



## Work Health Report

### TRENDS IN WORK HEALTH

The occupational health situation in Singapore continues to be satisfactory. The success of measures to ensure the health of our workers has been possible because of the strong support of employers, unions and other partners for our various enforcement and promotional programmes.

Data from our medical and industrial hygiene surveillance activities indicate that noise and chemical exposure levels in workplaces remain satisfactory.

#### Monitoring Conditions at Work

Exposure levels of specific workplace hazards provide a good indicator of the conditions in the work environment. Workplaces with specific hazards are required to have regular industrial hygiene monitoring and medical surveillance (including biological monitoring) for their exposed workers. The frequency of noise monitoring is once every three years, while that for chemical monitoring is usually annual. The results of both industrial hygiene and biological monitoring are submitted to the Division. The Division also conducts detailed industrial hygiene assessments on a selective basis in high risk workplaces.

#### MEDICAL SURVEILLANCE

##### Prescribed Hazards Requiring Medical Examinations under the Factories (Medical Examinations) Regulations

1. Arsenic & its compounds
2. Asbestos
3. Benzene
4. Cadmium & its compounds
5. Raw Cotton
6. Lead & its compounds
7. Manganese & its compounds
8. Mercury & its compounds
9. Excessive noise
10. Organophosphates
11. Perchloroethylene
12. Silica
13. Tar
14. Pitch
15. Bitumen
16. Creosote
17. Trichloroethylene
18. Vinyl chloride monomer
19. Any occupation or process carried out using compressed air

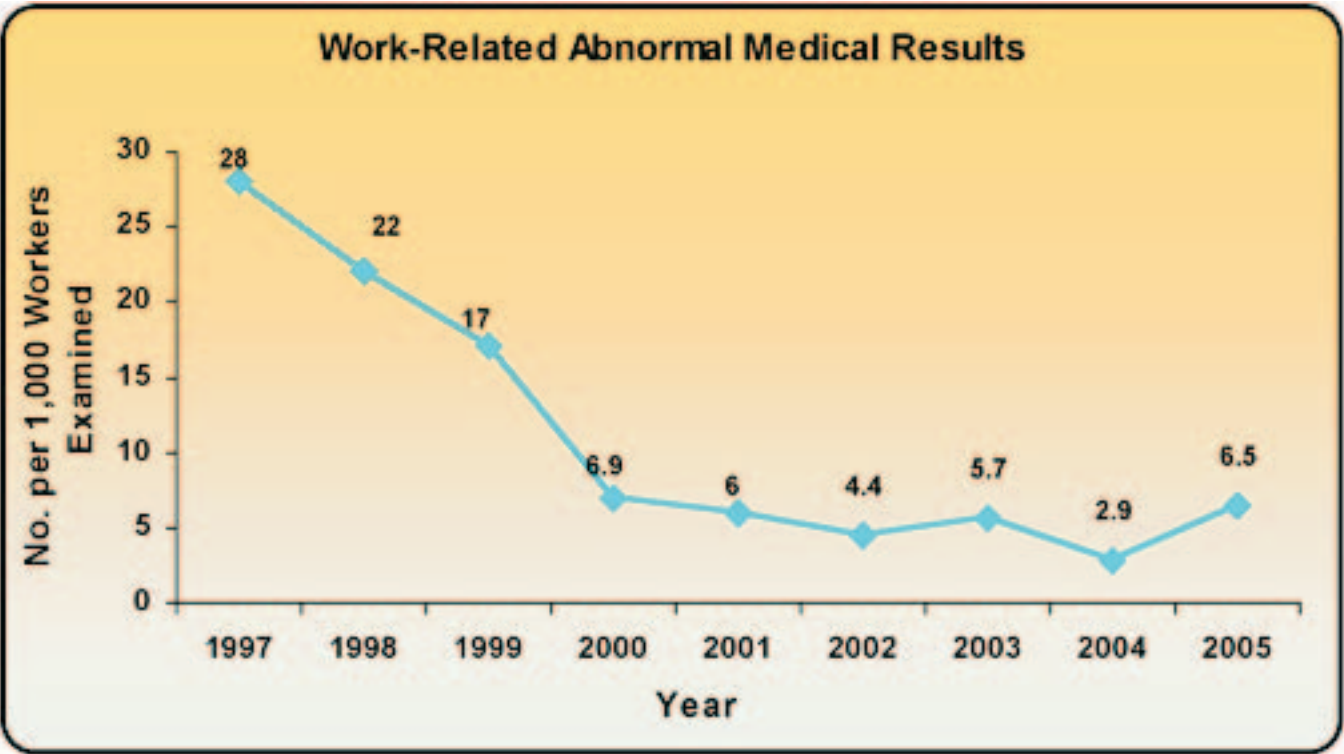
Industrial hygiene data from our selective assessments, as well as from companies with in-plant monitoring, is maintained in a National Database for Noise and Chemical Exposure. This enables us to identify high risk workplaces, evaluate trends in exposure levels and advise employers regarding control measures and appropriate monitoring programmes.



# Work Health Report

## Workers' Health Status

In terms of new work-related abnormal medical results, the overall rate remained low. The increase from 2.9 per 1,000 workers examined in 2004 to 6.5 in 2005 was mainly due to detection of noise-induced deafness and cases of overexposure to toluene and trichloroethylene.



Detection of work-related abnormal results among workers examined for exposure to noise was highest in the transport industry (mainly the ship building and repairing industry), while among workers examined for exposure to chemicals, detection of work-related abnormal results was highest in solvent exposed workers in the dry cleaning and paper products industry.



# Work Health Report

## Results of Medical Monitoring for Noise Exposure, 2005

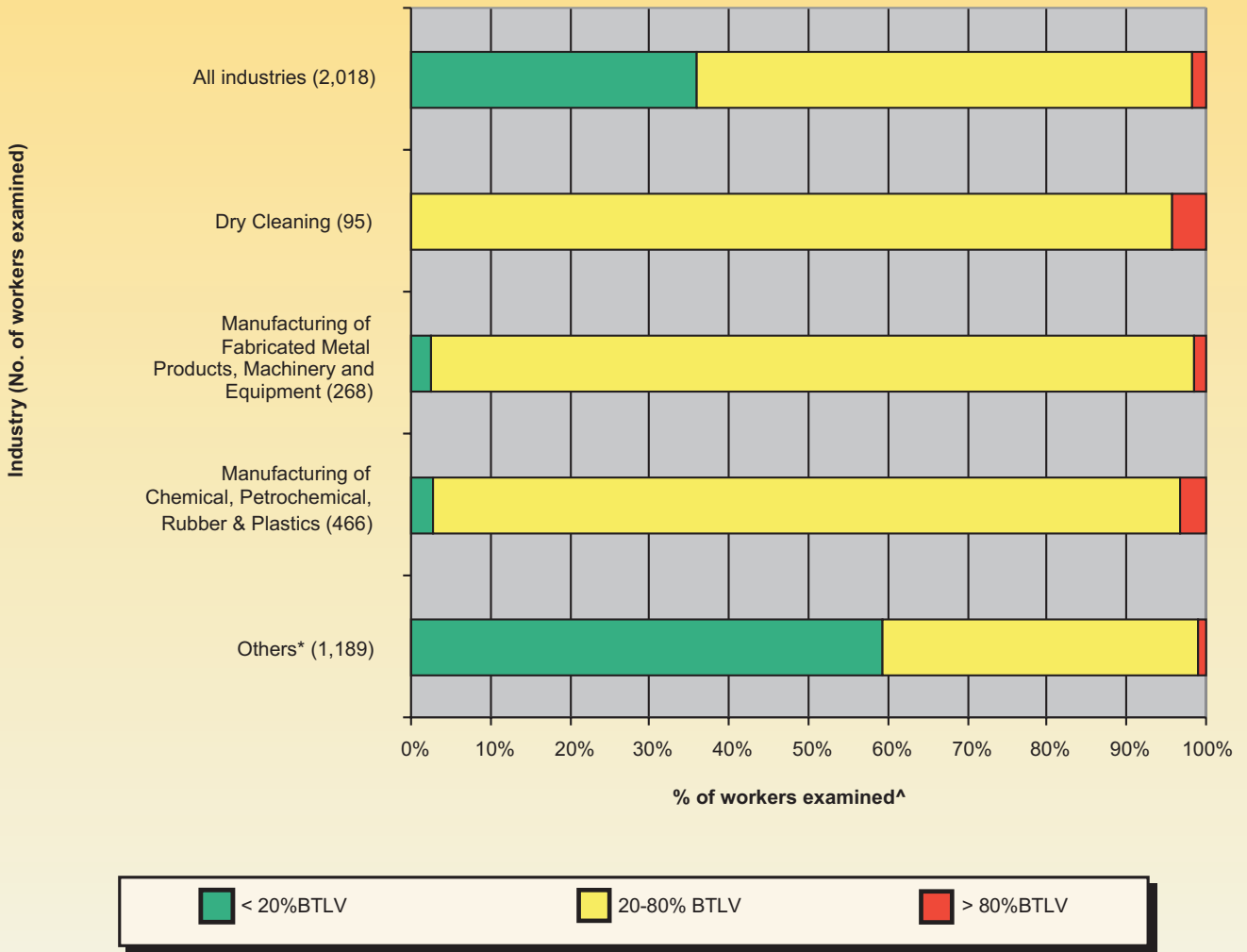


\*Others: include manufacturing of food products and beverages/ textiles/wearing apparel/paper and paper products/rubber and plastic/non-metallic mineral products/basic metals/electrical machinery/furniture, printing, sawmilling, recycling, construction, wholesale trade and other business activities.



# Work Health Report

Results of Biological Monitoring for Chemical Exposure, 2005



\*Others: include manufacturing of basic metals/electrical machinery/electronic products and components/paper and paper products/ ransport equipment/ medical precision and optical instruments, printing, other service activities, other business activities, and construction industries.

^Excludes medical examinations where biological monitoring is not applicable, viz., chest x ray, lung function and skin examinations for asbestos, silica, raw cotton, tar, pitch and bitumen exposure.



## Work Health Report

### OCCUPATIONAL DISEASES

Notification of occupational diseases by doctors and employers is required under the Factories Act. There are 31 notifiable diseases. To facilitate such notifications, the Division conducts joint specialist clinics that are located at various hospitals and polyclinics. All notifications are investigated to confirm the work-relatedness of the cases, as well as identify any other employees who may be similarly affected. Preventive measures are recommended to the company and employees concerned.

