[NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH]

Promoting Good Occupational Health

Annual Report 2007 2008

NATIONAL HEALTH LABORATORY SERVICE

ANALYTICAL SERVICES EPIDEMIOLOGY & SURVEILLANCE ERGONOMICS UNIT
IMMUNOLOGY & MICROBIOLOGY OCCUPATIONAL HYGIENE OCCUPATIONAL MEDICINE
PATHOLOGY TOXICOLOGY & BIOCHEMISTRY

NIOH

[MISSION]

The National Institute for Occuaptional Health [NIOH] is primarily concerned with prevention of occupational diseases in the workplace.

[VISION]

The NIOH strives to support the provision of good occupational health practice.

[OBJECTIVE]

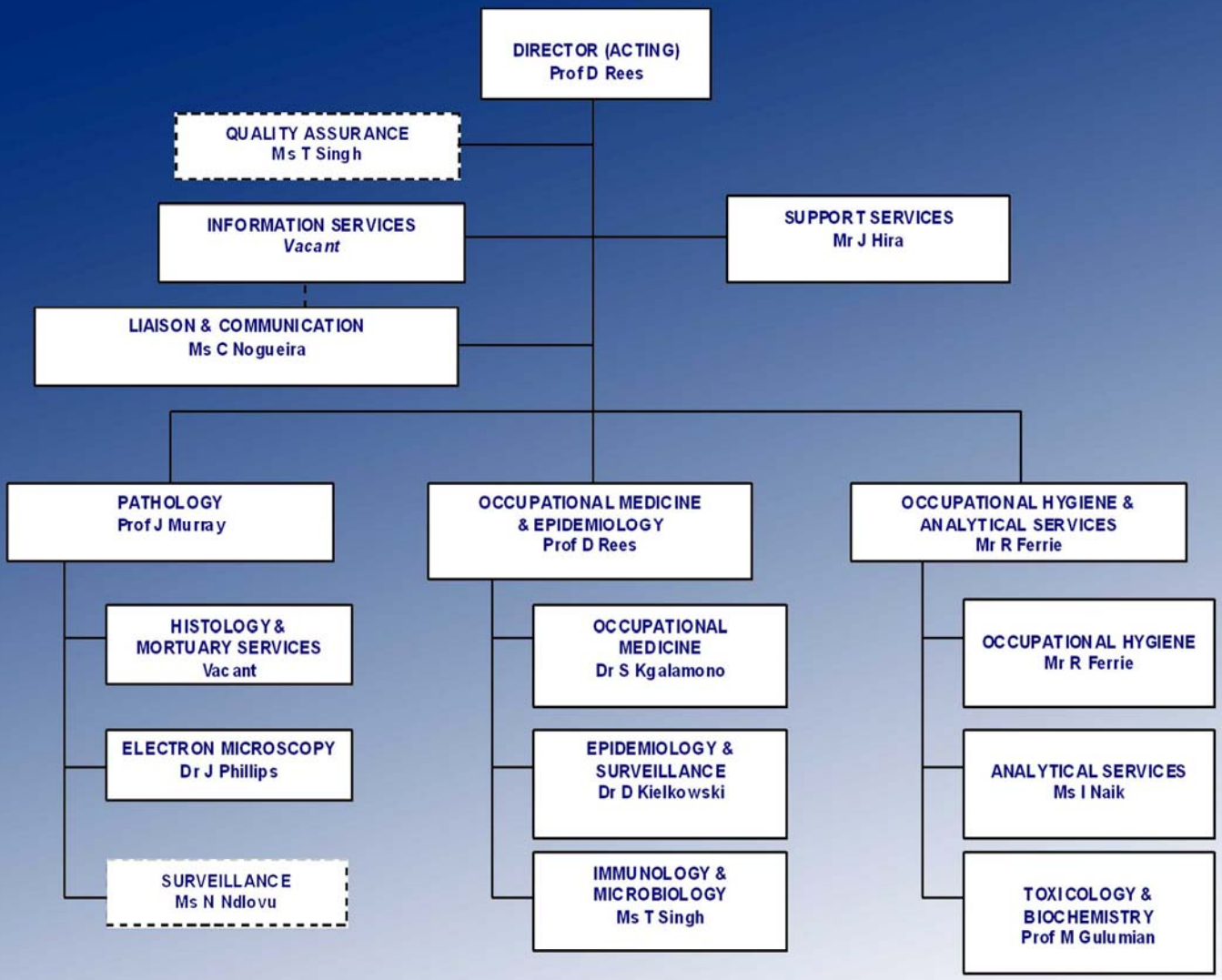
The NIOH aims to promote good occupational health practice and create awareness about occupational diseases in the workplace.

A WHO collaborating centre and ILO / CIS national centre

PO BOX 4788 - Johannesburg - 2000

http://www.nioh.ac.za

[NIOH ORGANOGRAM]



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DIRECTOR'S REPORT

Overview

This year was a period of consolidation and expansion following the 50th anniversary activities of 2006 celebrating the evolution from the Pneumoconiosis Research Institute for miners' occupational lung diseases to a multidisciplinary World Health Organisation Collaborating Centre for occupational health. The National Institute for Occupational Health is recognised internationally for excellence in research, service and training to support occupational health services not only in South Africa but also in southern Africa through its extensive outreach activities and collaboration. The highlights of the year were the physical improvements at the NIOH combined with the achievements of the staff through their routine activities, expansion of national and international research, training and service to sustain our main role to develop and support effective occupational health services in South and southern Africa.

We have achieved many of the planned initiatives and activities for 2007-2008. Liaison with labour and industry stakeholders, particularly in the industries identified as national priorities in South Africa, as well as in the Southern African Development Community (SADC) member states has progressed well with the initiation of new training and outreach activities. Research priorities have been aligned with regional and global initiatives so that NIOH programmes will make a difference and be more attractive to funders.

Highlights for the NIOH

The highlight of the year was the consolidation of the NIOH staff and facilities within the Old Medical School building. In July 2007, the staff 'took leave' of the original NIOH building which housed the pathology function since its inception and were 'piped' over to the new facilities (with the only formalin recycler in Africa). The new facilities will greatly enhance the working conditions and productivity of the Division and its service to the South African mining workforce. The NHLS contribution in supporting these state of the art facilities is much appreciated. With the completion and occupation of these custom-designed Pathology laboratories, combined with the electrical upgrade and installation of the back up generator, the NIOH has refocused on an important core function as a fitting conclusion to the jubilee year. The momentum and support from the NHLS has been maintained with further renovation and consolidation within the Occupational Hygiene and other sections. The 'new' pathology service established their first outreach programme which launched with training in clinical aspects and autopsy submission of occupational respiratory disease for Mpumalanga Provincial occupational health service. This outreach initiative was strengthened by the production of booklets, posters and information sheets on the role of autopsy in compensation. The service was promoted to miners through presentations at mines and to health practitioners, health and safety personnel, organised labour and management groups.

Another 'first' achievement was the SANAS accreditation for the Immunology and Microbiology and the Analytical Services laboratories at NIOH, thanks to a concerted effort from all the staff, particularly the Quality Manager and Co-ordinator, Ms T Singh and Ms K Fitchet.

The World Health Assembly endorsed the WHO Global Plan of Action on workers' health in Geneva in May 2007. The South African delegation from the Department of Health was instrumental in finalising the position of African countries and Dr Lindiwe Ndelu gave a statement on the actions being taken in South Africa, including the research and capacity building at the NIOH. This Annual Report concludes with a summary of the Institute's regional and international programmes: their scope and extent shows a solid commitment to improving occupational health in the Region.

In collaboration with the National Department of Health, which is a major funder of the Institute, the NIOH continued to support the Provincial Occupational Health Units and a study was commenced to determine the capacity and needs of these units and their occupational health services. Within the context of the NIOH serving the State, the Institution provided training, service and research assistance to a wide range of local, provincial and central government stakeholders.

The pilot phase of the NHLS occupational injury and diseases surveillance system was completed, largely due the efforts of Dr D Kielkowski, and a web-based system developed which is being tested. Further developments in conjunction with the University of British Columbia, Canada, have refined the surveillance system with the provincial occupational health units for surveillance of health care workers. Pelanomi Hospital, Free State Province, is the major site of development. As part of this programme a curriculum for training hospital based health and safety committees and representatives is being designed. The development of the training programme began in September 2007 with NIOH and the South African Health Department organising a seminar attended by national and provincial occupational health coordinators and Canadian team members. A standard core curriculum, core competencies and a methodology for rolling out a training programme for health and safety representatives in South Africa was discussed. A formative evaluation of training material prepared for a three-day workshop at Pelanomi Hospital was a key part of the agenda. The research and training materials were developed based on expertise gained from work conducted by team members in Canada, South Africa and Ecuador and included PBL case scenarios, a Worker Questionnaire and a Workplace Audit tool.

Progress was made regarding national occupational disease surveillance by obtaining commitment from key occupational health stakeholders from the mining, agricultural, manufacturing and fuel industries to submit occupational disease data within the RODISA (Reporting of Occupational Diseases in South Africa) surveillance system. The NIOH staff organised, hosted and presented a number of training and academic events within South Africa and in southern Africa. The highlight was the Webster Memorial Day which discussed the feasibility and desirability of a national occupational disease surveillance programme for South Africa.

Staff academic achievement and professional recognition brought credit to the NIOH. The Head of the Division of Occupational Hygiene and Analytical Services, Mr R Ferrie, served as the President of the prestigious 22 000 member International Occupational Hygiene Association (IOHA), an appointment which brought much interest in and credit to NIOH during the year. Mr Ferrie was also appointed as an international affiliate member of the American Industrial Hygiene Association. Within the WHO Global Network of Collaborating Centres in Occupational Health, Ms C Nogueira served as global manager for the Communications and Networking Activity Area, and Prof D Rees as the deputy manager for the Global Situation Analysis Activity Area. Prof M Ross and then Prof D Rees served on the Advisory Group of the WHO Collaborating Centres in Occupational Health. Ms T Singh and Dr J Phillips were appointed as honorary lecturer and senior researcher, respectively, by the University of the Witwatersrand School of Pathology, and Mr B Bello was appointed as an honorary lecturer in the School of Public Health. Mr J Mamabolo completed a post graduate Diploma in Information Management at the University of Johannesburg and Mr H Ntsuba obtained South African Institute for Occupational Hygiene (SAIOH) certification as a technologist. Prof J Murray was appointed to the editorial board of *Occupational Health Southern Africa*. We are proud to announce that Onnicah Mabe has successfully completed her MSc, pending minor changes, from the University of the Witwatersrand. She is registered for an MSc (Med) Degree in the department of Immunology and will be graduating in December 2008.

Within our close-knit staff of 100, we experienced a great loss with the deaths of Mr M (Mandla) Xaba, our NIOH driver, who was the face of NIOH for visitors, and Dr S Seopela, a former colleague who worked at NIOH until April 2006. Prof M Ross and Prof A Cantrell left the NIOH in 2007. Prof Ross successfully led the NIOH through a difficult transition and her term saw strengthening of a number of sections, notably Occupational Hygiene and Corporate Services, and substantial improvements to the NIOH buildings and infrastructure. Prof Cantrell retired after serving occupational health and the Institute for over 30 years. His knowledge and experience in multiple disciplines, particularly toxicology, industrial processes and information sciences, and his excellent teaching will be missed.

Research

The NIOH maintained a strong research focus on issues such as silica and silica-associated diseases, tuberculosis and HIV; occupational allergies and asthma; and pesticides and asbestos. But the research programme included more modern occupational health concerns, reproductive health and vibration among them. The NIOH projects are described by each Section in this Report.

The ongoing research activities included the projects submitted to the Network of WHO Collaborating Centres for Occupational Health as part of the global plan for occupational health research. The ILO/WHO Global Elimination of Silicosis Programme and the Mine Health and Safety Council (MHSC) were major drivers of research activities. Many new local and international contacts for surveillance, research and training were made.

Information dissemination of research findings was achieved through publications and participation by staff at international, national and local conferences (see publications and conference presentations).

