1997 to January 1998 totalled 2.02 million kilograms.⁴.

1.3 Dyes:

The dyestuff industry constitutes a major branch of chemical industry consisting of various types of dyes & dye intermediates. A dyestuff is a general industry term covering both dye and pigments.⁵

The industry has emerged as an important net foreign exchange earner and it has been identified as a thrust area for increasing exports. The industry is situated on the West Coast on India (Maharashtra and Gujarat). The reason is availability of raw materials in the state.⁵.

Table:2 Profile of the Indian Dyestuff Industry

World production		Total Qty. Total Value (1989 figures)
No. of Units (India)	Organized Sector	50
	Small Scale	850-950
	Total	Around 950-1000
Installed capacity	Organized Sector	55000 Tonnes
	Small Scale	140000 Tonnes (estimated)
	Total	195000 Tonnes
Production	Organized Sector & Small Scale	Around 190000 Tons

Note: 8 lac Tons US\$ 20000 (estimated to be US\$ 30000 by 1999)

The industry is developed to produce over 700 types of dyes. Small-scale concentrates on manufacturing reactive, acid and direct dyes while organized sector manufactures Vat, Disperse, Pigment Dyes etc.⁵. Dyes have application in Textile, Paper Printing Ink,

Leather, Food and Paint industries. In India 80% of the dyes manufactured is consumed by textile Industry. However the per capita consumption of dyestuff is placed in India at only 50 gms. Per year. With excess capacity in domestic market, the emphasis is on export. It grew from Rs. 506 crores in 1990-91 to Rs. 2228 crores in 1997-98. Exports are mainly to Europe, U.S.A., Indonesia, Hong-Kong, South Korea, Egypt, Africa etc. ⁵.

Dyestuff industry is now depending less on Textile industry and has started diversifying by manufacturing dyes required in other industries like paints, paper etc. The problem of the industry is expenditure on research is as low as 1% of sales income. It utilizes outdated technology. Now, China is rising as closest rival with better quality products at cheaper price. It should be noted that Govt. has prohibited the handling of Azo dyes because of health hazards. ⁵.

1.4 Bulk Drugs:

- Large market due to large population
- Large exports (US\$600-800 million) which is around 6-8% of global drugs market
- Total market is US\$3 Billion / pa
- Out of 475 drugs used, 425 are locally produced.
- Over 350 units in the organized sector and many more in the unorganized sector
- Bulk drug units concentrated around three areas:
 - Bombay - Ankleshwar
 - Hyderabad - Madras
 - Chandigarh

- Major players:

Ranbaxy, Shasun, Cipla, Dr. Reddy's, Cheminor, Lupin, IPCA, Sun, Cadilla, Wockhardt, etc.

- Most of the bulk drug companies are Indian companies, whereas some of the major pharmaceutical formulation companies are MNCs. ²

1.5 Petrochemicals:

The petrochemical industry in India made a beginning in the early 1960s. The petrochemicals were seen as futuristic products the consumption of which was bound to expand. The industry registered a 15% growth rate annually, much higher than that of the manufacturing sector as a whole. This was basically due to the expanding demands for a

wide product range covering polymers, elastomers, fibers, resins, surfactants, besides all the intermediates and the building blocks.

The liberalization process in the industry has brought about delicensing & lowering of import tariffs. The industry, however, continues to be constrained by high interest rates, high cost of power and infrastructural bottlenecks. Nonetheless, it is slated for a phenomenal growth in the coming decade.

The total turnover of the chemical industry is estimated at Rs 500 bn. A broad classification of the chemical industry developed the following broad composition:

Table:3

Petrochemical intermediates	22%
Fertilizers	17%
Synthetic fibers	17%
Pharmaceuticals	13%
Synthetic detergents	7%
Paints	4%
Dyes	3%
Pesticides	3%
Other (including inorganic)	14%
Total	100%

The total demand in 1991 for petrochemicals was estimated at around 3.5 mn tones. In the next 5 years (that is, by 2001-02), the total demand is expected to double to 7.0 mn tpa. This will represent an exponential high pace of 15% a year. The anticipated demand for ethylene, one of the principal intermediate products, shows how the petrochemical industries will expand.

The demand for polymers, thermosets, alloys, blends and composites, should rise to 5.0 mn tpa. by 2001-02. The main consumer segments of polymers - building and construction, plasticulture, packaging, transportation, domestic consumer goods - will all require increasing petrochemical inputs. The potential of demand in coming decades is, therefore, extremely promising. The expansion will not be limited to quantum; it will be support technology up gradation for which the industry is getting geared to.

The current per capita consumption of polymers in India is about 2 kg, which is one of the lowest in the world, even some of the less developed countries. With only a kg

added to per capita consumption, the demand increases by apparently, the domestic market for polypropylene has shown a growth of 38% in 1997-98. The synthetic elastomers, include PBR, SBP and butyl rubber. About half (45 to 50%) of the demand for rubber is for tire segment.

Caprolactum, Linear Alkyl Benzene (LAB) and Phenol constitute nearly 80% of benzene consumption in India. The consumption of benzene has grown at the rate of around 10% during the 15 year in 1994. Demand in 1996-97 was estimated at approximately 580,000 tpa which is expected to increase. LAB is a major surfactant, a feedstock for synthetic detergents. The current per capita consumption of surfactant is around 1.2 kg.. LAB consumption is expected to increase. All in all, the demand for petrochemicals (intermediates and products) is projected to expand phenomenally.

Tbale:4

	Demand (in tonnes)		Variance	
	1994-95	2000-01	in tonnes	Percent
Intermediates	3,000	6,500	3,500	120
Fiber intermediates	1,000	2,150	1,150	115
Polymers	1,550	3,650	2,100	135
Synthetic fibers	750	1,500	750	100
Synthetic elastomers	110	350	240	250
Surfactants	220	350	130	60
Others	500	800	300	60
Total	7,130	15,300	8,200	120

In the post-liberalization era, there was an expectation that unlimited flow of technology will start. This has been belied. The technology acquisition game is becoming more and more complex, since India is no longer being considered as a bottomless pit of demand by the developed world any more. Technology buyers from India are being seen as potential competitors in the world market. Therefore, technology sales are being conditioned with marketing territory restrictions. The age of straightforward technology licensing agreement is also over. It is giving way to technology-cum-market, technology-cum-stake holding, technology-cum-product swap, etc. Technology is available to an India buyer only if it fits in with the supplier's global scheme. If one compares the data in technology related payments during from 1993-94 to 1996-97, one sees a substantial

increase in professional services (\$95.8 million to \$397.8 million), management fees and office expenses (\$ 652.5 million to \$7147.7 million) but an actual decline in technology fees (\$ 603 million to \$459 million)².

1.6 Post liberalization Industrial relations:

Government appointed 2nd Labour Commission in ___ to review the labor situation and suggest remedies. The report of the Commission notes: A review of industrial relations in the pre-reform decade (1981-90) reveals that as against 402.1 million man-days lost during the decade (1981-90) i.e. in the pre-reform period, the number of man days lost declined to 210 million during 1991 to 2000 – i.e. the post-reform period. But, more man-days have been lost in lockouts than in strikes.³

A large number of workers have lost their jobs as a result of VRS, retrenchment and closures both in the organized and unorganized sector. The exact number is not available. According to our information, no data on this subject has been compiled by any State Government.³

The Commission received a large number of complaints of VR schemes. The Commission was also told of elements of indirect compulsion, pressure tactics, innovative forms of mental harassment, compelling employees to resign by seeking to terminate them, and in some cases, physical torture and threats of violence against themselves or dependents.

The Commission made general observations on matters relating the industrial relations scenario as under:

- 1) It is increasingly noticed that trade unions do not normally give a call for strike because they are afraid that a strike may lead to the closure of the unit.
- 2) Service sector workers feel they have become outsiders and are becoming increasingly disinterested in trade union activities.
- 3) There is a trend to resolve major disputes through negotiations at bipartite level. The nature of disputes or demands is changing.
- 4) The attitude of the Government, especially of the Central government, towards workers and employers seems to have undergone a change. Now, permissions for closure or retrenchment are more easily granted.

- 5) The Conciliation Machinery is more eager to Consider problems of employers and today consider issues like increase in productivity, cost reduction, financial difficulties of employer, competition, market fluctuations, etc.
- 6) Recovery proceedings against employers who could not pay heavy dues of workers are not being seriously pursued by the industrial relations machinery, if the financial position of the employer is very bad.
- 7) The labor adjudication machinery is more willing to entertain the concerns of industry.

Globalization is affecting collective bargaining. Earlier in the public sector, the emphasis was on greater parity across sectors and reducing the gap between the lowest and the highest paid employees. Now the gap is widening. Over 100 out of about 240 public sector companies have not had pay revision since 1992.³

The incidence of industrial conflict seems to be on the decline. Most long drawn strikes in the private sector do not seem to have borne results from the workers' point of view. Even resistance to privatization from trade unions is not deterring the government any longer.³

1.7 RECENT DEVELOPMENTS

In a bid to create a central pool, exclusively for the modernization of the chemical industry, the Union ministry of chemicals and fertilizers has proposed a 0.5% levy on the turnover of all chemical products sales in the domestic market.

The proposal forms part of a draft road map, which has recently been drawn up by the department of chemicals and petrochemicals to facilitate modernization of the industry. The road map, containing some other proposals as well to tone up the industry, will be implemented in consultation with the industry.

In the draft road map, the ministry has suggested that the proceeds of the cess can be used to fund R&D for the industry as well as for scale enhancement and value-addition. However, the road map seeks to exempt small-scale chemical units from the purview of the proposed cess.

While proposing this, the government makes it clear that in view of the cash crunch it is facing, the industry should not expect any government assistance for its modernization. Rather, the industry itself will have to foot the bill for modernization.

Since a majority of chemical units is concentrated in a number of small clusters, located mainly in Gujarat and Maharashtra, the ministry proposes to club some clusters to

form industrial parks. Citing the experience of such parks in Germany, the ministry feels that formation of such parks with shared supporting infrastructure and other facilities such as common effluent treatment plants will definitely help the constituent units save up to 40% in costs.

As these parks offer opportunities for vertical integration, this would help the constituent units to further bring down their operating costs. The road map spells out that services that could be availed from such parks through shared investments may include land development, captive power, water supply, security and safety, hygiene and health, networked logistics and social facilities.

To give competitive muscle to the cluster-based chemical units, the road map seeks special economic zone status for the proposed industrial parks. Since stiff competition in the world market has made it imperative for exporters to deliver quality products, the road map includes a proposal to set up state-of-the-art common testing centers in every industrial park.⁷

1.8 Health & Safety:

Situation of OHS, in nutshell is well described by a report of US Department of State as: The Factories Act establishes standards for working conditions. These standards generally are enforced and accepted in modern sector but tend not to be observed in older and less economically robust industries. State governments are responsible for enforcement of the Act. However, the large number of industries covered by a small number of factory inspectors and the inspector's limited training & susceptibility to bribery result in lax enforcement. Industrial accidents continued to grow due to improper enforcement of existing laws. Chemical industries are most prone to accidents."³⁹

17% of occupational diseases and 18% of deaths due to occupational diseases all over the globe occur in India, as per the estimates of WHO. Similarly 37% of occupational injuries in world and 32% of the deaths due to these injuries also take place in India. These figures are highest for any single country and surpass even China! Studies by NIOH and other institutes have shown 10-50% prevalence of dust induced morbidity. There are about 2-3 million active workers suffering from dust induced morbidity.⁴⁰ There is considerable under reporting of occupational injuries & diseases. The total number of 48,176 of expected occupational fatal injuries only 211 were reported.⁴¹

2. Chemical Industry in Gujarat

2.1 Introduction:

On the west coast of India, the state of Gujarat has some of the country's most dynamic entrepreneurs who are original in their thinking, fast paced and extremely friendly. Endowed with rich natural resources, a vast reservoir of skilled manpower and one of the most developed industrial infrastructures, the State contributes significantly to the economic development of the nation. Gujarat has become one of the most preferred locations for industrial investment in the country.

Area	: 196,024 sq.km. (5.96 % of India)
Capital	: Gandhinagar
Climate	: Tropical
Population	: 50.60 million as per 2001 census (4.93% of India)
Urbanization	: 37.67% (compared to the national average of 27.78%)
Population Density	: 258 persons per sq. km. vis-à-vis 324 of national average
Official Language	: Gujarati
Net State Domestic Product	: Rs 1,050,230 million (=US\$ 22,036 million) in 2001-02
Share of secondary Sector in SDP	: 38.5% in 2001-02 at current prices
Per capita income in	: Rs 21,276 (=US\$ 446)

In recent years, the state has come to be reckoned as a choice of many multinationals like:

Table:5

• Sumitomo	• Marubeni
• Matsushita	• Itochu
• GE Plastics	• Siemens
• General Motors	• Sandoz
• Cynamid	• Hoechst
• Ciba Geigy	• AT & T
• Glaxo	• LG
• Guardian	• Unilever

In addition, many large business houses in India have chosen Gujarat as their prosperous base of operations.¹³

Table:6

• TATA	• Lalbhai
• Reliance	• Mafatlal
• Birla	• Modi
• Essar	• Thapar
• L& T	• Nirma
• Torrent	• Digjam

State of Gujarat came into being in 1960, which 66% of its industrial production caused from textile industry. Today it has reduced to 33%. In 60s, 75% industrial workers found employment in textile industry. By the end of 1993, picture of chemical manufacturing in the state & its share in national production was as under¹³:

Table:7

Melamine	100%	Chloromethyl Ether	47.5%
ABS Plastic	100%	Refrigerant Gas	39.4%
Cyanide Salts	100%	Nitrogenous Fertilizer	38.7%
Polypropylene	99.4%	Plasticizers	37.2%
Soda Ash	88%	Nitric Acid	35.4%
Phosphorous	99%	Dyes & Pigments	33.2%
Bromine	76.6%	Acetaldehyde	100%
Common Salt	75.7%	PVC	66%
Maleic Anhydrides	58%	Sponge Iron	69%

When Gujarat was formed on 1st May,1960, it was like starting from scratch. With commercial capital of India –Mumbai gone to Maharashtra, State of Gujarat suffered a great set back. What was left was a state with less than 1-acre per capita agriculture and textile dominated economy. A state with water scarcity and poor agriculture .A state which was ranked 8th in the country. It did not even have a capital. Makeshift

arrangement was made in the premises of Engineering college for Secretariat. But, entrepreneurial skill of Gujaratis converted the state.⁸

With a landmass of 196024 sq. kilometers (5.96% of India) and a population of 5, 05, 96,992 (4.93% of the country) Gujarat's share in India's GDP is 11 percent. 35 per cent of India's export takes place through Gujarat. It accounts for 12.44% of industrial production and roughly 30 percent of stock market capitalization. First in the country, in terms of village electrification; number of cargo handling and number of Stock Exchanges. Gujarat, which was a textile dominated economy at the time of inception, is today *Numero Uno* in the country as far as production of Acrylonitrile, Cyanide Salts, Melamine, Sodium Bicarbonate, Phosphorus, Soda Ash, Xylene, Magnesium Carbonate, Dyes & intermediates, Elastomer and LDPE are concerned. It is second in the country in terms of industrial production of lignite, petroleum and so on. It produces 70% of common salt, ceramic items, spectacle frames and has major share in production of tobacco, diamond cutting, oil engines, cement, fertilizers and groundnut oil produced in the country.⁸

With 1600 km long coastline, Gujarat has an inherent advantage. No wonder, this has made Gujaratis true *Sagar Khedus* (seafarers) who are looking for greener pastures, across seven seas... Apart from this natural infrastructure, the State has created excellent infrastructure, which has strongly supported the pursuit of Gujarat to become industrial super power of India. It is not surprising that with 73,600 km long road network; about 5,312 km long rail network; 11 airports; 8615 MW power generation capacity; 41 ports and finest education institutions like Indian Institute of Management, National Institute of Design, Institute for Rural Management, National Institute of Fashion Technology, MS University DAIICT, Nirma Institute of Management and so on, coupled with peaceful labor force. Literacy rate is 69.97%.⁸ Gujarat hosts institutes like Physical Research Laboratory, National Institute Of Occupational Health, ATIRA (Textile Industry research center)

No wonder, this environment and infrastructure has attracted global giants like Shell, Guardian, Niko, Marubeni, Sumimoto, Matsushita, Siemens, Uniliver, Novartis, Glaxo, General Motors, Itochu, LG, GE plastics, Cyanamid etc. to have their operations in Gujarat,. Not to miss, Indian who's who like Tata, Birla, Essar, Thapars, Godrej, L&T; Modi, Digjam, Ambuja, Asian Paints, Videocon, Bayer; Goodlass,

Lupin also have their presence in Gujarat and last but not least Gujarat has its own share of industrial houses like- Reliance, Torrent, GNFC, Nirma, Alembic, Sarabhai, Atul, Adani, Arvind, Mafatlal, GSFC, Vadilal, Ashima, Amul, Core, United Phosphorous, Cadila. Intas, Zydus, Pioma, Arti Ind. to name a few, And with the presence of all these large industrial houses coupled with 200,000+ small-scale industrial units, put together has created country's crucial, strategic and very important hub of industrial activity -Gujarat!⁸

In 1993, there were 500 small-scale dyes manufacturing units and more than 100 small-scale units manufacturing dye-intermediates. Out of these 100, 75 were exporting their products. This export is 50% share of total Indian export of these products. Gujarat had 40% share in pharmaceutical industry employing more than 60,000 people. There were more than 100 pharmaceutical units exporting their products.³⁶

Approximately 41 % of the total population in Gujarat was in employment as of 1991 in all the three sectors viz. primary, secondary and tertiary, together. The total number of workers in secondary sector in 2000-2001 is estimated to be 35 lakhs. The total number of workers in 2010 employed in this sector is projected to be 46 lakhs after considering the growth policies of the Government. This indicates that a significant number of people in Gujarat are already in workers category and this would continue to increase further by 2010.