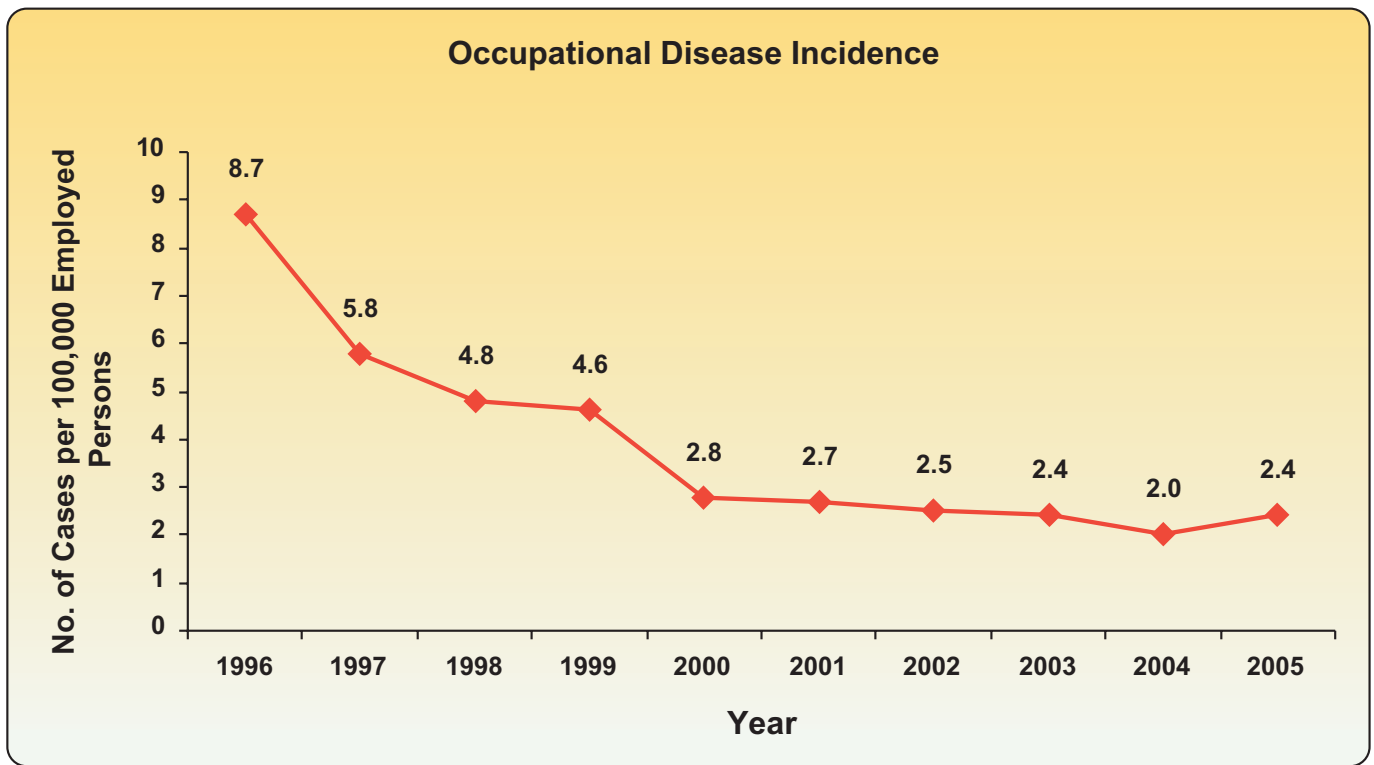
1. Aniline Poisoning
2. Anthrax
3. Arsenical Poisoning
4. Asbestosis
5. Barotrauma
6. Beryllium Poisoning
7. Byssinosis
8. Cadmium Poisoning
9. Carbamate Poisoning
10. Carbon Bisulphide Poisoning
11. Chrome Ulceration
12. Chronic Benzene Poisoning
13. Compressed Air Illness
14. Cyanide Poisoning
15. Epitheliomatous Ulceration (due to tar, pitch, bitumen, mineral oil or paraffin or any compound product or residue of any such substance)
16. Hydrogen Sulphide Poisoning
17. Industrial Dermatitis
18. Lead Poisoning
19. Liver Angiosarcoma
20. Manganese Poisoning
21. Mercurial Poisoning
22. Mesothelioma
23. Noise Induced Deafness
24. Occupational Asthma
25. Organophosphate Poisoning
26. Phosphorus Poisoning
27. Poisoning From Halogen Derivatives of Hydrocarbons
28. Repetitive Strain Disorder Of The Upper Limb
29. Silicosis
30. Toxic Anaemia
31. Toxic Hepatitis





## Work Health Report

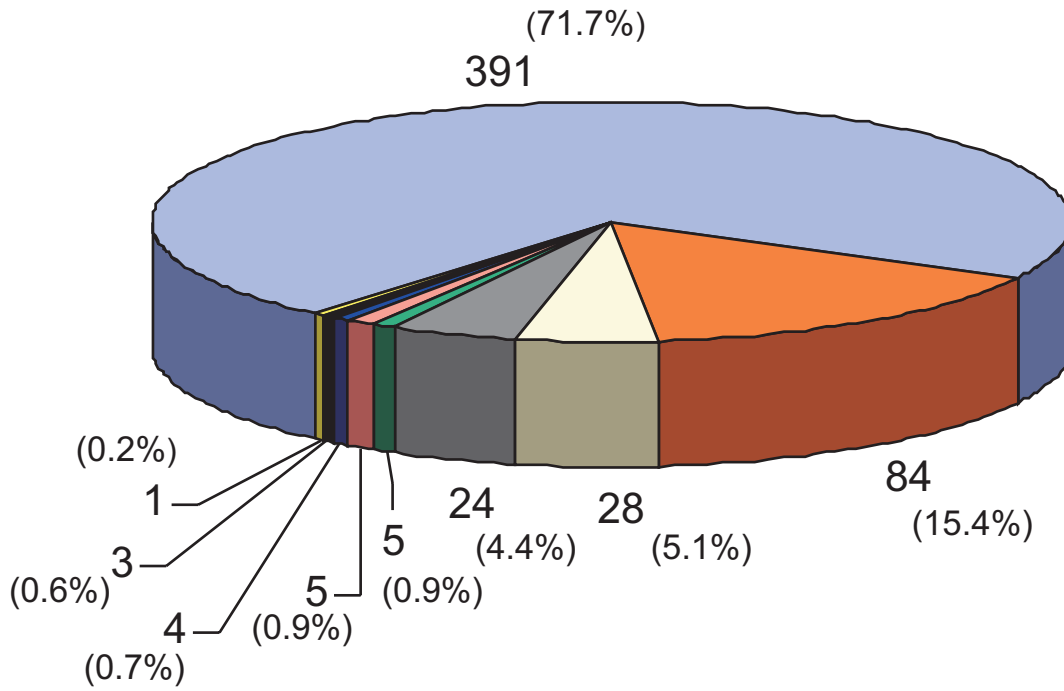
The occupational disease incidence increased from 2.0 per 10,000 employed persons in 2004 to 2.4 in 2005, mainly due to more noise induced deafness cases from the marine sector. The denominator is based on data of all employed persons from Labour Market Report 2005. Noise induced deafness and industrial dermatitis remained the two leading occupational diseases, accounting for 87% of the 545 cases. The number of persons affected by excessive absorption of chemicals increased from six in 2004 to 24 in 2005, accounting for 4% of the cases, mainly due to more cases detected in the paper products and lamination industries.





# Work Health Report

## Occupational Diseases, 2005



- Noise Induced Deafness
- Industrial Dermatitis
- Gassing
- Excessive Absorption of Chemicals
- Barotrauma
- Compressed Air Illness
- Occupational Lung Disease
- Work-related Musculoskeletal Disorder
- Others

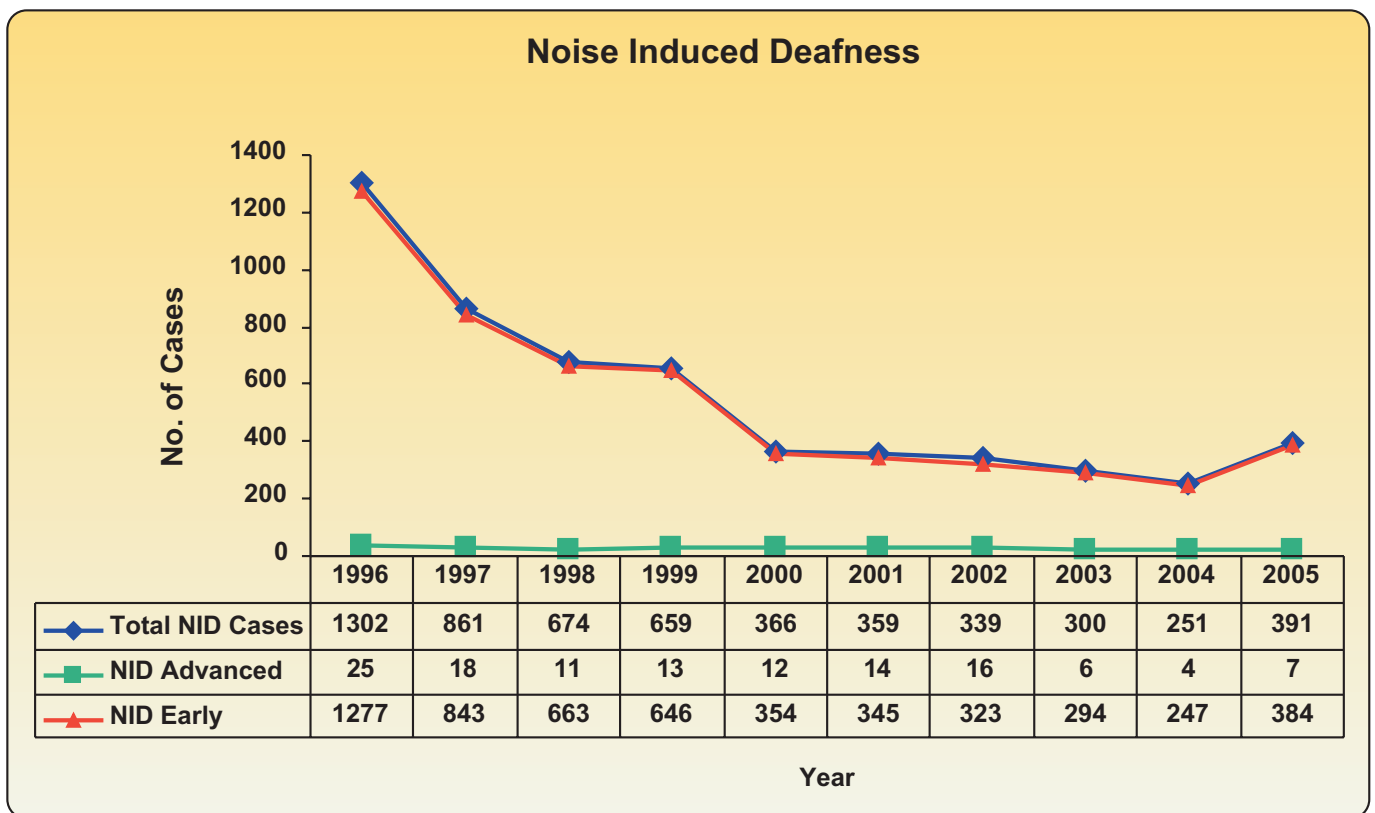


# Work Health Report

## Noise Induced Deafness

Noise Induced Deafness (NID) continued to be the leading occupational disease in 2005, with 391 cases, accounting for 72% of all occupational disease cases confirmed. Most of these cases were in the early stages of the disease. Seven (or 1.8%) had advanced or severe hearing loss, compensable under the Workmen's Compensation Act, compared to four in 2004.