Training and Capacity Building

The NIOH contributed significantly to training and capacity development within the service activities of the Institute, the formal education system and informal training of a wide variety of groups and individuals plus continuous professional development for occupational health professionals. During the past year, NIOH staff supervised 43 postgraduate research projects, and taught and examined postgraduate and undergraduate students at various tertiary institutions throughout South Africa. Formal training of registrars in the new speciality of Occupational Medicine began in the reporting year.

Beyond the formal academic input, the training activities that NIOH organised, co-ordinated and presented included:

- A dust control seminar, co-ordinated by NIOH, was conducted in Tanzania
- An expert group meeting on the prevention of tuberculosis in silicosis-exposed workers was held in Mozambique
- An occupational health and safety training workshop for mine management and state occupational health and safety representatives, was facilitated and presented in Portuguese in Lucapa, Angola
- An advanced module in biostatistics was presented to NHLS scientists and registrars from the Universities of Pretoria and the Witwatersrand
- A surveillance training course was given by the Epidemiology Section to the medical inspectors for the Department of Minerals and Energy (DME), tailored to their needs for the SAMODD surveillance system in the mining industry
- NIOH assisted the Department of Labour with training of inspectors in air monitoring

Service

NIOH staff provided strategic services and advice on occupational health and safety for many companies, individuals and agencies including the Department of Health Forensic Laboratories; Department of Labour; Gautrain project; South African Society for Travel Medicine; as well as internal risk assessments and advice to the NHLS.

International

NIOH maintained longstanding associations with international organisations through both formal agreements and informal collaboration (e.g. WHO, ILO, NIOSH (USA), the HSL (UK), the University of Birmingham Institute of Occupational and Environmental Medicine (UK), the Swedish National Institute of Public Health (NIPH) and the Fogarty International Center (FIC), USA). In addition, new North-South and South-South alliances were established with Portuguese and Brazilian Institutes to support the expansion of NIOH activities in Portuguese- speaking countries in southern Africa. The first phase of the Work and Health in Southern Africa (WAHSA) Programme, funded by the Swedish International Development Cooperation Agency (Sida) for SADC member countries, was completed with a successful review in February 2008. The NIOH activities focused on interventions on silica, silicosis and tuberculosis and dust control in quarries with Zambia, Mozambique and Lesotho.

Internal Processes

The new facilities completed in 2007-2008 included the Pathology Laboratories, upgraded electrical infrastructure, upgraded occupational hygiene laboratories and offices and further refurbishment to improve the safety and appearance of the Institute.



New Pathology premises (L-R): Clerical offices, Pathology lung display area and New Pathology laboratories.

The realignment to develop a core communications and liaison capacity was put on hold until the appointment of appropriately trained staff.

The monthly Research Forum continued to showcase new research initiatives from different sections and particularly encouraged presentation by junior researchers.

Plans for the Year Ahead

The year ends with numerous ongoing activities and new challenges. The routine and statutory services need to be consolidated. Among the priority activities to improve NIOH support for occupational health are (1) the upgrading of the Information Services of the NIOH; (2) collaboration with occupational health structures at provincial level and in the inspectorates; (3) extension of accreditation to other NIOH laboratories; (4) ensuring that research projects reach publication and appropriate dissemination of findings; (5) further capacity development and training for occupational health professionals; (6) the surveillance programme for health care workers; (7) maintaining the high profile support of the Global Plan of Action and also the International Commission for Occupational Health (ICOH) scientific programme for the 29th Congress to be held in Cape Town in March 2009.

Head
Prof. J Murray

The Pathology Division had been housed in Joubert Street Extension since 1959. During this time it has been part of the Pneumoconiosis Research Unit, South African Institute for Medical Research, the National Research Institute for Occupational Diseases and the National Centre for Occupational Health in the Department of Health, and since 2003, the National Institute for Occupational Health within the NHLS. In July 2007 the Division moved from its old home to join the rest of the NIOH at 25 Hospital Street. Although moving was a mammoth task, the new laboratories and facilities are much appreciated by all staff. Working conditions have improved considerably with features such as air conditioning and a formalin recycling plant. The recycler is the first of its type to be installed in South Africa and will increase efficiency while protecting the environment. The Division is involved in teaching and training, research and service work.

Teaching and Training

The Division teaches and trains through formal lecturing to professional bodies, universities and teaching hospitals. Staff members participate in the teaching and supervising of MPH (Masters degree in Public Health) students at the University of the Witwatersrand, and DOH (Diploma in Occupational Health) students from the Universities of Pretoria and the Witwatersrand. They also moderate examinations at the University of Johannesburg. The Division actively participates in a weekly clinical pathology meeting with doctors from the Johannesburg teaching hospitals.

The Division runs an outreach programme to assist with the process of compensation of ex-mine workers. Specialised small group training is given to health care professionals, organised labour, and mortuary and funeral parlour staff. The programme has been deployed in hospitals, mines, townships and funeral parlours in the Gauteng, Limpopo, Mpumalanga, Free State and North West Provinces. Visits were made to the Northern Cape Province and Maseru, Lesotho, in collaboration with the Asbestos Relief Trust. In addition, short courses are conducted at the NIOH for health care professionals, occupational hygienists and organised labour organisations. Individual teaching such as the training of pathology registrars and the supervision of higher academic degrees is undertaken within the Division. Prof J Murray is an Associate Professor in the School of Public Health, University of the Witwatersrand and Dr J Phillips is an honorary Senior Researcher in the School of Pathology.

Research

Research is a core function of the Division and projects relevant to the health of South African workers are carried out by members of the Pathology staff. Material and data from the service work of the Division provide a good deal of information for research projects. Current areas of interest focus on diseases of the lung, in particular with respect to dust, especially silica and asbestos. Tuberculosis is a particular problem in the mining industry and along with HIV/AIDS is a focus area for research. Other areas of interest include the history of disease in the mining industry and the adverse health effects of noise and vibration. During the course of the year Prof J Murray and Dr J Phillips were asked by editors of journals to be peer reviewers for nine research articles.

Research

The Division collaborates with local and international researchers and has fostered links with local and overseas institutions. These currently include: University of Pretoria; University of the Witwatersrand: Schools of Pathology, Public Health, Clinical Medicine and Geological Sciences; University of Stellenbosch; Council for Scientific and Industrial Research (CSIR); Safety in Mines Research Advisory Committee (SIMRAC), Health and Safety Laboratory (HSL-UK); Occupational and Environmental Lung Injury Centre, Sheffield University (UK); University of Wales (UK); Brooklyn College, City University of New York, (USA); National Institute for Occupational Health and Safety (NIOSH-USA); Dokkyo University School of Medicine (Japan); London School of Hygiene and Tropical Medicine (UK); Clinical Trials Unit, Medical Research Council (UK); University College London (UK); University of Edinburgh Medical School, Edinburgh (UK), and Institute fur Umweltmedizinische Forschung gGmbH, Dusseldorf (Germany).

The NIOH staff establishment and outputs are supplemented by personnel and visiting researchers funded by local and international organisations. Current research funders include: The Mine Health and Safety Council (MHSC -South Africa), the Colt Foundation (UK), International Environmental Research Foundation (USA), and NIOSH (USA).

The Division receives visitors from local and international institutions. In this reporting year overseas visitors included Dr K Honma (Dokkyo University, Japan), Prof F Green (University of Calgary, Canada) Prof F Pooley (University of Wales, UK) and Dr N Field (University College London, UK).

Completed and Ongoing Research Projects

Study of an HIV positive cohort of gold miners with known dates of seroconversion

A large cohort of South African gold miners was established in the early 1990s. The cohort comprises nearly 2000 HIV-1 positive men with known dates of seroconversion, and more than 6000 HIV negative men. Several papers have been published. The study has shown that there is an increase in accident rates in HIV positive individuals which may reflect direct effects of HIV infection as well as behaviour change once HIV is diagnosed. Mortality patterns were also analysed: the relative mortality rate in comparison with HIV-uninfected miners increased quickly, and survival patterns were similar to that seen in the West before antiretroviral therapy was available. Tuberculosis was the leading cause of death in HIV-positive and negative men who died from natural causes. Although the mortality rate from natural causes increased greatly with the duration of HIV infection, the pattern of disease hardly changed, suggesting that slow and fast progressors succumb to the same range of diseases. Under current analyses are the data for tuberculosis recurrence and trends, as well as for time taken off work.

Smoking prevalence in platinum mine workers

The prevalence of, and trends in, smoking in employees of a South African platinum mining company were analysed over a five year period, from 1998 to 2002. The study showed a significant decrease in smoking prevalence over a relatively short period, despite the fact that there was no smoking cessation programme in the company. Rates decreased from 42.9% to 29.8% in black men. The decrease was less in white men, from 47.2% to 44.7%. The decline can be largely attributed to the South African government's antismoking initiative and supports the drive to continue to increase excise taxes on cigarette products. Nevertheless, the relatively high prevalence of smoking in some groups of mine employees highlights the need for workplaces to support the government's initiatives to curb smoking by establishing smoking cessation and prevention programmes.

Cryptococcal pneumonia in African miners at autopsy

In the period 1996 to 2000, around 590 black miners were diagnosed, at autopsy, with histological evidence of cryptococcal pneumonia; the incidence was 7%. 16.5% had a concomitant respiratory infection, most commonly Pneumocystis jirovecii pneumonia and mycobacterial infection. In life, cryptococcal meningitis was diagnosed in 46.9% and cryptococcal pneumonia in only 2.7%. Although tuberculosis remains the most common HIV-associated respiratory disease in Africa, it is important to consider the diagnosis of cryptococcal pneumonia in acquired immune-deficiency syndrome (AIDS) patients, and to bear in mind the possibility of dual pathology.

Autopsy findings in Witwatersrand gold miners, 1907–1913

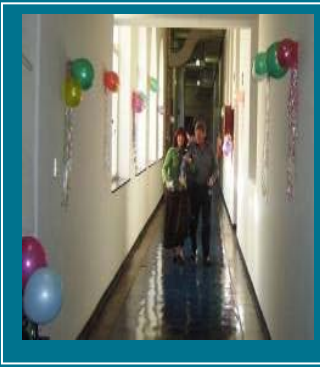
This study analyses the autopsy findings in black Witwatersrand gold miners who originated mainly from Portuguese East Africa. These men died at the Witwatersrand Native Labour Association compound in Johannesburg between 1907 and 1913, just over 20 years after the discovery of gold in South Africa. At that time there were shockingly high levels of death and disease on the mines. The main causes of death were pneumonia, meningitis, tuberculosis and dysentery. Pneumonia and meningitis were the principal causes of death in new recruits arriving from Portuguese East Africa, and tuberculosis the main cause of mortality in referrals from the mines.

Asbestos fibres in roofs and soil below asbestos cement roofs in Soweto
Construction in the township of Soweto began some 50 years ago. It is now home to over 2 million people and covers an area of 63 square kilometres. The original four room houses still dominate the landscape. The roofs of these houses were constructed with sheets of asbestos cement. A study carried out at the NIOH showed that there were little, if any, asbestos fibres in the ambient air in and around Soweto homes. The original roofs have suffered damage and weathering over the years and a pilot study suggested that fibres from the roof may have been leached into the soil below. This study is examining the asbestos content of the roofs and the soil from below the roofs of 61 houses in Soweto. The soils are being compared with 20 houses in Johannesburg that do not have asbestos cement roofs. The results suggest that asbestos fibres have been leached from the roofs into the soil below. Also, amphibole asbestos appears to be leached more readily than serpentine chrysotile.

Rock Drills used in South African Mines: A Comparative Study of Noise and Vibration Levels
This study compares the noise and vibration levels associated with three hand-held rock drills (pneumatic, hydraulic and electric) currently used in South African mines, and a prototype acoustically shielded self-propelled rock drill. Equivalent A-weighted sound pressure levels were recorded on a geometrical grid, using Rion NL-11 and NL-14 sound level meters. Vibration measurements were conducted on the pneumatic, hydraulic and electric drills in accordance with ISO5349-1 (2001) international standard on human exposure to hand-transmitted vibration, using a Br?el and Kjær UA0894 hand adaptor. PCB Piezo accelerometers were used to measure vibration in three orthogonal directions. No vibration measurements were conducted on the self-propelled drill. All four drills emitted noise exceeding 85 dB(A). The pneumatic drill reached levels of up to 114 dB(A), while the shielded self-propelled drill almost complied with the 85dB(A) eight hour exposure limit. Vibration levels of up to 31 m/s2 were recorded. These levels greatly exceed recommended and legislated levels. Significant engineering advances will need to be made in the manufacture of rock drills to impact on noise induced hearing loss and hand arm vibration syndrome. Isolating the operator from the drill, as for the self-propelled drill, addresses the problems of both vibration and noise exposure, and is a possible direction for future development.