SDP Growth rate of Gujarat for year 2003-04 is estimated to reach 20%. With Gross Domestic production of Rs.1,66,000 Crore, Indian GDP growth rate was 5% in 80s, 6% in 90s and now about 8%. In most states of India this rate remain 4 to 8 %. In 10th 5 year plan, growth rate planned for Gujarat is 10%, but has reached 20% this year.²¹

The critics say that this development is at a cost of environment. Moreover, there big units have failed in generating employment. Big units offer only 1 employment per investment of Rs.100 million which small scale sector offers employment to 20 for the same investment. After the new economic policy, 70,000 small-scale units have closed down. Agricultural production consistently went down. It was 66.8% in 1966, 55.6% in 1994 & 25% in 2001. Use of pesticides in 1960 was 15 kg per hector of land under cultivation. This rose to 70-75 kg up till now. National average of fertilizer rise use is 89.9 kg while that of Gujarat is 105 kg. 1.8 million-hector land is cultivated using groundwater. Ground water levels have gone down subsequently. Farmers have over

utilized this water resulting in spoiling the soil. Land quality has deteriorated because of over use of pesticides, fertilizers & ground water. 33.4% of the total land is spoiled.²²

Behind the so-called industrial development, what remains hidden is huge public debt. On 31 March 2000, the public debt was Rs. 28,804 crore. It is said that this has now gone up to Rs. 60,000 crore almost doubled in 3 years.²²

Drought is a major problem for Gujarat. Rural population of Gujarat face lot of problems as the income from agriculture is very unstable. Rate of economic development has gone down in recent year. Income of the state increased at a rate of 11.1 during 93-97 while during 97-02 it increased at a rate of 1.8 only. Per capital income had increased at a rate of 2.1% during 93-97 while the rate for the period 97-02 was only 0.3%. Availability of water in 91 was 1,391 m³ per person, which decreased to 1,137 m³ in 2001. In areas of North Gujarat & Saurashtra, this figure is 500-700 m³. In last 15-20 years, the state lost 30% of ground water. Literacy rate of the state is 69.7% while it is 77% in Maharashtra. 69% children in the age group of 6-17 year attend school, while it is 82% in Maharashtra. Gujarat is second lowest in the country. Infant mortality rate in Gujarat is 63 per 1,000 births. This rate for Maharashtra & Kerala is respectively 52 & 14 per 1,000 males. Women population in Gujarat is 878. National average is 927 women per 1000 males.²³

Despite the existence of factors inhibiting growth, in the form of unreliable rain fall, poor soil over large areas, unkind topography and highly skewed distribution of water resources, Gujarat has been able to build upon its limited advantages of a long coast line and occurrence of mineral wealth, to propel itself to a preeminent position of industrial growth, largely through the entrepreneurial skills of the people. A proactive industrial promotion policy of the State also helped considerably.¹⁰

The State's share of factories, [9.8%] organized employment [8.21%], productive capital [15.27%], output [12.96%], and net value addition [11.45%] in 1998-99, was way above its share of population [5%] or its geographical area [6%]. As a result, the per capita income in the State, at Rs. 18792 at current price (19,980.99), is above 30% more than the national average.¹⁰

Gujarat had 19,771 registered factories and 2,33,777 small-scale industries as on 31 Oct., 2000. Industrial investment is still pouring in. About 5,190 industrial entrepreneurs' memoranda representing investment of some 135009 crores of rupees and 18.10% of the total for the country, are committed to the State.¹⁰

2.2 Profile of industries

According to the annual survey of industries for the year 1997-98, the chemical and chemical products group constituted 37.28% of the industries. Rubber, plastic, petroleum and coal based industries contribute another 14% while textiles contribute 8% of the industries.

Development of manufacturing industries in the Gujarat region dates back to pre-independence year with the setting up of large number of textile mills. The dye and intermediate dyestuff industries followed suit. Exploitation of oil and gas led to refining, petrochemicals and downward integration. Abundant limestone deposits led to the setting up of cement industries. A long coastline provided the impetus for the manufacture of marine chemicals and now drives port-based development.

The policy of industrial promotion with liberal incentives did not discriminate enough, about the type of industries or their demand on life supporting systems or the absorbing capacity of the environment.(Table on p.20)

2.3 The Golden Corridor:

The "Golden Corridor" of the Indian State of Gujarat is an industrial belt that runs along the main north-south highway, linking the southern town of Vapi, with northern State capital of Ahmedabad. It is so called because of the wealth that has been generated by rapid industrial development. This area includes the large industrial estates in Ankleshwar, Nandesari and Vapi¹⁹ Dye factories, textile, rubber, paint, pulp and paper manufacturer, pharmaceutical, engineering and chemical companies, small and medium sized units rub shoulders one after the other in a grid of streets. The characteristic yellow containers of chlorine gas lie haphazardly in unit forecourts.¹⁹

These industrial areas contain thousands of individual industrial units, including dye factories, textile, rubber, pesticide and paint manufacturers, pulp and paper producers, pharmaceutical, engineering and chemical companies Visual surveys of the sites reveal industrial development that is haphazardly organized and poorly controlled, with facilities for waste management generally inadequate, and in many cases, non-existent. Widespread contamination of the industrial sites and surrounding areas is clearly observed. Poor health and safety, and waste management practices may pose serious health hazards, not only to the workers, but also to the communities within and around the sites, and the villages downstream from the effluent discharges.¹⁹

The Ankleshwar industrial estate is made up of approximately 3,000 individual

companies. Over half of these are chemical units, manufacturing dyes, paints, fertilizers, pharmaceuticals, industrial chemicals, pulp and paper and pesticides (Bruno 1995, CPCB 1996).³⁷

The Nandesari industrial estate was established in 1969, and is now made up of approximately 300 industrial units, including those that produce a wide range of

Table 8 : Number of Factories

Office wise Factories - Gujarat State			
OFFICE	WORKING FACTORIES	CLOSED FACTORIES	TOTAL FACTORIES
AHMEDABAD	5452	1341	6793
GANDHINAGAR	443	97	540
KALOL	1453	194	1647
NADIAD	309	148	457
ANAND	501	271	772
BARODA	2372	592	2964
GODHRA	454	224	678
BHARUCH	1320	269	1589
SURAT	2070	708	2778
NAVSARI	439	151	590
VALSAD	1976	416	2392
SURANDRANAGAR	529	225	754
BHAVNAGAR	417	150	567
ALANG	129	24	153
RAJKOT	1827	184	2011
JAMNAGAR	460	349	809
JUNAGADH	397	159	556
ADIPUR	275	104	379
TOTAL	20823	5606	26429

chemicals, pharmaceuticals, dyes, pesticides and plastics. The main contributors to the total quantity of waste generated by the estate include dyes and dye intermediates manufacture (82%), and the production of drugs and pharmaceuticals (13%)³⁷

The Vapi industrial estate is made up of nearly 2000 industrial units that produce a wide

range of chemicals, pharmaceuticals, dyes, pesticides and other agrochemicals, and plastics.³⁷

Almost 80% of the major and medium industries and 65% of the small-scale industries are located in the golden corridor stretching from Vapi to Mehsana.¹⁰

Table:9

Small-scale industries in the golden corridor (31-10-2000)	
Ahmedabad	54928
Kheda	11192
Vadodara	13197
Bharuch	10136
Surat	34193
Valsad	13841

The golden corridor also boasts of 84% of the units manufacturing highly hazardous chemicals.

Most of the water polluting industries [major and medium] is set up in the golden corridor, Ahmedabad accounting for [154], followed by Surat [89], Bharuch [74], Valsad [68], Vadodara [53] and Mehsana [25].¹⁰

The golden corridor traverses the basins of Sabarmati, Mahi, Narmada, Tapi and Damanganga

Rivers, which, among them, represent 87.1% of the available surface water resources [84.54% of the total utilizable surface water resource] of the Sate. The implications of both the composition and location of industries in Gujarat for its water resources are obvious.¹⁰

2.4 Gujarat Chamber of Commerce & Industries:

Gujarat Chamber of Commerce & Industries (GCCCI) has prepared its comments on various issues, for submission with the Government, reflecting their concerns and demands. Of particular interest is their demand for labor reforms. Though the document is long, I quote liberally as it presents picture of various factors affecting industrial growth. Excerpts from the document:

Industrial Policy:

While the industrial policy 2000-2005 announced by the State govt. is quite dynamic and pragmatic and is basically growth driven yet the implementation of policy is halting and hesitant. It leaves much to be desired in respect of promotion of Industries large, medium and small, infrastructure development employment intensive parks, Hi-tech parks, investment parks, trade center as well as backward area development, environmental protection, and export promotion. Tardy progress made in these directions so far indicates poor and weak follow up and lack of publicity of the incentives and facilities available to industries. Corrective measures are therefore required to be taken to

sustain and accelerate industrial growth in Gujarat so that with maximization of larger manufacturing capacities and productivity, enhanced employment opportunities could be generated and enlargement of exports could be achieved.⁹

Leads and lags in Industrial growth:

It has to be realized that Gujarat's inherent advantages of low labor cost, intelligent man power, highly qualified and trained man power in the form of pool of scientists, prolonged period of industrial peace, entrepreneurial edge of the people, good grasp of technology and proactive govt. attitude and approach and supportive bureaucracy etc. should have taken it right to the top of the league on the industrial firmament of the country. This potential has not been realized reflects that there are still problem areas on which govt. needs to pay special attention to enhance competitiveness of our products both in the domestic and international market.⁹

Core concerns:

Gujarat had shined out for impressive performance in 90's even in the adverse environment due to global economic slow down and an array of unprecedented natural and man made calamities. Gujarat state being growth driven will continue to have a growing role in the national and international economy in the years ahead provided the govt. undertake priority areas for action on the following lines. This is imperative because rate of economic and industrial growth are on the downward path. This calls for adoption of immediate and effective measures for restructuring and resurgence of industrial structure and growth in Gujarat.⁹

Power availability and rates:

Periodical inadequate and irregular supply of power and high cost thereof obstructs industrial growth and hampers competitiveness. The power cost to total expenditure in major industrial units in Gujarat works out to 4.3% to 11.77% whereas in chemical industry units it comes to 13.15% to 37.3%. Power cost works out to about 7.5% to 8% of the sales which is very high. Besides high cost of power, the quality and reliability of power supply leaves much to be desired due to periodical interruptions, failure, voltage fluctuation and power cut and staggering. Even power is not available to exporting units at international price of Rs.2 per unit/kw as is being done in China.

*Concrete actions are needed for augmenting power supply and for reducing cost there of including duties and taxes levied thereon by state govt. otherwise it is apprehended that large number of chemical and other units will face closure.*⁹

Infrastructural constraints:

Infrastructure bottlenecks and costs thereof are prohibitive and hamper competitiveness of our industries and exports. Inadequate facilities and congestion at ports, condition of roads being far from satisfactory, ineffective working of railways and antiquated facilities at airport etc. operate as impediments and add to the cost of the transaction and ultimately make goods uncompetitive both in the domestic and international market. When Hyderabad is already promoting itself as the hub of chemical and pharma industry in the country and is willing to take all possible steps, it is high time that this issue be given priority it deserves so that existing or new units do not migrate over there from Gujarat.

Finance:

It is distressing to note that out of 2.65 lakh SSI units registered in Gujarat at present, about 76% are working and about 20% are closed. Out of this during July-June, 1998 only 21192 units were given disbursement of the order of Rs.1265.11 crores whereas in the same period in 1999 there was sharp drop in no. of units to 13334 whereas disbursed amount was only Rs. 661.46 crores. The % of disbursement to SSI via-a-vis total disbursement for priority sector had dropped from 49.19% to 32.24%. The same situation of deceleration had continued in 2000, 2001, and still continuing. The major constraint is non availability of working capital. Despite the fact that banks are flush with funds and credit policy advocates liberalization of finance for SSI, the picture in reality is otherwise and SSI units are starving for want of funds.

While interest rates have shown signs of softening and prime lending rate has been revised down ward to 11%, the actual lending rates that SSI units have to pay vary from 12% to 16%, which are still way above international bench mark. It is therefore reasonable and necessary that interest costs for SSI be reduced by making available finance between 8 to 10%. Even the bank charges and guarantee cost for sanctioned limit works out to about 2% which are required to be reduced. Pressure is brought on nationalized banks to not only augment credit deposit ratio from 45% to 65% but also finance for SSI be augmented at highly concessional rate.⁹

Small & Medium Industries:

The investment in SSI sector is Rs. 7446 crore producing goods worth Rs. 10,223 crore and providing employment to 7.24 lakhs people in state. These units account for 3.5% of total investment 8% of production and 24% of employment. The SSI Sector has become the “Nursery” for the development of entrepreneurial talent. SSI sector thus acts

as a prime mover to overall economic growth. Concept of ancillarisation can be effective only if proper tie up between large and small units nearby is arranged by govt. with requisite facilities.

In order to provide a strong and attractive environment to the SSI sector which is struggling hard to survive due to severe competition and lack of working capital etc. it is essential and desirable that the policy for SSI sector need to be reoriented and restructured on sounder lines so as to provide momentum for its all round growth and development.⁹

Cluster development:

Although Gujarat has developed 73 product clusters which include clusters like brass parts industry in Jamnagar, oil engine in Rajkot, ceramic tiles industry in Morbi, Ship breaking industry at Alang, rerolling mills in Sihor, cotton power-loom industry in Ahmedabad, artsilk power-loom industry in Surat and diamond cutting and polishing industry in Surat and Ahmedabad, yet none of them have been declared as centers of economic and export excellence in the New Exim policy such as Tirupur, for hosiery, woolen blanket in Panipat, woolen knitwear in Ludhiana. These later centers have been provided various advantages by GOI viz. facility of EPCG scheme for common service, market access funds, central assistance for infrastructural gap and entitlement of export house status at Rs. 5 crores instead of Rs. 15 crores for others that should be sought for main Gujarat clusters also in the Tenth plan. Despite better performance, Gujarat clusters woefully lack the aforesaid facilities for organic growth and export development.⁹

Exports:

Even though Gujarat accounts for about 17% of the total exports of the country, a lot more needs to be done to diversify and consolidate manufacturing capacity, enhance productivity and competitiveness and increase market access to newer markets, which are opening up due to globalization and liberalization.⁹

Despite the fact 13 SEZ have been sanctioned in the country with 3 in U.P., 2 in West Bengal and 2 in Orissa and most of the them have obtained Possession of land and detailed feasibility project reports are under preparation some by KPMG, Cashman and Wakefields and Ernst and Young etc. while the progress at Positra SEZ in Gujarat is very slow. If we want to sustain our premier position in exports then progress of SEZ at Positra will have to be accelerated with speed and vigour. The step taken by the govt. to declare SEZ's as "deemed foreign territories" would help in the progress of the areas in the state.⁹

(Local community was against formation of SEZ .They protested. They went to Court.

Court has stayed the formation. Government has intimated farmers that their land acquisition has been stopped.-Ed))

Labor Reforms:

Despite the talk of India/Gujarat having lower wages, the labour productivity in India/Gujarat compares very unfavorably with many other countries like Pakistan, China, Fiji, Japan, Malaysia etc. as also compared to many leading states in the country. It is understood that out of 12 countries for which comparison of productivity indices are available, India is at the 8th position. Even compared to China we are lagging behind in labor productivity in all most all industrial sectors to the extent of 7% to 180%.⁹

It is high time to introduce hire and fire policy and link wages with productivity and efficiency so as to enhance competitiveness of our products both in domestic market and international markets. Even pragmatic exit policy also needs to be implemented with social concern in view.⁹

2.5 Chemical Industry:-

Official website of Government. Of Gujarat, proudly declare: With rapid industrialization various types of industries developed in the state. Along with this there was spurt in chemical industries and at present state has highest umbers of chemical industries in the country.

Government website gives details of chemical factories in the State. It seems that the site has not been updated since 2001.

There were 372 MAH units, 459 A class units and 1822 B & C class units existed totaling 2,653 units. Valsad district had maximum A class units (100) followed by Bharuch (78), Ahmedabad (77) & Baroda (77). In 'B' & 'C' class units, Ahmedabad topped with 404 units (22%), followed by Valsad (350; 19.2%) and Baroda (306; 16.79%). These 3 districts totaled 79% of total units.

One of 2653 working units Ahmedabad hosted highest numbers (524; 19.75%) followed by Valsad (496; 18.69%), Baroda (465; 17.52%) and Bharuch (245; 9.2%). Employment in Chemical 4.5 million + 1.2 million indirect by way of transport, sales, packing. or 60% of detergent is produced in small-scale 50% of dyestuff is produced in small-scale.

Valsad district had maximum 'A' class units (100) followed by Bharuch (78), Ahmedabad (77) & Baroda (77). In 'B' & 'C' class units, Ahmedabad topped with 404 units (22%), followed by Valsad (350;19.2%) and Baroda (306;16.79%). These 3 districts totaled 79% of total chemical units in the State.

Of 2653 working units, Ahmedabad hosted highest numbers (524;19.75%) followed by Valsad (496;18.69%), Baroda (465;17.52%) and Bharuch (245;9.2%).

Popularly known as GDMA, the Gujarat Dyestuff Manufacturer's Association was founded in 1962. GDMA is now in existence since over 36 years and has formidable membership strength of 715 manufacturing units; producing Dyes Intermediates, Dyes Pigments and specialty chemicals. The number of its members is ever growing. Majority of units hail from small-scale industry sector, spread all over the state of Gujarat, the west coastal state of India. GDMA informs that of Gujarat contribute 60% of the total export of dyestuff from country.

In 99-2000, share of chemicals & chemical products in Net Value Added was 47.05%, which was highest among all industries. NVA for textile was 7.57 %, Metal was 6.72 %, Food -5.83 % & machines – 4.78 %. Total NVA in this year was Rs. 19,366 Crore. This indicates the economic importance of chemical industry in the state.³⁸

2.6 Dangerous Operations:-

Under the provisions of section 87 of Factories Act, State Governments are empowered to declare any operation as "hazardous" and can frame special rules for such units. Gujarat Factories Rules, 1961 (GFR) are framed under the factories Act. Rule 102 of the GFR enlist the dangerous operations. Rules are applicable to all such units employing 5 or more workers. In year 2000, 153 units were declared having 'dangerous operations'. Out of these 153 units, 99 were in the industrial category of "Chemicals". i.e. 64% units were chemical units. 153 units employed 21,000 workers out of which 13,935 (66.3%) were in chemical units. In a given unit, not all the workers are employed in department where 'dangerous operation' is being carried out Among 21,000 workers, only 4,999 were employed in "dangerous operations". The corresponding figure for the chemical units was 3023, (60.47%). This amount to be 21.65 % of the workers employed in chemical units having 'dangerous operations.' This figure seems to be small. One of the reasons is, more than 42 % of the units do not reveal information. Again, one does not know how the units submitting returns calculate the figure.

