



Department of Labour

# National Programme for the Elimination of Silicosis



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**Edition 1**

# Introduction

This programme outlines the commitment of government to significantly reduce the prevalence of Silicosis by 2015 and to totally eliminate Silicosis in workplaces by 2030 in line with the International Labour Organisation (ILO) and the World Health Organisation's (WHO) Global Programme for the Elimination of Silicosis.

To succeed in this government and other role-players will have to build capacity round the four pillars of preventive action, namely:

- Regulatory and enforcement systems to focus essentially on the prevention of exposure and to integrate a management system approach
- Concentrate knowledge development, management and dissemination systems and tools, including awareness raising, training and education at all levels
- Apply effective inspection and health surveillance systems and tools
- Sustain and implement preventative health and safety measures, including technical and administrative controls in the enterprise through the application of the principles of an occupational health and safety management system.

Government is aware of the huge commitment and major challenge but with the support of organised business and organised labour this country will rise to the challenge and in so doing fulfill its commitment.

The key to the commitment lies in the education and training of employers and workers both in work places and in civil society. Government commits itself and its limited resources to do all it can to assist with the necessary training and information dissemination to realise this commitment.

Government is encouraged by the fact that countries such as Finland, Sweden and Switzerland have succeeded in eliminating Silicosis. This is an indication that it can be done.

The ILO/WHO initiative has helped countries to develop and implement a National Programme for the Elimination of Silicosis (NPES). Government, organised labour and organised business are committed to cooperate with the ILO/WHO to eliminate Silicosis.

Government realises that the National Programme for the Elimination of Silicosis is a work process that will change as information becomes available and technology changes.

## Magnitude of the problem

Silica exposure and Silicosis have re-emerged as very serious public health issues in Southern Africa because:

- Dust control is inadequate in both the mining and non-mining sectors and the development of small mines throughout the region is likely to expose more workers to Silica dust
- There is a large burden of undetected lung diseases in former Silica exposed miners now living in labour-sending areas

- Silicosis is common in industrial workers and in gold miners and the attendant tuberculosis risk is high. Recent research has found that Silica dust, independent of Silicosis, increases the risk of tuberculosis.



*Silica is transported in holders to be deposited into tanks for the production process.*

Inadequate dust control is widespread in the region. For example, only 24% of South African foundries responding to a postal questionnaire actually measured dust, and an uncontrolled dust hazard was evident in all foundries surveyed by the National Centre for Occupational Health in South Africa, between 1983 and 1992. Towards the end of the 1990's only 8 of 48 gold mines had estimated quartz concentrations below the widely used reference limit of  $0.1 \text{ mg/m}^3$ .

Silicosis rates in former gold miners now living in labour-sending areas illustrate the effects of Silicosis in the region. Steen and co-workers found a Silicosis prevalence of 26% to 31% in former miners living in the Thamanga village, Botswana, and Trapido et al. 22% to 37% in Libode in the Eastern Cape. Generalising these rates to an estimated 2 000 000 former miners living in Southern Africa produces an astonishing 480 000 cases of Pneumoconiosis. If Silicosis was an innocuous disease these high rates would not be of great concern, but the strong association between Silicosis and Tuberculosis in South Africa combined with the HIV/AIDS epidemic, makes the situation alarming. Cowie found an increasing incidence of Tuberculosis with increasing severity of Silicosis in South African gold miners: 1% per annum in men without Silicosis; 2.2% in men with mild Silicosis; 2.9% with moderate Silicosis; and 6.3% with advanced Silicosis. Cowie suggested that one quarter of his subjects with Silicosis would have developed Tuberculosis by 60 years of age. This was before the surge of the HIV/AIDS epidemic. In addition, the International Agency for Research on Cancer (IARC) has classified Silica dust as a cancer causing agent.

Recent studies have found that it is not only Silicosis but Silica dust itself that confers an increased risk of Tuberculosis and that this risk persists even after Silica dust exposure ends, probably for life. This finding has profound implications for a public health policy including surveillance of workers and compensation for affected workers.