PATHOLOGY






ABOVE: (L-R) NIOH Staff take leave of the old building and are "Piped" across to the new Pathology Premisis; NIOH Staff waiting outside the old Pathology premisis; A burst of colour decorates the passageway to the new Pathology premisis; Prof Ross receiving flowers from the LTS engineers in celebration of the opening.

Service Work

In terms of the Occupational Diseases in Mines & Works Act (Act 78 of 1973), the Pathology Division continues to carry out the statutory requirement of examining the cardio-respiratory organs of deceased miners. The post mortem service is utilised by 80% of families of men who die while in mining service. The pathologic examination forms part of the compensation process for miners and involves the Medical Bureau for Occupational Diseases (MBOD) and the Compensation Commissioner. Information from the service is made accessible by the Pathology Division database (PATHAUT). The PATHAUT database is a national resource and contains unique information about disease trends in the mining industry. It is an important tool for disease surveillance and has been utilised in international collaborative studies. Detailed disease surveillance reports compiled from the PATHAUT database giving demographic data and disease rates are produced annually and are available in the publications section on the NIOH web site (www.nioh.ac.za)

During the calendar year 2007, 1726 cases came to autopsy compared with 1720 in 2006, 1876 in 2005, 2056 cases in 2004, 2318 in 2003 and 2518 cases during 2002. The sustained decrease possibly reflects both the decline in the number of mine workers employed and the decreased mortality due to the availability of antiretroviral therapy within the industry.

In an attempt to increase the utilisation of the autopsy service by all communities, an outreach programme was initiated in 2006. The programme informs, educates and trains stakeholders in all aspects of the compensation process.

The Electron Microscopy Section functions within the Division. The section is headed by Dr J Phillips, a NRF rated scientist. Tissues, dusts, fumes and fibres are analysed to determine possible adverse health effects. The section has maintained a satisfactory rating in the Asbestos in Materials (AIMS) international quality assurance scheme coordinated by the HSL, UK. The Electron Microscopy Section supplements the service work of the Division by determining the asbestos fibre concentrations in lung tissue to assist with the compensation process, and aids with diagnoses using electron microscopy techniques. The section also participates in teaching and research programmes. In addition, it carries out qualitative and quantitative analyses for other divisions of the NIOH and external clients including national, provincial and local government, NGOs and the private sector. Expert opinion in the form of an affidavit was given on behalf of the Minister for Housing in a high profile court case.

OCCUPATIONAL MEDICINE & EPIDEMIOLOGY

Head
Prof. D Rees

The Division comprises three sections: *Epidemiology and Surveillance*; *Immunology and Microbiology*; and *Occupational Medicine*. Prof D Rees is jointly appointed at the University of the Witwatersrand as Professor of Occupational Health in the School of Public Health.

The development of occupational health services for healthcare and laboratory workers, including the establishment of surveillance programmes, was a major aspect of the work of the Division in 2007. The ongoing teaching and training functions, particularly aimed at occupational health professionals (practitioners and hygienists), through postgraduate courses and registrarships; and interventions and surveys conducted at various Southern African workplaces, as part of the Work and Health In Southern Africa (WAHSA) Programme were prominent. The research programme was diverse: silica, endotoxins, latex, mycobacteria and occupational allergy remained a strong focus, but reproductive health was much more prominent than in the past.

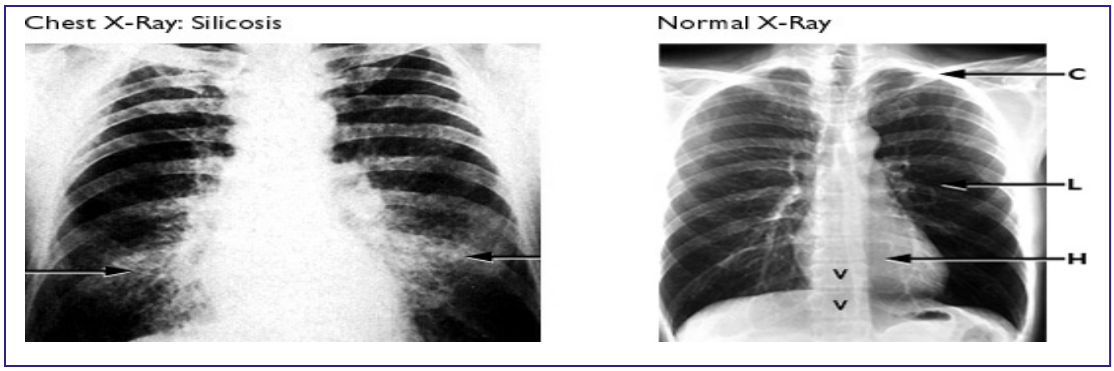
The provision of specialist occupational medicine referral services remained a strong focus during the year, particularly with regard to occupational respiratory disorders, occupational allergies, metal exposure, contact dermatitis and musculoskeletal problems. Besides the value that the referral services bring to individual patients, each case of occupational disease may be a sentinel event, requiring intervention to protect co-workers, and the occupational exposure histories constitute a valuable database of hazardous industries and enterprises.

The *Legionella* publication, described below in the Immunology and Microbiology Section, was a significant contribution.

The Mine Health and Safety Council (MHSC)-funded project "NIOH Silicosis Materials Development" - managed by Profs D Rees (Occupational Medicine and Epidemiology Division) and J Murray (Pathology Division), and Ms F Ingham (Wits Health Consortium) - produced the following materials:

(1) *Ntate Thabang and Sello's Story* – a training DVD in Sotho, with English subtitles, aimed at the mining workforce, for improving mineworkers' respiratory health
(2) The manual - *Preventing Silicosis – a guide for Health and Safety representatives*
(3) The deskpad - *A Silicosis Information Resource* – aimed at managers and occupational health practitioners

These are pilot awareness-raising materials which are currently in the process of being tested. They will be used in support of silicosis elimination in the mining industry in South Africa.



ABOVE: An abnormal chest x-ray shows multiple nodules (arrows) on the lungs caused by silicosis. A normal chest x-ray is shown on the right for comparison; the heart (H), lungs (L), vertebrae (v), and collarbone (C) can be seen.

Occupational Medicine

Head
Dr. S Kgalamono

The Occupational Medicine Section consists of two parts: Occupational Medicine, with a Referral Clinic; and the Ergonomics Unit. In fulfilling the major functions of the NIOH, the section has participated in teaching and training, advisory services, information dissemination, research and service provision. There is a reciprocal relationship with other sections of the NIOH, providing support for their routine services and research, and utilizing their expertise in specialized areas when required.

Teaching and Training

Staff were involved in the coordination of courses and lecturing, at both under- and postgraduate level, at the Universities of the Witwatersrand, Pretoria, Johannesburg and Free State. Informal training has been offered to public health registrars, nurses, workers and doctors. The Section has established a rotation for occupational medicine registrars and has two registrars on the rotation.

The University of the Witwatersrand Diploma in Occupational Health (DOH) course, co-coordinated by Dr S Kgalamono, saw all the 23 doctors successfully completing the diploma at the end of 2007, with three students obtaining distinctions. In addition, Prof A Solomon, Prof D Rees, Dr S Kgalamono and Dr S Gazi continue to lecture at various universities on occupational health related topics, by invitation.

Dr S Kgalamono and Dr S Gazi contributed to various workshops and seminars by lecturing or being members of organising committees; these training activities included a spirometry workshop in Mpumalanga, a compensation workshop at the NHLS, a MHSC workshop on women in mining, and an expert group meeting on tuberculosis and silicosis, held in Mozambique as part of the WAHSA Programme.

Advisory Services

In support of the Provincial Departments of Health, the section provided advice to Provincial Occupational Health Units regarding medical surveillance for health care workers, and the drafting of policies for prevention of needle stick injuries and hepatitis B. Advice and information were given to a wide range of occupational health services and practitioners in industry.

ABOVE: Diploma in Occupational Health [DOH] students and course facilitators 2007

Research

Musculoskeletal disorders and associated factors in nurses, bank and postal workers in South Africa

This PhD is part of a multinational project, with 14 participating countries. The main aim of the study is to determine if musculoskeletal disorders and resultant disability are influenced by cultural beliefs and expectations, as well as physical activities and mental health. Ethical approval for the study has been obtained and permission to do the study has been granted by a Gauteng hospital and one of the South African financial institutions. The questionnaire has been translated into three languages (Zulu, Sotho and Afrikaans) and piloted. Interviews with nurses and bank workers are currently being done. The information collected is expected to increase the current body of knowledge about these disorders and will be a catalyst to generate appropriate preventive strategies for musculoskeletal disorders.

Chainsaw vibration levels and Hand-Arm Vibration Syndrome (HAVS) in South African forestry operations

The main objectives of the study are to quantify the chainsaw vibration levels and to screen for HAVS among chainsaw operators. Chainsaw vibration is known in most industrialised countries as one of the occupational hazards associated with HAVS. In South Africa, vibration measurements and the occurrence of HAVS have been ascertained in the mining industry but not much is known in forestry operations. The study will help to bridge the gap of knowledge in forestry. Moreover, upon the completion of the study, recommendations will be formulated to help alleviate the problem, create awareness in forestry workers and occupational health practitioners to enable early detection and management of HAVS.

Occupational asthma cases assessed at the NIOH Occupational Medicine Referral Clinic

Occupational asthma is one of the most commonly reported occupational diseases in the world. In South Africa there is a paucity of statistics on occupational asthma cases and there is significant under-reporting, and as such, there is little information about the industries, occupations and agents causing occupational asthma in the region; hence the targeting of prevention strategies is difficult. The objectives of the study are to characterise occupational asthma cases assessed at the NIOH Occupational Medicine Clinic from 1st January 1997 to 31st December 2007 in terms of types of industries, occupations, duration of exposure prior to onset of occupational asthma, nature of exposure and agents implicated in causation of occupational asthma diagnosed at the Clinic. The study is expected to give information on occupational asthma that is necessary for targeted prevention and that may decrease the incidence of the disease.

ABOVE: Dr Spo Kgalamono attending to a patient in the referral clinic at the NIOH.

ABOVE: L-R: Dr. S. Gazi attends to a patient at the Clinic; the Occupational Health Clinic waiting rooms at the NIOH

Service Provision

Occupational Medicine Referral Clinic

About 300 cases were assessed at the Clinic during 2007, for occupational diseases. Among these, 183 were new cases and 50 were review cases. A detailed breakdown of some cases is given in the table below:

Occupational Diagnoses	Confirmed Cases	Cases Sent for Compensation
Asthma	20	15
COPD	10	3
Asbestos related diseases	11	3
Silicosis	3	2
Pulmonary Tuberculosis	6	6
Lung cancer	1	1
Rhinitis	6	0
Motor neuron disease	2	0
Latex allergy	1	1
Mesothelioma	1	1
Musculoskeletal disorders including HAVS	9	2
Mental disorders	1	1
Manganese poisoning	4	0
Metal poisoning	3	0
Non Compensable diseases	127	

Surveys

The Clinic benefited from reporting of chest radiographs by an experienced radiologist. In support of the National Elimination of Silicosis campaign, mobile chest x-ray surveys focused on industrial mineral milling companies to assess the prevalence of silicosis in workers with more than ten years exposure to silica dust. The prevalence was lower than expected owing to high turnover of workers; only a few workers had more than ten years exposure.

Occupational Health Service

In terms of medical surveillance needs for NIOH employees, the occupational health nurse continues to offer hepatitis B immunisations and special investigations including chest x-rays and lung function tests that are targeted at employees deemed to be at high risk. To assist the broader NHLS in medical surveillance programmes, the section has started designing medical surveillance for employees exposed to specific agents commonly used at NHLS laboratories.