TABLE:10

	All Units	Chemical Units	Percentage
Numbers of units having Dangerous Operations.	153	99	64
Total Number of workers employed by the units	21,000	13,935	66.3
Numbers of Workers actually employed in dangerous operations in these units.	4,999	3023	60.47

TABLE:11

Sl. No.	Type of Industry	Industries	%	Workers	%
1	Man-Made Fibre	4453	23.2	220458	31.4
2	Extraction Of Oils & Fats	2031	10.6	76636	10.9
3	Chemical	1490	7.8	45883	6.5
4	Glass And Ceramics	1967	10.3	46855	6.5
5	Grind Or Glaze Of Metal	2052	10.7	44708	6.4
6	Drugs And Pharma	572	3.0	34836	5.0
7	Electrical Accumulators	798	4.2	33356	4.7
8	Paints And Pigments	1323	6.9	29640	4.2
9	Ferr Metal, Iron & Steel	654	3.4	24829	3.5
10	Synthetic Resin & Plastic	928	4.8	22882	3.3
11	Foundries	618	3.2	15952	2.3
12	Rubber (Synthetic)	469	2.4	15888	2.3
13	Fertilizer	163	0.9	15212	2.2
14	Petroleum	107	0.6	13392	1.9
15	Power Generating	30	0.2	12664	1.8
16	Pulp And Paper	270	1.4	12388	1.8
17	Cement	283	1.5	12062	1.7
18	Soap & Toilet Preparation	357	1.9	11912	1.7
19	Nonferrous Metallurgical	431	2.2	10087	1.4
20	Others*	165	0.9	3663	0.5
21	Total	19161	100.0	702322	100.0

* Others include mining, leather tanning, coal and fuel gases, asbestos & its products, fermentation, nuclear fuels, Dyes & dyestuff.(Document Agenda 3-1 A)

2.7 Hazardous Industries:

There are 24,576 registered factories in Gujarat, out of which 19,161 (78 %) are reported to be involved in hazardous processes. Maximum numbers of units (23.2 %) were in 'Man made fiber' followed by 'Grinding or Glazing of metals' (10.7 %) and 'Glass & Ceramics' (10.3 %). 1490 chemical units are identified as having 'hazardous processes' (7.8 % of total) in which 46,883 workers are employed (6.5 %). In all 7,02,322 workers are employed in hazardous processes. About 7 lakh workers are reported to be working in these industries. A maximum of 2.2 lakh workers (31.4%) are involved in 'Man-made Fiber' industries followed by 77,000 (11.0%) in 'Extraction of Oils and Fats' and about 46,000 (6.5%) each in 'Chemical' and 'Glass and Ceramic' industries. All other categories of industries had their total number of workers below 35,000.

2.8 Major accident hazard units

In Gujarat 416 Major Accident Hazard (MAH) units were identified, out of which 44 were closed and 372 were working. Bharuch district had maximum concentration of such units (78 units) followed by Baroda (82 units), Ahmedabad (43), Valsad (46) and Surat (32). These five districts have 75% of the total working units. This area is known as "Golden Corridor". India has 1461 MAH units. Gujarat state has highest number of these units with 28% share followed by Maharashtra state with 22%. Then comes Andhra Pradesh & Rajasthan with 7% each. Big state like Uttar Pradesh has only 6% units.

In Baroda district 91 MAH units are identified, out of which 25 are closed units and 66 are working. Chemicals stored in these units are either/and toxic, flammable, explosive, corrosive, poisonous in nature. Some of the hazardous chemicals are Chlorine, Ammonia, Hydrocyanic acid, Butadiene, Styrene, Benzene, Sulfuric Acid, Nitric Acid, Oleum, Thionyl Chloride, Chloro acetyl chloride, caustic lye, SO₂, Methyl Ethyl Ketone, ethylene dichloride, ethylene oxide, Aniline, Nitrobenzene, Toluene etc.

2.9 Employment in chemical Industry in Gujarat

Chemical industries employ directly 4.5 million workers. Moreover, 1.2 million workers get employment by way of transport, sales, packing etc. In 99-2000, chemical industry

employed 1,97,000 workers in 2091 units. Daily average employment in this sector was 17.66 % while it was 18.43 % in textile. No. of chemical units in small scale in 98/99 was 4870, employing 46,413 workers.

2.10 Female Workers:-

In Year 2000, out of 29,424 working factories, 12,234 factories filed returns under Factories Act. In these 12,234 units 5,49,934 workers were employed. Among 5,49,934 number of female workers were 36,495. This is 6.63% of total work force. In 20,424 factories 8,66,720 workers were employed. If we consider 6.63% as the percentage of female workers in entire work force then the projected figure of female workers would be 57,463.

Table: 12

	Male	Female	Total
Private Sector	4,83,449 (93%)	35,717 (6.87%)	5,19,166
Public Sector	29,990 (97.4%)	778 (2.52%)	30,768
Total	5,13,439 (93.3%)	36,495 (6.6%)	5,49,934

Looking at the available figures it is clear that public sector employs only 2.52% female workers of its total workforce while public sector offers more employment opportunity to female workers.

Numbers of chemical units in private sector was 3449. One of these 1939 submitted returns & 1510 did not. In 1939 units 91,394 workers were employed. Here, no. of female workers are 5762 (6.3%). Total no. of workers employed in 3449 units is 148671. if we apply same ration for this entire work force, estimated no. of female workers in chemical units in Gujarat in year 2000 would i.e. 9,366..

Among the chemical units in the state, 31 units employed more than 30 women workers. As per the provisions of Gujarat Factory Rules, the units having more than 30 women workers need to provide crèche facility. As per government figures out of 31, 29 units have provided crèche.

2.11 Strikes & closers:

A review of industrial relations in India, in the pre-reform decade (1981-90) reveals that as against 402.1 million man-days lost during the decade (1981-90) i.e. in the

pre-reform period, the number of man days lost declined to 210 million during 1991 to 2000 – i.e. the post-reform period. But more man-days have been lost in lockouts than in strikes.

In 99, 112 incidences & in 2000, 71 incidents were registered in which 18,574 & 16,630 workers were affected respectively. Out of these, chemical units were 24 & 14 respectively. Number of workers affected in chemical units in year 99 & 2000 were respectively, 2960 & 4772. The figures for year 2000 are significant as only 14 units were involved but numbers of workers affected were much more than earlier year.

2.12 Private Sector

In private sector, there were 3,449 working chemical factories in Gujarat. In these units worked 4,48,671 workers. If the government figures are to be believed, there were no adolescent or child labors employed in these units! Again, if govt. figures are to be believed, none of the workers worked neither less than 45 hours a week nor worked more than 48 hours in a week!

2.13 Size of Units

Small scale units have a significant presence in the State. 60% of detergent is produced in small state while 50% of dyestuff is produced in small scale.

Information of the size of the unit was available for 1,981 private sector chemical units with the government. Out of 1,981 units 43.66% units employed less than 10 workers, 23% employed more than 20 but less than 50 workers and 8.3% units employed 50-100 workers. Thus, 98.43% units employed any where between less than 10 to 100 workers. (See Table on p.30)

These units employed 95,922 workers. Highest numbers of workers, 24,751 (25.8%) were employed by the units in category 100-200. Next important group is the one employing 1000-5000 workers with 24.91% share.

2.14 Days Worked

Among 1,981 private sector chemical units, 81.1% units worked for more than 300 days in a year. 21 units worked for less than 2 months. In all, 83 units (4.18 %) worked for less than 6 months in a year.

2.15 Public Sector

There were 42 units, manufacturing chemicals in public sector employing 4853 workers in year 2000. In Gujarat, total numbers of factories in public sector are 432.

Number of workers employed by these units is 42,946. 42 chemical units (9.7% of total) employed. 4,853 Workers (11.3%). This category of industry does not include Petroleum Refinery, Rubber, Plastic, Paper, though largely these units may be categorized under “chemical”.

Table:13

Sr. No.	No. of Workers	No. of Units	As Percent of Total
1	Less Than 10	865	43.66
2	10-20	457	23.00
3	20-50	347	17.50
4	50-100	166	8.37
5	100-500	118	5.90
6	500-1000	20	1.00
7	1000-5000	11	0.55
8	More Than 5000	0	0
9	Total	1981	100

Table:14

No.	Category of the Unit	No. of Worker	Percentage of Total
1	Less Than 10	4,575	4.76
2	10-20	6,135	6.39
3	20-50	11,064	11.53
4	50-100	11,741	12.24
5	100-500	24,751	25.8
6	500-1000	13,753	14.33
7	1000-5000	23,903	24.91
8	More Than 5000	0	0
9	Total	95,922	100

2.16 Factory Inspectorate:

To implement various provisions of Factories Act, under ministry of Labour and employment, Factory Inspectorate wing has been established. Since new economic policy in 1991, Government stopped new recruitment. By & by the numbers of inspector has gone down and existing workforce is loaded with more work. On the other hand, due to international development number of new legal provisions add up. Laws for environment protection, disaster management, hazardous waste, chemical transportation have come up in last decade. Factories Inspectors are also implementing laws like payment of wages Act, Equal pay for equal work, Maternity Benefit Act etc. In 2003, Govt. of Gujarat enacted Rules for construction workers safety and responsibility for its implementation has also been given to Factory inspectorate.

As on 31-12-2000, against 23 sanctioned post of class-1 officers, there were only 12 officers. By year 2004, the situation has deteriorated further. Recently I visited Alang ship breaking yard. This yard is notorious for its safety record. After lot of pressure generated by international agencies, govt. opened office at Alang. When I visited in first week of May, 2004, the office was empty. The officer appointed was sitting at Bhavnagar, 30 Kms from Alang. Bhavnagar is district place, where there is main office of Factory Inspectorate. Since there was no Factory Inspector, Alang officer was instructed to sit at Bhavnagar. Between 2 offices only one inspector!

At the moment, post of Chief Inspector of Factories is vacant since last more than 1 year. The charge is given to the Dy. Chief inspector! Such a industrialized state remain without proper appointment of Chief Inspector.

In December 2000, against 88 sanctioned positions of class II officers, they had 81 officers. In class-III position, against 103 positions, 13 were vacant and in class IV against 44 positions, 2 were vacant.

For whole state, they have only one chemical Inspector of Factories, who is class II officer. He has his own resentment, as there is no scope for promotion for him. More over, his powers are limited.

2.17 Prosecutions

Factories Act & Gujarat Factory Rules are main legal instruments in the protection of health & safety at work. To monitor the implementation of these provisions, all districts have office of Factory Inspectorate. In year 2000, inspectorate prosecuted 94 factories. (out of total working factories 20424) Number of successful complaints filed against these units was 423. Out of these 423, 64 were pertaining health & safety. During

the year inspectors inspected 15,041 factories, i.e. they inspected 73.64% of existing factories. Out of 15,041 they could find only 94 factories violating provisions for OHS. There are various provisions to protect Health & safety of women worker at work in Factories Act and Gujarat Factory Rules. In year 2000, Factory inspectors successfully prosecuted only one factory for violation of these provisions.

There are no separate courts to hear the complaints filed by Govt. inspectors for violations of labor laws. As a result, large numbers of complaints remain pending for years. There were 59,409 cases pending in the courts for violations of Factories Act in year 2001. This number rose to 59,998 by October 2002.⁴³

2.18 Budgetary provisions:

In year 99-2000, Government expenditure on working condition and safety was Rs.4,19,59,000. In the budget for year 2003, budget presented was for Rs.5,58,00,000 for the same head. This meant that Government increased the budget by 19.30 %. Though overall budget rise for Labor ministry was 69.63%, Government decreased 9.04% budget on implementation of labor laws. Expenditure on inspections by different inspectors shall be reduced, it was declared.⁴³

For its Safety Unit for accident prevention, Government spent Rs.30.67 lakh in 2001-02. Budget allocation for year 2002-03 was increased to Rs.35.55 lakh⁴³

2.19 Accidents in Chemicals:-

In 1998, 164 total accidents took place per 1000 workers in employed chemical industry in India while 3543 non-fatal injuries took place plus 1000 workers employed. Incidence rate for fatal accident was 0.34 while that of non-fatal was 6.7. Frequency rate for fatal accidents was 0.09 & for non-fatal accidents was 1.8. Incidence rate for fatal accidents was highest in chemical industry, among all industries.

In Gujarat in 1998 223 fatal accidents took place while 11,930 non fatal accidents took place. Respective figures for Maharashtra are 163 & 17,120. Rate of fatal accidents in Gujarat was 0.56 & 0.16 in Maharashtra. Rate of non-fatal accidents for Gujarat & Maharashtra was, respectively 30.01 & 16.28. Frequency rate for fatal accidents for these two states were respectively 0.18 & 0.05. Frequency rate for these states for non fatal accidents was 9.79 & 4.92 respectively. Thus it can be concluded that industrial working

in Gujarat run higher risk of getting injured than their counter parts in Maharashtra. Or there is grave under reporting of accidents in Maharashtra. (See Table below)

In year 2001, 175 fatal accidents took place while till October 2002 202 fatal accidents were reported. Non-fatal accidents reported in 2001 were 6.467. Government projected that the figure shall go up in next year.⁴³

Table:15

	Gujarat	Maharashtra	India
Fatal Accidents	223	163	-
Non-fatal accidents	11930	17120	-
Incidence rate for fatal	0.56	0.16	0.34
Incidence rate for non-fatal	30.01	16.28	6.7
Frequency rate for fatal	0.18	0.05	0.09
Frequency rate for non-fatal	9.79	4.92	1.8

2.20 Working Conditions:

Working conditions in some the large industrial estates in Gujarat – Nandesari, Vapi and Ankleshwar could be described as ‘medieval’, We saw workers in Ankleshwar covered head to toe in dyes containing carcinogenic, chlorobenzenes. In Vapi, workers washed themselves and their tools in some of the most hazardous chemicals known.¹⁹

Workers are mostly employed on a casual basis through labour contractors. Thus employers have no liabilities to pat benefits, such as medical expenses or are provided with personal protective equipment. Wages are low. Morale is very low “because of the conditions they have to undergo simply to keep going. Excessive and continual exploitation by the combination of labor contractors and management (specifically of the casual and unskilled laborers interviewed) has brought down morale.”¹⁹

International Labor Organization (ILO) statistics show that India experiences the third highest level of fatal accidents-about 25 deaths per thousand workers every year. It is not known how many of these fatalities are caused by exposure to pollution, fugitive emissions and handling of toxic material in industrial units. Nor is it clear how morbidity levels are affected by such exposure. And these are only the reported figures.¹⁹

Greenpeace observed the conditions of workers in Ankaleshwer. Purnima Chemicals Ltd had spread a yellow dye on a patch of empty ground, presumably to dry. Workers were covered in it as they packed it into sacks. This dye contained di-, tri- and

tetrachlorobenzenes. It is totally unacceptable to grossly expose the environment let alone humans to such chemicals.¹⁹

Vapi is home to Chemie-Organics; described by Greenpeace scientist, Dr David Santillo, as, "possibly the worst piece of chemical plant I have ever, and will ever, set eyes on." He was unable to sample what appeared to be the main effluent channel because there were too many workers queuing to wash themselves and their tools in it!¹⁹

2.21 OSH Status in Chemical Units

In year 2000, 232 fatal accidents & 8,584 injuries were reported in Gujarat in 20,424 working factories. Chemical units counted for 2,572 units. (12.59% of total). Fatal accidents in chemical units were 120 (51.72%). This indicates that more than half of fatal accidents take place in chemical units! What a risk workers of chemical units carry ! Share of chemical units in injuries is just 3.55%. Is this not a clean case of under reporting? As per the data, either there are no injuries or there is only fatality. 29 occupational diseases are notifiable occupational diseases as per provisions of Factories Act. The list includes diseases due to lead, phosphorous, mercury, manganese, chromium, benzene, carbon monoxide, isocyanates, occupational cancer, noise induced deafness, dermatitis etc. In year 2000, not a single case of occupational disease was notified. Though Gujarat has such a high number of chemical units and number of chemical units and OHS standards have remained extremely poor, not a single case of poisoning is reported! In 1998, 52 cases of occupational diseases were reported, though there is no break up available of the disease. Orissa reported 1888 cases of occupational diseases that year! This is either due to nexus between private practitioners and industry or lack of knowledge and will in doctors and office of the Factory Inspectorate. There are 4 medical practitioners working as certifying surgeon in the office of factories inspectorate. They have utterly failed in detecting cases of occupational diseases. There is a large network of dispensaries & hospitals of Employees State Insurance Corporation (ESIC) in the state. Out of 0.8 million workers working in registered factories about 0.5 million are covered by ESI Act. The ESIC doctors, too, have not reported any case of occupational disease. In fact, since 1990, a strong working movement has taken place in Gujarat for identifying & compensating victims of occupational diseases and several victims have been compensated. However, either there is lack of co-ordination between factories inspectorate and ESIC or, they are not interested in presenting correct picture.

Govt. of Gujarat established Industrial Hygiene Laboratory in 1982 under International program. Some equipment have never been brought out of the boxes because, no one knew how to operate. Some equipment are not used because Govt. did not appoint appropriate staff. What they have is a pump and dragger tubes for only handful of substances like Chlorine or Ammonia. When the team visits a factory, they just go and measure chlorine. In a factory, where I used to work, department manufacturing chloro-acetic acid would be always full of strong pungent & irritating smell to eyes & respiratory tract. The team would visit the plant twice in a year, measure the chlorine & would say, this workplace is free of Chlorine! I used to ask them, what this irritating material is & what its level is. The technician would say, "Sorry, we do not know."

In 1996, Govt. carried out medical examination of 18,000 workers with the help of National Institute of Occupational Health & Employees State Insurance Scheme. Report of the survey has not been made public. Even the process of examination was not transparent. The team of doctors sat in office of Industrial Hygiene and factory owners were asked to send their workers. Factory owners would choose healthy workers and send them for examination. Moreover the doctors examining them were not adequately trained. Occupational history was not properly noted down. Most of the times workers themselves do not know correct names of the substances they are exposed to. Government website does not give any details of survey.

Dr.H.L.Trivedi, Director, Institute of Kidney research and diseases, note, "There is no doubt, industry has played important role in development of Gujarat, but what is the use of development achieved at the cost of environment and health of people. In textile and chemical industries, workers suffer from various diseases because of lack of attention paid. Workers need to be made aware in this regard... With advent of chemical industry in Gujarat, high prevalence of kidney and liver diseases is found among workers directly exposed to chemicals. People staying around chemical units are always at a risk of exposure to hazardous gases. Treatment of diseases of kidney, lungs or liver is very costly for ordinary worker. Hence, not only workers, but the employer, too need to be made aware of the hazards associated."¹¹

Kartikeya Sarabhai, Director, Centre for Environment Education, Ahmedabad, says, "It is a matter of concern that, we in Gujarat, welcome the industries discarded and banned by Europeans and Americans and then we claim that our exports have increased. Do we have any responsibility for future? During winter, in Ahmedabad sometimes respiration becomes difficult."¹²

The website informs, “In spite of increased in number of factories, there has been considerable decrease in industrial accidents. (During 1991 to 2001, registered factories increased by 58% where as fatal accidents decreased by 52%), due to effective enforcement of safety provisions by the factory inspectorate.”¹³The site does not give data of fatal accidents. They also hide severity rates or frequency rates, which are best instruments for comparisons.

Reporting of non-fatal accidents has gone down for two reasons. With globalization, private industry has entered into race to show their clean face. In pursuit of this, they discourage workers to report the cases. Recently in one of the meetings we organized at Baroda on 20/03/04 for shop floor trade union leaders, workers complained that the accidents are not reported. Companies now need ISO certification to compete global market, which compel them not to report cases. More over, after the new economic policy more & more companies recruit workers, even for manufacturing process (Prohibited by law), through contractors. If contract worker is injured or die in accident at work, principal employer does not include in its list of accident. The company declares, he was not ‘our’ employee. We have made several complaints with local factory inspector in this respect. One of the public sector companies, Indian Oil Corporation is also found doing such practice. A worker called Babubhai Chitre, working on cooling tower, fell down and died. The incident was reported in local newspapers. When we enquired with factory inspector, he replied that the company has not reported the case but he shall look into the care. Later, I was informed that the premises in which, worker was working, did not belong to the company, though the cooling tower on which he was working was owned by company! This reply was clearly for saving face.