The majority of the NID cases (57.1%) worked in companies manufacturing transport equipment (e.g., ship building and repairing), basic metals (eg., iron and steel), machinery and equipment (e.g., tools and die), fabricated metal products (eg., structural metal ), warehousing and support activities for transport.

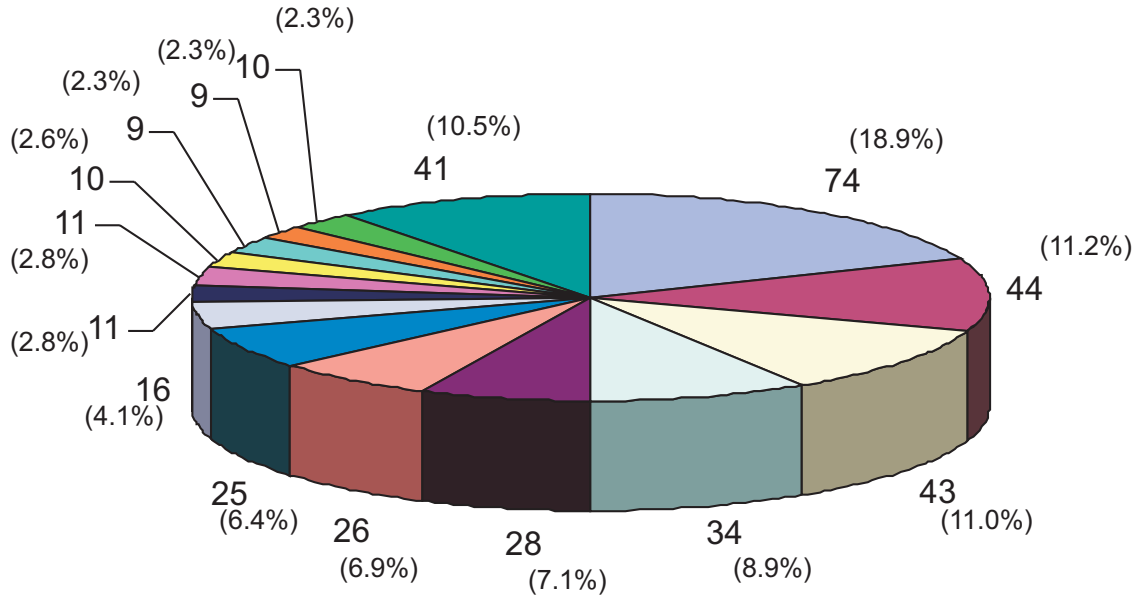






# Work Health Report

## Noise Induced Deafness By Industry, 2005



- Manufacture of Transport Equipment (SSIC 35)
- Manufacture of Basic Metals (SSIC 29)
- Manufacture of Machinery and Equipment (SSIC 31)
- Manufacture of Fabricated Metal Products except Machinery and Equipment (SSIC 30)
- Warehousing and Support Activities for Transport (SSIC 55)
- Repair and Maintenance of Vehicles, Office Equipment, Personal and Household Goods (SSIC 92)
- Manufacture of Chemicals and Chemical Products (SSIC 25)
- Manufacture of Furniture; Manufacturing Nec (SSIC 36)
- Electricity and Gas Supply (SSIC 40)
- Construction (SSIC 45)
- Manufacture of Paper and Paper Products (SSIC 22)
- Printing and Reproduction of Recorded Media (SSIC 23)
- Manufacture of Rubber and Plastic Products (SSIC 27)
- Manufacture of Non-Metallic Mineral Products except Products of Petroleum and Coals (SSIC 28)
- Other industries

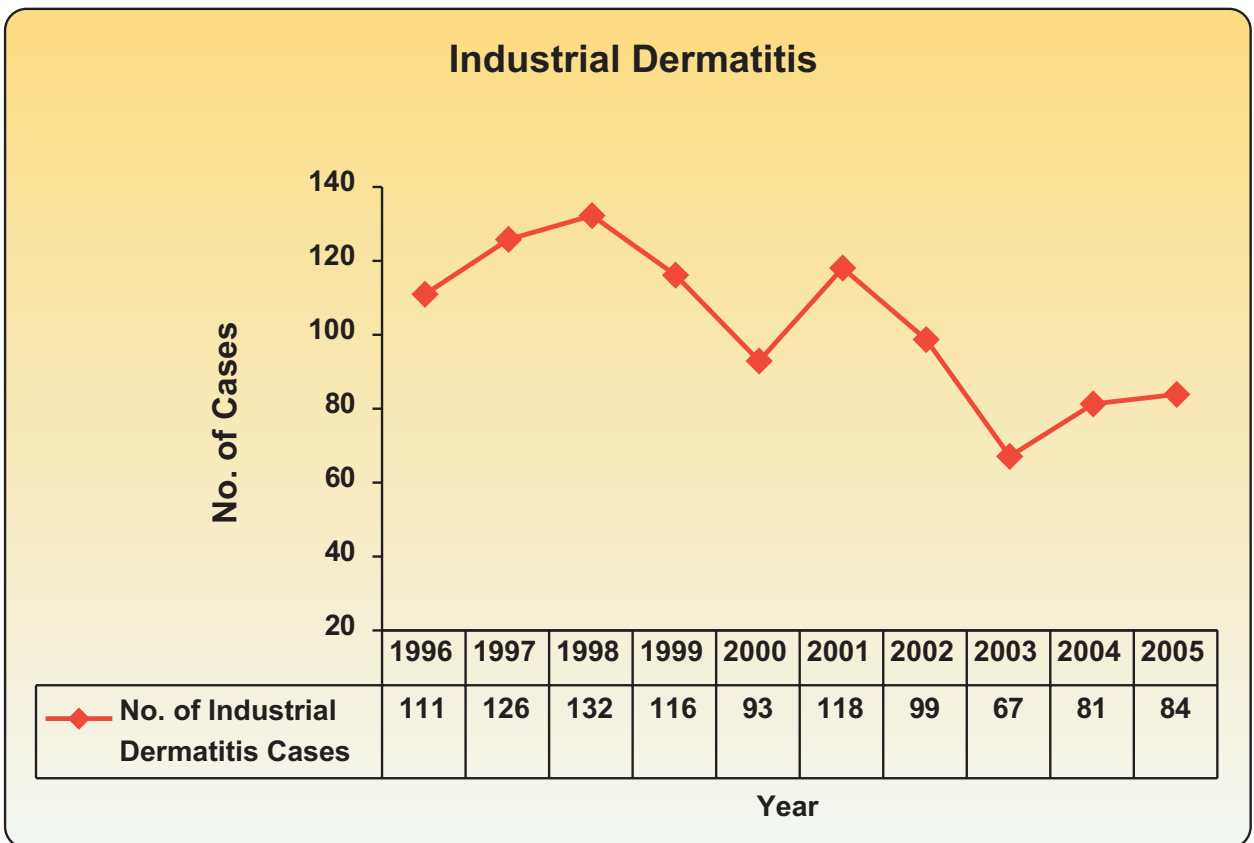
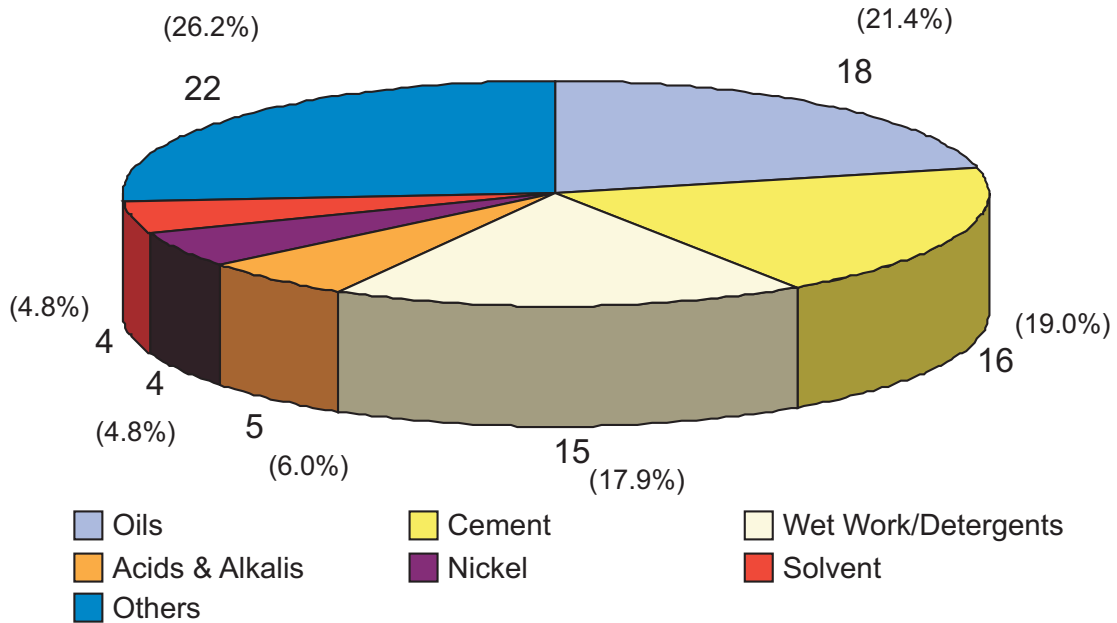


# Work Health Report

## Industrial Dermatitis

Industrial Dermatitis (ID) continued to be the second most common occupational disease, with 84 cases in 2005. The common causative agents were oils, cement, wet work and detergents.