Ergonomics Unit

In the year under review, the Ergonomics Unit continued with its mission to create better places for work through research, ergonomic risk assessments, and teaching and training of occupational health practitioners. The Unit has provided teaching to the Universities of the Witwatersrand, Pretoria, Free State, KwaZulu-Natal and Johannesburg.

At the request of the Department of Labour, the Ergonomics Unit contributed to the new "Construction Regulations". This involvement provided an opportunity for the Unit staff to consult widely and network with specialists in the field.

A number of companies, including the NHLS head office, requested ergonomics risk assessments of their operations. Recommendations were submitted to concerned parties and where necessary, specific employees were referred to the Occupational Medicine Referral Clinic.

The Unit published a paper titled "Evaluation of preventive and control measures for lead exposure in a South African lead-acid battery recycling smelter". This research emanated from the work done in the Unit in collaboration with the smelter.

ABOVE: Busisiwe Nyantumbu stands next to one of the Hand Arm Vibration Syndrome [HAVS] machines that is part of the NIOH Ergonomics Laboratory.

Epidemiology and Surveillance

Head
Dr. D Kielkowski

The functions of the Epidemiology and Surveillance Section are research and surveillance; teaching and training; and support for occupational health research generally in South Africa and in other NIOH sections.

Research and Surveillance

The Section is involved in various surveillance and research projects, and participated in collaborative projects investigating the progress of the registration process of occupational hygienists in South Africa and an audit of occupational health services in public hospitals.

Research

Reproductive Health Community Survey

The reproductive health of women, particularly pregnancy outcomes, has not been studied at a population level in South Africa. As part of its reproductive health research programme, the Epidemiology and Surveillance Section is developing a tool and methods for studying the effects of occupational exposures on reproductive health outcomes. The Section carried out a large population survey on women of reproductive age, in Potchefstroom, to estimate the prevalence of adverse reproductive outcomes (including pregnancy loss and novel outcomes like *time to pregnancy,* which is a measure of fertility). This study explored the effect of workplace exposures on reproductive health and will establish the baseline prevalence of adverse pregnancy outcomes and provide tools that can be used across diverse settings in developing countries. A total of 1200 women from Potchefstroom were asked questions about their reproductive history such as time to pregnancy, fertility, contraceptive use and detailed information on their last pregnancy in relation to other important variables such as occupational exposures, mother's health, and lifestyle and environmental factors. Analysis of results is on going. Prior to this large study, a pilot project was carried out in 2006 which showed a significant increase in *time to pregnancy* in women who reported working while trying to fall pregnant.

Mortality analysis of data from cohort studies

Two studies – the Prieska Asbestos Cohort and the Paper Pulp Cohort – are in the process of being updated for new cases of mortality. A trend analysis of mesothelioma and lung cancer is underway.

Surveillance

The national surveillance programme RODISA (Reporting of Occupational Diseases in South Africa) was discontinued due to poor response. Piloting of the NHLS injury and incident surveillance continued with the development of a dedicated IT system called SLIDE (Surveillance of Laboratory Injury and Disease Evaluation). This system contains a module for reporting of incidents, injuries and occupational disease, and the Bophelo (Wellness) Module to monitor staff immunisation programmes, and other important health indicators such as needle stick injuries and chronic illness. The system was piloted in paper format, between July 2007 and February 2008 and the response was very positive. Testing of the web-based SLIDE modules was done in March 2008 and the modules are ready to be used. The training and live reporting on SLIDE will start in the new financial year.

EPIDEMIOLOGY & SURVEILLANCE

LEFT: Staff of the Epidemiology and Surveillance Section with fieldworkers in Potchefstroom, Nov/Dec 2007 – Reproductive Health Study

The project on occupational health indicators is ongoing, and it is envisaged that the report containing the statistics for occupational health practitioners will be finalised and published in 2009.

The Epidemiology Section coordinated the scientific component of the Webster Memorial Seminar of 2007, "Surveillance in Occupational Health – Information for Action". This seminar discussed various methods of occupational health surveillance in South Africa and encouraged sentinel surveillance from the key industrial sectors. Several occupational health practitioners volunteered to provide data on occupational injuries and disease, for analysis and reporting to the occupational health community.

Teaching and Training

During the year under review, the Section staff members provided training in occupational epidemiology and research methods to external clients, and lectured on the postgraduate Diploma in Occupational Health.

The advanced modules of training in Epidemiology and Biostatistics were presented at the NIOH by Prof BV Girdler-Brown in 2007, with support from the Epidemiology and Surveillance Section staff. The Section organised and presented two Epi-Info training courses, as part of the NHLS CEU Programme, in February and March 2008; these courses included elements of data analysis for NIOH and NHLS staff as well as external participants.

Both courses were oversubscribed which is an indication of the demand for this type of training.

Section staff members also participated in teaching at the School of Public Health, University of the Witwatersrand. Basic modules were taught to MSc students; modules included Epidemiology, Public Health and Population-based Field Epidemiology, and

tutoring of Epi-Info and STATA software programmes. Lectures were also given in the field of Occupational Epidemiology to students of the Diploma in Occupational Health (DOH) course. Two staff members are registered for PhD degrees: Mr B Bello - Time to pregnancy in a South African population; and Ms K Wilson - Validation of biomarkers for silica exposure in gold miners.

Support

The Section collaborated with government departments such as the Department of Minerals and Energy (DME) – Policy and Inspectorate Units - and the Gauteng Department of Health in support of research projects, such as the audit of the occupational health and safety in hospitals project and audits of inspectorate reports. Entities such as the DME and the National Nuclear Regulator (NNR) have approached the Section for advice on epidemiological studies of health in communities exposed to environmental contaminants. The continued collaboration with Statistics SA resulted in a renewed commitment to the coding of occupations for registered deaths from 2006. This coding had been discontinued in 1997. A new member of staff was appointed in the Section in February 2008, which will strengthen the research, support and training functions of the section.

IMMUNOLOGY & MICROBIOLOGY

Head
Ms. Tanusha Singh

The Immunology and Microbiology section contributes to occupational health by providing specialised laboratory services, research, advisory services and training on occupational allergy and infectious disease. The Section provides a service primarily aimed at evaluating the association between hypersensitivity or disease and workplace exposure; this is achieved by immunological or microbiological laboratory tests and / or visits to the workplace to evaluate possible allergen, irritant or pathogen exposure. The advisory services component encompasses advice to practitioners, employers and employees on matters of occupational health and safety in the field of immunology and microbiology. The training done by the Section primarily targets occupational health professionals and includes in-service programmes for students completing the Diploma in Biotechnology with the aim of preparing them for employment in the laboratory setting. *Ad hoc* lecturing is also done.

The Section is divided into the following units: Bioaerosol Monitoring Unit; Occupational Allergy Unit; and Occupational Microbiology Unit. Many of the services are provided in collaboration with other sections of the NIOH (particularly Occupational Medicine and Occupational Hygiene).

The Section has made great strides in terms of its overall objectives, particularly around research and quality. Staff members were kept abreast of current trends by attending relevant skills development programmes and thus ensuring the best possible service to the Section's clients. One of the highlights for the Section was the publication of the book "A practical guide for the prevention and treatment of Legionellosis" prepared and compiled by Dr C Bartie. The Section made a major contribution to achieving accreditation by SANAS of selected NIOH laboratory tests.

Laboratory Services

Tests and samples processed during 2007:

- 49 patients were assessed for occupational skin disease and cases requiring compensation were submitted to the Compensation Commissioner
- 15 patch tests were done for various allergens to diagnose possible occupational allergies
- 412 latex samples were analysed for specific Hevein proteins, as part of the latex project
- 98 water samples for Legionella testing were received and referred to NHLS Infection Control for analysis
- A Legionella survey was conducted at a Gauteng public sector hospital; environmental and clinical samples were analysed
- 443 samples were analysed for rye and wheat allergy. Ten of these samples were sent to the Immunology laboratory in Pretoria for inter-laboratory proficiency testing. The results from both laboratories showed excellent agreement (99.48%) using the weighted Kappa score
- An allergen database was compiled by Ms E Ratshikhopha to assist doctors with the types of tests available for allergic sensitisation
- In addition, skin prick test solutions were prepared using workplace allergens and routine skin prick tests were done in support of the Occupational Medicine Clinic

Research

The research agenda for the Section included three main projects; sample and data analyses for these projects were done during the course of the year:

- Work-related asthma associated with endotoxin exposure in dental workers

This project aims to explore the associations between work related asthma and endotoxin exposure in dental workers in academic institutions in South Africa. Dental surgeries may be contaminated with endotoxins, which can elicit a non-allergic neutrophilic inflammatory response. Studies have shown that approximately 50% of asthma cases are attributable to neutrophilic inflammation. Asthma is an heterogeneous disease and assessing the type of inflammation will impact on the clinical management of the condition.

- Detection of latex aeroallergens in dental schools

Allergy due to natural rubber latex (NRL) has become an important occupational health concern recently, particularly among health care workers, with powdered glove use being the major source of workplace exposure. Exposure to airborne NRL has emerged as the major cause of respiratory allergy among exposed workers over the last decade, and is being reported as the fourth most common cause of occupational asthma. The aim of this study is to develop a method for sampling and detection of latex aeroallergens.

- Detection of airborne *Mycobacterium tuberculosis (MTB)*

Tuberculosis (TB) has been declared a "global emergency" by the World Health Organisation. The risk of infection is worsened by overcrowding and lack of ventilation. The disease is further complicated by HIV. Monitoring MTB levels may be beneficial in assessing the efficacy of control measures as well as determining TB hot spots, which may be useful in reducing exposure in the work environment.

Three members of the Section are members of the NIOH Research Committee - Dr C Bartie (Chair), Ms T Singh and Ms O Mabe. Ms Z Kirsten received a TB award to attend the 38th World Conference in Cape Town in November 2007. The Section staff members are actively involved in reviewing protocols for other organisations like the Allergy Society for South Africa and the National Research Foundation (NRF).

Project collaboration includes national and international experts from various institutions: University of Cape Town, University of Michigan, Health and Safety Laboratories (HSL-UK), University of Tennessee (USA) and RMIT University (Australia).

Research findings were presented at the NIOH Research Forum and the University of the Witwatersrand School of Public Health Research Forum during the course of the year under review. The Section published a paper on epoxy resin allergy in the workplace.

Advisory Function

Among the allergy queries handled during the year were exposures to chromium, latex, printing agents, diesel, isocyanates, rubber, paper dust, endotoxin, cellulose fibre, garlic and papain. Queries handled regarding infectious agents included *Legionella* and *Mycobacterium tuberculosis*. The industries involved were also varied - laboratory workers, archives, spray painters, dental workers and workers from printing facilities.

Teaching and Training

The scope of teaching activities included lecturing or facilitation on the Masters in Public Health (MPH) and Diploma in Occupational Health (DOH) courses and GEMP Programme. The staff members involved in these activities were Ms T Singh, Ms A Fourie and Dr C Bartie. Short presentations on the Section's services were also given by various staff members to a number visitors and target audiences at various meetings and conferences.

Two new information brochures are currently being developed in the Section – "Moulds in the Workplace" and "Hazardous Biological Agents in the Workplace"

Training received by the Section Staff

Skills development of staff remained a high priority for the Section. Staff members attended various courses during the year including Epidemiology and Biostatistics modules; Microsoft software programmes; weekly accreditation lectures and monthly Research Forum presentations; and NHLS presentations on Time Management, the Yarona Skills Audit and Scam-Stop Anti-Fraud. In-house laboratory training is routinely carried out for new staff, and a sectional weekly Journal Club was initiated in January 2008.

ABOVE: Airborne *Mycobacteria tuberculosis* sampling in a dead box

Quality Assurance and Health and Safety

QA Manger: Ms T Singh
Health and Safety Committee Chair: Ms K Fitchet

Accreditation

The major highlight for the year was obtaining SANAS ISO 15189 accreditation for certain laboratory tests for two NIOH Sections: Immunology and Microbiology and Analytical Services.

NIOH Quality meetings were held throughout the year, and this included the Management Review meeting. Regular internal audits were conducted to maintain momentum following the SANAS audit. Health Care Risk Waste was high on the agenda as shown by the submission of four posters from NIOH for the NHLS Waste Awareness Day 2008.