The website further enlighten us: “ It is submitted that, due to vigilance and periodical monitoring by the officers of factory wing, no disaster took place, in spite of remarkable increase in strength of chemical factories. In the state 2612 boilers and 52 economizers have been inspected and certified...”.¹³ How do they define disaster is a question, if they say this after large numbers of fires, explosions and fatalities.

Looking at the table below, it is evident how grave the situation is. Frequency rate and security rate both have gone up, though the numbers of non-fatal accidents have gone down.

2.22 Govt. Surveys:-

In Gujarat, Ankleshwar, Vapi, Nandesari & Ahmedabad are four major Industrial areas, where chemical industry has concentrated. Govt. of Gujarat got Vapi &

Ankleshwar areas surveyed through Gandhi Labour Institute. Though these surveys are now a decade old, still they are relevant. In Vapi more than 75% and in Ankleshwar 61% of the chemical units surveyed were in bad shape in health and safety. The surveyor found in a pharmaceutical unit, manufacturing Ethambutol that the product was freely flowing in the air near dryer. A worker in that unit had severe skin problems and was sacked on that ground. He found 600 empty drums of Sodium Cyanide with a scrape-trader each having at least 100 gms of powder left behind. A worker was cleaning the drums in open with water near a well. In Vapi about 311 chemicals are used while in Ankleshwar 925 different chemicals are used. Out of 206 units, 77% units respiratory problems, in 86% units skin problems while in 87% of the units problems of eyes was observed. Almost in 100% units, workplace pollution was not monitored. Out of 925 chemicals, he could not get information of hazards for 350 chemicals. Out of remaining 575 chemicals, 32.5% were extremely hazardous and 51 chemicals were banned in developed countries. In a diagnosis camp organized at Ankleshwar, 6 out of 100 were found to have cancer. It was also found that skin and bone diseases are on increase.

50 percent of chemical storage tanks were found to be in a bad or very bad condition with over 61 percent of units surveyed having no scheduled maintenance system for storage tanks.

- Almost 80 percent of workers were not using personal protective equipment.
- Alarm systems were only available in 18 percent of units.
- Start-up and shutdown procedures were only written down in only 17 percent of some units surveyed. There were shortages of qualified managerial and supervisory staff in 45 percent of units.
- 68 percent of units suffered from pollution. Pollution due to water contamination and odor was present in 80 percent of units
- The effects of air pollution particularly on workers at present exposure levels include respiratory and irritation troubles in 7 percent to 82 percent of factories. Adverse effects on skin eyes were noted in 86 percent of units.

2.23 Our Experiences:-

In a Chloroacetic Acid plant, the crystals are crushed manually before feeding it to the centrifuge. Dust, vapors, gases are allowed to move freely in the air, noise control is considered a luxury. We do have good legal provisions but not implemented. Most workers do not know their Health & Safety rights. One of the studies carried out in textile

mill showed 100% workers covered by the study to be deaf. National Institute of Occupational Health (NIOH) carries out this study. Millions of workers in unorganized & informal sector suffer much more than their brothers in organized sector. The suffering of these workers does not come to the light anytime. You would not believe, that according to the Government labor statistics, Indian industry is far cleaner than the industries in any other country in the world. Not a single worker in India is suffering from any of the prescribed Occupational Diseases. So this is the situation in which we work..

In a unit manufacturing chromium salts, workers are suffering from chrome ulcers occupational dermatitis, rhinitis and other upper respiratory tract problems. In a unit manufacturing chloroacetic acid, there were 22 workers in 1989 exposed to chemical vapors of high concentration. By 1995, there remained only 7 workers. No, rest of them did not die. They were transferred to other departments on medical grounds. They were suffering from dyspnea. Remaining 7, too, are in various stages of chronic bronchitis. In a unit manufacturing dichloro aniline & other intermediates like ortho- & para-tolidine using Toluene and other chemicals, where I worked for 2 months. In two months of period, without any exaggeration I can say that, almost daily one worker would be unconscious due to chemical exposure. We had two cases of paranitrochloro benzene ingestion in that period. In yet another unit in Baroda, manufacturing vat dyes using pyridine, chlorosulfonic acid, bromime, Nitrobenzene and many other chemicals. There was no control of monitoring of pollution. Chlorosulfonic acid was taken to third floor manually by open buckets. The dyes were pulverized without dust control. The worker pulverizing it would be covered from toes to hair by the dye being pulverized.³⁵

A worker working in a unit manufacturing paracetamol narrated his experience. “.. I was in General shift. I was given job of preparing small pieces of paranitrochloro Benzene and feed it to the reactor. After lunch brake, I started feeling vertigo, head-ache, I was given soda & lemon. At 4.30 pm, I went home. After dinner when I went to sleep, I again experienced giddiness, headache, spasms in extremities etc. In my village, there is no doctor, so I had to walk down in the late night on dark road up to the next village, about 1.5 km. away. I woke up the doctor. When he heard that history is that of chemical exposure, he hesitated giving treatment. I insisted to give me some injection but he refused and gave me some pills. Next day I could not attend duty. I sent my brother to inform management & get some money for treatment. He came back in the evening with Rs. 25/-. I went to the hospital in Baroda, on the third day of incident. They tested my

urine & blood. On the fourth day, I felt better but today even after 10 days I feel lack of hunger...”

2.24 Experience in Pesticide Manufacture:

In a pesticides formulation unit workers were exposed to toxic chemicals like Fenvelerate, Phosphamidon, Endosulfan, Mencozeb, Monochrotophos, Forate, Cypermethrin, etc. Packing workers were provided with nose-strips, which used to get clogged frequently. “We used to have nose irritation till we worked. Our hands and part of nose used to get covered with pesticides. We had complaints of headache, vomits & giddiness. On an average one or two such incidence would take place in a day. One or two incidence of hospitalization used to take place in a moth. Due to fenvelerate vapors, we had irritation near eyes and cheeks in particular. Phorate vapors caused headache and CNS effects like sleepiness. One worker lost 9 kg weight in just six months. Most contract workers were not medically checked up periodically and in the units where medical check up is carried out if the worker is found to have affected, he is given ‘brake’ from the job. So, contract workers do not prefer to go through periodical medical checks. One worker in a pesticide unit was in night shift. At about 8 o’clock he felt giddiness. So he went to the rest room and slept, without informing the supervisor. 6 o’clock in the morning he vomited & taken to the hospital. His condition worsened, so was taken to Surat and died there by evening on 7 June’90. Another worker named C.M. Patel was in phosphamidon packing. While packing a glass bottle broke. His clothes got contaminated, may be he ingested little pesticide. Supervisor got annoyed on him and asked him to go home. Worker got terrified. He went home. By late evening, he started vomiting and same night he died, on 25.05.89. Shankar Baria joined company on 26 June 89. On 30th June, he was severely exposed to pesticide & he died same day.” – a former worker informed me.³⁵

Most of the workers in manufacturing sector stay near to the working location. These workers are dually exposed to pollutants i.e. to industrial air pollution in the surrounding areas of industries/industrial clusters and to work zone environmental conditions. Thus, the probability of workers attacked by the diseases is more compared to the normal population.¹⁴

The following are the main issues related to occupational health:

- Bad work zone conditions in majority of the industrial units. However, some large scale units are concerned about work zone environment and workers health

- Only few companies have been taking care of their employees in terms of providing better working conditions and regular medical check-ups
- Workers are ignorant about the effects of long-term exposure to pollutants
- A large number of workers are in unorganized sectors such as agate manufacturing, diamond cutting, etc. Occupational diseases in these sectors are equally severe if not more than organized sector
- No periodic monitoring of work zone environment by regulatory authorities . Less focus to occupational disease aspects compared to occupational safety and labour problems in legislation
- The only regulatory agencies dealing with this subject is overloaded with the existing work related to labor problems
- Poor systematic record keeping of the data on occupational diseases, recurrence of the diseases, history of the workers suffering from occupational disease, etc.

Less knowledge about the linkages between disease and the exposure among the doctors

14

2.25 Ankleshwar:

During 1989-90, at a Trust Hospital in Ankleshwar Industrial Area cases of chloroform & Toluene exposure were admitted. In all, different 18 chemicals were involved in 65 cases of exposure to chemicals & brought to the Hospital. Monobenzyl Ether and Turpentine showed positive patch test results confirming occupational skin problem in a study carried out by All Indian Institute of Medical Science, New Delhi.

Four male workers were assigned the task of dusting off a yellow colored powder of the interior walls of a storage tank of an industrial unit. Unskilled and unprotected the workers brushed the tank of its residual deposits of Para-aminoaniline dye. Approximately, two hours of skin and respiratory exposure had its toll. The workers were blue and breathless with the yellow powder scattered over their face, palms and sloes.¹⁵

Dr. H.I. Shah, former Chief Medical Officer of J. Modi Hospital in Ankleshwar reported 33 cases of industrial organophosphorus poisoning during June 94 to Oct. 94. In his paper published in Indian Journal of Industrial Medicine Published in June 95, he wrote:

“...As is well known, the industrial estate at Ankleshwar is one of the largest

estate of its kind in Asia. The majority of the industries are chemical based industries. There is a range of small scale to large-scale units manufacturing drugs, dyes, pesticides and other chemicals. While most of the skilled labor comes from outside the area, much of the unskilled laborers are employed from villages around Ankleshwar, most of them on “contract” basis, i.e. as temporary workers without any fixed job descriptions, wages or prospects of significant development. It is not uncommon to find such laborers being asked to handle dangerous chemicals without adequate protection or even information about the potential hazards of the work they are assigned. It has been the recurrent experience of the hospital that most of the cases of poisoning from such chemicals occurs in contract laborers. There have been instances when epidemics of such poisonings have broken out in specific industrial units with large numbers of cases of toxicity reporting to the hospital over relatively short period. It is also not uncommon for industrial units to disown or otherwise neglect victims of such poisoning, so that many such contract laborers admitted with signs of toxicity absconded because they could not afford investigation and treatment. Some industrial units, however, are more sensitive and generous and are willing to bear expenses for treatment of their workers.

One class of chemicals that has particularly been prominent in causing such outbreaks has been the organophosphorus class of compounds. There are about 18 units in the industrial estates of Ankleshwar and neighboring Panoli that handle these chemicals. Broadly there are two kinds of units-those that manufacture the raw compound usually in the form of powder, and those that use this raw material to formulate sprays, liquids etc. which are then marketed. This latter process involves dissolving the parent compound with volatile solvents, and it is this process that seems to most commonly cause acute accidental toxicity through inhalation and direct contact of the aerosol with the eyes, skin and mucous membranes.

As we accumulated considerable experience in treating these patients, we learnt to capitalize on whatever available resources and to work out treatment protocols according to the paying capacity of the patient.

The profile of symptoms and signs of these patients at the time of presentation is givenaccording to recommended ILO staging. The commonest findings on presentation were papillary constriction, giddiness, headache, vomiting and anxiety. As can be seen 28 patients were in stage II, 3 in stage III and 2 in stage I. it is remarkable that we did not find any significant abnormalities in heart rate and blood pressure in any of the patients, except mild tachycardia (<100/min) in some of them.

A wide variety of dosages of Atropine and PAM were employed in the treatment of these patients, usually determined by both the clinical condition of the patient and his paying capacity. Atropine was administered at 1 to 6 hourly intervals according to need. The total dose to Atropine administered ranged from 18 mg. to 46 mg. and that of PAM from 500 mg. Of the 33 patients, 2 were serious enough to require referral to hospitals with ICU facilities, 2 absconded and 4 were discharged against medical advice before they could fully recover. The remaining 25 fully recovered, all of them by the 6th day. On follow up over a period of about 4 weeks, we found that all the 33 cases had clinically recovered.

In addition to these clinical points, it is very significant that a large number of the patients were apparently neglected by their parent industries, especially when they seemed to be on the way to recover it. This was the main reason for some of the patients going away without completing treatment. It is also worth noting that none of the patients had taken any specific precautions to avoid the toxicity to which they fell victims. None of them had a clear idea about the potential or kind of toxicity of the chemicals to which they were exposed. This problem was much aggravated by the fact that most of the laborers involved were short-term contract laborers.

The journal again carries an article written by predecessor of Dr. Shah in Oct.-Dec, 2002 issue. In the article titled “Epidemiology of poisoning in an industry based hospital of South Gujarat”, Dr. R. Calton reports 521 cases of poisoning during the period June’97 to June’2000. He writes, “.....A total of 521 cases were admitted with a suspected poisoning between June 1997 to June 2000, out of which 439 cases met the inclusion criteria and were included in the analysis. Majority of the patients 95.44% were industrial workers and were males. The percentage of females and children was less than 5 percent. The average age of the cases was 26.32 years \pm 2.98 (range 60 to 1 years). (Table 14)

Type of toxins involved (Table 15 on p.44) were noted. Majority of cases (157, 35.8%) suffered from Aniline poisoning, followed by the Organo-phosphorus (OP) Compounds (135, 30.8%). A large majority of the cases were asphyxiated by gases. Toxicity of known gases was found in 41 (9.3% cases while a large majority of cases had toxicity to some unknown gases (48, 10.9%). Fifty eight cases (13.2%) belonged to miscellaneous classes. All the cases were studied for features of poisoning in general e.g. nausea, vomiting, weakness lethargy, palpitations etc. and for toxin specific features like Cyanosis, cough,

dyspnoea, Sweating, Fasciculation, Incontinence, Papillary constrictions, Respiratory signs, Altered sensorial and convulsions, Nausea, vomiting and giddiness were the most commonly occurring features. A Large number of cases had cyanosis (145, 33.03%). This was a prominent feature among the Aniline poisonings. Dyspnoea, cough and rhonchi were found more prominently among poisoning with gases and fumes.¹⁶

Table 15: Occupation and sex distribution of the cases:

S. No.	Particulars	Number	Percent
1.	Total Cases	439	
2.	Industrial Workers	419	95.44
3.	Others	20	4.56
4.	Males	418	95.22
5.	Females	17	3.87
6.	Children	4	0.91
		Mean Age	26.32 Years
		SD	2.98 Years
		Range	60-1 Years

Table 16: Classification of toxins observed: (n=439)

Toxins	Number	Percent
Aniline Poisoning	157	35.8
Organophosphorous Compounds	135	30.8
Unknown Gases	48	10.9
Gases and Fumes	41	9.3
Miscellaneous	58	13.2
Total	439	100.0

Among features of OP Compounds poisoning e.g. Sweating, Abdominal cramps, Urinary incontinence, Fasciculation and Papillary constriction, Papillary constriction was the most commonly observed abnormality. Central nervous system features were observed in the form of alteration in sensorial, restlessness and convulsions. These

features were more pronounced among the OP compound Poisoning and Aniline Poisoning cases (20 cases and 23 cases respectively).

There was one death in the series, two cases were referred to other hospitals, one for Adult Respiratory Distress syndrome (ARDS) and the other for Acute Renal Failure (ARF) twelve cases were discharged against medical advice and were lost to follow-up. Total duration of the hospitals stay was calculated for each class of poisoning cases. Mean hospital stay was maximal for the OP Compounds 2.941 ± 2.25 (Range 13 days -1 day).¹⁶

“.....Our study highlights the fact that a majority of cases has occurred in the industrial setting and were mostly accidental. Ankleshwar being an industrial town there is a telling need for more rigorous statutory monitoring and implementation of principles of Industrial Hygiene. The incidences of certain poisoning such as OP compound poisoning and Aniline Poisoning seem to be abnormally high. Further studies are required to evaluate the epidemiological profile of poisoning in other Industrial towns of South Gujarat specially the ones situated on both sides of the golden Corridor...”¹⁶

2.26 Chemicals Pushed Them Out³⁴

- ◆ I used to see a man sitting mostly at window, tied his mouth (Tightly covered) with handkerchief in a local train between Anand and Vadodara, almost daily. This aroused my interest I him. I was fortunate to get seat beside him next day. He informed me that since he is suffering from asthma, he chooses window seat and that was also the reason for covering the mouth/nose – to get some protection from dust etc. I learned from him that he was working with a chemical factory and was employed in packing of Phthalic Anhydride for quite some time. He also informed that few of his colleagues too, suffer with same problem. Back home, I referred ILO Encyclopedia of OHS to confirm my doubts – that his problem was related to his exposure at work. Thereafter I came to know that he was in process of accepting voluntary retirement. I visited his home to persuade his to raise claim for compensation. He was scared of being robbed of retirement benefit, if he raised claim of compensation for asthma. My efforts did not bear any fruits. He was without any job in few days. Window seat in morning local always remind me Isudas , poor chemical worker.

- ◆ Incensed sticks, popularly known 'Agarbatti' are used for fragrance at places of worship and other places. This is manufactured by small-scale units or home based workers. Two cases of poisoning were admitted in local hospital with unusual symptoms. Patients suddenly succumbed to death following renal failure after 4-5 days well responding treatment. Both cases were suicide cases and both were Agarbatti workers. Upon inquiry it was revealed that they consumed a liquid which is used for sealing cellophane wrapped around packets of Agarbatti. On further inquiry it was known that the liquid referred is nothing but Ethylene Dichloride. With bare hands, it is applied to cellophane. No one knows hazards of EDC.
- ◆ A medium scale unit manufactures 8-Hydroxyquinoline, a photographic chemical. Exposure to it damages eyesight is a known fact. Number of workers has been pushed out of job following blindness. Needless to say, this 'premature retirement' was without any compensation. About 40% of the existing work force has affected their vision.
- ◆ We came across at least two cases of contact dermatitis both working manufacturing Paracetamol. Later after patch-test, the culprit was identified as Para-Aminophenol.
- ◆ We have seen cases of Dermatitis among Chromium workers also. After a worker had to undergo to amputation following secondary infection to ulcer, workers got interested. A clinical checkup as organized. Forty-three workers were found with nasal septum perforated. Further tests, though, recommended, we do not know where & when it would be done.
- ◆ A worker exposed to Toluene Di-isocyanate acid vapors have been found to be suffering from reversible bronchitis after 8/10 years of heavy exposure. Acute toxicity of Para-Nitrochlorobenzene (PNCB) through ingestion and inhalation and amine compounds has also been observed. We have seen blackened faces of workers engaged in Benzanthrone dyes.

2.27 OHS-Some case studies:

These problems have come to us without much of efforts on our part. A systematic study may reveal truths hitherto remain in dark. Lack of information on hazards coupled with poor enforcement of legal provisions and poor H & S standards at work play vital role. Information of hazards in local language will go a long way in improving the situation.