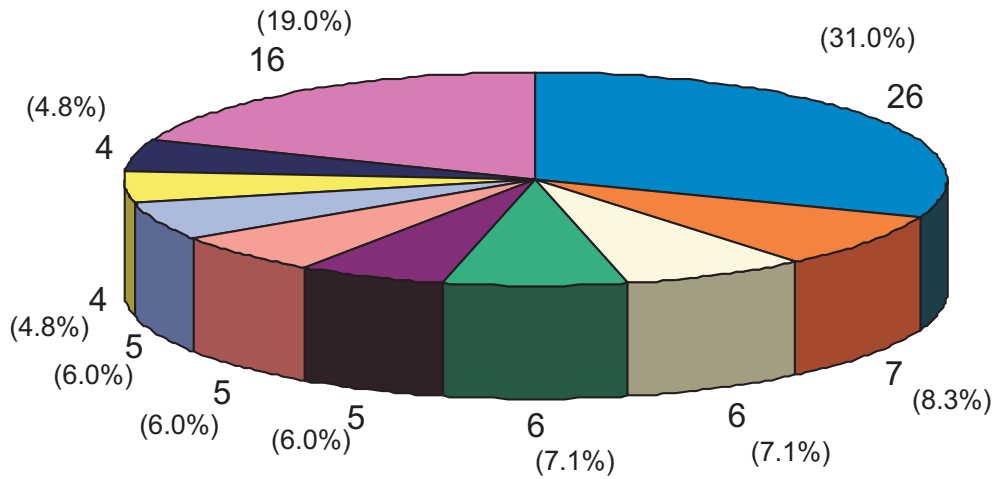
**Industrial Dermatitis by Causative Agent, 2005**





# Work Health Report

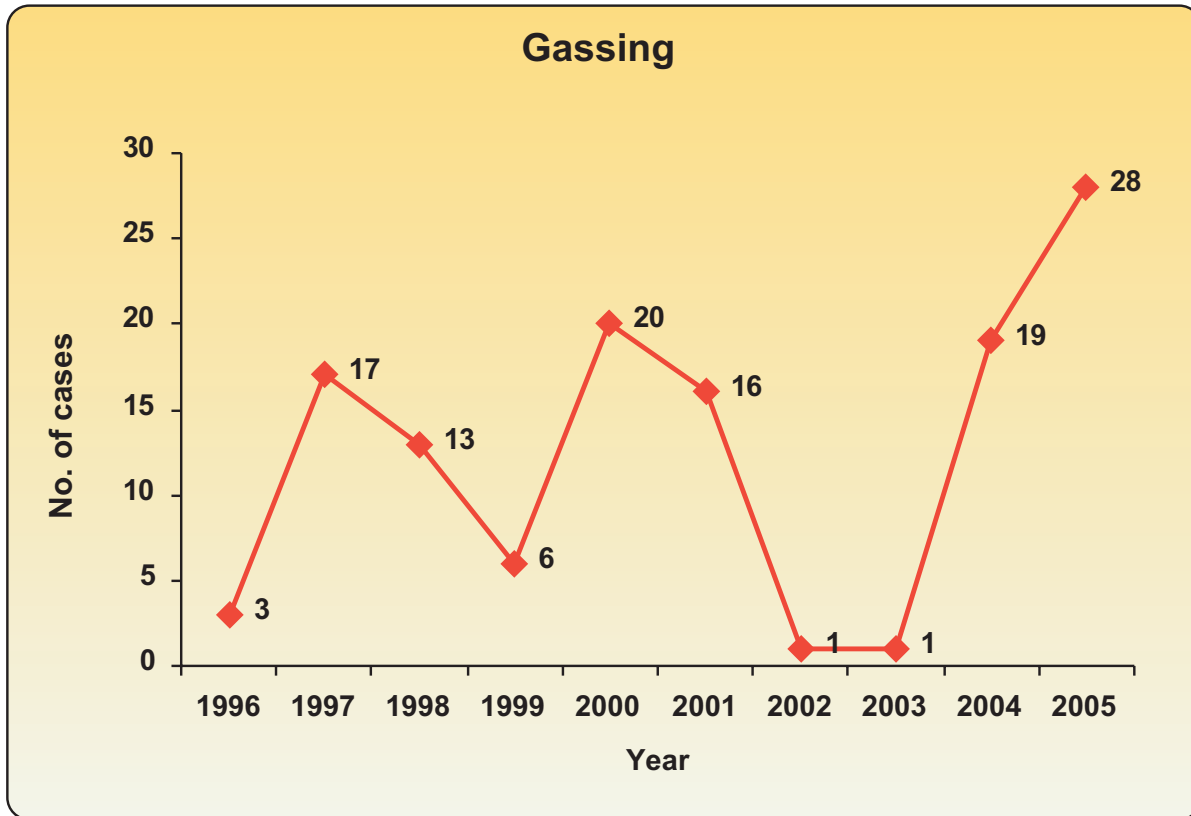
## Industrial Dermatitis By Industry, 2005



- Construction (SSIC 45)
- Manufacture of Electronic Products and Components (SSIC 33)
- Manufacture of Fabricated Metal Products except Machinery and Equipment (SSIC 30)
- Manufacture of Transport Equipment (SSIC 35)
- Manufacture of Machinery and Equipment (SSIC 31)
- Other Service Activities (SSIC 93)
- Public Administration and Defence (SSIC 94)
- Manufacture of Chemicals and Chemical Products (SSIC 25)
- Hotels and Restaurants (SSIC 58)
- Other industries



## Work Health Report



In 2005, a total of 28 persons were affected in confined space and gassing incidents compared to 25 in 2004. Six were fatal cases.

### Death Traps

- Five workers were overcome by high levels of toluene inside a confined space of a box culvert. Two of the four workers involved in spray painting and a rescuer died. Apparently there was no suitable breathing apparatus provided and it was believed that the box culvert was not adequately ventilated.
- A worker was found unconscious in an ISO tank while carrying out touch up cleaning using a wipe cloth and thinner containing toluene and acetone. He subsequently died.
- A crew member died after entering a freezer tank of a fishing vessel to retrieve some fishing equipment. Two other rescuers also lost consciousness. The oxygen level in the tank was 8-10% volume of air. Gas testing was not conducted nor was the tank certified safe for entry.
- A worker died from oxygen deficiency while inspecting a tank on board a barge. The oxygen level in the tank was found to be 10%, well below the atmospheric level of 21%.



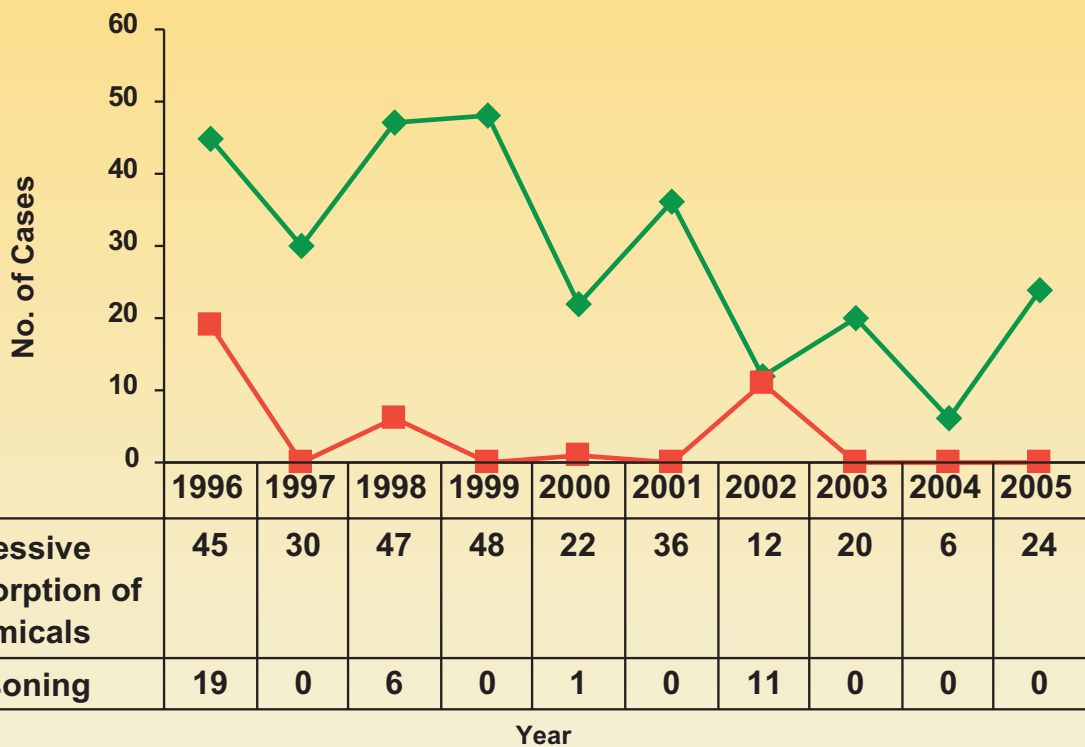
## Work Health Report

### Treat Chemicals with Respect

- Fifteen workers had acute exposure to triethylamine (TEA) vapour that had leaked from a damaged package during parcel sorting. They had symptoms of eye, nose, throat and lung irritation, but all recovered without any permanent health effects. The exposure occurred as no precautionary measures were taken during the cleaning up of the spill since the consignment was declared as non-hazardous goods.
- Two technicians vomited and fainted after dismantling a “live” pipeline during the changing of cylinders. It was believed that the pipeline which had erroneous labels contained nitrogen trifluoride.
- A technician felt giddy and nauseous while filling nitrogen into a gas cylinder containing the hydrogen sulphide at a specialty gas centre. He was exposed to the gas mixture which escaped as the nitrogen filling pressure (100 bars) exceeded the activation pressure (40 bars) of the safety relief valve. He has since recovered fully.