Weekly accreditation training lectures continued for all NIOH staff involved in laboratory work, and the format was revised to include more practical sessions with hands-on training and experts on various topics were sourced from other NHLS labs. Accreditation lecture topics included: Quality Manual Quiz; Waste Management; Equipment Maintenance; Who did you infect today?; Hand Washing; Feedback from IQC; HBAs and HCS; What dangers are lurking in your workplace?; Incidents on duty; Health and safety in the workplace and emergency and evacuation procedures; Accreditation - does it make good business sense?; How to deal with spills; Uncertainty of measurement; Fire drill feedback; Balance and pipette verification; Ergonomics; and Verification of thermometers and biohazard units.

Ms K Fitchet ran the NHLS CEU Accreditation Course and gave a presentation on the new Occupational Health System at the NHLS CEU Safety Course.

Health and Safety

From a health and safety perspective, efforts were put in place by Ms K Fitchet and Ms Z Kirsten to streamline the Injury on Duty (IOD) reporting process.

Safety inspections of laboratories were conducted by a NIOH task team. A fire drill was conducted to familiarise staff members with correct procedures in the event of an emergency.

Regular meetings were held by the NIOH Health and Safety Committee to ensure that health and safety issues were prioritised and NHLS safety meetings, including the Emergency Preparedness Committee Meeting for the Braamfontein complex and the Disaster Management Planning Meeting, were attended by NIOH representatives.

Training courses and conferences attended by staff members of the QA Department included: the SafeConex Exhibition; the Dangerous Goods Management Course; and Q-Pulse Version 5.

OCCUPATIONAL HYGIENE & ANALYTICAL SERVICES

Head
Mr R Ferrie

The Division comprises three Sections: Occupational Hygiene, Analytical Services, and Toxicology and Biochemistry.

During 2007 the Division was involved in a number of research projects. Many of these relate to the exposure and health effects of silica in support of the National Programme for the Elimination of Silicosis that is being driven by the Department of Labour and the Department of Minerals and Energy in mining.

Teaching activities continued to grow with academic support for undergraduate and postgraduate students. A large number of occupational hygiene training courses were run for personnel from the Departments of Health and Labour.

Over the past few years a great deal of effort has been put into the development of staff and the expansion of the capabilities of the Division. As a result, a gratifying increase in the demand for service work was evident in 2007. This came from a wide variety of clients including in-house work for the NHLS, advice to small enterprises, and support for a number of provincial and national government departments.

Occupational Hygiene Section

Head
Mr R. Ferrie

The Year Just Gone

This has been a turbulent but exciting year when much-needed infrastructure maintenance was carried out. Laboratory facilities were renovated and several offices were relocated and consolidated around the key dust generator, XRD and FTIR facilities.

The Section has maintained its registration with the Department of Labour as an Approved Inspection Authority, has four members of staff and one contract employee registered as Occupational Hygienists, and two staff members registered as Occupational Hygiene Technologists. There are two unregistered support staff and two other employees contracted through a five year research project.

The functions of the Section included advice to regulatory authorities, employers, unions and individual employees; occupational hygiene formal and informal teaching and training; and applied research.

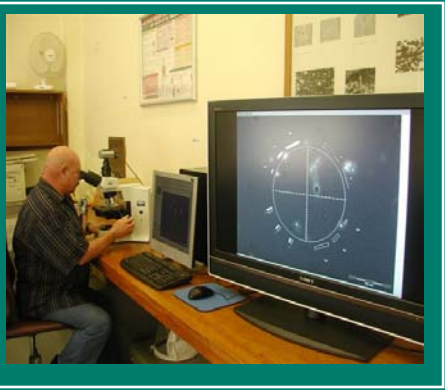
The Section continues to provide professional cost-effective occupational hygiene services to national and provincial government departments to prevent or reduce work-related illnesses or adverse health conditions. In addition, the Section has continued to provide support for occupational health and safety inside the NIOH and the NHLS.

Occupational Hygiene Services

Occupational hygiene risk assessments, audits, surveys and advisory services were provided for many clients including - the Lesotho Department of Labour; the SANDF; the Asbestos Trust in Kuruman; the NHLS; the NICD; the national and provincial departments of Health, Labour, Minerals and Energy, Public Works, and Arts and Culture; municipal facilities such as Johannesburg and Amatola Water Boards and Ekuhuruleni Metro; Kroonstad and Johannesburg hospital laundries; the Salt River Mortuary, as well as individual hospitals, pathology and histology departments around the country.

Occupational health and safety services were provided to a large assortment of private clients when circumstances allowed.

The Occupational Hygiene Section has produced twelve reports on surveys for clients in a wide range of industries.



ABOVE: L-R: Training course held at the NIOH for Occupational Health & Safety Coordinators, Gauteng Provincial Department of Health; Department of Labour inspector training & Adriaan Greyling, Occupational Hygiene staff member , performing asbestos fibre counting in the Hygiene laboratory.

Of particular interest here was the comprehensive occupational health and safety audit which the Gauteng Province contracted the Section to carry out on the high profile Gautrain construction project.

The Section invested in state-of-the-art asbestos fibre counting equipment this year and employed experienced staff to manage it. This has resulted in a dramatic upturn in the demand for advice and fibre counting for asbestos.

Teaching and Training

Teaching and training activities included course management, student supervision and teaching, and practical support for the Masters in Public Health (Occupational Hygiene) degree from the University of the Witwatersrand.

The Section also continued its teaching and practical support for the Diploma in Occupational Health offered by the University of the Witwatersrand, the Tshwane University of Technology and the Nelson Mandela School of Medicine KwaZulu-Natal.

The annual short practical training courses for Environmental Health and BTech students from the University of Johannesburg were continued. This year saw 44 students complete this training. Practical occupational hygiene training was also provided to 50 provincial factory inspectors from the Department of Labour. A further 15 inspectors were given advanced training in asbestos control and management. Six occupational health co-ordinators from the Gauteng Department of Health received practical training. The Section also provided informal practical training to a number of individuals on an *ad hoc* basis.

Research

A number of important research projects are in progress including a Mine Health and Safety Council (MHSC)-sponsored five year research project on the measurement and analysis of respirable crystalline silica. This is part of the mining industry's commitment to eliminate silicosis.

Other research projects completed include a preliminary assessment of fit testing of respirators, exposure to formaldehyde in a pathology laboratory, and an investigation into the registration of occupational hygienists in southern Africa.

Members of the Occupational Hygiene Section also participated in a number of other research projects including an investigation of biomarkers for silica exposure, silica exposure in farmworkers, Project 7 of the WHASA Programme: Silica, Silicosis and TB, and some preliminary work into a proposed study into dust in a platinum mine.

The XRD/FTIR laboratory facility for the direct-on-filter analysis of respirable crystalline silica dust that was developed over the last two years is now supporting a number of important silica-related research projects through MHSC, the University of the Witwatersrand and the Vaal University of Technology.

The laboratory is also analysing samples received from private sector clients on a fee-paying basis.

A number of publications were produced this year in the journal, *Occupational Health Southern Africa*. These included papers on "Asbestos in and around Soweto dwellings with asbestos cement roofs", "Where have all the hygienists gone?", and "Facts about IOHA".

Staff Development

Staff development continued apace. During the year various members of staff attended training in statistics; research techniques; public speaking; communication and presentation skills; incident investigation; risk management; and occupational hygiene.

One contract employee passed the Certificate in Occupational Hygiene from the Tshwane University of Technology. One member of staff registered for the MPH and a contract employee registered for the DPH in occupational hygiene at the University of the Witwatersrand.

The Road Ahead

The Section has made a considerable investment in facilities, equipment and skills over the last few years and is now in a strong position to provide valuable input to the occupational health needs of the SADC Region.

The Section will promote and manage a local quality assurance reference centre for all laboratories that wish to carry out analyses of occupational hygiene respirable crystalline silica filter samples. This is of national importance to the Departments of Labour and Minerals and Energy plans to eliminate silicosis.

The Section will also develop a national reference centre for asbestos fibre counting and will begin training courses in asbestos assessment and control. Due to the history of asbestos mining and use in this region, asbestos will remain an occupational health priority in South Africa for many years to come.

Apparatus for evaluating and testing the face-fit of respirators has been obtained and a preliminary research project to evaluate the fit of some of the common respirators available in South Africa has been started. Since personal protective equipment is often the primary exposure control method employed in many industries in South Africa, this long-neglected technique is seen as a national priority.

The Section will be continuing its efforts to provide occupational hygiene support in the form of training, advice, risk assessments and exposure monitoring to the national and provincial departments of Health, Labour and Minerals and Energy.

The Occupational Hygiene Section is committed to providing similar services to all regions of the NHLS via their National Health and Safety Manager. Specifically, during the coming year, the plan is to assist him to develop a simple, easy to use, Occupational Health and Safety Audit tool that can be used to benchmark OH&S performance across the NHLS operations.

ABOVE: Occupational Hygienists Gabriel Mizan and Rob Ferrie were part of the Gautrain Audit team.

Analytical Services Section

Head
Mrs I. Naik

The core function of the Analytical Services Section is to render specialised analytical services in environmental and biological monitoring to support the practice of occupational and environmental health. The Section is divided into three units - Metals, Organic and Quality Assurance - and is staffed by scientific and technical staff.

The Section supports research projects of national importance and provides advice to industries and the public sector. The Section is involved in training students at both under- and postgraduate level; in particular, programmes are available for students requiring experiential and in-service training to fulfil the requirements for completion of Diplomas in Biotechnology and Analytical Chemistry. Other training in the Section is offered mainly to occupational health professionals in the form of workshops and seminars. During the course of 2007, the Section continued the quality assurance scheme for blood lead and cadmium for laboratories countrywide.

SANAS Accreditation

The major highlight for the year was obtaining SANAS ISO 15189 accreditation for certain tests in the Metals unit. Staff members continue working towards obtaining accreditation for the Organic unit in 2008, as well as the assessment of certain laboratory tests according to ISO 17025 criteria.

Specialised Analytical Services

- **Routine**

Samples analysed, both for routine diagnostic purposes and for research projects, included blood, urine, tissues, paint, traditional medicines, wipes, filters, water, and soil samples.

Assays were requested for toxic metals - aluminium, arsenic, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium and thallium - in biological and environmental samples.

Organic assays were carried out for acetone, alcohol, ketones, butoxy acetic acid, isocyanates, methylene chloride, o'cresol, PBA, trichloroacetic acid, mandelic acid, toluene, phenol, MEK, methyl hippuric acid, hexane, hydroxyl pyrene and organophosphate metabolites in biological samples.

In total, 2895 analyses were performed during the year under review; 19 tests in the Section.

- **New Developments**

A number of new methods were developed and introduced, to meet the continuous challenge to increase analytical capacity. These included methods to estimate organophosphate metabolites such as dimethyl phosphate, dimethyl thiophosphate, dimethyl dithiophosphate, diethyl phosphate, diethyl thiophosphate and diethyl dithiophosphate in urine samples. In the Metals unit new methods were developed on the ICP-MS for arsenic, selenium, beryllium, aluminium, chromium, manganese and iron in urine samples.

Research

The Analytical Services Section is collaborating on the following research projects:

DDT and current use pesticide in mothers and children in malaria control areas in South Africa
This is a project with the Environmental Health Research Unit, Medical Research Council (MRC), South Africa, and the University of Tromsø and Air Research Institute, Tromsø, Norway. A collaborative agreement between the three institutes was finalised in 2007.

Female reproductive health by occupation, social class, urbanisation, maternal risk factors and pesticide exposure – A pilot study
This project is being conducted in conjunction with the NIOH Section of Epidemiology and Surveillance.

Teaching and Training

During the course of 2007, staff members of the Section were involved in teaching and training activities for various stakeholders as part of academic and in-service programmes, and attended a number of conferences, workshops and skills courses as part of their continued professional Development.

Nine students from the University of Johannesburg and the Vaal Technikon were trained in the Section in fulfilment of experiential training of 6 and 12 months duration, for the diploma courses in Analytical Chemistry and Biotechnology. Five students completed their training in 2007, and the remaining four will complete their in-service training during the course of 2008.