❖ **Drink A Bottle of Soda**

I work in a factory manufacturing paracetamol. This factory is situated in Nandesari. On 29 October, I was in the general shift, on that day I and one other worker were assigned to the task of breaking slabs of PNCB into smaller pieces. Normally this task was assigned to the laborers supplied by the contractor. But due to some reason these contract laborers were not attending the work since last few days. We worked till the recess on this Job. During the recess I felt some influence of gas. o I drank a bottle of soda and some lime which is provided by the factory. I felt better after this. After the recess we put 750 kilos of PNCB into the reactor. At 4.30 my shift was over and I went home. After the evening meals I felt sleep, but by 10 P.M., I started feeling some discomfort, I was feeling giddy, my senses were going numb, and I felt as if my veins were being stretched. There is no doctor or dispensary in our village. So at around 1.30 I went all alone to Ambali and woke up the doctor. I told him of my complaints. He gave me some oral pills but refused to give me an injection. I came back home, but I did not feel any relief. Next morning I had to report for work but simply could not get up. So I sent my brother with a leave application to the factory. My brother went to the factory and met the owner who gave him Rs. 25/- and told him that I should go to Baroda for medical treatment. My brother came back home around 5.30 p.m. it was already evening and no transport was available to go to Baroda. During the night my condition worsened. Next morning we boarded the 5 A.M. bus to Baroda and got myself admitted to the E.S.I. hospital. They gave me some glucose water intravenous. And sent my stool and urine for medical examination. They prescribed some drugs and discharged me from the hospital. I went to Nandesari to buy the medicines. On my way back home, I met some of my co-workers. On the fourth day of falling sick I felt slightly better. Anyway, I rested for another 2-3 days. Today is the 10th day, but I still feel weak, my appetite has gone down.

The laborers supplied by the contractor refuse to work only for this reason. The owner forces us to work on PNCB because the 'Production must continue'. Even if we refuse to do this job nothing comes of it. When we ask him about the effects of PNCB he says 'It does not cause any health problem. If you feel some discomfort drink a bottle of soda'. But this dose nothing to reduce our discomfort.³³

❖ **Beating is the best Medicine**

During 1981-82 I was working as a wireman in Modern Dyes, Nandesari. At present this unit has closed down. PNCB was used there also as a raw material. I was not aware of any side effects of this PNCB, but the workers used to complain of gastric discomfort.

Anyone who complained of discomfort used to get a brutal beating from our supervisor, at times he would force them under a tap and forcibly pour water on them. We would watch this routine feeling helpless. One day I could not tolerate it, so I intervened and told the supervisor that he cannot beat the workers, he should instead give them medical attention. He started scolding me, who are you to advice me? Go and do your work later on he said to me you don't understand anyway, there is no medical treatment for this. Beating is the best and only medicine! Once I went to a doctor and told him of the peculiar discomfort that the workers felt. He said that they must be working without having proper meals, so they should be given some tea-snacks when they feel discomfort. After that, I used to spend my own money and give the worker feeling discomfort some tea and light snacks. One day the supervisor also felt discomfort due to the exposure to PNCB. But troubles started after he went home. Therefore, the company refused to give him any money for medical treatment. I went to see him at residence and brought up the topic of beating being the best medicine, he was ashamed of himself and admitted his mistake.³³

❖ **Pesticides Factory: An Inside Story**

“On reading an advertisement in the news paper I applied for the job. I was interviewed thrice. During the interview, they asked me many questions to check my knowledge of pesticides, I did not know much. But, they did not provide me with much information during the interviews. After the interview, I was asked to go for medical examination. I was happy, naturally! They did all types of checks, but they did not give me a copy of the report, but I was informed that I was fit for the job. I got the job, my pay was fixed at Rs. 700/-. I was appointed as supervisor. This factory produced many pesticides.

When full capacity is utilized, there are about 100 workers in the plant, otherwise 20-25. The factory had three shifts. Each labourer was a contract labourer.

Pesticides are in the form of powder and liquid. The powder form was packed in containers; this had to be done with hands, while liquids were packed in plastic bottles with machines. There were larger bottles with the capacity of 5-10 kg. in addition, which had to be filled manually. Two workers were required to operate the liquid-filling machine. They would fill the bottle and then place It on the conveyor. The bottles had no seals. While moving on the conveyor belt some liquid would spill over, at times bottles would fall. At least 3 to 4 bottles would fall in every shift. After this the bottles

were cleaned and sealed. Those who were filling the powder in the containers were no better off. The powder dust would get into their system.

Those workers in charge of liquid filling were given a thin plastic facemask and disposable plastic hand gloves. They did not last for more than 2 to 3 hours. Once they are damaged, they would seldom get a new pair. While from among those working with powder, some were being provided with a cap, while some with face shield. Once the plastic gloves are destroyed, the workers had to use PVC hand gloves. These were not at all comfortable. Therefore, the workers would prefer to work without protection than use PVC gloves. The supervisor was not given enough plastic gloves before the start of the shift, he is told to distribute it among only those who are likely to be affected. Once they are damaged, the workers had to use the PVC gloves. Each worker did not have a pair, some would be lying in the plant, they would pick it up and use it. Each worker was given a separate facemask, which they would wash with water after each shift. Those working with powder had a peculiar problem. The powder gets into the facemask, making it difficult to breathe so the worker preferred to work without any protection. Moreover, they had no protection on their hands, which would normally be full of powder. This powder causes itching sensation in the nose. So the workers would take their hand up to the nose each time they felt this sensation. In short, there was no part of their body, which was not exposed to the powder. Headache was a common complaint, at times the workers would vomit. On an average, there would be one or two such incidents every day. At least once a month, some worker would require hospitalisation. The smell of chemicals caused headaches, vomit, sleepiness etc. The workers would start complaining only after 15-10 minutes of their shift. Still, they keep working so that production is not affected. Some workers get fever and lose a day or a few days of wages.

Whenever some liquid falls on the worker, he is asked to take a coldwater bath. If that does not work, he is given some oral pills. But, no accident form is filled. Supervisor is strictly instructed that such things are not to be reported, no records are to be maintained.

If a worker complains of some uneasiness or discomfort, he is presented before the superior officers. They might tell the worker to stop coming for work from the next day! Others are asked to go to the rest room.

The rest room is not a rest room at all. There are no beds, or mattresses. There are small wooden benches. It is not easy to sleep on them. Therefore, the workers sleep on

the floor. This room did not have a fan. Even drinking water was not available and the room had the same polluted atmosphere of the plant.

Contract labour is not subjected to medical check-up. Barring the supervisor/operator all others are contract laborers. Some workers were on contract for more than 3 years, they were forced to take a break after sometime. Every week a doctor would visit the plant and write prescriptions for the workers. They had to get the necessary medicine from the market with their own money.

At the time of the first medical check-up I weighed 50 kg, During five months I lost 7 kg. At least 20 days in a month I used to have fever. At last, it was unbearable and I resigned in disgust.³³

2.28 Worker's Struggle- Some Case Studies

❖ Struggle for Safe Flooring

I am working in a chemical plant which manufactures Nitrilotriacetic acid. In 1985, Housing of plant was in very bad shape, which required totally new flooring. Floor was full of pits ditches. Whenever we used to wash the plant, all these pits & ditches would be full of water. We had to clear up this water literally by hand from each ditch so that plant can be restarted. We all were fed-up of this unnecessary extra burden of work. We had requested the management many times for new floor but deaf ear was given to it. So, one day we all workers decided, not to clean up the water accumulated in the plant nor to wash or clean the floor. In four-five days the plant became so dirty and the plant was filled up with foul smell to such an extent that even our plant in charge did not like to attend & sit in his place in the plant. This gave the result. Immediately decision was taken and within a week, we had new flooring.³³

◆ We got the noise survey done

I am working in Ashok Organic Ind. Ltd. Nandesari since last nine years. I am working in chilling plant. In this plant Gas compressor are run by huge motors. We have a chilling plant with total capacity of 350 tonnes. Apart from compressors, we have pumps, too. These units are continuously run for 24 hours. We operators of this plant, have to take readings every year as well as look after the plant.

Since we run all the machines simultaneously that result in high noise levels-which is disturbing, deafening, and fatiguing. Once I saw a pamphlet on our union notice board about noise. I read it with interest. At the end, I found that our union leader Mr. J.B. Patel

wrote it. Therefore, I immediately went to him and complained, "You are doing lot of activities about safety outside but you do not pay any attention to the situation inside our company". He replied, "I was waiting for you people to come forward with complaint. If you feel that the noise level is high, you must give written complaint to the General Manager. He then helped me to draft the complaint, which I then submitted to the G.M. on 30/11/87. Later I heard that Mr. Patel was called on and was asked what he had wanted to do with the complaint. Mr. Patel advised the company to carry out the survey of noise level in all the departments. GM was scared about the resulting action by union. Mr. Patel assured him that since the Factories Act does not prescribe any threshold limit he should not worry about any legal action taken by union.

After long discussion and persuasions, management was prepared to take up the survey. Who will do it, where is the meter were the questions? So, Mr. Patel suggested that he can help it borrow the meter from SOCLEEN, an NGO working for environmental awareness. Mr. Patel himself went and brought the meter. Our chief engineer and we all active union members went through all the plants. Except at a pulverizing machine, noise level was beyond 90 dB, which is run occasionally (few hours in a day). In my plant, it was about 78dB. The meter was returned to SOCLEEN ON 26/12/87. We sent the results of the survey to the Factory Inspector. Our union put forward a demand for soundproof cabin in our plant. During those days the union was negotiating on other demands too. Management prescribed the union to withdraw the demand for cabin. To win the other monetary demands, union had to sacrifice this demand.³³

2.29 Environmental Pollution:

Gujarat is 'one of the most polluted States of India' (Gujarat Human Development vision 2010)¹⁰ Of the 2000 large and medium industries, about 65% are in the polluting sector. Around 45% of the small-scale industries are also in the polluting sector. Most of the highly polluting industries in the list of 18, identified by the Central Pollution Control Board (CPCB), can be found in Gujarat. The Labor Commissioner, Gujarat has identified that there are 46 highly flammable, poisonous, lethally toxic and hazardous chemicals being produced in Gujarat. It is reported that the production of some of these are either banned or agreed to be phased out in the developing countries.¹⁰

This quote represent a true picture of the situation.: "A red dog laps up purple water from an open gutter, while a yellow cow ambles past. Dreams in Technicolor?

No... just one of the many everyday scenes in Ankleshwar, Gujarat, Asia's largest chemical industry zone and possible one of the most polluted.”¹⁹

The Central pollution Control Board's (CPCB) inventory of water polluting industries, lists 563 large and medium industries in Gujarat. They are found in the groups of textile [183], petrochemicals [44], pulp and paper [14], organic chemicals [26], paints and dye stuff [17] and other. [CPCB 1993-94].¹⁴

2.30 Air Pollution:

People in Nandesari, Ankaleshwer and Vapi say that it is impossible to stay in the estate at night. “The factories emit more at night and the stench is oppressive, it hangs over the whole state and you cannot get away from it – you cannot breath. Many people have breathing problems and our children are affected the most.”¹⁹

Kanubhai, a loader of wastes on tractors, earning Rs 15 per tonne, commented: “If I were to live for a hundred years, this area with its chemicals in the water and strong smelling gases have taken at least twenty years off my life. There are many health problems in this area like TB, chest and breathing problems, it's a terrible life”.¹⁹

2.31 Solid Waste:

Contaminated sludge and solid wastes are indiscriminately dumped by the banks of rivers or in convenient open areas at the edges of the estates. Brightly colored dye effluent runs in open ditches past tea stalls in the main streets.¹⁹

A sample of sludge from an open ditch on-site revealed a host of highly toxic, persistent organochlorines: apart from the ubiquitous chlorobenzenes, the sludge also contained high levels of mono-, di- and trichlorobiphenyls (i.e. PCBs), chlorinated terphenyls and hexachlorocyclohexane. The full list reads like a guide to the most dangerous organochlorines. Any responsible regulatory authority would shut down this plant immediately.¹⁹

The National Productivity Council (NPC) has estimated that some 186 industrial units in various estates in the area generate some 27,000 tonnes of hazardous waste per year (TPA). In addition, some 18,600 TP A of hazardous waste is expected to be generated from the planned treatment of industrial wastewater [116, NPC, 1995].¹⁹

According to the Ankleshwar Industries Association, Ankleshwar alone creates 60,000 TP A of solid waste. The Government of Gujarat has agreed to develop the abandoned stone quarry for solid waste disposal. A sum of 30 crores is required to

develop the site including an incinerator and other facilities [117, AIA, 1996].¹⁹

It is common knowledge that so-called secure landfills are rarely secure and impermeable liners will, however well engineered, in time become permeable and leach toxic materials into groundwater. Incinerators will produce highly hazardous by-products such as dioxin from burning chlorinated wastes, always create toxic ash to add to landfill, and further test so-called secure facilities.¹⁹

2.32 Effluents:

In Nandesari, we sampled a discharge running under a road and pouring into a deep gully where sludge was being dumped. The main contaminant in the waste stream was DDT, in such concentrations that Green peace's sensitive analytical equipment was in danger of being damaged! A total of 15 individual organochlorines were identified, 8 of which were isomers of DDT or its derivatives. Supposedly, manufacture of DDT has been restricted to government-owned Hindustan Insecticides.¹⁹

The GIDC has installed a Common Effluent Treatment Plant (CETP) for wastes from both small units in the Nandesari estate and for large companies such as Indian Petrochemicals Ltd (IPCL) and Gujarat Alkalies and chemicals Ltd (GACL) operating in the area we visited the treatment plant and were offered samples collected by the technical staff and access to sampling treated effluent.¹⁹

This treated effluent contained large quantities of the highly toxic, persistent chlorobenzenes. Even more revealing were the samples provided by the GIDC laboratory, which originated from specific plants, supposedly post-treatment, prior to discharge into the common channel and thence into the Narmada river. Of these, Indian Dyestuffs was discharging 1,3- dichlorobenzene, 1,2,4-dichlorobenzene and 1,3,5-trichlorobenzene. Gujarat Petro-Synthese was discharging hexachloroethane, and pentachlorocyclopropene. Transpek Industries were discharging 1,2,4 trichlorobenzene, hexachloroethane and hexachlorobutadiene.¹⁹

The latter chemical is considered a useful indicator for the presence of dioxins and furans and is a known animal carcinogen. Very low doses via food can induce kidney and liver damage in animal experiments. It is included in the UK "red list" for priority control. None of these identified compounds have any place in the open environment.¹⁹

Mono-,di- and trichlorobenzenes were also found in open effluent streams in Ankleshwar. These are all highly persistent and are frequently considered a high priority

for elimination in the north.¹⁹

Pride of place in this waste management scheme is the newly constructed Common Effluent Treatment Plant (CETP). The first of 4 planned CETPs, this will treat 1 million litres of effluent per day. It has cost Rs 5.5 crores; Rs 3.3 crores through a World Bank loan routed via The Industrial Development Bank of India. However, only 79 (out of 1,200) units will contribute effluent from the most visible polluting sector, the dye industry and also some from 'fine chemical' plants.¹⁹

But even the Deputy Chief Engineer of GIDC, K.B.Bhagat remains sceptical, "But even today the effluents of the industry are acidic. In such a situation even existence of CETP, which is largely biological treatment, would be useless as the bacteria would be killed by the acidic effluents, and regeneration of the bacteria will take another three months. Thus CETP is not the solution."¹⁹

2.33 Struggles for Change:

Environmental protest in Gujarat has forced some changes and there are plans to construct "secure landfills", incinerators and a long outfall to the sea. We concluded that these, along with treatment facilities, would serve only to divert the problem elsewhere. Huge investment has led to large-scale chlorine-based industries being built on Greenfield sites at Dahej, Jhaghadia and elsewhere in Gujarat. Some plants are already operating without full environmental clearance. This development will lead to further contamination of soil, groundwater and rivers; in particular the Narmada estuary.¹⁹

Environmental protest has been focused mostly on Ankleshwar, the largest and most obviously polluted estate. In May 1996, when Greenpeace took samples, Nandesari looked somewhat derelict and empty. The courts had recently "closed down" 26 industries because of water pollution by cutting off water and electricity. Workers were fearful about potential other closures. However, Ankleshwar, employing 70,000 people in over 1,200 companies bustled with activity.¹⁹

At present all the effluents in the estate, along with effluent from the nearby Panoli estate and the expanding industrial area of Jhaghadia are collected through an underground sewage system and dumped into open canals, or Amlakhadi, where it flows through farmland to the Narmada River, a distance of some 30 km.¹⁹

Farmers have been protesting since the estate was opened in 1972. These canals were originally used to capture the floodwaters of the Narmada and provide local

farmers with a good water source for crops such as sugar cane, vegetables and banana. Industrial effluent is turning the farmland to wasteland. During monsoon Amlakhadi overflows, submerging lands in polluted water, Fruit trees, which were once plentiful have been replaced by the ubiquitous and hardy weeds.¹⁹

Babubhai is head farmer of a village near Dhantura, which has been severely affected by the overflow from the Amlakhadi channel. "We have been living with this stench (hydrogen sulphide) over our houses and crops for over 20 years," said Babubhai. "Our crops grow less and less each year; our children are less intelligent, slower and listless. The adults can feel the effects of these chemicals too. We feel constantly nauseous and dizzy and suffer skin problems on our hands and feet. This has to stop, it is affecting every part of our lives and we have been fighting it for the last ten years to no avail. Nobody listens and nobody seems to care. The industries are getting richer. They are robbing us of our lives and livelihoods." (Interview 9 April 1996).¹⁹

However, a local group of activists, Manaviya Technology Forum, working with farmers have forced some change. In 1992-3, they stopped IPCL extracting groundwater which local people used. In November 1995, GIDC was made to stop construction of an effluent pipeline from its Vagra estate to the Narmada estuary. In January 1996 GIDC was forced to stop construction of a pipeline from its Jaghadia estate to release more effluent into the Narmada. [115, CSE, 1996]¹⁹

Now the GIDC has agreed to build a long sea-outfall to pipe all effluent from these estates underground to the sea. NEERI, The National Environmental Engineering Research Institute, is looking at the potential impact of these wastes on the marine ecosystem and identifying the best place to end the pipeline.¹⁹

Local farmer, Jayesh Patel is very sceptical about these plans, suspecting that the 50 crore of rupees it will take to construct the pipeline will be hard to find. Local fishermen express concern over impact of effluent on already declining fish stocks.¹⁹

Chemical units have been established in villages like Luna, Ekalbara, Umraya, Bhimpura etc. - the villages are along the effluent channel carrying effluent of giant units like Indian Petro Chemical. Gujarat State Fertilizer Corporation, Gujarat Alkalies & Chemicals, Gujarat Refinery and small-scale chemical units in Nandesari to the Sea. These villages are part of Padra taluka of Vadodara district. ('Taluka' is an administrative unit of a district. Baroda district has 12 taluka) Villagers get colorful water from their underground

wells and had to stop using it for drinking. When some cattle died, they also stopped giving this water to their cattle. Padra taluka is known as vegetable basket, which supplies vegetables not only to Baroda city but also to the cities like Bombay. These vegetables are found to be containing heavy metals like chromium, nickel & mercury crossing the legal limits many times. On 4th May, 2004 Supreme Court of India passed an order directing Government of Gujarat to supply clean drinking water to the villages. Hardness of the water in these and several other surrounding village has increased than 500 TDS to 5000 TDS in last few years according to a study carried out by Faculty of Technology, M.S. University, Baroda.²⁰

Groups active on environment approached Indian Peoples Tribunal to organize a public hearing at Baroda to give ear to the complaints regarding environmental abuse. Accordingly, IPT organized public hearing at Baroda in January 1999. IPT appointed a team of experts from various fields to hear the complaints. Before hearing the complaints, the panel visited the places for which they had received complaints well before the hearings. The panel met the community and took first hand information. Later they heard the formal complaints through the representative organizations. Panel received 3 complaints from Baroda-Nanadesari area, 5 from Vapi area, 5 from Ankalehwer area, 1 from mining area and 1 from a chemical factory for workplace environment problem. One complaint was for right to information on environment.²⁷

2.34 Organizations working on environment:

There are several organizations working on various aspects of environment. Organization like SOCLEEN in Baroda work on urban environment issues, Centre for Environment Education is a big organization with focus on education. Paryavaran Suraksha Samiti is militant organization active in South Gujarat raising their voice on damage to water, soil and air. In Ahmedabad, Centre for Social Justice is active on the pollution problem, which depend more upon judicial system. In Baroda, INSONA has its focus on tree plantation and ozone layer depletion, while WWF has wider aspects like saving wild life. In Bharuch, Safety, Health and Environment Association is active. It was established with the help of industries and Factory Inspectorate in the area.