Combined with significant levels of migrant labour and the high HIV/AIDS infection rate, the interaction between inadequate Silica dust control, high rates of Silicosis, HIV/AIDS infection and Tuberculosis, including the multi-drug resistant forms, present major challenges for occupational and general public health and safety services in the region.

# Socio-economic context

The inhalation of Silica dust paralyses one of the most important defense mechanisms in the lung. As a result Silica exposed workers are much more likely to get Tuberculosis than the rest of the population. For about 100 years large numbers of workers have been exposed to high levels of Silica dust, mainly, but not exclusively in the gold mines of the Witwatersrand and the Free State. Health damage due to Silica exposure manifests as fibrosis of the lung and as an elevated incidence of pulmonary Tuberculosis among workers and their close contacts. It is not unexpected that Southern Africa which have supplied migrant labour to the South African mines all have high Tuberculosis rates.

Recent studies of gold miners in Botswana and the Eastern Cape have shown high prevalence of Silicosis and Tuberculosis. It is probably fair to say that in any population of Silica exposed workers living in the rural labour-sending areas of South and Southern Africa a detailed study is likely to find that about one in three have, or have had Tuberculosis, about one in four has Silicosis and that almost none have been properly compensated. About half of a random sample of Eastern Cape ex-miners had died prior to the study.

Tuberculosis is a very damaging disease, particularly among the rural poor who do not have easy access to health services and whose general health and nutritional status is low. The cost of Tuberculosis control measures is a significant drain on the health budget. The cumulative cost of the failure to control Tuberculosis in South Africa is vast, and the advent of the HIV/AIDS epidemic in a country that already has an uncontrolled epidemic of Tuberculosis is catastrophic. It is likely that one of the important reasons for the failure of Tuberculosis control in South Africa was the huge number of workers exposed to Silica in mines, foundries, ceramic and similar industries.

## Identification of target groups at risk

There are over a million workers employed in industries using Silica containing materials or where production processes generate Silica dust. The number of workers actually exposed to excessive Silica dust is not known and needs to be established. Through this programme there is hope that vast numbers of workers exposed will be identified. Measures have been put in place to identify industries (excluding mines) where Silica is handled and to capture the information on a national database.

Silica exposure is a problem in the following areas:

- Agriculture due to plowing, harvesting, use of machinery, burning of agricultural waste and processing of agricultural products. Soil is generally the source of Silica. Agricultural chemicals may also cause exposure to Silica as a result of crushing raw material, handling of such chemicals, bagging and dumping of products or raw materials. Phosphate ore and rock being the source material
- Mining and related milling operations as a result of underground operations, surface milling, rock drilling and dredging. Ore and associated rocks are the source of Silica
- Silicon and ferro-silicon foundries, where raw materials are being handled and processes such as casting, molding, shaking out, fettling, furnace installation and repairs are being done. Sand and refractory are the source materials

- Ceramic industries, including bricks, tiles, sanitary ware, porcelain, pottery, refractories, vitreous enamels. In these industries there is mixing, molding, glaze or enamel spraying, finishing, sculpting and firing. Clay, shale, flint, sand, quartzite and diatomaceous earth are the source materials
- Construction industries, mainly as a result of abrasive blasting of structures and buildings, highway and tunnel construction, excavation and earth moving and digging, dry sweeping and brushing, jack hammering, etc. The source of Silica will be sand, concrete, rock soil, mortar, plaster and shingles.
- Jewelry making due to cutting, grinding, polishing, buffing, etching, engraving casting, chipping, sharpening and sculpting. Semi-precious gems, abrasive and glass are the source materials.

## Definition of a preventative strategy

Silicosis is a dangerous, disabling, non-reversible and sometimes fatal but preventable occupational lung disease. Its preventative strategy can be divided into four levels, primordial, primary, secondary and tertiary prevention.