### Excessive Absorption of Chemicals

#### Poisoning and Excessive Absorption of Chemicals



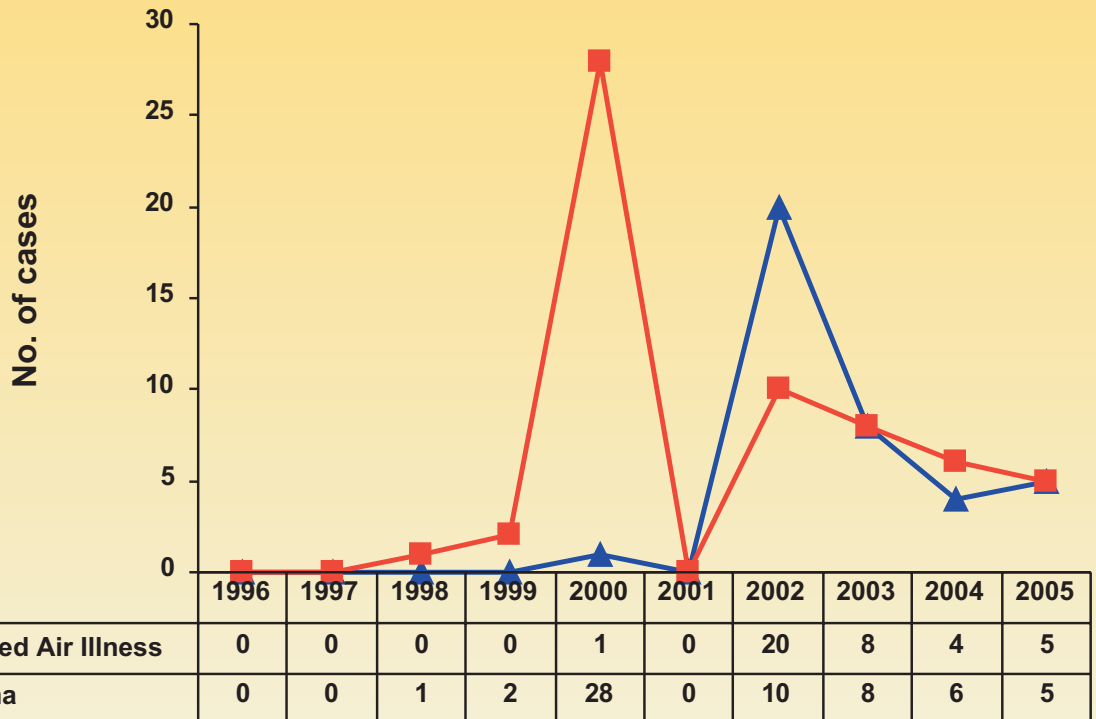
There were 23 cases of overexposure to solvents and one case of lead overexposure from a factory manufacturing lead stabilizers for PVC compounding. The solvents involved were toluene, trichloroethylene and perchloroethylene used in degreasing in the paper products, lamination, dry cleaning, gold jewellery and ink manufacturing industries.



# Work Health Report

## Barotrauma

**Compressed Air Illness/Barotrauma**



**Year**

Of the 10 cases, one was a freelance commercial diver, laying pipes on the seabed as part of the Deep Tunnel Sewerage System project, while nine were involved in the construction of a transmission cable tunnel, working at pressures of up to 2.3 bars while changing cutter heads of the tunnel boring machine.

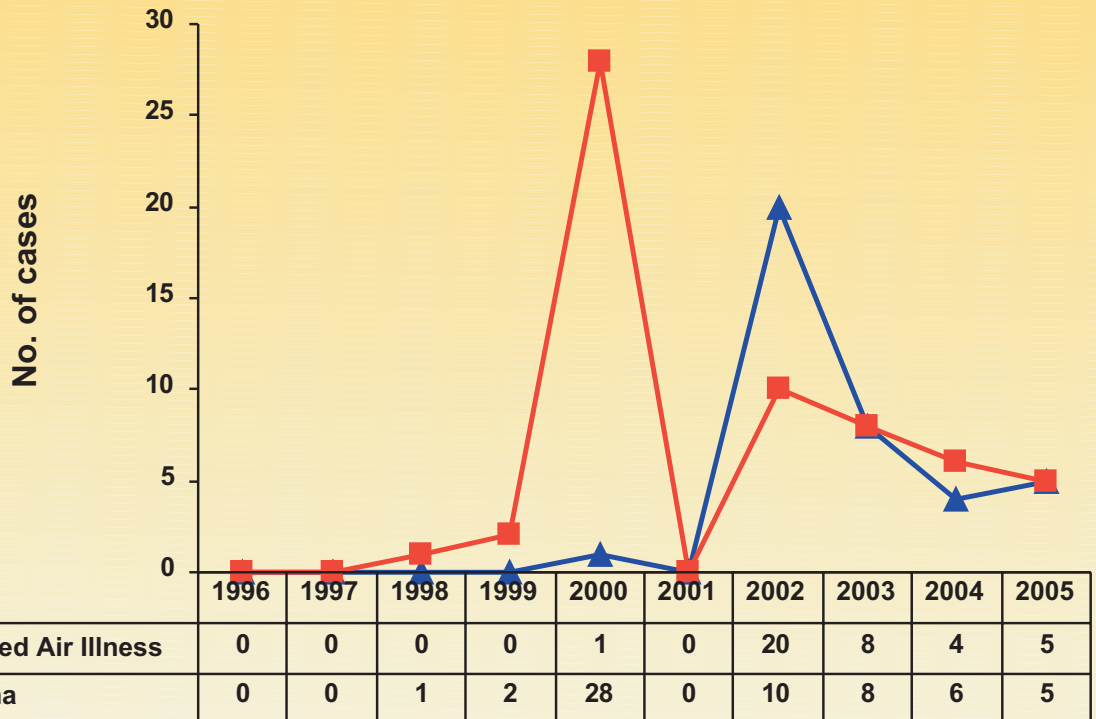




# Work Health Report

## Compressed Air Illness

**Compressed Air Illness/Barotrauma**



**Year**

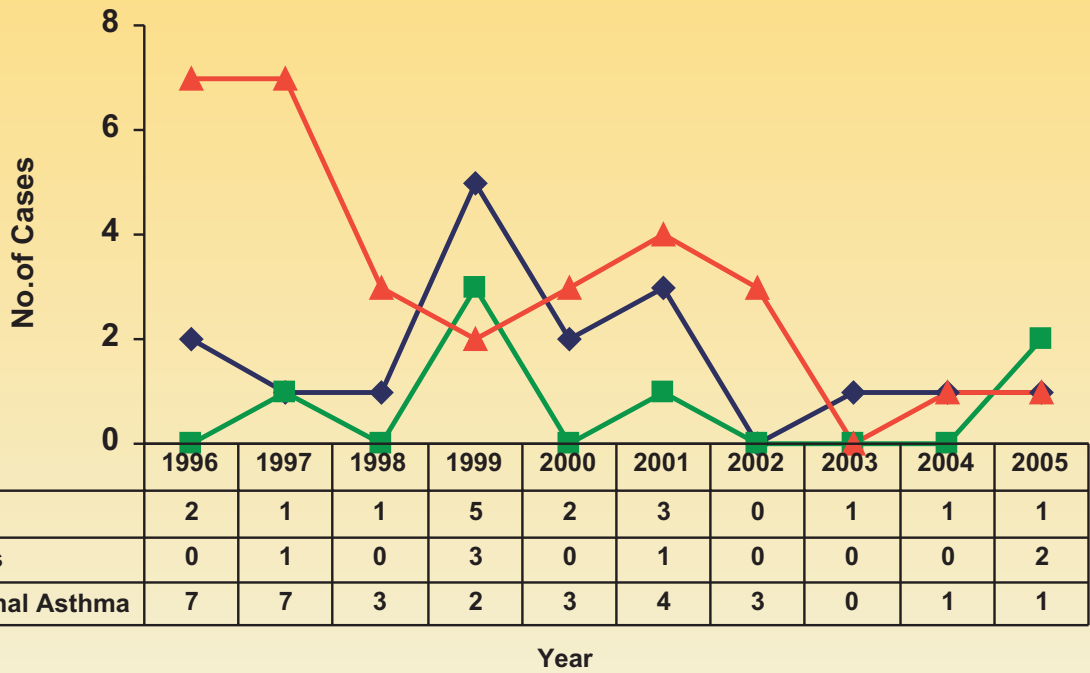
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# Work Health Report

## Occupational Lung Disease

**Silicosis, Asbestosis, Occupational Asthma**



The two workers with asbestosis had worked previously as pipe fitters in a factory manufacturing asbestos cement pipes, while the worker with silicosis had previous exposure to silica dust while employed as a blaster and grinder in a granite quarry .

A technician developed occupational asthma after exposure to ethylenediamine (EDTA) during the transfer of chemicals into enclosed reactors in a chemical plant. He has since recovered after his transfer to another section with no exposure to EDTA.



## Work Health Report

### SAYING GOODBYE TO BODY ACHE AND BAD BACKS

There are two Joint Clinics at Tan Tock Seng Hospital and Singapore General Hospital catering to patients who may have Work-related Musculoskeletal Disorders (WRMSD) . Here are the cases confirmed in 2005.

#### Repetitive Strain Disorders of the Upper Limbs

- An electrician involved in changing and checking batteries located at the bottom of buses developed right shoulder supraspinatus tendonitis. His work involved bending his back and using force on his upper limb pulling and pushing trays containing batteries, weighing 20 kg each. Recommendations to the company included training workers on proper posture, provision of gloves to improve the grip, as well as lubrication and regular maintenance of the trays to minimize frictional forces.