Vyavsayik Swathya Suraksha Mandal, established in 1986 in Baroda by few Trade Union activists was first of its kind of organization in Gujarat to work on Occupational Safety & Health. Later, in 92, PTRC was registered for more organized efforts. Peoples

Training & Research Centre, Occupational Health & Safety Association and Kamdar Swathya Suraksha Mandal are the organizations working on occupational safety and Health. PTRC is based in Baroda while OHSA and KSSM are based in Ahmedabad. OHSA is mainly active among Power plant workers while KSSM has focused its activities around textile workers and man-hole workers in Ahmedabad, Baroda and Surat. These are workers groups which help workers in claiming compensation and represent them at various Govt. forums. Gujarat Safety Council is a tripartite organization, though dominated by industries.

2.35 Struggle for OHS:

First documented struggle for OHS in Gujarat is that of workers of Alembic Glass works in Baroda. When they came to know that the respiratory disease taking toll of the workers is Silicosis and not TB, in 1982, they started movement for compensation. They succeeded after a long battle. In 1990, National Campaign For Dust Related Diseases was started by PRIA (Delhi). In course of the movement was formed KSSM. KSSM succeeded in claiming compensation for Byssinosis and noise induced hearing loss in few cases. Raghunath Manvar, a worker of a power plant launched a brave fight for cleaning up the workplace. He was alone fighter though had sympathy of fellow workers. He succeeded in his mission largely. The company was compelled to invite National Institute of Occupational Health (NIOH) for medical checks and Central Labor Institute for workplace survey. Later he moved to court for getting the recommendations implemented. He also succeeded in identifying cases of Asbestosis in his unit and getting favorable orders from Gujarat High Court for compensation. He later established OHSA. He was kicked out when the public sector company got privatized, for taking up the issues of compensation to accident victims, providing protective equipments and medical monitoring of contract workers. PTRC took up the cause of preventing Silicosis among Agate workers in Khambhat. It also engaged itself in generating educational material, imparting training, take up research, publish bimonthly bulletin in Gujarati regularly and helping trade unions and individuals in related matters. Since 1995, it has remained in forefront along with Vadodara Kamdar Union to get justice for Chromium toxicity victims. It has succeeded in claiming compensation for chrome ulcer, dermatitis, occupational asthma. It has given legal advice and help workers to represent their cases in Court.

2.36 Recent Developments:

- ❖ Recently Indian Chemical Manufacturer's Association (ICMA) has opened its Gujarat chapter with an office at Baroda. There are 70 members of ICMA in Gujarat. ICMA was established 66 years ago.³²
- ❖ Hazira, a coastal village 30 km west of Surat is the fastest developing industrial area. The investment in this area is in excess of Rs. 30,000 crore. The area has presence of private & public sector giants like Reliance, Essar Steel, Larsen & Toubro, Rama Newsprint, Oil & Natural Gas Commission (ONGC), National Thermal Power Corporation Ltd; KRIBHCO (Fertilizer Unit), Indian Oil Corporation, Gas Authority of Indian Ltd. Shell & Gujarat State Petroleum Corporation Ltd. Hazira & other 7 villages spread over area of 85.91 59 km is known as Hazira Industrial Area .³¹
- ❖ It is estimated that Gujarat has 2.15 billion ton hydrocarbon deposits under its soil. Share of Gujarat in total Indian production of hydrocarbon & gas is respectively 18% & 4%. Gas production has increased by 33% since last December. In years to come Rs. 40,000 crore shall be invested in gas based industry. In Hajira, near Surat, off shore platform is being constructed at the cost of Rs. 250 crore, which would produce. 5 million cubic meter gas this year. Rs. 70 crore dollar shall be invested in North Gujarat to mine coal bed methane (CBM) gas. In Hajira area 2,00,00,000 m³ gas per day shall be produced. Gujarat State Petronet has planned to lay 2700 km long pipeline net work to carry gas from Hajira & Pipavav to various destinations in Gujarat-208 km pipeline, up to Baroda, has already been completed. Shell & French oil major Total have a joint Project to build a port & LNG import & regassification plant at Hajira. 2.5 MT LNG terminal shall be set up by end 2004.
- ❖ Union Chemicals & Petrochemicals Ministry Secretary informed at a seminar in April 2004 that Central Government is in process of short listing consultants for setting up of mega chemical industrial estate across the country. Location of such estates would be finalized within 6 months.³⁰
- ❖ New patent laws would come in force from year 2005. This may adversely affect the pharmaceutical industry in Gujarat. According to All India Institute of Medical Sciences, Southern cities like Hyderabad and Bangalore are taking lead in modern pharma industry. Gujarat has failed to respond to changing realities of a new

patent regime that is coming fast.²⁹

- ❖ After oil was explored in Gujarat at various places like Ankleshwar, Khambhat and Mahesana, Indian Oil Corporation (IOC) established refinery at Baroda in 60's. That was one the biggest refineries in India. In year 2000, Reliance put up refinery at Jamnagar investing Rs. 25,000 crore. Now, IOC is increasing its capacity investing Rs. 10,000 crore. Essar is coming up with a project of refinery near Jamnagar. Gujarat's share of oil refining is 33%. Government of Gujarat is now dreaming of making Gujarat, India's petro-capital in coming 10 years.²⁸

3. Maharashtra

3.1 Land:

Maharashtra is the third-largest state in India, located in the north-central part of peninsular India. The Arabian Sea borders Maharashtra to the east with the Deccan plateau to the west.²⁵

Maharashtra has a remarkable physical homogeneity. The dominant physical feature of the state is the upraised plateau in the west, forming the Sahyadri Range and sloping gently towards the east and southeast.²⁵

The Sahyadris, forming part of the Western Ghats (mountain range) and located between 15.60-22.10 N latitude and 72.60-80.90 E longitudes, run along the western divide the coast from the Deccan plateau. The Konkan, lying between the Arab sea and the Sahyadri range, is narrow coastal lowland, barely 50 kms. wide.²⁵

Forests, comprising only 17 per cent of the state area, cover the eastern region Sahyadri range, while open scrub jungles dot the plateau.

The capital of Maharashtra, Mumbai, is one of the most vibrant commercial and cultural centers of India.²⁵

3.2 Geographical Divisions

The geographical divisions of Maharashtra are as follows:

- Konkan
- Marathwada
- Vidarbha

3.3 Industrial Production

From the available indications, it is surmised that the industrial production (manufacturing) in the State for the first nine months of the current financial year 2001-02, is expected to register a moderate increase of about 3.2 per cent. The corresponding increase in the entire year of 2000-01 was 6.6 per cent. Industrial Relations 1.22. The number of work stoppages in factories due to strikes and lockouts during 2001 was 59 and was lower than that of 85 during 2000. However, the number of mandays lost due to work stoppages including continuing work stoppages was 52.31 lakh mandays during 2001 which were higher as compared to 46.04 lakh mandays during 2000.²⁵

3.4 Foreign Direct Investment (FDI)

Since adoption of liberalization policy in August 1991, up to October, 2001 under foreign direct investment, 2,473 projects with an investment of Rs. 46,402 crore have been approved by the Government of India for setting up industries in the State. Of the proposed total investment under FDI in the country, Maharashtra accounted for about 17 per cent investment.²⁵

3.5 Employment

According to factory statistics the average daily factory employment in the state at the end of December, 2000 was 12.30 lakh, almost the same as that in December, 1999.

As per the data collected under Employment Market Information Programme (EMI), the total number of employment as on 31st March, 2001 in both public and private sectors was 36.95 lakh as against 37.60 lakh reported during the previous year.²⁵

During the last 2-3 years, factory employment in the State has remained stagnant. Though there is new registration of factories in the State, addition of employment in new factories is nullified by the factors such as voluntary retirement scheme, closure of some factories etc. This may be an effect of globalization and may remain continued for some period. With the containment of expansion of the Government and public sector as a whole, growth in organized public sector employment has been low. Higher growth observed in private sector employment has not been adequate to compensate reduction in employment in the public sector.²⁵

The census - 2001 results indicate that proportion of working population in the total population remained stagnant at 43 per cent during the last decade. The Census results also indicate that the dependency on agriculture sector for employment is reducing and at present only about 55 per cent of the population in the State is dependent on agriculture for livelihood.²⁵

Radical reforms in the areas of infrastructure service, agriculture and factor markets are necessary to initiate more employment generation.

3.6 Industry

The Industrial (registered manufacturing) growth rate in the State showed wide fluctuations and remained subdued during the recent two years. The slow down of industrial growth in the State is mainly on account of global recession, constraints in infrastructure, lower demands on exports and other segments and attractive incentives provided by other States to establishing new industries. In the context of the globalization and liberalization and the strategies followed by other States, there is a need to review current policy on Industrial growth and policy of dispersal of industries. Further, to

compete in World Trade Organization (WTO) environment, the State Government needs to create an exclusive WTO Cell to guide the entrepreneurs of the State, particularly the small and medium entrepreneurs and how to conduct their WTO audit and ensure compatibility of their operations within the new realities of WTO.²⁵

In case of drugs and pharmaceuticals, there has been extensive third party manufacturing. The loan licensing scheme allows pharmaceutical companies to possess a license to manufacture a product, to get it done through third parties provided the first party guarantees the quality of the product. Some TNCs manufacture products for export in their plants and products for domestic markets through loan licensing. The practice is to be phased out. The industry is still hoping it will be extended. It is estimated that those who do not have their own factories make 10% of the entire industry's production. There are about 6000 to 8000 active loan license units according to estimates (CW 31-8-1991). About 30% of the export production is done by loan license (CW 29-10-1991).

The dyestuff industry again has a large presence in the small-scale sector. There are approximately 1000 small-scale units. These units have liberal excise duty exemption. As a result, a number of entrepreneurs fragment their production capacities into several firms. In this sector the number of dyestuff firms increased from 90 in 1978-79 to 900 in 1989-90 (CW Annual 1991).

The number of units in the plastic industry rose from 6500 in 1980 to 13500 in 1990. A major portion of these units is expected to be in the small-scale sector.

It is difficult to estimate the magnitude of employment in this sector. A study on Bombay showed that there were 3463 small units in all industries in 1961. This increased to 18990 by 1990. Most of them were in chemical and allied industries. In the Boisar Industrial area, developed by the Maharashtra Industrial Development Corporation, there were in all 1100 plots allotted to small units. Of these, 405 were chemical units, 93 were dyeing units, 31 were pharmaceutical units and 31 were plastic units.¹⁷

According to official figures, the number of workers employed in this zone was 17000 in all. However, the Bombay Labour Union conducted an internal survey which showed that the zone employed 40000 workers in all. The survey revealed that there was no workers' hospital under the Employees' State Insurance Corporation, and the workers had to travel at least two hours to reach a public hospital. The trains were few and there was no taxi or bus services on a regular basis.¹⁷

3.7 Economy

About 70 per cent of the people in Maharashtra depend on agriculture. The state contributes to about 11 per cent of India's total industrial units, over 17 per cent nation's labour, about 16 per cent of investment and 23 per cent of the industrial output. The Per Capita Net State Domestic Product (1997-98) is Rs 18,365.²⁵

The major industrial produce in the state are chemicals and chemical products, textiles, electrical and non-electrical machinery, petroleum and allied products. Important industries are pharmaceuticals, engineering goods, machine tools, steel & iron castings and plastic.²⁵

The mineral-bearing zones of Maharashtra are in eastern Vidarbha, southern Kolhapur and the Sindhudurg area. Chandrapur, Gadchiroli, Bhandara and Nagpur districts form the main mineral belts, with coal and manganese as the major minerals and iron ore and limestone as potential wealth earners. Bituminous coal is found in the districts of Bhandara, Nagpur and Chandrapur. Undersea oil deposits were discovered in and near Mumbai in the 1970s. The mountainous region of the state is a repository of rich timber reserves.²⁵

Maharashtra is one of the most industrialised states in the country. The cotton textile industry is the largest and oldest industry in the state. Important centers of this industry are located at Bombay, Nagpur, Solapur, Akola and Amravati. Handloom goods are produced especially in and around Nagpur and Solapur. Traditional and agro industries (including sugar refining) also have a significant presence in Jalgaon, Dhule (edible oils processing), Kolhapur, Ahmednagar, Sangli and Miraj. Fruit canning and preservation are important in Nagpur, Bhusawal, Ratnagiri and Mumbai. Timber, bamboo, sandalwood and tendu leaves (for cheap cigarettes) are the in forest produce. Small-scale agro-processing, consisting of conversion of food grain, oilseeds and other crops into items of daily consumption, are ubiquitous to the State.

The state's greatest concentration of heavy industry and high technology is in the Mumbai-Pune zone. The petrochemical industry has witnessed massive growth in the State after the installation of India's offshore oil wells near Mumbai in 1976. Oil refining and the manufacture of such items as agricultural implements, transport equipment, rubber products, electric and oil pumps, lathes, compressors, sugar-mill machinery, typewriters, refrigerators, electronic equipment, television and radio sets are assuming increasing importance. The automobile industry here is growing. Aurangabad and Thane are also important industrial hubs.

3.8 Business with China:

Reliance group supplies China plastic granules worth 10 lakh dollars. Indian Steel Authority supplies 10,000 tones Hot Rolled Coils to China. Besides, that authority supplies China 1,920 tonne stainless steel slabs. Ispat Company imports every year 10m lakh tonne Coke for its plant at Dolvi in Raigad (Maharashtra) District. Now that company supplies every year 20,000 tonnes Hot Rolled Coils and Galvanized Iron. It supplies 50% its exports only to China. Its four high level officers are camping in Beijing and are co-ordinating with the customers. Ages Safety Company of Kolhapur imports 85% of its goods from its plant in China in its production of 60 lakh dollars. It exports 50 lakh dollars worth of safety gloves to Japan.²⁶

3.9 Disaster:

More than 200 people residing in Mohane locality in Kalyan were affected following gas leakage from a chemical unit in the town late on Monday, 15-12-98, night, the police said.

According to the police, the residents of neighboring areas complained of vomiting, nausea, giddiness after the gas leaked from the National Rayon Corporation unit. The affected people were rushed to the company hospital and treated.

Those affected include rickshaw drivers of the locality and passengers waiting for trains at the Kalyan railway station, the police said, adding that all the affected were out of danger.

Fire tenders from Kalyan and Dombivli rushed to the scene immediately after getting the information about the incident. The gas leakage gave rise to much panic in the region and surrounding villages.

3.10 Setting up of an Hazardous Waste Management Facility in Thane - Belapur Industrial Area

The Maharashtra Government had initiated a program to set up a hazardous waste management facility with the assistance of World Bank. Seven sites were identified for hazardous waste disposal in different industrial zones of the state, including Trans Thane Creek (TTC) Industrial Area, Navi Mumbai.

As per the reports 7 hectares of area situated in TTC Industrial Area was identified for setting up this facility.

The Maharashtra Government had appointed M/s Chemcontrol A/S of Denmark in association with their Indian Counterpart M/s Econ Pollution Control Pvt. Ltd. for preparing Techno Economic Feasibility study and Environmental Impact Assessment for hazardous waste disposal in TTC area. The consultant had prepared the report and the same was accepted by the Central Government and will be implemented soon.²⁴

Case Studies from Maharashtra illustrating adverse impact of hazardous wastes

The Thane-Bealpur industrial area, in Maharashtra where about 1200 industrial units are housed on a 20 km stretch close to new Mumbai creates more than 100 tonnes of solid waste every day. About 85% of this waste is either acidic or alkaline in nature. The area also produces 5 tonnes of waste every day, which is difficult to treat because of its halogen content. The bulk of hazardous waste in this area is co-disposed with municipal waste in municipal waste dumpsites. The water bodies in the vicinity of this industrial area are polluted. The sediment in the Ulhas River has registered high levels of mercury and arsenic. Ulhas River empties into Thane Creek at its northern end. As a result, Thane Creek is one of the most polluted seawaters in the country.

Source (Shankar, Martin, Bhatt and Erkman 1994)

3.11 A Novel Experiment:

Lote-Parashuram Industrial Area (LIA) is located in Ratnagiri district of Konkan region of Maharashtra. Surrounded by Sahyadri mountain ranges in the East and the Arabian Sea in the West, Konkan is bestowed with abundant natural resources. The area receives more than 340 centimeters (cms). of annual rainfall and is endowed with fertile soil rich in agricultural produce such as rice, millet, coconut, cashew nut, betel nut, alphonso and other higher varieties of mangoes. Its proximity to the sea and the rivers flowing through the area has contributed to the establishment of a strong fishing community.

The LIA is spread over 530 hectares (Ha.), with two rivers, i.e. Jagbudi and Vashisht passing through it.