ABOVE: L-R: (Back Row) Debbie Kanni, Shirley Makamu, Thando Serame, Phency Nchabeleng, Phindile Mbongo (Front Row) Kalavati Channa, Halina Tassell, Ina Naik, Penny Theodorou.

The Section hosted academic visitors from Norway (Profs Yngvar Thomassen and Dag Ellingsen and the USA (Ms Leslie Nickels and Dr Steven Lacey). The visitors from the USA attended various meetings facilitated by Mrs Naik in preparation for the presentation of WHO training modules in South Africa, planned for later in 2008.

Ms I Naik was invited to attend the First International Workshop in Occupational Health, Hygiene and Safety, held at the Indian Institute of Chemical Technology in Hyderabad, India, in February 2008. Ms Naik gave a lecture on chemical exposures and biological monitoring, and was also a facilitator and evaluator of the workshop. This training was a joint initiative with the three WHO Collaborating Centres – Great Lakes Centres of Occupational and Environmental Health, University of Illinois-Chicago, USA; Sri Ramachandra University, Chennai-India and NIOH-South Africa. The initiative was also supported by NIOSH and AIHA (USA).

Mrs Naik was appointed as an external examiner for the Diploma in Occupational Health (DOH) and Masters in Public Health (MPH) courses, in the Department of Occupational and Environmental Health, University of KwaZulu-Natal, for the qualifying examinations of 2007.

- **Staff Skills Development**

Ms J Bhana attended a workshop on "Drug and Alcohol Policy in Workplace" at the Health and Safety Laboratories (HSL) in Buxton, UK and spent two weeks at the HSL, receiving hands-on training on the measurement of organic contaminants in environmental samples.

Mrs P Theodorou, who is the Quality Assurance manager for the Section, completed a two-part training course on the estimation of uncertainty of measurement in chemical analysis, presented by the local National Laboratory Association (NLA).

Mrs I Naik attended the 7th International Symposium on Biological Monitoring in Occupational and Environmental Health, in Beijing, China, in September 2007 and presented a poster.

Toxicology and Biochemistry Section

Head
Prof M Gulumian

The functions of the Section are research, diagnostic services, and teaching and training.

Research

Research on particles has featured prominently in the research programme of the Section. Projects included those on biomarkers of silicosis and surface activity of crystalline silica dust collected from the South African gold mines. In addition, two new projects were initiated to investigate inflammation and apoptosis induced by crystalline silica as well as protection offered by South African herbal extracts with antioxidant activity against silica induced genotoxicity. Finally, a project investigating the role of silica in the increased susceptibility to infection to *Mycobacterium tuberculosis* was also initiated. The project investigating the biomarkers of genotoxicity in scleroderma has also continued.

Completed research projects - two projects were completed by students under Prof M Gulumian's supervision during the year under review:

The anti-inflammatory properties of *Salacia leptoclada*, *Pachycarpus rigidus* and *Warburgia salutaris*: Their possible use as therapeutic agents in crystalline silica-induced inflammation.
This study was partially funded by the NRF and was conducted by Ms M Leshwedi. The aim of this project was to investigate the anti-inflammatory and therapeutic properties of *Salacia leptoclada* and *Warburgia salutaris* in silica-induced injury.

Salacia leptoclada and *Warburgia salutaris* have been used in the treatment of several diseases including inflammatory diseases but the mechanism of action of these plant extracts is still unclear. In order to establish their therapeutic use in silica-induced injury, the extracts of *S. leptoclada* and *W. salutaris* were used for experiments on: (i) production of proinflammatory cytokines TNF-α, IL-1β, INF-γ; (ii) the activation of the transcription factor NF-κB; and (iii) the induction of DNA damage and lipid peroxidation in the presence of crystalline silica particles.

The study showed that treatment of cells with the extracts of *W. salutaris* can prevent the acute inflammatory process, NF-κB activation, DNA damage and membrane peroxidation associated with silica exposure. Similarly, the extracts of *S. leptoclada* showed protection of cells against silica-induced membrane peroxidation.

However, *S. leptocl*ada proved ineffective in preventing silica-induced DNA damage, proinflammatory cytokine expression and NF-κB activation.

Crystalline Silica-Induced Inflammation
This study was partially funded by the NRF and was done by Ms N Mbatha. This project was undertaken to evaluate the effects of crystalline silica exposure on apoptosis and / or necrosis, cytokine expression, glutathione (GSH) and nitric oxide (NO) production in U937 macrophages and neutrophils as well as clearance of apoptotic neutrophils by crystalline silica-exposed macrophages. Annexin V and 7-AAD with flow cytometry was used to assess apoptosis and / or necrosis. CBA Flex Sets Technology and flow cytometry were employed to assess cytokine expression. Griess reaction was used to measure NO production and GSH was assessed with flow cytometry. Crystalline silica exposure resulted in apoptosis of these cells, decreased intracellular GSH; augmented cytokine production and increased NO production in U937 macrophages. Crystalline silica exposed macrophages showed a decreased ability to phagocytose apoptotic neutrophils.

New research projects - four new projects were initiated by students under Prof M Gulumian's supervision.

An investigation of the mechanisms involved in increased susceptibility to mycobacterial infection of silica exposed individuals

This project is funded by MHSC and is being done by Ms L Khoali. Little is known of the mechanisms involved in crystalline silica-induced increased susceptibility to *Mycobacterium tuberculosis*. This study will evaluate the effect of *in vitro* exposure to crystalline silica and *M. tuberculosis* H37Rv on U937 human macrophage cell line in the presence and absence of γδT-lymphocytes.

Validation of biomarkers for improved assessment of exposure and early effect from exposure to crystalline silica

This project is funded by MHSC and is being done by Ms K Makinson. This is the Phase III report of a four phase project. The overall purpose of the biomarker project is to identify and operationalise biomarkers for silica dust exposure that can then be used for surveillance of dust exposure levels in South African mines. The biomarker(s) would be used as an early lead indicator of potentially hazardous conditions that might result in disease after several years if not corrected.

Isolation and identification of fractions with antioxidant fractions from South African herbal remedies.

This project is a collaborative project with the University of Pretoria and is being conducted by Mr Obakeng Nkwane. The main aims of the study are to develop methods for: 1) estimating flavonoid and phenolics content in SA medicinal herbs, 2) identifying and analysing major phenolic antioxidant fractions from these medicinal herbs, 3) assaying antioxidant activity of the identified fractions using the Trolox Equivalent Antioxidant capacity assay and 4) testing the protective effects of the antioxidant fractions on silica induced lipid peroxidation and DNA damage.

Evaluation of the Comet assay to assess oxidative DNA damage and repair capacity in the peripheral mononuclear cells of systemic sclerosis and systemic lupus erythematosus and silicotic patients.

This is a collaborative project between the NIOH and the Rheumatology Department at the Chris Hani Baragwanath Hospital. This project is headed by Mr X Masoka and the collaborative partner at CH Baragwanath Hospital is Prof M Tikly, of the Internal Medicine Department at the University of the Witwatersrand. The aim of the this project is to assess the ability of the Comet assay to measure oxidative DNA damage and repair capacity in peripheral mononuclear cells (PMNCs) of silicotic, scleroderma and systemic lupus patients. Oxidative stress, and the resulting DNA damage is thought to contribute to the general decline in cellular functions that are associated with many human diseases Understanding the aetiology of the delay in DNA repair in these diseases may provide insight into disease pathogenesis.

Diagnostic Services

The Toxicology Section has established a number of tests that can be used to assess the toxicity and genotoxicity of compounds in the work environment. These include:

- The quantification of bound NF-*k*B transcription factor induced by crystalline silica in neutrophils and mononuclear cells using the BD FACSCalibur flow cytometer
- The simultaneous determination of THP1 and THP 2 cytokines and levels of intracellular calcium using the FACSarray and Cary Eclipse Flourescence Spectrophotometer, respectively
- A method to measure 8-hydroxy-2'-deoxygaunosine in urine and serum and 8-oxoguanine in phagocytic cells as biomarkers of DNA damage
- A method to measure DNA damage repair using the Comet assay

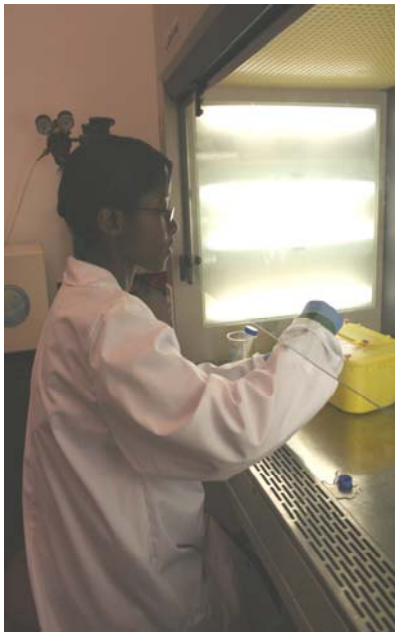
- The DNA diffusion assay in conjunction with fluorescent microscopy to determine nuclei diffusion in apoptotic cells
- Assays to measure apoptosis in neutrophils and other cells using Annexin-V and 7-AAD with flow cytometry

Teaching and Training

A highlight in 2007 was the award of Best Young Scientist to two MTech students in the Section – Ms N Mbatha and Ms M Leshwedi, at the Joint Congress of the South African Societies of Toxicology and Pharmacology.
The Section continued with the training of undergraduate students, with Ms N Matiwane (a student Biotechnologist) completing the Bachelor of Technology degree at the University of Johannesburg.

Four student biotechnologists were trained towards their National Diploma in Biotechnology as part of the NHLS training programme. The training involved general laboratory techniques, safety in the laboratory, quality assurance, presentation skills and report writing. Students were T Ndlovu, L Nkhaphe, L Mdaka and
L Radebe.

Under Prof M Gulumian's supervision, the following students are conducting their postgraduate studies in the Section:
University of the Witwatersrand: PhD students – Ms K Downs, Ms L Khoali; MSc students - Ms K Makinson, Mr O Nkwane, Mr X Masoka
University of Johannesburg: MSc students – Ms M Leshwedi, Ms N Mbatha



ABOVE: Toxicology student Nomfanelo Matiwane is hard at work in the laboratories, preparing samples.

INFORMATION SERVICES

Head
Prof A Cantrell *(Retired November 2007)*

The Information Services Section includes:

- South Africa's national reference library for occupational health
- a query handling service to provide technical information on occupational health to practitioners throughout the Region
- a resource centre with publications from many international agencies
- a SADC Clearing House for occupational health information

The functions are to obtain and disseminate information in support of occupational health services throughout South Africa and the SADC Region; and to develop capacity to source information by occupational health practitioners, students, workers, management, health and safety representatives and union officials.

Prof Cantrell retired after serving occupational health and the Institute for over 30 years. His knowledge
and experience in multiple disciplines, particularly toxicology, industrial processes and information sciences,
and his excellent teaching will be missed.

In the past the library holdings have focussed on the more traditional aspects of occupational health, but over the past year more modern topics have been attended to. For example, journals and books covering psychosocial issues and ergonomics have been improved.

The NIOH Information Services have benefited from a closer working arrangement with the other NHLS libraries and information services. Coherent acquisitioning and electronic access to journals and materials are examples.

The modern Computer Laboratory established in the previous year has been well used, particularly to offer courses in software programs. The laboratory is used for computer-based training on and off line. Training has included laboratory staff on DISA, postgraduate students on the Diploma in Occupational Health on Internet searching for OH&S data, and research personnel on the use of Epi-Info. Both internal and external participants have been involved.

The Query Answering Tool, developed to manage technical queries reaching the NIOH, records details of queries reaching the various divisions. Its value lies in the ability to track queries for QA purposes, and to record the input of all staff into this important service. Reports are extracted to follow monthly traffic and topic searches done to identify FAQs and emerging areas of interest that can be developed to improve the information service.

The Year Ahead

The SADC Clearing House has not been a success. The aim was to curate and update information on occupational health training in SADC; practical solutions to common hazards in the Region; policies, laws and regulations from member countries; and to maintain a network of occupational health practitioners. One of many reasons for failure to establish a functional Clearing House is that the internet has become the preferred and first source of information. The future of the Clearing House will be determined early in the next year.