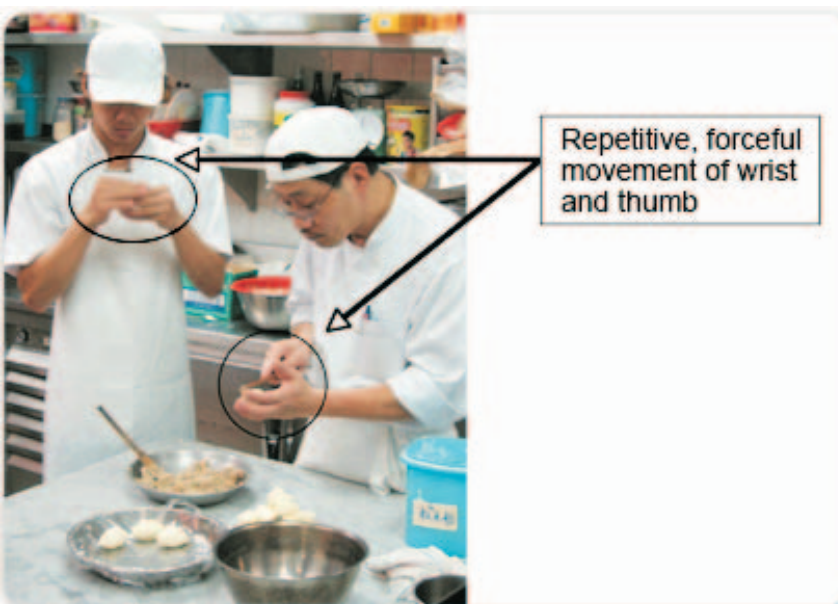


Bending of back and excessive shoulder elevation



Adopting correct posture and use of gloves to improve grip

- A trainee chef from a restaurant developed de Quervain's tenosynovitis of the left wrist and thumb within two months of work. Her work involved repetitive and forceful movements of the wrist and thumb during kneading of dough and wrapping prawns into dumpling skin. The company has since put in place a schedule to rotate such work among the employees and is looking into the feasibility of implementing more frequent rest breaks and automation for dough kneading.





## Work Health Report

### Backache

- A 29 year old store cum delivery man, diagnosed with prolapsed intervertebral disc, presented with pain in the low back and left buttock of insidious onset. His work involved manual packing and frequent lifting of automobile parts (weighing 10-20 kg) from boxes, and to the storeroom or delivery truck. He had adopted awkward postures e.g. bending at waist during lifting. The company is looking into the use of lifting devices and rotation of tasks. Training on correct lifting techniques was conducted.



Awkward bending at the waist during lifting



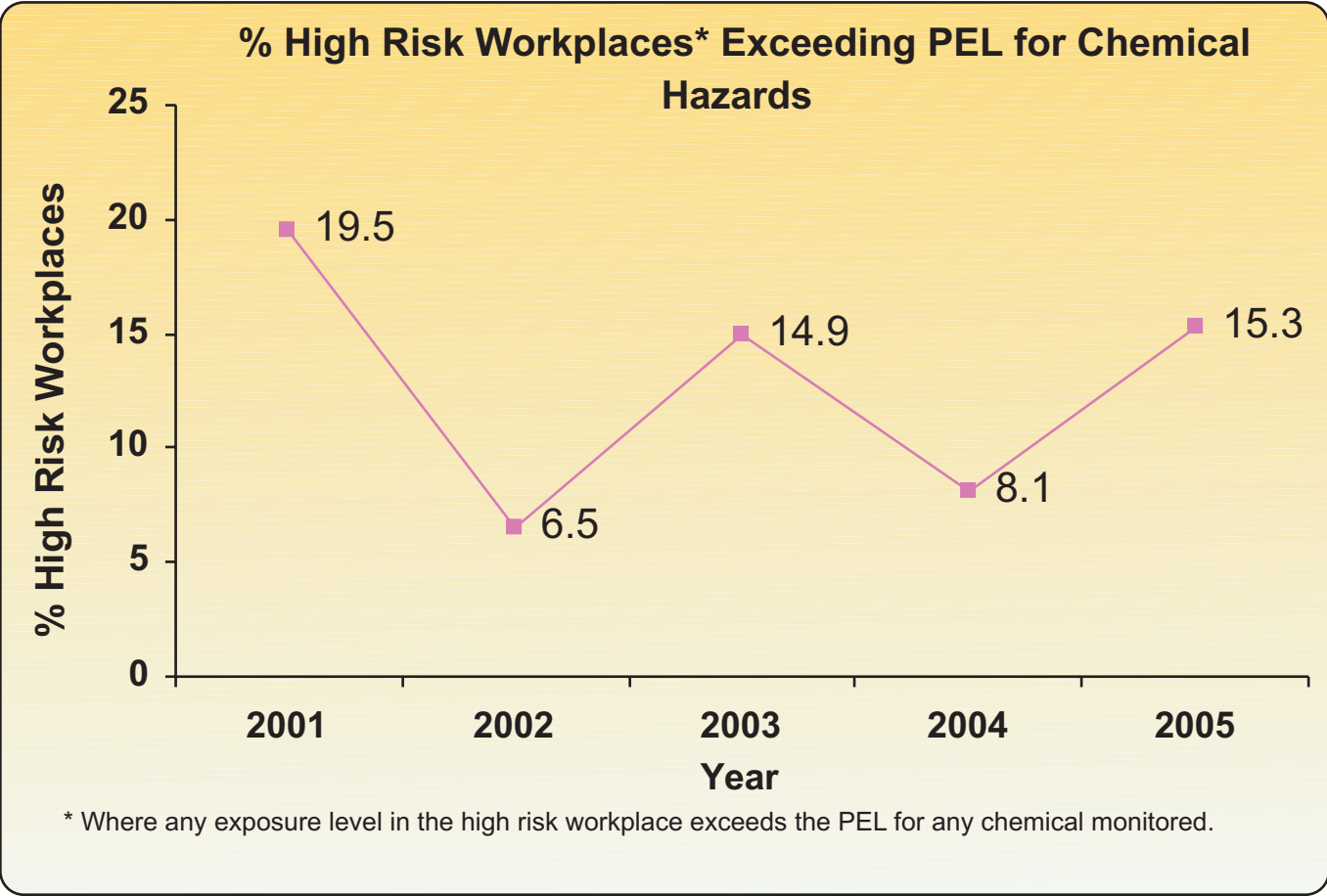


# Work Health Report

## EXPOSURE LEVELS

### Chemical Exposure Levels

Overall, chemical exposure levels remained satisfactory. The percentage of high risk workplaces that had excessive chemical exposure increased to 15.3% from the lower base of 8.1% in 2004, reflecting our ongoing efforts in identifying such workplaces and enforcing requirements to reduce chemical exposure.

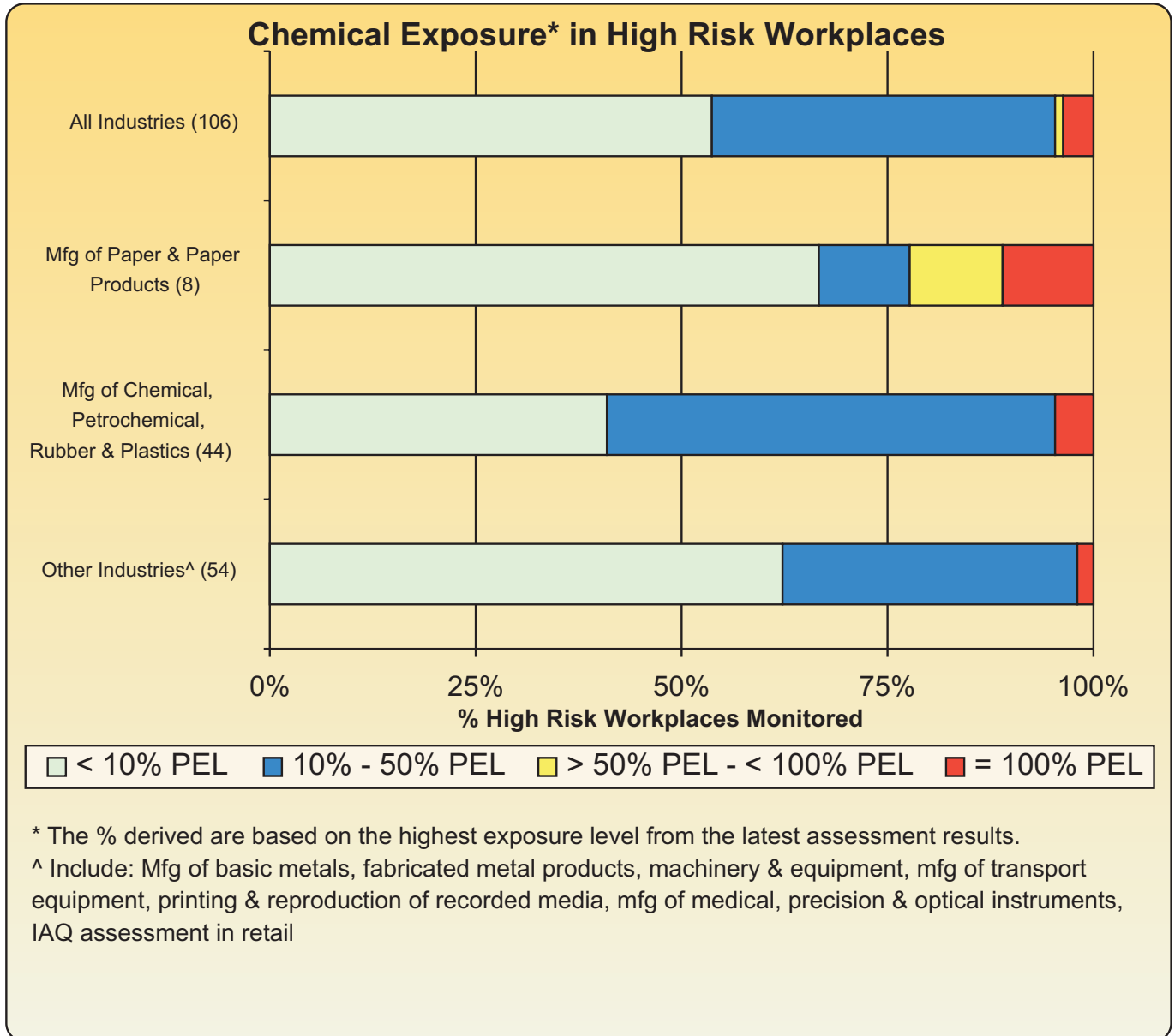




## Work Health Report

Our surveillance data indicate that workplaces with significant chemical exposure levels (of over 50% PEL), were mainly from the following industries:

- Manufacture of paper and paper products
- Manufacture of petrochemical and petrochemical products