In 1978, Maharashtra Industrial Development Corporation (MIDC) appropriated 512.73 hectare of land of Lote, Awashi, Songaon and Dhamandevi villages for Industrial development [with promise as compensation, amounts as meager as Rs. 250 per guntha (One Guntha is equivalent to 100 Square feet)]. This was part of the Government's plans

to develop the Konkan region, while generating employment for the people. The obvious purpose was of setting up an industrial belt for chemical units, because of the area's proximity to the clean water and natural drainage system. This was due to sea and the presence of the two rivers, which meet at the Dabhol creek.

The establishment of the LIA and its success prompted the MIDC to go for further expansion. However, the decision to acquire another 640 Ha. for inclusion in the Industrial belt was stalled by a writ petition filed in the Mumbai High Court in 1994 by some local people's groups.

The petition opposed the expansion with the plea that already existing structures were not monitored by MIDC, resulting in large-scale degradation of the area. Existing Industries have created havoc with water, soil and air pollution affecting the local community who subsisted on traditional livelihood like, farming, fishery or horticulture. Expansion would only exacerbate the steady impoverishment of the land and the community.

The court appointed a fact-finding committee that included experts from the Bhabha Atomic Research Centre (BARC), the Indian Institute of Technology (IIT), Mumbai, MIDC and the Maharashtra Pollution Control Board (MPCB).

The committee's confirmation of pollution in the area prompted the court to decree a shift from an exclusive focus on the chemical industry. The court further ordered for the provision of green belts, setting up of effluent treatment plants, water and air monitoring centers and corrective measures for industries to prevent the pollution of Dabhol creek. The court orders were a welcome step but they were never really implemented.

History of Development

The development of Lote-Parashuram Industrial Area has been a double-edged sword. On the one hand, people from the urban pockets of Chiplun and Khed, as well as from the surrounding villages of Lote, Asgani, Awashi, Dhamandevi, Ghanekhunt, Kotwali, Songaon and Chirani are employed in these Units. Many more are indirectly supported through an expansion of the support infrastructure like transportation, hotels, entertainment, communications, construction, banking, small traders in terms of supplying necessary services - milk, stationary, uniforms to workers etc. Neighboring towns have developed at a faster rate because of the industries.

On the other hand, water and air pollution has badly affected the agriculture, fishing and horticulture. Acquisition of land and the pollution of agricultural land has drastically decreased yield - whether it is the staple crops of rice and millet or cashew or the world famous alphonso mango. The creek and rivers have become so murky with pollution due

to effluent - dumping, that fishing no longer remains the livelihood of the 42 communities settled near the creek. Families that used to earn as much as rupees three thousands a month from fishing are struggling to survive and depending on casual labour for an income. Cattle deaths are common - either due to drinking contaminated water or because of lack of pasture for grazing.

The local population very often complains of different ailments - vomiting, headache, eye irritation, nausea, reduced appetite, lung diseases, cough, and skin irritation - which are caused by constant exposure to noxious air. Residents have to bear the sudden gush of reeking gases that invade their homes after nightfall and disperse only after several hours. Local doctors say that they receive many pollution-related complaints like asthmatic bronchitis and chronic cough. In areas where water pollution is intense, gastrointestinal complaints are on the rise.

The compensation package offered by MIDC at the time of land acquisition was very low, besides which many of the tenanted farmers did not receive any compensation. Consequently, adequate resources were not available to promote individual private enterprise for livelihood. The promise of jobs being made available in the Industrial belt was also not kept. Only about 10% to 12% of the local population has been able to find employment in the industry of which less than 5% is permanently employed. Most work as contract laborers. Eighty percent of the work in factories is done through contractors. Therefore, a large number of workers are not eligible for compensation within existing laws. Life of most of the workers remains unsafe in chemical industries. Apart from their economic exploitation, they face the risk of getting various types of diseases. Workers have met with serious accidents and deaths in the past. Complaints of occupational contact Dermatitis, occupational Acne, back pains, hearing loss, episodes of Jaundice, Malaria, repeated upper respiratory tract infection, irritation, burning and watering of eyes is common among the workers.

Finally, a mention must be made on the role of the small-scale sector in the industry. There is virtually no data collected on the basis of size of industry. The quantum of production from the small-scale sector is, therefore difficult to gauge. According to the Deputy Director, Chemical Industry, of the Maharashtra Institute for Small Scale Industries, the organic chemical product units have been growing at the rate of 8% to 10% a year in the State, whereas plastic units have grown at the rate of 25% to 30% a year. According to the Deputy Director's estimate, the export share of small units is 40%. This

is however, difficult to confirm. Last year the exports from this sector were Rs. 8 billion and this year the target set is Rs. 12 billion.¹⁷

3.12 The Chemical Industry:

The Managing Director of Sandoz India, stated that though the Company was 35 years old, there was no basic change in the technology. As and when the company felt it necessary, modifications were introduced. The technology used by Sandoz in India was not 'state of the art' and not comparable to similar plants in Switzerland or elsewhere in Europe¹⁷

On a conservation estimate, it could be said that the level of technology prevalent in the drugs, pharmaceuticals, chemicals and allied industries is at least 10-15 years older than similar industries in the West. In general, these industries have been beleaguered by problems of technological obsolescence. Much of the problems relating to health, safety, working conditions, pollution and environment are related to technological obsolescence. In Union Carbide, it was found that it was obsolete technology combined with poor maintenance and replacement of spare that caused the disaster.¹⁷

In Bombay Paints near Chembur, the workers reported that they were facing constant health problems due to their working conditions, particularly in the Thinner Manufacturing Section where spraying was done. The powder Section also created a lot of health problems. While filling or rotating the stirrer, workers inhale a lot of fumes and lot of heat is generated. There was a feeling of suffocation and congestion in the chest. They also reported that a lot of varnish was released in the air. They reported that there was no medical check-up of the workers and the workers were demanding that medical check-ups be done once in six months at the company's cost. Until this day the demand has not been conceded to. The factory inspectors came, but they never met or discussed any thing with the workers or union representatives. Furthermore, the workers, including union activists, did not know any thing about permissible exposure limits or about the nature of risks involved in their work. There were no education programs, and the workers felt that it was impossible to have good working conditions (Interviews 1992). This company manufactures for the US Company, Hampels Marine Paints. About 25% of the production is for the US Company, the rest is sold to companies in India. In December 1990, workers employed in Ion Exchange, a subsidiary of Permitt Co, UK, served a strike notice after a worker died of cancer. In their strike notice, workers gave the reasons for the strike to be unhygienic atmosphere and deterioration of health. The workers reported that as a result of chloromethyl ether (CME), nine workers had died since 1985 due to

cancer. The workers alleged that when they complained to the factory inspector, the company shut down the plant on the day of the inspector's visit. The Workmen's Compensation Act does not include cancer as an occupational disease. So the families of the workers, who died of cancer, were not entitled to compensations. When the workers served a strike notice, the company put up a notice of voluntary retirement scheme and told that workers that they should opt for the voluntary retirement scheme by accepting 60 days wages for every year of service as against the legal 15 days wages. The workers believed that since the company already had another plant at Ankleshwar in Gujarat state (where conditions are worse than in Maharashtra), it would shift its manufacturing operations if they pursued with the strike.¹⁷

It is found that it is the residents living in an around the factory who mostly protest against pollution. In and around the Ion Exchange Factory, which is situated in Ambarnath over 60 km from Bombay, there are approximately 290 industries, the majority in the chemical zone. The residents of these locality more than 3000 families complain of giddiness, suffocation, vomiting, hair loss, burning of eyes whenever factories discharge gases in the air. The residents organized a protest in March 1990, where there were incidents of stone throwing. They complained that the vessels in the house got black and TV-antennas got corroded. The management of the major company against which the protest was organized, the Dharamsi Morarji Company, however, felt, since their technology was imported from Nissan, Japan, there could not be anything wrong with their plant. The agitations were according to the management, due to political reasons.¹⁷

The residents around the Bombay Paints Company at Gavenpada have frequent quarrels with the officers of the company. There are occasions when the residents have beaten them up. On one occasion, the Mayor also complained to the company about emission levels. The company merely raised the height of the chimneys and laid a few underground pipes. This did not solve the problem to any significant extent. The workers in the company said, when the residents complained, the officers merely said: 'We will look into it'. If the agitation takes a serious turn, the company appeases them by giving employment to some of the people in the settlement.¹⁷

At the Boisar Industrial Estate, near Tarapur about three hours ride from Bombay, the field Officer of the Maharashtra Pollution Control Board, who resides there, said that the workers and unions seldom complained about pollution or discharges. The residents, however, did that all the time. There are numerous memorandums before him signed by

the residents. He also stated, since he resided there, he was the target of their anger and was frequently pulled out of his house at night to inspect one unit or the other. He recommends 25 to 30 prosecutions a year, of which 10-15 are actually launched. However, he did not know of any convictions¹⁷

In January this year, the residents of Goregaon, a suburb of Bombay, filed a petition in the Bombay High Court, claiming that toxic fumes and poisonous chemicals emanating from the industrial sheds around their residential colonies were violative of their fundamental right to life guaranteed under the constitution. In their petition, they claimed a compensation of Rs. 2.5 million. They also complained that in the industrial sheds, there were numerous explosions and many of the factories were clandestine.¹⁷

3.13 Garg Committee:

Soon after the Bhopal incident in December 1984, the Maharashtra pollution control Board constituted a committee under the Chairmanship of Shri R.K. Garg, Head, Chemical Group, Bhabha Atomic Research centre, Bombay-85, to assess and evaluate possible hazards in large industries handling hazardous substance. The committee has visited 52 industrial units in around Bombay and other parts of Maharashtra and has submitted its observations and recommendations, the excerpts of which appeared in the press has attracted national attention.¹⁸

The committee surveyed 15 major industries in greater Bombay. Its report was definitely sobering. Almost every factory it inspected was deficient in safety measures. Except for Calico Chemicals, every company was making good profits consistently and there was no shortage of funds.¹⁸

The committee reported a series of deficiencies in the RCF, Chembur factory. It found that shop floor operators were not conversant with safety devices and procedures for handling abnormal operational problems. There was no system for continuous monitoring of hazardous chemicals like ammonia, carbon monoxide and nitrogen dioxide. A number of safety valves and level and pressure indicators were found to be corroded. The committee was promised that steps would be undertaken to rectify this situation.¹⁸

The styrene monomer plant of Polychem Ltd in Chembur handles a variety of hazardous chemicals in bulk including alcohol, benzene, ethylbenzene and ethylene, which are also highly inflammable. But the company had no firefighting group, nor a safety officer. The committee was also concerned by the inadequate water supply arrangements for firefighting purposes. The workers were not checked periodically for benzene or styrene

exposure. Workers were also exposed to anhydrous aluminium chloride, which they had to feed into the chemical reactor manually.¹⁸

The Calico Chemicals plant at Chembur was found to be a particularly hazardous place. The plant handles a range of inflammable materials and highly carcinogenic substances like vinyl chloride. The entire safety aspect, including disaster planning, needed a thorough review. The valves, pipelines and storage vessels of the chlorine and caustic soda plant were found to be in such a highly corroded state that the plant was not even safe enough to be operated in its present condition. Workers in the chlorine handling plant had not been given proper masks, emergency kits or breathing apparatus. The vent lines from the hydrochloric acid storage tank did not pass through a scrubbing system, as safety regulations demand. The company also maintained a highly dangerous quantity of vinyl chloride, which, according to the committee, should be restricted to a maximum of one day's requirement. It was also found that, in the case of a runaway reaction the highly carcinogenic vinyl chloride was blown into the atmosphere in the obsolete PVC plant. Mercury leakage was not monitored, nor were workers checked regularly for exposure to mercury and vinyl chloride. The effluent treatment facility was also not adequate and did not operate regularly.¹⁸

The Carbide Chemicals plant in Chembur both uses and produces a range of highly toxic and inflammable chemicals. In 1979, an expansion program increased the company's polyethylene production capacity from 9,000 tonnes to 20,000 tonnes. Although the company has a safety officer and a fire-fighting group, the committee claimed that, "it is not well equipped to cope with a disaster". The workers were not provided with clear instructions for what to do in case of an emergency. The treatment plant was inadequate. Levels of BOD, COD and chlorine in the effluent water were excessive. The vent line from the crotonaldehyde storage tank was left open to the surrounding atmosphere. The committee felt that the company was storing dangerous amounts of this chemical and recommended that it be limited to a maximum amount of process requirements of 8 hours. Before shutdown of the plant for repairs and maintenance, it should be ensured that all crotonaldehyde is consumed. There were no monitoring arrangements for toxic chemicals like crotonaldehyde and benzene in the atmosphere and fire-fighting arrangements were inadequate.¹⁸

The Hindustan Petroleum Plant at Chembur has a crude oil processing capacity of five million tonnes a year. The plant emits 36 tonnes of sulfur dioxide and 76 tonnes of carbon monoxide every day. The committee felt that not only should these emissions be

monitored regularly, but they should also be reduced, as they are inordinately high. The oleum storage tank opened out into the atmosphere without an absorption system and there was no dike wall to prevent the spreading of the acid in case of leakage. Leakage of phenol in the coolant water was also not being monitored adequately.¹⁸

The Bharat Petroleum Corporation refiner at Chembur processes another 6 million tonnes of crude oil every year. Apart from 3.5 million tonnes of crude oil, which are stored at any given time in the refinery, constituting the biggest fire hazard in the area, the natural gas and petroleum products that are produced here area all highly inflammable. The committee found that the refinery's wastewater treatment plant was not functioning to the mark, both sulphur dioxide, and carbon monoxide emissions to the atmosphere were very high. Air and water discharges and their sources were not being regularly monitored for pollutant levels. The scrubber vent on the tetraethyl lead storage tank was also inadequate.¹⁸

The five electricity-generating units of the Tata Electric Company (837.5 mw total) are located in the congested Trombay area. This company accounts for nearly 70 per cent of the nitric oxide released in Chembur. Neither the releases of sulphur dioxide and nitric oxide nor the temperature of the wastewater at the discharge point was being monitored continuously.

The Ahmed Oil Mills situated in the densely populated and residential Grant Road area produces hundred tonnes of edible oil every day. The BOD in the effluent water and the sulphur dioxide emissions to the atmosphere were very high. There was no system for monitoring the plant's effluents. It did not have an effluent treatment plant either. There was no safety training for the workers nor was there a fire and safety officer. Hydrogen has been stored in a partially open, congested place and no permission had been taken from the explosive department. The company did not have any provision for control of ammonia in case of leakage.¹⁸

The Bombay Soap Factory, situated next to the Ahmed Oil Mills, also has no effluent treatment plant, despite being located in a densely populated area. The BOD COD and chlorine levels in the effluent water were very high compared to the set standards. There was no separate fire-fighting group. The committee noted that the company has a casual approach to safety aspects. Hexane, a dangerous chemical, was stored in large amounts even when the plant was not in operation and the storage area was not properly segregated. The committee recommended that the plant be shifted to a suitable area immediately.

The Hindustan Lever plant at Sewri manufactures various detergent bars, talcum powder, soaps and vansapati. This company also handles a number of toxic and inflammable chemicals. The committee told the company that it should immediately discontinue its practice of storing monoethanolamine, a highly toxic chemical, in large quantities in drums near the plant. The COD in the effluent water was also higher than the stipulated standard. The emissions from the plant were being monitored only once a quarter. The company was also told not to transport the toxic sludge from the wastewater treatment plant by road, as this was dangerous. Transport by sea was recommended.

Excel Industries Ltd has two plants in Bombay at Amboli and Jogeshwari. It manufactures industrial and agricultural chemicals used as basic chemicals and intermediates in industry and as pesticides and fumigants. Neither of the plants had a separate safety and fire officer as required by safety regulations. The oxalic acid plant at Jogeshwari did not have any standby caustic soda scrubber for nitric oxide. Nor did it have an alarm system to indicate release of excess nitric oxide was very high in the mercuric chloride plant. The flooring of the plant was not proper for collecting any spillage of mercury. The mercury release in the effluent was slightly higher than the standard. Mercury level in the urine of the workers was not being monitored. The committee found that in the Amboli plant, yellow phosphorus drums were being stored in a dangerous manner. The stacks of aluminium phosphide and zinc phosphide plants are not monitored periodically for toxic compounds, nor was the percentage of arsenic in zinc dust checked. The workers were not periodically checked for benzene exposure.

The dyes and chemical plant of India Explosives Ltd in Sewri came in for harsh criticism from the committee. There was no monitoring of emissions and no proper effluent treatment plant had been provided. There was a casual approach in safety measures while handling hazardous chemicals. There was no fire-fighting group available round the clock, Butanol was being stored near the cyanide-handling unit, which is highly, dangerous. The committee suggested a number of changes in the storage practices of various chemicals and recommended proper level indicators, vents and workers should undergo regular medical checks. The committee passed the following verdict: "In view of the improper storage facilities of hazardous chemicals, absence of proper monitoring system for effluents and emissions, and low levels of awareness of safety measures, the committee feels that it is not safe to operate the plant."¹⁸

The Burroughs Wellcome plant in Mulund, which manufactures medicines, was found storing highly dangerous and inflammable substances including hydrogen, phosgene and

sulfur dioxide. Many of the chemicals and solvents were stored in the open and close to each other. The committee felt the excessive storing of these chemicals should be stopped immediately. The pipe from the phosgene reactor to the scrubber was made of glass, which is fragile, and constitutes a potential hazard. The monitoring of phosgene and chlorine in the working areas was not being carried out with proper instruments. The COD and BOD levels in the effluent waters were also high.

The Hindustan Ciba Geigy plant at Bhandup manufactures several consumer products, dyes, and chemicals. The emissions from the plant were not being monitored and there was no temperature measurement system for chloroform in the storage tank. The chloroform tank itself needed to be relocated away from the railway line. The vent of the toluene storage tank was left open to the atmosphere. Acids and various chemicals were being stored together.

3.14 OHS situation:

Trend of Frequency rate of injuries is that of decreasing as can be seen from the table below. Compared to Gujarat figures of fatal accidents are lower. In 1998, 163 workers died in Maharashtra while in the same year 214 workers died in Gujarat.⁴²

Table:18

	1993	94	95	96	97	98
Frequency Rate	8.93	7.83	6.64	5.19	4.5	NA
Non-fatal accidents	NA	24046	20629	17557	15120	16739
Fatal Accidents	NA	157	195	180	198	163

In a paper & pulp industry during 1977 to 1980, 76 cases were admitted to Lokmanya Hospital with history of acute chlorine inhalation of which 22 had mild severity, 38 had moderate severity & 16 had severe effects.²⁶ The results found in the studies carried out by Central Labour Institute, Bombay are quite alarming, which shows 20% of 215 workers affected by Benzene and 25% of 82 workers (in caustic soda) of Caustic-Chlorine plant were affected. (See Table3)²⁷ In a pharmaceutical company in Bombay isosorb dinitrate powder affected women workers their faces get swollen up, headache, nausea and stomach problems are regular problems. One pregnant lady delivered a deformed baby who could not survive.³¹ Examination of 125 workers of a fertilizer company in Bombay, found that those working for a longer period showed greater frequency of dyspnoea, cough, chest pain & headache. The styrene monomer plant of

Polychem Ltd. In Bombay handles variety of chemicals like Alcohol, Benzene, Ethylbenzene and Ethylene. The workers were not checked periodically for Benzene & styrene exposure. In a refinery manufacturing Benzene in Bombay, workers are tested for phenol levels in urine but they are never given the report. Group of 10 workers exposed to Ethyl and Methyl Cellosolve were reported to be suffering from agliospermia and azzospermia.