- Primordial prevention entails removal of exposure by for example stopping to mine Silica, stopping sand blasting or substituting Silica with safer materials
- A primary prevention approach is a critical element of the preventative strategy. It involves prevention of the disease before its initiation. This prevention approach entails controlling Silica dust at the source so as to reduce a worker's exposure to Silica dust. It includes introducing dust control measures, the use of appropriate technologies i.e. local exhaust ventilation, process enclosure, wet techniques and substitution to limit exposure to Silica dust. Primary prevention is not only important in the prevention of Silicosis but also in the prevention of Tuberculosis, which is closely related to exposure to Silica dust and Silicosis
- Secondary prevention is the early detection of the asymptomatic disease and prompt intervention when the disease is preventable or more easily treatable such as screening, chest X-rays and possibly lung function test. Secondary prevention is important in determining the efficacy of the dust control measures that are in place and to determine the health risks
- Tertiary prevention is used once the disease has occurred and it aims to lessen the long-term impairments and disability effects stemming from the disease and it entails diagnosis, treatment, appropriate placement, compensation and rehabilitation.

Research conducted and international experience has indicated that the current Occupational Exposure Limits (OEL) has not been adequate to reduce the ever-growing incidents of Silicosis. There is a pressing need to revise the OEL for crystalline silica from 0,1 to 0,05 or even to 0,025mg/m<sup>3</sup> in the short term.

The views of several roleplayers and coordinators of medical surveillance programmes as reflected in the Provincial Silicosis Workshops are that a new set of regulations dealing specific with and controlling the prevalence of Silicosis will need to be drafted and promulgated. The present Hazardous Chemical Substance Regulations were found to be inadequate to properly guide employers to put measures in place to effectively eliminate Silicosis. Recent research studies also indicate that the Occupational Exposure Limit of 0.1 mg/m<sup>3</sup> is not protective for Silicosis.

Meanwhile to prevent Silicosis the employer will have to do the following:

- Comply with the current Occupational Exposure Limits (OELs) and if at all possible better them. If there are workers who are overexposed, reduce the exposure by implementing engineering control measures, which may include: exhaust ventilation, dust collection systems, water sprays, wet drilling, enclosed cabs and drill platform skirts
- Conduct air monitoring of workplaces and implement corrective action when Silica levels are excessive
- Substitute less hazardous materials than crystalline Silica for abrasive blasting where possible
- Supply vacuum cleaning equipment with High-Efficiency Particulate Air (HEPA) filters and instruct workers to vacuum, hose down or wet sweep work areas instead of dry sweeping
- Train workers about health effects, engineering controls and work practices that reduce dust, the importance of maintenance and good house keeping as well as the availability of appropriate respirators. Ensure that workers know what operations and materials present a Silica hazard
- Provide workers with appropriate approved respirators (homologated) when engineering controls are insufficient to keep exposure within safe levels. Ensure that respirators are kept clean and properly maintained at all times and that workers are trained to use them



*To prevent silicosis measures should be applied to reduce silica dust levels.*

- Provide medical surveillance for workers who are exposed to respirable crystalline Silica and have their X-rays read by specialists in Pneumoconiosis who are competent in the use of the ILO International Classification of Radiographs of Pneumoconiosis
- Develop a plan for reducing the exposures of workers whose X-rays show changes consistent with Silicosis
- Report all cases of Silicosis and pulmonary Tuberculosis to both the Compensation Commissioner and the Chief Inspector for Occupational Health and Safety

- Post warning signs to identify work areas where respirable Silica is present
- Make risk assessment and annual reports of the occupational medical practitioner available to the health and safety committee for assessment of trends in TB and Silicosis.

Workers will on the other hand be expected to carry out the following measures in order to prevent Silicosis:

- Cooperate with employers to prevent Silicosis at the workplace
- Report engineering control measures not functioning properly
- Follow good work practices such as removing dust with a water hose or vacuum cleaning equipment with HEPA rather than blow with compressed air, or by wet sweeping rather than by dry sweeping
- Wear, maintain and correctly use approved (homologated) respirators when engineering controls are not adequate when used alone
- Participate in air monitoring, medical surveillance and training programmes offered
- Report to your employer, Health and Safety Representative or your shop steward if you notice any dust in your work place.
- Participate in health and safety committee activities and familiarise yourself with risk assessment and other available reports.

## Institutional framework and principal partners

The Working Group, which in itself is a tripartite structure, has ensured that there is wide involvement and partnership among government agencies, national institutions, organisations and bodies responsible for and operating in the field of occupational health and safety.