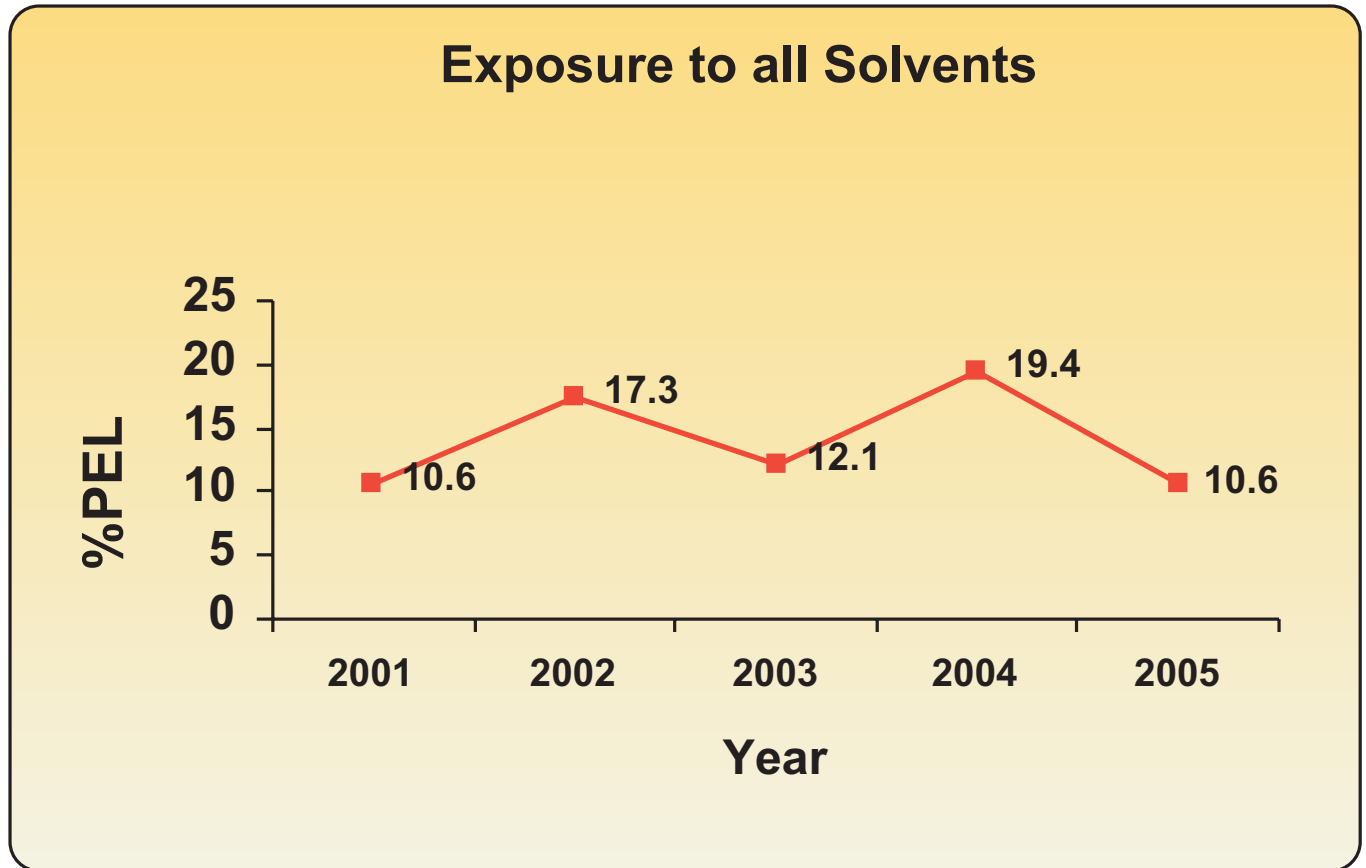






## Work Health Report

Air levels of all solvents were lower in 2005, reflecting significant improvements following our enforcement activities in the metalworking and aircraft-servicing industries, with none of these exposure levels exceeding 50% PEL.



The paper products, lamination, dry cleaning, gold jewellery and ink manufacturing industries were also targeted following the detection of excessive absorption cases in these industries. These efforts resulted in a number of successful intervention cases that contributed to subsequent reductions in air levels.



## Work Health Report

### Exposure to toluene from laminating machines

Workers operating laminating machines were exposed to toluene vapours which evaporated from the glue trays. This was due to large gaps between the hood panels of the existing local exhaust ventilation (LEV) system and inadequate side panels to cover the rollers completely.

New stainless steel hoods with extended panels were installed onto the laminating machines to cover the rollers. Gaps between the hoods and the machines were minimized to enhance the efficiency of the LEV system. With these controls in place, exposure to toluene vapours was reduced from 69 % PEL to 27 PEL.



Old hood on laminating machine

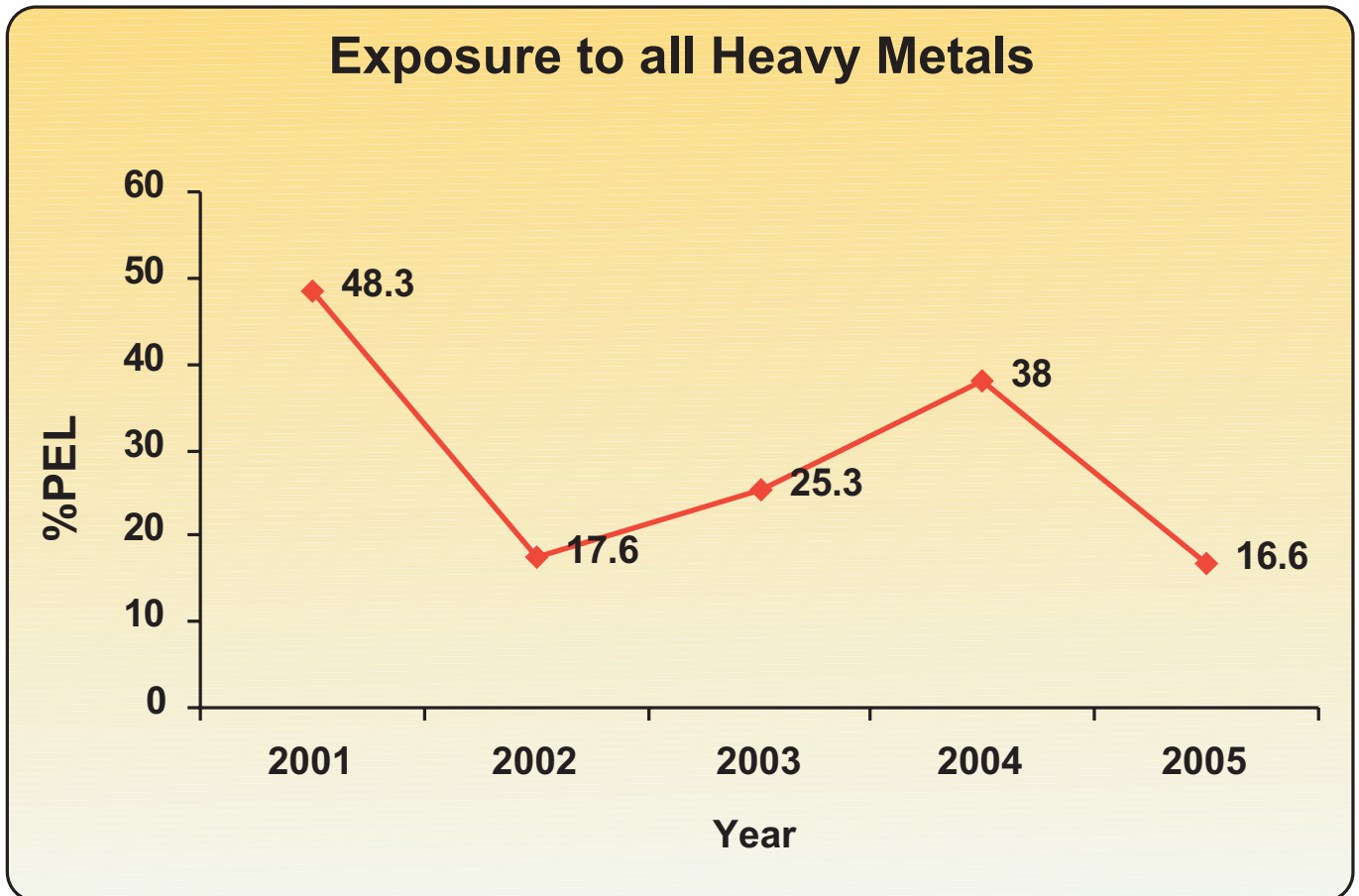


New hood without side gaps



## Work Health Report

Exposures to heavy metals were also reduced, although one chemical plant noted some increase in air levels of Chromium III arising from a new process line. The factory was advised to improve the effectiveness of engineering controls.



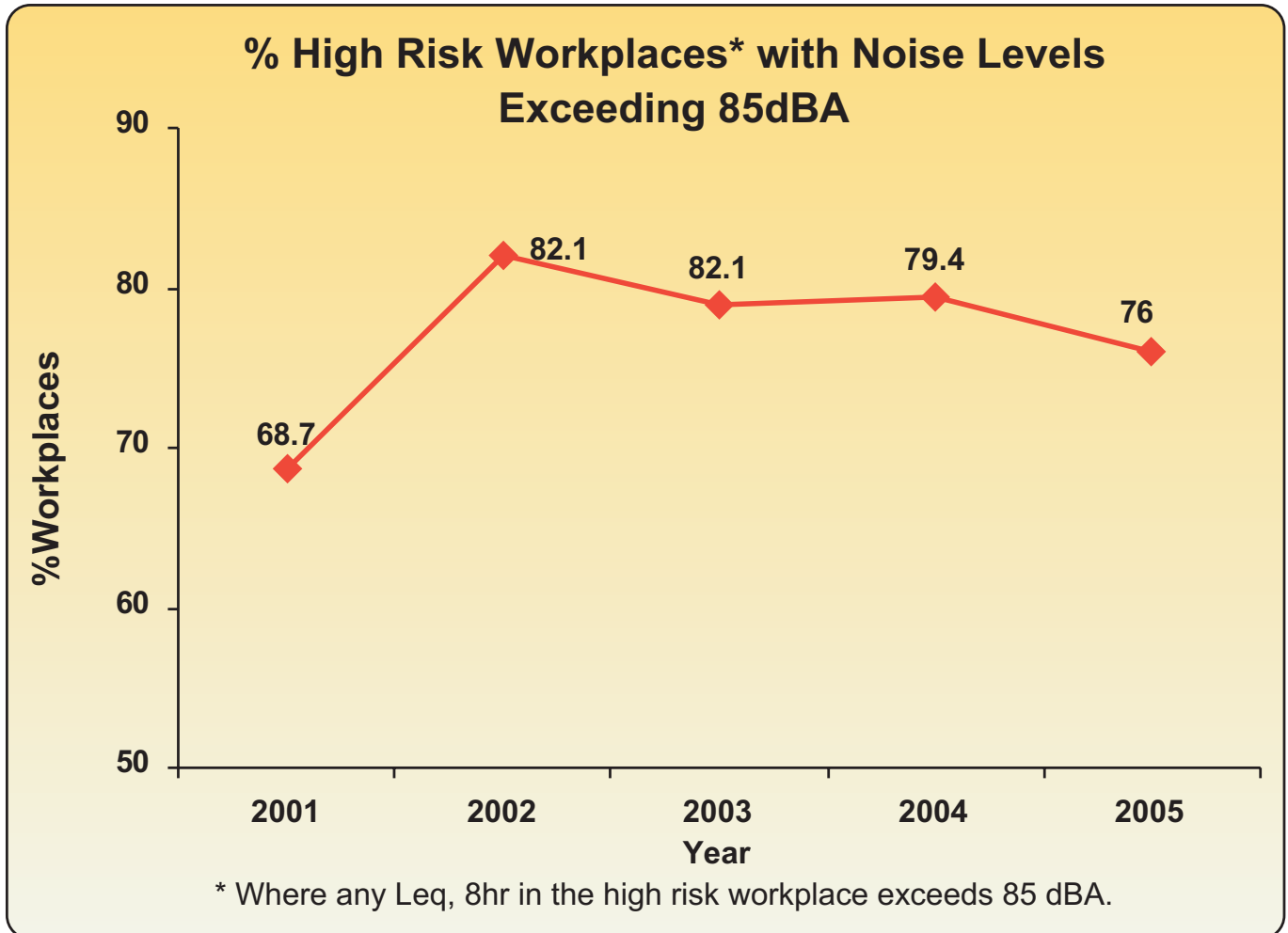
As to other airborne contaminants, significant levels were noted in talc, non-specific respirable and nuisance dust during our enforcement activities on factories in the chemical products, rubber and plastic products industry, ink manufacturing. The companies concerned were advised on the implementation of engineering controls, including local exhaust ventilation, and general ventilation improvements.