The NIOH website (www.nioh.ac.za) is to be re-modelled in the coming year.

The Library and Resource Centre are to be combined. The new Head of Information Services will be an information scientist, rather than an occupational health expert, and capacity development of the occupational health community in accessing information will be a focus.

TRAINING, LIAISON & INTERNATIONAL COLLABORATION

Head
Ms C Nogueira

The Section provides a support function to the NIOH, and the main objectives are the promotion of occupational health and safety and the development of human resources in the SADC Region, through international training and outreach programmes. The Section coordinates training programmes run by the NIOH, organises programmes for foreign visitors and facilitates the continued professional development of the NIOH staff, as well as certain human resource management functions. Additionally, the Section works in close collaboration with other sections of the NIOH with shared objectives, e.g. Information Services, Management, IT, and Support Services.

ABOVE: Swedish collaborators at the WAHSA Meeting, Maputo, Mozambique, February 2008

Outreach to the SADC Region

Two international programmes in occupational and environmental health are well established in the SADC Region: the Fogarty International Center / University of Michigan Southern African Programme in Occupational and Environmental Health Training, and the Sida (Swedish International Development Cooperation Agency)-sponsored Work and Health in Southern Africa (WAHSA) Programme. Both programmes held their annual meetings in Maputo, Mozambique, 11-15 February 2008. The meetings were attended by representatives from the United States, Sweden, Mozambique, South Africa, Tanzania, Zambia, Zimbabwe, Botswana and Lesotho; directors, managers, coordinators and administrators from both programmes were present, as well as official SADC representatives.

Work and Health in Southern Africa (WAHSA) Programme

A number of activities linked to the Sida-WAHSA Programme were carried out by NIOH in the SADC countries, in fulfilment of the outreach function of the NIOH. The overall purpose of the WAHSA Programme is to contribute to poverty reduction by social and economic development in the SADC Region through improvements in occupational safety and health.

The NIOH is responsible for the coordination and facilitation of WAHSA Project 7: Action on Silica, Silicosis and Tuberculosis in the SADC Region.

The collaborative institutions that are part of the Resource Complex for Project 7 are the NIOH, the School of Public Health of the University of the Witwatersrand, the Occupational Health Management (OHM) Board in Kitwe - Zambia, and the Centre for Industrial Studies, Safety and Environment (CEISA), at the Faculty of Engineering, Eduardo Mondlane University, Maputo - Mozambique.

A seminar for Inspectorates on Silica Dust Control and Measurement took place in Tanzania, at the Barrick Gold mine site, in North Mara, 5 – 8 May 2007. The seminar, jointly organised and facilitated by the NIOH and Muhimbili University College of Health Sciences (MUCHS), Dar es Salaam, was attended by 20 Tanzanian participants (representing mine sites, government agencies responsible for overseeing health and safety in the mines, and university departments). This was the third dust control seminar that has been organised and facilitated by the NIOH in the SADC Region; the previous workshops were held in Zambia in 2005, and in Mozambique in 2006.

A regional Expert Group Meeting – "Preventing TB in silica-exposed workers" was held in Maputo, Mozambique, 1-2 June 2007. The meeting was planned and facilitated by the NIOH and co-hosted by the Mozambican collaborating partner of Project 7 – CEISA. The meeting, officially opened by the Mozambican Deputy Minister of Labour and the Rector of Eduardo Mondlane University, was attended by 20 participants from South Africa, Zambia and Mozambique.

ABOVE: Aspects of the Occupational health and safety training workshop in Lucapa, Angola, January 2008

The main aim of the meeting was the formulation of guidelines for treating TB in silica-exposed workers, appropriate for the SADC Region.

Subsequent to the Expert Group Meeting, the preparation of the document "Guidelines on isoniazid preventive therapy (IPT) for patients with silicosis in Southern Africa" was finalised by Profs D Rees and J Murray. The document is designed so that it can be implemented largely by trained health care providers and not necessarily doctors. The guideline is a consensus statement on the elements of an IPT programme; health service policy makers and programme manages will have to decide on the application and cost-effectiveness in particular settings. This resource can be obtained from the NIOH.

Quarry intervention work continued throughout 2007 in quarries identified in resource-poor countries – Zambia, Lesotho and Mozambique. The overall goal of these activities is to improve dust control in the quarries in the SADC Region, by designing, implementing and evaluating recommended dust control solutions; successful solutions will be published and disseminated to enforcement agencies and the quarry industry sector in Southern Africa. The expert teams constituted to conduct the quarry interventions in the three countries had members from South Africa and practitioners from the participating country, as well as regional experts selected by the Project 7 planning team at the NIOH, because of the need for specific skills and knowledge. The OHM Board (the Project 7 collaborating partner Zambia) was asked to take over the Zambian component of quarry intervention; their local expert was included in the preliminary work in Lesotho and Mozambique to benefit from the consultation and to learn from the dust control solutions being implemented there.

Experts visited each country to assess the dust measurement capacity which was in place at each quarry site. This capacity was found to be lacking in Zambia and Mozambique. In consultation with local occupational health practitioners and the WAHSA Steering Committee, the project was modified to build capacity in dust measurement, and continue the actual intervention once capacity was established.

In January 2007, a workshop was held to identify the specific parts of the quarries for intervention and to design control solutions and sampling strategies. Detailed plans for establishing dust measurement capacity in Mozambique were completed (setting up of a laboratory, obtaining equipment, installation and calibration of microbalance, training of staff). A dust control solution was partially installed in Lesotho.

Other accomplishments of WAHSA Project 7 during 2007 include the following:

- An advanced draft of the information packages for workers, on silicosis, was completed; the draft includes graphics and illustrations
- A desktop notepad was developed and designed as the general information package for managers, on silicosis. It is available for distribution in the Region
- A completely revised SORDSA Alert was finalised. The publication – *Crystalline Silica Health Hazards and Precautions* - contains new information on silica, silicosis and TB for practitioners in the Region, and has been distributed electronically
- A Silica Resource containing a set of CDs and DVDs was repackaged for the WAHSA Programme and distributed to SADC countries

Fogarty International Center (FIC) / University of Michigan (UM) Southern Africa Programme in Environmental and Occupational Health Training

The FIC / UM Programme for Research and Training in Environmental and Occupational Health has over the last 10 years (1996 – 2006; in two five-year cycles) contributed extensively to the enhancement of efforts in research training and capacity building and sustainability in the SADC Region. The Programme has funded short-term training, postgraduate studies and research projects, and has served as a catalyst for a variety of other related initiatives in the region, by dovetailing with other programmes. The submission for a third five-year cycle of the grant was successful and funds were allocated in mid-2007.

The NIOH organised and hosted the FIC / UM Programme Review Committee Meeting, 11-12 June 2007. The meeting was attended by representatives from South Africa, USA and the SADC countries which currently have Fogarty Resource Centres – Tanzania, Zambia, Zimbabwe and Mozambique. The meeting was held to plan the allocation of funds which have been granted for a third cycle of research and capacity development in occupational and environmental health in the SADC Region, with a strong emphasis of building and sustaining the Single Country Resource Centres.

International Collaborations

North-South collaborative links are well established, as the NIOH has had long standing associations with numerous international organisations and institutes including: WHO; the International Labour Organisation (ILO), the Health & Safety Laboratory (HSL) in the UK, the National Institute for Occupational Safety and Health (NIOSH) in the USA; the University of Birmingham Institute of Occupational Medicine in the UK; the Swedish National Institute for Public Health (SNIPH); and the Fogarty International Center and University of Michigan in the USA.

World Health Organisation (WHO)

As a WHO Collaborating Centre (CC) in Occupational Health (OH), the NIOH continues to be an integral part of the current WHO CC in OH Global Network Plan 2006 – 2010, which was launched officially in June 2006, in Milan. The NIOH collectively submitted a total of 14 collaborative projects which are included in various Activity Areas of the Plan:

- Occupational disease surveillance and other indicators of occupational health practice
- An ergonomics audit in South African public hospitals

- SA Silica Pilot Project – silica exposure reduction using control banding in quarries
- Identification and prevention of occupational risks for health care workers
- Silica, silicosis and tuberculosis
- Developing capacity in biological monitoring in occupational and environmental health
- Training on asbestos and its identification
- Ergonomics and musculoskeletal disorders
- Prevention of needle stick injuries in health care workers
- Latex allergy and asthma – risk management programme for health care workers
- Enhanced diagnosis and management of pulmonary TB
- The use of autopsy data as a gold standard to develop reference standard digital X-rays for silicosis
- Pilot Study: establishment and development of a model for occupational health service provision
- Access to occupational health and safety information in the SADC Region and in Portuguese-speaking countries (Portugal, Brazil, Mozambique)

Following the launch of the first issue of the newsletter "Collaborating Centre Connection" of the WHO CC in OH Global Network Plan, which was published electronically by NIOSH, USA at the end of March 2007,

a further 4 issues have been published to date and can be accessed on the following websites:
www.cdc.gov/niosh/CCC/CCCnewsV1N2.html
www.cdc.gov/niosh/CCC/CCCnewsV1N3.html
www.cdc.gov/niosh/CCC/CCCnewsV1N4.html
www.cdc.gov/niosh/CCC/CCCnewsV1N5.html
The electronic newsletter provides a forum for disseminating information related to the work being carried out by various WHO CCs in OH.

Dr D Kielkowski (Epidemiology and Surveillance Section) was appointed by the Occupational Health Division of the WHO as a member of the committee tasked with reviewing the document on International Coding of Disease (ICD) for Occupational Injuries (Version 11). Her contribution as a member of the task team is in an advisory capacity, and she was instrumental in the initiation of a piloting study of the injury chapter of ICD11 in South Africa. The work started in September 2007.

The WHO-endorsed "International Seminar on the Prevention of Occupational Diseases" and associated meeting for WHO CC representatives from Portuguese-speaking countries [Portugal, Brazil, Mozambique], took place in Oporto, Portugal, at the end of October 2007. The seminar and meetings were conducted in Portuguese and were follow-on activities to the initial meeting held in Brazil in December 2006, which formalised collaborations and future activities with occupational health institutes in Portuguese-speaking countries, a number of which submitted projects to the WHO CC in OH Global Network Plan 2006 – 2010. Working collaborations were formalised with the following institutes in Portugal and Brazil: The Centre of Environmental and Occupational Health of the National Institute of Health Dr Ricardo Jorge (INSA) – Oporto, Portugal; and FUNDACENTRO (The Jorge Duprat Figueiredo Foundation of Occupational Safety and Medicine) and SENAC (National Commercial Training Service) – both based in São Paulo, Brazil.

In January 2008, the NIOH was invited to join the De Beers SA training team, to co-present an occupational health and safety workshop to mine management and government occupational health and safety representatives and personnel from the De Beers operations – Angola Prospecting – at the Lucapa exploration camp in Angola. Ms C Nogueira gave presentations in Portuguese covering the occupational health, medicine and legislation components and assisted with the translation of the presentations of the hygiene and safety aspects. The trip to Angola was fully sponsored by the De Beers Group and afforded the NIOH the opportunity to establish contacts in Angola, as part of its outreach and capacity building function in the Southern African Development Community (SADC) Region.

Special Events and External Visitors to the NIOH

The NIOH hosted a number of external visitors and conducted workshops for various target audiences during the year under review.

The NIOH hosted Prof Christer Hogstedt, consultant to the Swedish National Institute for Public Health (SNIPH) on 13 June 2007. He visited the specialised laboratories of the NIOH and gave a presentation titled "Occupational Health in Sweden: successes and threats".

Dr. Marilyn Fingerhut, consultant for the National Institute for Occupational Safety & Health (NIOSH), USA and Coordinator of both the NIOSH Global Collaborations Program and the WHO Global Network of Collaborating Centres in Occupational Health, visited the NIOH, 2-3 July 2008. Her visit was in her capacity of Vice President of the International Commission on Occupational Health (ICOH) and Scientific Chair of the International Conference on Occupational Health, 2009, which will be held in Cape Town. This was the second meeting held in Johannesburg for the planning of the scientific programme for ICOH2009. Dr Fingerhut visited the NIOH again during the week of 18 February 2008, for more ICOH2009 business and meetings with the Organising and Scientific Committees.