The Department of Labour is involved as the lead agent in occupational health and safety and as the custodian of one of the major compensation systems in the country. The Department of Minerals and Energy is responsible for occupational health and safety in the mines. The Department of Health mainly looks at the secondary aspects of the prevention strategy (surveillance of workers' health for early detection of the disease) and also manages compensation systems aimed specifically at mine workers.

Discussions between the Department of Labour and the Department of Environmental Affairs and Tourism, which is the custodian of the environment, are at an advanced stage and there is hope that the Department of Environmental Affairs and Tourism will soon be having a representative in the National Working Group as well as in the Provincial Working Groups.

The National Institute for Occupational Health (NIOH), which is part of the National Health Laboratory System, is already a major role player and assist government in many respects, especially with conducting research and gathering information on the prevalence of Silicosis. Three major trade union federations, COSATU, NACTU AND FEDUSA, representing most of the workers in the country are actively involved and participating in the programme.



There is still a need to have employers' organisations being adequately represented and actively taking part in both the National Working Group and Provincial Working Groups. Thus far it is only the mines that have nominated people to be part of the National Working Group and have been actively participating in the workshops conducted throughout the country. The majority of employers' organisations have been receiving feedback of developments on a quarterly basis after meetings of the Advisory Council for Occupational Health and Safety (ACOHS).

The Approved Inspection Authorities (AIAs), which are registered and approved by the Chief Inspector for Occupational Health and Safety to monitor stress factors have also been made aware of, and invited to participate in the process of developing the programme. Draft documents were sent to them and they were requested to comment during the developmental stages. The National Working Group will work hard to make sure that they are brought on board.

Academic research and teaching institutions have been a pillar of support and they have been involved with the programme since the National Working Group started. Their role will increase as more and more research has to be done in this field so that better intervention measures can be implemented. More inspectors from government departments, particularly from the Departments of Labour and of Minerals and Energy will need to be trained so as to be able to anticipate, recognise, identify, monitor, evaluate and control exposure to Silica dust. More occupational hygienists will have to be trained to be able to monitor workplaces for more effective control of Silica dust.

## Programme implementation and modalities of operations

The Department of Labour has established a National Working Group consisting of major role players namely government, organised labour, organised business and interested and affected parties. The National Working Group is responsible for the following functions:

- Develop and manage the programme



*One of the areas of potential risk to silica dust is in the Construction Industry where activities such as sandblasting, tunneling, rockdrilling, jack-hammering and powertool grinding of surfaces containing silica take place.*

- Monitor the implementation of the programme
- Develop criteria for evaluating the success of the programme
- Updating the programme as new information becomes available.

The National Working Group will in turn establish Provincial Working Groups which will be composed of members similar to that of the National Working Group except that members will be residents of that province. So far three Provincial Working Groups have been formed in the following provinces:

- KwaZulu-Natal
- Eastern Cape
- Western Cape.

The National Working Group will intensify their effort after the launch of the National Programme for the Elimination of Silicosis to establish more Provincial Working Groups. Their functions are to:

- Implement the programme
- Evaluate the success of the programme in their respective provinces
- Report back to the National Working Group on the progress made quarterly
- Communicate any new developments in their province to the National Working Group
- Help the National Working Group to update the programme
- Liaise with the National Working Group on any matter they may deem necessary.

There will be annual workshops that will be organised by the National Working Group where report back by each chairperson of a Provincial Working Group will be provided on the progress made in their respective provinces and to map the way forward.

## Monitoring and evaluation of programme implementation

The National Working Group remains the responsible body for monitoring and evaluating the programme implementation and its chairperson will in turn report to his/her principals within the Department of Labour and make a quarterly presentation to the Advisory Council for Occupational Health and Safety during their meetings. These reports and presentations will be based on the reports and feedback that would have been obtained from the Provincial Working Groups.

The following are the agreed-upon indicators developed by the National Working Group that will reflect the initial success of the programme:

- Proportion of enterprises measuring respirable dust within one year of launching

- Proportion of enterprises that comply with the Occupational Exposure Limit for quarts of  $0.1\text{mg}/\text{m}^3$
- Proportion of enterprises organised and providing training on Silica and its health effects to all their workers
- The implementation of appropriate medical surveillance programmes in industries where workers are exposed to Silica dust
- The medical surveillance programme to monitor whether there is any reduction in the number of workers with pulmonary Tuberculosis
- The submission of records of workers requiring compensation to the Compensation Fund as well as a letter concerning the diagnosis of an occupational disease to the Chief Inspector for Occupational Health and Safety.