## Work Health Report

### Noise Exposure Levels

Overall, the average noise levels in high risk workplaces remained satisfactory. The high percentage of workplaces with excessive noise reflects our ongoing efforts in identifying such workplaces and enforcing requirements to reduce noise exposure.



Under the Factories (Noise) Regulations, companies with 10 or more workers exposed to excessive noise, i.e., above an equivalent sound pressure level of 85 dBA over an 8-hour workday, are required to monitor the noise exposure at least once every three years.

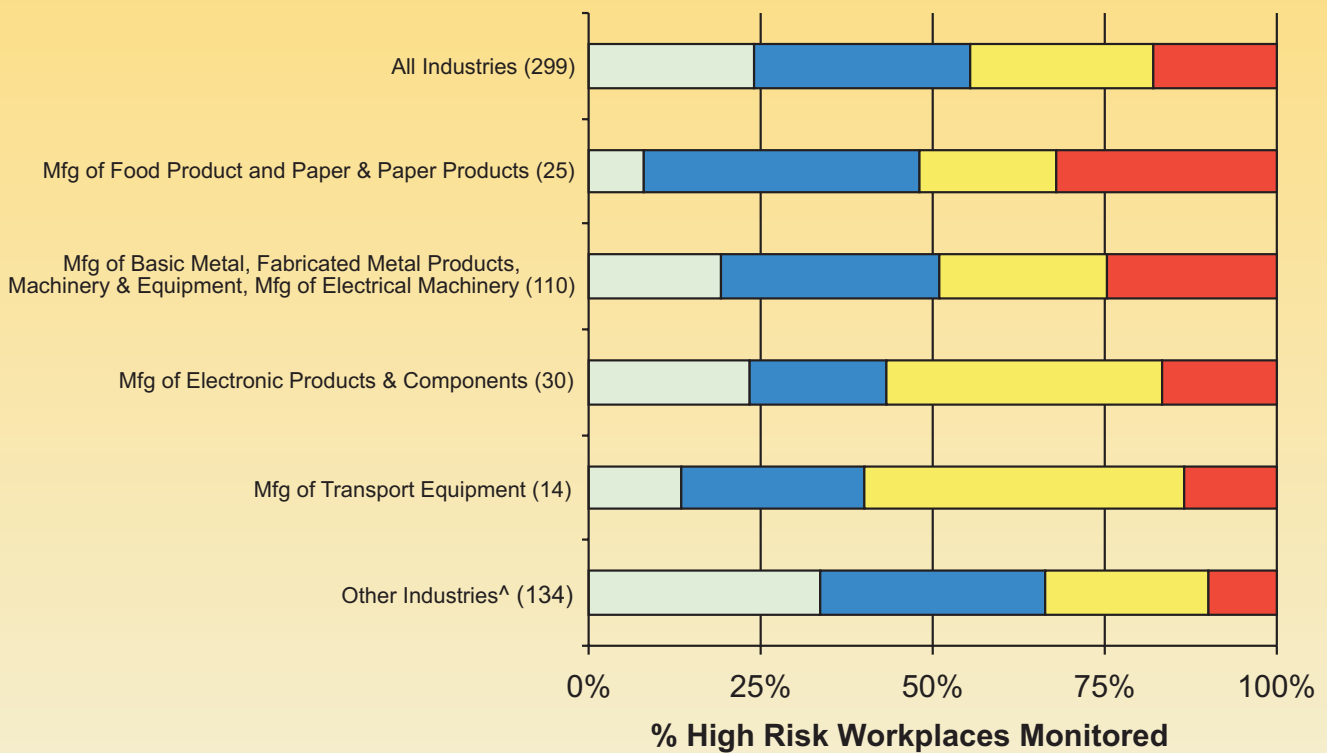


## Work Health Report

Our surveillance data indicate that workplaces with very high noise levels (90 dBA and above) were mainly from the following industries:

- Manufacture of fabricated metal products, machinery and equipment
- Manufacture of electronic products and components
- Manufacture of transport equipment

### Noise Exposure\* in High Risk Workplaces



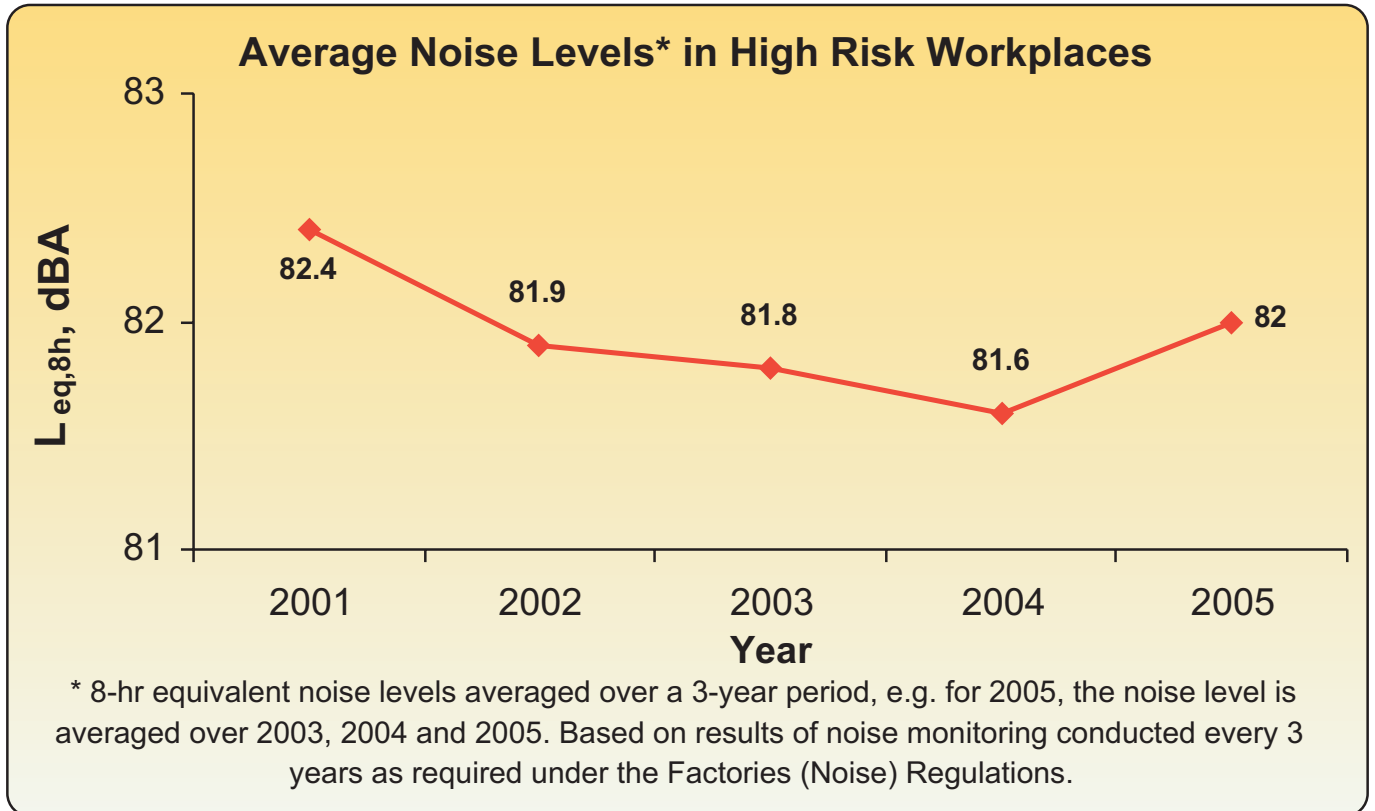
< 85 dBA   
  = 85 dBA - < 90 dBA   
  = 90 dBA - < 95 dBA   
  > 95 dBA

\* The % derived are based on the highest exposure level from the latest assessment results

^ Include: Mfg of beverages, textile, wearing apparel, tanning & dressing of leather, wood & wood products, printing & reproduction of record media, coke & refined petroleum products, petrochemical & petrochemical products, chemical & chemical products, rubber & plastic products, non-metallic products, mfg of precision product, electricity & gas supply and warehousing.



## Work Health Report



Noise exposure in the manufacture of transport equipment improved due to the successful implementation of engineering controls in workplaces involved in aircraft repair and aircraft components manufacture.

Enforcement activities were stepped up in the food and paper products industries where processes with high noise levels were detected. These processes involved the use of high pressure nitrogen for inerting food containers in food preservation and compressed air for roller compression in the lamination of paper products.