On 10 July 2007, the NIOH hosted a group of medical doctors from New Zealand, which included Drs Zack Mesaritis and Rob Kydd from the Occupational Health Unit in the School of Population Health, University of Auckland. This visit was part of an on-going collaboration between the Occupational Medicine Section of the NIOH and the University of Auckland.

The NIOH hosted two academic visitors (occupational health specialists) from the National Institute for Occupational Health in Oslo, Norway, on Friday 27 July 2007. The visit was facilitated by the Analytical Services Section. Profs Yngvar Thomassen and Dag Ellingsen toured the specialised laboratory facilities of the NIOH, and gave the following presentations, respectively: "Exposure assessment of workers in the primary aluminium industry" and "Health effects of manganese exposure in welders".

The Analytical Services Section of the NIOH is involved in a collaborative study with the SA MRC and Norwegian partner institutions, and two of the medical scientists in the Section (Mrs P Theodorou and Mrs K Channa), attended laboratory training sessions, respectively, in Norway (Oslo in 2007; Tromsø in 2006) in the analysis of toxic metals and organic compounds, as part of this collaborative study - "Levels of persistent toxic substances in blood from pregnant women from selected areas of South Africa".

In September, the NIOH presented a 2-day workshop "Seminar on Training of Health and Safety Representatives for South African Hospitals". The training days were attended by national and provincial health coordinators, H&S reps from various hospitals, union representatives and academics from the University of British Columbia, Canada (collaborators on the current NIOH/NHLS Surveillance Programme). The aim of the workshop, which was co-organised by the NIOH and the MBOD, was to finalise a standard core curriculum for the training of hospital H&S reps appropriate for South Africa, and to test case studies, practical sessions and other learning materials to be used in the training.

Also in September, the NIOH hosted two academic visitors from the Division of Environmental and Occupational Health Sciences at the University of Illinois at Chicago (UIC), USA Ms Leslie Nickels and Dr Steven Lacey attended various meetings with a number of stakeholders in preparation for the presentation of WHO training modules in SA in 2008. They toured the specialised laboratory facilities of the NIOH, and gave the following presentations, respectively: "Education and training in occupational health: interdisciplinary approaches to preventing workplace injuries and illnesses" and "Outreach efforts to recruit young scientists and engineers to occupational hygiene". Their visit to the NIOH was arranged and facilitated by Ms I Naik (Analytical Services Section) as part of a grant proposal submitted for a collaborative study with UIC and WHO.

TRAINING, LIAISON & INTERNATIONAL COLLABORATION

ABOVE: L-R: Joint WAHSA-Fogarty Meeting in Maputo, Mozambique, February 2008; Norwegian academic visitors to the NIOH, Mrs. M. Thomassen (Norway), Prof. Dag Ellingsen (NIOH – Oslo, Norway), Prof. Mary Ross (Director: NIOH, SA); Mrs. Ina Naik (Head: Analytical Services Section, NIOH, SA); Prof. Yngvar Thomassen (NIOH – Oslo, Norway); Ms Claudina Nogueira (Head: Training and International Liaison, NIOH, SA).

L-R: WAHSA Expert Group Meeting on TB and Silicosis – Maputo, Mozambique, June 2007;
Visit to the Endeb drill rig site near the Lucapa Exploration Camp, Angola, January 2008

The annual Webster Memorial Seminar took place on 22 November 2007. Over the years, the NIOH has hosted very successful Webster seminars in memory of one of the NIOH's directors, Prof Ian Webster, an early pioneer of lung disease research in South Africa. The theme was "Surveillance in Occupational Health – Information for Action". The seminar was attended by close to 120 delegates, with good representation from the Department of Health – national and provincial, as well as academic institutions, independent organisations and industry. Dr D Kielkowski and Ms K Wilson from the Epidemiology and Surveillance Section coordinated the scientific content of the Webster Seminar. The NIOH bid farewell to Prof A Cantrell, Head of Information Services, at the 2007 Webster Seminar. Prof Cantrell retired officially at the end of November and had been at the NIOH (and its predecessor institutions) for close to forty years.

Ms Matlhodi Loselo from the ILO Regional Office is the National Project Coordinator for the OSH GTZ/ILO/VW Project. Ms Loselo visited the NIOH on 24 January 2008, with Mr Mohlakola Monyaki from the Department of Labour (focal person for the aforementioned project). Through the partnership with Volkswagen (VW) and the German Technical Cooperation (GTZ), the ILO is implementing a project on occupational safety and health in the supply chain, in three countries – Brazil, Mexico and South Africa – with two main objectives: to improve OH&S, including HIV/Aids programmes, in small and medium enterprises, and to build the capacity of Inspectorates. The ILO envisages setting up a Knowledge Management Centre (Call Centre) for Occupational Safety and Health in the Region and wanted to visit the NIOH to gather more insight into the services offered by the Institute, including access to and dissemination of information resources. The visit was coordinated by Mr T Papo (Information Services) and the visitors liaised with most sections about future collaboration activities.

On 11 and 12 March 2008 the Occupational Hygiene Section coordinated and presented a training course for Gauteng Provincial Health Coordinators, as part of the NIOH support function to the Department of Health.

PUBLICATIONS & CONFERENCE PRESENTATIONS (2007/2008)

PUBLICATIONS

Books

Bartie C. A Practical Guide to the Prevention and Treatment of Legionellosis. Johannesburg, PrintCol (Pty) Ltd. 2007 [ISBN 978-1-874813-01-9]

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Wong ML, Back P, Candy G, Nelson G, Murray J. Cryptococcal pneumonia in African miners at autopsy. *Int J Tuberc Lung Dis* 2007, **11**, 528-533.

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PUBLICATIONS & CONFERENCE PRESENTATIONS

Information Booklets, CDs, Pamphlets

Training materials developed by the Mine Health and Safety Council (MHSC)-funded project - NIOH Silicosis Materials Development:

- *Ntate Thabang and Sello's Story* – a training DVD in Sotho, with English subtitles, aimed at the mining workforce, for improving mineworkers' respiratory health
- *Preventing Silicosis – a guide for H&S representatives* (a manual)
- *A Silicosis Information Resource* (a deskpad aimed at managers and occupational health practitioners)

CONFERENCE PRESENTATIONS

International

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Nogueira C. Current Status of the WHO CC in OH Global Network Plan 2006-2010.

38th Union World Conference on Lung Health, Cape Town, South Africa, 8 – 12 November 2007

Glynn JR, Sonnenberg P, Nelson G, Bester A, Shearer S, Murray J. Increasing risk of TB with increasing duration of HIV infection: results from 2000 men followed for 12 years.

Murray J, Sonnenberg P, Nelson G, Bester A, Shearer S, Glynn JR. Cause of death and respiratory disease at autopsy by duration of HIV infection in gold miners, South Africa.

Murray J. A tool for improving the diagnosis of TB: process-based performance review.

Australian Institute of Occupational Hygienists (AIOH 2007) Conference, Melbourne, Australia, 1-5 December 2007

Ferrie R. Global challenges for occupational hygiene.

Ferrie R. Where have all the hygienists gone?

Gordon Research Conference on Oxygen Radicals, Ventura, California, USA, 3-8 February 2008

Khoali L, Gulumian M. Oxidative stress induced by crystalline silica in U937 cells.

7th International Occupational Hygiene Association (IOHA 2008) Scientific Conference, Taipei, Taiwan, 18 – 22 February 2008

Renton KA, Ferrie R, Wilson K, Johnston JR. An evaluation of Silica Essentials at quarries in a developing country.

Spies A, Ross MH, Ferrie R. Determination of typical occupational airborne pollutants associated with clay brick making.

Society of Toxicology (SOT) 2008 Conference, Seattle, USA, 16-20 March 2008

Gulumian M. Evaluation of silica-induced reduction in macrophage function.

National

10th Annual Congress of the Mining Medical and Other Health Care Professionals Association, Vanderbijlpark, 11-13 May 2007

Gulumian M. Investigation into surface activity of airborne particles in the mining environment.

10th Conference of the Ergonomics Society of South Africa (ESSA), Durban, 21-22 June 2007

Dyosi S, Nyantumbu B. Ergonomics audit in a South African public hospital: a pilot study.

PUBLICATIONS & CONFERENCE PRESENTATIONS

South African Society for Occupational Medicine (SASOM) Congress, Pretoria, 6-7 August 2007
Rees D. Trends in occupational lung disease.

Congress of the Federation of Infectious Diseases Societies of South Africa, Stellenbosch, October 2007
Ross MH, Kielkowski D, Ferrie R. Reporting and surveillance databases for blood-borne virus exposures.

The SA Pharmacology and Toxicology Congress, Marikana, North West Province, 2-5 October 2007
Leshwedi M, Steenkamp V, Dutton M, Gulumian M. The anti-inflammatory properties of *Salacia leptoclada* and *Warburgia salutaris*: their possible use as therapeutic agents in silica-induced cellular injury.
Khoali L, Komane P, Gulumian M. Intracellular calcium levels in relation to lipid peroxidation in U937 phagocytic cells exposed to crystalline silica.
Komane P, Gulumian M. An investigation into the surface activity of airborne particles in the gold mining environment.
Makinson K, Girdler-Brown B, Murray J, Gulumian M. Validation of biomarkers for improved assessment of exposure and early effect from exposure to crystalline silica.
Mbatha N, Gulumian M. Evaluation of intracellular GSH in silica-induced apoptosis.
Masoka X, Matiwane N, Gulumian M. Comet assay parameters for use in assessment of genotoxic effects.
Masoka X, Matiwane N, Gulumian M. Gender and smoking related differences in baseline DNA damage levels in a healthy African population using the Comet assay.
Nkwane O, Steenkamp V, Gulumian M. Total phenolic and flavonoid content in South African herbal remedies.

Local

Annual Webster Memorial Seminar - Surveillance in Occupational Health: Information for Action, NIOH, 22 November 2007
Kielkowski D. NIOH Experience in surveillance: past and current development.
Ndlovu N. Mining a database.

NIOH Research Forum Presentations (February – November 2007)
Baker A. Measurement of respirable crystalline silica in South African gold and coal mines: verification study.
Bello B. Time to pregnancy, fertility and contraceptive use in a South African community
Bello B. Time to pregnancy and fertility in a South African population – findings from a preliminary study.
Davies JCA, Kielkowski D. Adult mortality in South Africa.
Dyosi S. Reviewing workplace ergonomic risk assessments: 2004 to date.
Gulumian M. Toxicogenomics and occupational health.
Khoali L. An investigation of mechanisms involved in increased susceptibility to mycobacterial infection of silica exposed individuals.
Kirsten Z. Preliminary results for detection of MTB.
Mabe O. Latex allergens in dental settings.
Masoka X. Gender and smoking related differences in DNA damage in a healthy population
Murray J. Cause specific mortality in an HIV seroconversion cohort of miners.
Ntsuba H. Airborne concentration of formaldehyde in a pathology unit.
Nyantumbu B. Work with Computing Systems (WWCS) Conference in Stockholm, Sweden, 21-24 May 2007.
Ramotse W. Outreach programme for miners and ex-miners.

PUBLICATIONS & CONFERENCE PRESENTATIONS

Renton K. Preliminary evaluation of Silica Essentials at quarries in a developing country.
Renton K. Reducing worker exposure by using the Occupational Risk Management Toolbox.
Senabe B. Investigating medical follow-up and compensation in workers with asbestos related diseases.
Singh T. Endotoxins in dental schools: highs and lows of the project.
Wilson K. Adverse outcomes of pregnancy in rural and peri-rural communities: a pilot study.

NHLS Health Care Risk Waste Open Day, NIOH, 12 March 2008
Immunology and Microbiology Section poster: Effective segregation of health care risk waste in the medical laboratory **(awarded first prize)**
Pathology Section poster: Effective segregation of health care risk waste in the medical laboratory **(awarded second prize)**
Analytical Services Section poster: Effective segregation of health care risk waste in the medical laboratory
Occupational Hygiene Section poster: Effective segregation of health care risk waste in the medical laboratory