3.15 Organizations:

Occupational Health & Safety Centre, Bombay is probably the oldest organization in Maharashtra to take up the cause of issues of OHS with workers perspective. Those who established are well-known activists in the field like Vijay Kanhere, Dr. Muralidhar, A.J.Rego etc. With the help of PRIA (Delhi) they helped several workers in diagnosing cases of occupational diseases, certifying them and helping claim compensation through social security scheme. Until now, as a result of their work, several hundred workers have been able to claim compensation for Byssinosis, Noise induced deafness, acid burns, radiations, asthma etc. They have facilities for carrying our lung function tests and audiometry. They have skill to assess the damage and calculate the amount t be claimed. They have succeeded in demystifying the knowledge. They have trained worker activists in carrying out these tests.

Under PRIA's project at Aurangabad, they succeeded in inspiring local workers to address their issues regarding ESI benefits (Employees State Insurance Act under which workers and employers pay their contributions for various benefits as provided for under the Act). The committee meets regularly for grievance redresal.

COPE is recently established organization in Bombay for taking up various OHS issues. They are campaigning for democratization of ESI, i.e. getting more powers for workers and TUs in administration of ESI.

Pune is a major industrial centre in Maharashtra. Lokmanya Hospital, Chinchwad carried out few hospital-based studies of pattern of injuries. Though their perspective is not that of workers, it is one of few organizations, which has taken up industrial injuries seriously. They carried out a study of hand injuries, developed training module for reducing such injuries and brought out pictorial pocket book with the help of National safety Council, Mumbai on hand injuries.

National Safety Council is a tripartite organization working on OHS issues. Industry and Government dominate it. TU members do find place on their Board but have failed in perusing pro-labor policies. Central Labor Institute is a Government organization working under the Central Ministry of Labor and Employment. Director General, Factory Advice Service & Labor Institutes also has its HQ at CLI. CLI carries out various training programs for workers, safety officers, factory medical officers, plant operators, safety committee members, TU leaders etc.

There are some organizations established by TUs, which also take up studies, trainings etc for OHS like Maniben Kara Institute

4. RECOMMENDATIONS:

Looking up to the prevailing scenario needs for improvement can be summarized as under:

1. Workers in chemical industry need to be trained for taking up OHS issues with their own organizations, employers and Government; Short term and long term modules may be developed.
2. Information on legal & human rights for protection of OHS at work and compensation, resources, hazardous situations & dangerous properties of materials is an on going need, as new workers keep up adding the labor force. This may be done through exhibitions, posters, newsletters in vernacular language.
3. Advocacy for better laws, better implementation, faster justice system for punishment as well as compensation, better implementation of OHS services.
4. Research on various topics like justice system, prevalence of occupational cancers, how punishment can improve workplace etc. There is a good deal of gap of research on this subject.
5. General awareness & sensitization of various groups in the society like students in various faculties like medical, engineering, social science, social work, psychology, history, journalism, economics, environment, design, fine arts, law, etc is a great need.. This can be done through organizing seminars, inviting students for joint projects, initiating study groups etc.
6. Focused campaigns for specific needs of specific groups may be taken up. Silicosis deaths, Noise Induced deafness, Dermatitis, Diseases due to chemicals; Occupational Asthma may be the subjects. Textile industry in Surat, Ship breaking in Alang and Chemical industry in Ankalaeshwer or Vapi also may be taken up.
7. There is a need to initiate and / or promote small OHS groups in various industrial areas and/or groups of workers. These groups may then be strengthened to take up local issues.
8. Medico-legal advice and support is lacking. PTRC experimented successfully for one year in Baroda, which benefited large numbers of workers. It had to be stopped for lack of resources. OHSC, Mumbai, run such a centre since long, which has benefited greatly in identification, certification and compensation for cases of occupational diseases. For lack of legal support large numbers of workers can not claim their legal rights

9. This study is based on secondary information. There is a need for visiting centers where chemical industry is developed to meet workers, TUs, other NGOs, activists to assess the existing problems, needs and organize a joint program,
10. There is a need to work with other social groups like doctors, safety officers, Government officers, ESI etc. Sensitization/ trainings may be organized for these groups.
11. Publications on legal rights in simple language are felt need. Factories Act and Gujarat Factory Rules are important legal instruments available to workers. But, the law books are either not available and even if available, are not in vernacular language or the prices are not affordable. In this situation, what is needed is small booklets and brochures on different topics.
12. Study groups may be initiated and strengthened at few places where workers are ready to run such a group.

REFERENCES

1. Mukesh Rohatagi on internet
2. Chemical portal of India.
3. Report of the National Commission on Labor, Conclusion and Recommendations.
4. Toxic Legacies; Poisoned Futures, Persistent Organic Pollutants in Asia, Green Peace. November 1998.
5. Dye Stuff Industry: Marketing Prospects of reactive dyes in Rajasthan on internet.
6. Dr.Mashekar's lecture on internet.
7. Ratna Ganguly, Times of India, 15-09-03
8. Saket, issue no,
9. GCCI, their website
10. State of the Environment Gujarat, Gujarat Ecology Commission 2001.
11. Financial Express, Spl.issue, 1993, p.33
12. – do – p.35
13. Government of Gujarat Website
14. Gujarat Ecology Commission, State Environmental Action Programs, Industrial Pollution, Draft Phase II Report. March 2001.
15. Indian Journal of Occupational and Environmental Medicine. Vol. 6, No. 4, October-December 2002.
16. Indian Journal of Industrial Medicine. Vol. 41, No. 2, June 1995.
17. The Chemical Industry in India and Some Facts about Gujarat, F.I.L. Working Papers, No. 4, 1994.-Radha D'Souza
18. Handbook of Chemical Safety, Gujarat State Factory Inspectorate Gazetted Officers' Association.
19. The Stranger, Pub:Greenpeace,November,96
20. Indian Express, 5-05-04
21. Bharat Gariwala, Sandesh, Gujarati Daily, 23-02-04
22. Shamaji Antala, Sandesh, 02-02-04
23. Indira Hirway & Darshini Mahadevia, Naya Marg, 16-12-02
24. Chemical Industry Digest, January- February, 2000
25. Maharashtra Govt website
26. Milind Gadgil,Tarun Bharat,20-04-03
27. Who Bears the Cost?, Feb,99, IPT, Mumbai

28. B.Gariwala,Sandesh,15-03-04
29. Indian Express, 29-09-04
30. – do-, 5-04-04
31. – do - 28-02-04
32. Gujarat Samachar,Guj.Daily,1-04-04
33. Health at Workplace,PRIA,1992
34. Chemicals Pushed them out- Jagdish Patel,
35. Developing Recourses at Local Level-Jagdish Patel
36. Govt. add. Financial Express Spl.issue,1993, p.121
37. Toxic Hotspots: A Greenpeace Investigation of Gujarat Industrial Estates, Green Peace. December 1999.
38. So economic survey 2001-2002
39. US Deptt Of State Reprot
40. Report of working group on EOH for 10th Five Year Plan,August,2001,p.6
41. WHO Report
42. Report of working group on OSH, 2001
43. Pathey Information on Budget.
44. Development With Destruction-
45. ICEM World Conference on Health, Safety & Environment, Developing Resources at Local Level,- Jagdish Patel
46. Working With Chemicals : Indian Worker Experiences. - Jagdish Patel

Annexure:1

INDIA; LEGISLATIONS

Rules to Curb Ozone-eating Gases

The Union Environment Ministry has come up with comprehensive rules to regulate the phasing out of ozone-depleting substances (ODS) over the next decade or so, bringing, India in line with its International obligations.

The ozone Depleting Substances (Regulation and Control) Rules, 2000, seek to ensure a step-wise elimination of ODS, regulating production, trade, import and export. Ozone-eating gases are used in the manufacture of aerosol cans, such as perfumes, and foam products as well as refrigeration, air-conditioning and fire fighting among other things.

The planned phase-out dates are :

- Chlorofluorocarbons (CFCs) may not be used in manufacture beyond January 2003, except for medical purposes and metered dose inhalers for which affordable replacements are not readily available.
- Use of Halons is generally prohibited after January 2001.
- Methyl Bromide, used in limited quantities for pre-shipment and quarantine, may be used until January 2015 - this is used in India mainly for fumigation during dockyard storage.
- Hydrochlorofluorocarbons may be used till 2040.

The rules specify compulsory registration of ODS producers, manufacturers of ODS based products, importers, exporters and stockiest. They will be required to maintain records and file periodic reports on production and use of ODS. Among other regulatory steps, licenses will be needed for all imports and exports of ODS and products containing ODS.

The Hazardous Wastes (Management and Handling) Amendment Rules, 2000

The above rules notified by Ministry of Environment and Forests, Government of India have not only made the scope of hazardous wastes extremely comprehensive in terms of definitions of hazardous wastes but have also added stringent provisions in the existing the Hazardous Waste (Management and Handling), 1989.

The changes incorporated in the amendment rules, 2000 require a great deal of action from all parties involved in the life cycle of hazardous wastes i.e.

- **Generator** of the hazardous wastes: Occupier

- **Transporter** of the hazardous waste
- **Operator** of the facility, where the waste is destined for treatment and final disposal

The key provisions of the rules come into force w.e.f. 6th January 2000.

Abstract of the Provisions is given hereunder.

New Definitions of Hazardous Wastes

In the context of these rules hazardous wastes are those waste substances, which are listed in Schedule I, II and III. *Please note that the Schedule I of the Hazardous Wastes (Management and Handling), Rules 1989 now stand withdrawn/ repealed.*

Schedule I: Process specific Hazardous Wastes

Schedule I lists 44 types of industrial process and the waste streams being generated from these processes. Any industrial Activity, which involves any of these 44 processes and generate the kind of waste stream listed in this schedule (irrespective of the quantity of generation), shall fall in the preview of these rules.

Schedule II: Non Process Specific Hazardous Wastes

Schedule II lists five classes of waste substances (namely class A, B, C, D and E) along with concentration limits. Any industrial activity/ process/ operation, generating any of the type of waste substance listed in these five waste classes equal to or more than the concentration limits specified in the corresponding class of this schedule shall be treated as hazardous waste.

Schedule III: Lists Of Waste to be Applicable only for Imports and Exports

This schedule lists waste substances, which are regulated under these rules, incase, occupier is involved in the import and exports of these waste(s).

Liability for Proper Handling and Disposal

The occupier as well as operator the facility have been made responsible for the proper collection, reception, storage and disposal of hazardous wastes listed in schedule I, II and III., so as to ensure no adverse effects on the environment.

Duties of Occupier and Operator of a Facility

Both have an obligation to contain contaminants, prevent and limit consequences of adverse effects on human beings/ environment as well as provide information, training and equipment to persons working on the site.

Fee for Processing Application of Authorization

Occupier is required to submit the application for authorization along with a sum

of Rupees Seven Thousand Five Hundred towards processing; and analysis fee, if required.

Time Limit for Processing Application of Authorization

State Pollution Control Boards (SPCBs) to process the application for authorization within 90 days of the receipt of such application.

Time Frame for Authorization

Under these rules, the grant of the authorization shall be in force for a period of five years from the date of issue or renewal.

Conditions for the Renewal of the Authorization

SPCB shall renew the authorization based on

- i. Submission of annual returns by the occupier
- ii. Efforts undertaken for reduction/ recycling or reuse of the hazardous waste.
- iii. Compliance with prescribed authorization conditions
- iv. Remittance of the processing fee.

Manifest System

These rules introduce a system of waste tracking in the form of "Manifest System". The system warrants occupier to provide specific information to the transporter operator of the facility and State Pollution Control Board. Occupier is also required to provide transporter the Transport Emergency Card (TREM) regarding the nature of the waste and measures to be taken during emergency.

Identification of Disposal Sites

The new rules prescribe the responsibility for the site identification for disposal of hazardous wastes on occupier or operator of the facility. However, in case of common hazardous waste disposal site, the State Government, operator of the facility or any association of occupiers has been made responsible for identification of such sites. "*Public Hearing*" has been made mandatory for notification of such sites as hazardous disposal sites in both the cases i.e. individual or common sites.

Design and Setting up of Disposal Facility

The new rules prescribe the mandatory approval for the design and layout of the proposed facility from the concerned SPCB, before setting up of such facility.

Liability of the Occupier, Transporter and Operator

This is the most significant provision that has been added in these rules. According to this provision, occupier and operator of the facility are liable to reinstate or restore damaged or destroyed elements of the environment.

The SPCBs have been empowered to levy the fine in case of any violation of these rules, however, with the approval of the Central Pollution Control Board.

The above information is based on the Environmental Legislation Update, Issue 06 (January - March 2000)

Other particulars related to these rules like details of Schedules, etc. will be published in the next issue.

The Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 2000

The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000 has been notified by the Ministry of Environment and Forest, New Delhi on 19th January 2000. They have come in force from the same date. These Amended Rules have primarily widened the scope of chemicals that now shall be categorized as “Hazardous Chemicals” in addition to defining certain terms used in The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and addressing the deficiencies in the threshold limits.

Noise Pollution (Regulation and Control) Rules, 2000

Ministry of Environment and Forests, New Delhi has notified the above rules, which have come into force with effect from 14th February 2000: The key provisions of these rules are:

- Ambient air quality standards in respect of noise for different areas/ zones have been notified in the schedule of these rules.
- State Governments made responsible to categorize the areas in above zones and take measures for abatement of noise pollution and to ensure compliance with the ambient air quality standards in respect of noise.
- Restriction on the use of loud speakers/ public addressing system subject to certain conditions.
- A person may make a complaint to the designated “Authority” in case of the actual noise level exceeds the ambient noise standards by 10 dB (A) or more as compared to the prescribed standards.
- Designated Authority to take action against the violator in accordance with the provisions of these rules/ other law in force.

Annexure;2

Gujarat Investment Opportunities in CHEMICAL & ALLIED INDUSTRY¹³

Sr. No.	Item	Capacity	Investment (Rs. In lakhs)
1	Alkyd Resin	500 MTA	63
2	Alpha Phenyl Glycine	300 MTA	2100
3	Anti-Corrosive Pipe Coating (PU based coating)	3000 MTA	180
4	Benzeldehyde	5000 MTA	270
5	Benzoic Acid	250 MTA	50
6	Benzophenone (Di-phynyle Methanone)	600 MTA	250
7	Benzyl Acetate/Benzoate/Alcohol	120 MTA	39
8	Benzyl Chloride	120 MTA	29
9	Bisphenol-A	3000 MTA	200
10	Bituminious Felts	125000 sq.mt. PD	110
11	Bituminious Products	18000 MTA	200
12	Bromine and Derivatives	300 MTA	150
13	Castor Oil Derivatives	9000 MTA	1100
14	Chlorinated Paraffin Wax	300 MTA	40
15	Cypermethrin Diketene and Derivatives Diphenyl Oxide	300 MTA	350
16	Diketene and Derivatives	2300 MTA	1530
17	Dithenyl Oxide	1000 MTA	455
18	Detegent Grade Zeolite	10000 MTA	2000
19	Epichlorohydrin	4500 MTA	190
20	Ethanol for Blending in Petrol	10000 KLA	2000
21	Ethylene Glycols	15000 MTA	15000
22	Gasahol Manufacturing	100 KL/day	1400
23	Glycine	450 MTA	150
24	Glycol Ethers	3000 MTA	800
25	Magnesium based Chemicals	1000 MTA	350
26	Micro Crystalline Waxes	3000 MTA	200

27	Molasses-Alcohol based Chemicals	1000 MTA	1000
28	Natural Food Colours	400 MTA	1500
29	Perfumery Chemicals	1200 MTA	250
30	Phenolic Resins	3000 MTA	200
31	Phenyl Acetic Acid	200 MTA	80
32	Phthalate Plasticisers	3500 MTA	300
33	Powder Coating	250 MTA	55
34	Re-refining of used Lubricating Oil	1800 LTPD	71
35	Silicon metal and Calcium Silicide	2500 MTA	3100
36	Sodium Benzoate	6000 MTA	400
37	Solid Waste Management	1000 TPD	1200
38	Stable Bleaching Powder	10000 MTA	500
39	Waste Oil Reclamation	3000 KLPA	185
40	Wax Emulsions	1500 MTA	200
41	Zinc Oxide	5000 MTA	850
42	Zirconium Salts	370 MTA	320

Annexure:3**SUBSTANCES MOST FREQUENTLY REPORTED IN DEATH/INJURY
EVENTS**

RANK	SUBSTANCE NAME	NO. OF DEATH AND INJURY EVENTS	NO. OF DEATHS	NO. OF INJURIES
1	Chlorine	121	5	54
2	Ammonia (Anhydrous)	66	1	248
3	Hydrochloric Acid	64	1	911
4	Sulfuric Acid	62	5	365
5	Ammonia	26	6	308
6	Sodium Hydroxide	26	1	39
7	Nitric Acid	18	21	361
8	Toluene	16	13	70
9	Styrene	14	0	32
10	Phosphoric Acid	12	0	369
11	Toluene Diisocyanate	12	3	112
12	Benzene	11	16	436
13	Phosgene	10	2	303
14	Sulfur Dioxide	10	0	55
15	Hydrofluoric Acid	9	3	664
16	Acrylonitrile	9	1	63
17	Methylene Chloride	9	2	481
18	Hydrogen Sulfide	9	3	157
19	Acetic Acid	8	0	41
20	Methyl Alcohol	8	9	29
21	Methyl Ethl Ketone	8	6	101

Annexure:4**SUBSTANCES MOST FREQUENTLY REPORTED IN EVACUATION EVENTS**

RANK	SUBSTABCE NAME	EVACUATION EVENTS	NO. OF EVACUATIONS (ALL SUBS)
1	Chlorine	89	38037
2	Hydrochloric Acid	76	47243
3	Ammonia (Anhydrous)	67	12126
4	Sulfuric Acid	60	14055
5	Ammonia	21	5158
6	Nitric Acid	20	17124
7	Vinyl Chloride	14	17686
8	Sodium Hydroxide	12	5070
9	Hydrogen Sulfide	12	3022
10	Styrene	12	17250
11	Toluene	10	2950
12	Phosphoric Acid	10	18760
13	Toluene Diisocyanate	10	4958
14	Phosgene	9	1109
15	Methyl Alcohol	9	3275
16	Ethylene Oxide	9	6225
17	Sulfur Dioxide	8	630
18	Polyvinyl Chloride	8	18250
19	Benzene	8	5050