These indicators will be communicated to the Provincial Working Groups, who will in turn ensure that they are translated into action. The results of the Programme implementation will be analysed by the National Working Group and will be tabled at the annual workshops for ratification and thereafter the report will be tabled at the first meeting of the Advisory Council for Occupational Health and Safety. The ILO/WHO will be kept informed of the developments and progress made as well as to seek their guidance and direction.

## National standards and links with international standards

The Hazardous Chemical Substance Regulations issued in terms of the Occupational Health and Safety Act, 1993 (Act no 83 of 1993) stipulates the Occupational Exposure Limit-control limit for Silica crystalline respirable dust as  $0.4\text{mg}/\text{m}^3$  and the Occupational Exposure Limit-recommended limit for Silica fused respirable dust as  $0.1\text{mg}/\text{m}^3$ . This is confusing to industry and the recommendation from the provincial workshops is that  $0.4\text{mg}/\text{m}^3$  is too high and will negate all efforts to eliminate Silicosis.

There is a need for the Department of Labour to bring the OEL-control limit in line with international trends of  $0.1\text{mg}/\text{m}^3$  and even lower it to  $0.05\text{mg}/\text{m}^3$  or even better to  $0.025\text{mg}/\text{m}^3$ . This will not only bring the country on par with others internationally but will also lay a better foundation for the programme. The Department is in the process of establishing a Technical Committee in concert with all roleplayers and interested and affected parties. The Technical Committee will review the Occupational Exposure Limits and Biological Exposure Indices.

This Technical Committee will be guided by best practices of the international communities as well as information available from recognised international agencies such as the Occupational Safety and Health Authority Permissible Exposure Limits (PELs), the American Conference for Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs), the European Union Occupational Exposure Limits and the National Institute for Occupational Safety and Health (NIOSH).

Government and indeed the Department of Labour through the working groups will actively participate in the ILO/WHO Global Programme for the Elimination of Silicosis and the WHO Global Strategy for Occupational Health for All. This involvement is crucial since this will inform

the National Working Group to align the country with what is done internationally.

# Relationship with the protection of the general environment

Protection of the general environment resort within the Department of Environmental Affairs and Tourism, which promulgated an Act of Parliament known as the National Environmental Management Act, 1998 (Act No. 107 of 1998) through which it identified certain government departments as those that have a role to play in the management and protection of the environment. The Departments of Labour, Minerals and Energy, and Health are among those that are listed together with the Department of Environmental Affairs and Tourism as having environmental management functions.

The Department of Environmental Affairs and Tourism is therefore a major role player and its contribution in the dust control processes will go a long way in helping to eliminate Silicosis. As a result the Department of Environmental Affairs and Tourism will have to have a seat in both the National Working Group and respective Provincial Working Groups. The Department of Labour as custodian and lead agent of occupational health and safety will then together with its partners and roleplayers facilitate a Memorandum of Understanding to be entered into by the Department of Labour and the Department of Environmental Affairs and Tourism.

This working document was compiled by the following members of the National Working Group informed by discussions at four Provincial Silicosis Workshops:

Mr Lesley Moshelanoka	Department of Labour
Dr Sophia Kisting	Occupational and Environmental Health Research Unit, University of Cape Town
Prof David Rees	National Institute for Occupational Health, Department of Health
Dr Desmond Sekudu	Department of Labour
Mr Bruce Doyle	Department of Minerals and Energy

## Contact details

If you wish to contribute any information to be included in the National Programme for the Elimination of Silicosis, then please forward it to the:

Director-General Department of Labour Private Bag X 117 Pretoria 0001	Attention: Mr Lesley Motshelanoka
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E-mail: [lesley.motshelanoka@labour.gov.za](mailto:lesley.motshelanoka@labour.gov.za)  
Tel: (012) 309 4400  
Fax: (012) 309 4763

