Annual Pathology Asbestos Analysis Report

Bulk material and air filter data for 2023

Thembi Mashele

Zethembiso B Ngcobo

Kerry Wilson

PO Box 4788
Johannesburg
2000

email: thembiM1@nioh.ac.za

NIOH Asbestos Surveillance Report 1/2024

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GLOSSARY

Asbestos	A group of fibrous silicate minerals that include chrysotile (white Asbestos; serpentine), crocidolite (blue asbestos; amphibole) and amosite (brown asbestos; amphibole) and others (actinolite, tremolite, anthophyllite; amphiboles) that were not mined in South Africa.
Samples	All materials received and analysed for asbestos.
Type of sample	The sample that was received, be it an air filter, piece of floor tile or roof grouped into either the air filter or bulk sample category.
Bulk samples	All samples that do not include air filters e.g. pieces of floor tiles, roofs, soil, ceiling, cement etc. This information was obtained from the description of the material that was sampled and submitted with the sample.
Air filters	Gold coated filters that were used in pumps to sample the air.
Province	The province where the sample was taken from.
Industry	The industry where the samples were taken was grouped into categories according the Standard Industrial Classification of all economic activities (7th Edition).
Activity	The activity that resulted in sending the sample to analyse for asbestos e.g. inventory purposes or identifying asbestos prior to demolition work.

REPORT SUMMARY

A total of 65 samples were received and analysed in 2023, a decline of approximately 73% compared to the previous year, 2022 (n=239). Of these, 46 (70.8%) contained asbestos. The decline in the number of samples that were received by the institute is possibly attributed to the decline in the number of samples received from outside South Africa, in comparison to the previous year.

The majority of the samples were received from South Africa, 63 (96.9%) and the rest of the samples were received from Botswana, two (3.1%). Of the samples that were received from South Africa, the majority were received from Gauteng (n=26, 41.3%) followed by Eastern Cape (n=20, 31.7%) and Northern Cape (n=10, 15.9%). The least number of samples were received from the Limpopo (n=1, 1.6%) and North West (n=1, 1.6%) provinces.

The majority of samples received were bulk samples (n=42, 64.6%). The most common types of bulk samples were cement (n=28, 66.6%) and fascia board (n=8, 19.0%), whereas, fibrous material, vinyl tile and other sample types accounted for the least number of samples with 2 (3.1%) samples each. Upon analysis, 33 (78.6%) of the bulk samples contained asbestos. Most of these samples contained serpentine asbestos (n=13, 39.4%) followed by serpentine and amphibole mixtures (n=7, 21.2%).

The most common industries from which samples were received were mining and quarrying (n=23, 35.4%) followed by social security (n=11, 16.9%), and professional, scientific and technical activities (n=10, 15.4%). All the samples in 2023 were received with complete information post electronic follow-ups with the clients.

BACKGROUND

In terms of the 2020 Asbestos Abatement Regulations, the first step when working with possible asbestos containing material, is to confirm whether or not the material contains this fibrous silicate. The regulations specify all precautions that need to be considered when conducting any work on any structure containing asbestos. The 2020 Asbestos Abatement Regulations have been gazetted by the Department of Labour which suggests that the identification of asbestos in materials and air will continue to remain an integral part of the regulations.

Regulations to prohibit the use, manufacture, import and export of asbestos and asbestos containing materials were promulgated in 2008. Despite this prohibition, the legacy of asbestos remains and this legacy includes environmental contamination due to activities such as mining, milling and transportation of asbestos as well as the presence of a large number of asbestos containing materials in the environment. Environmental contamination poses potential health risks to surrounding communities. These risks include the potential development of asbestos related diseases, namely, pleural plaques, asbestosis, lung cancer and malignant pleural mesothelioma. While occupational exposure through the mining, milling and manufacturing of asbestos has ceased, workers in other industries may be exposed. The incorrect removal of asbestos containing materials can result in the liberation of fibres, exposing workers in the construction and demolition industries, as well as to the community.

The National Institute for Occupational Health (NIOH) analyses samples for the presence of asbestos using scanning electron microscopy combined with electron dispersive spectrometry (SEM/EDS). This technique enables the identification of the type(s) and size of asbestos fibres present in the sample. All samples received are analysed and reported. The Electron Microscopy Unit participates in the Asbestos in Materials Schemes from Health and Safety Laboratories in the United Kingdom. This external quality assurance scheme ensures that the unit produces reliable results.

In 2003, the NIOH was able to offer a service to meet the demand by contractors to identify asbestos in materials and to enumerate asbestos fibres in air. In addition to recording the results for samples that are submitted for analysis, the NIOH also captures the information that accompanies the samples in a database. The database was created using Epi Info and RedCap and contains various fields including the origin of the sample, the industry as well as the activity taking place before, at or after sample collection e.g. demolition/renovation etc. The NIOH, being a national research institute, undertakes to study various aspects of occupational and environmental health in terms of asbestos exposure. Data from these studies are also captured in the database and are included in the results presented in this report.

While the legacy of asbestos is recognised as a national problem, details of its extent and magnitude remain largely unknown. These databases provide information about the location and type of asbestos that remains in the environment.

This report summarises the asbestos database for 2023. Data from the asbestos database was analysed, using STATA version 16.1.

SECTION 1 – SAMPLES RECEIVED AND TYPE OF ASBESTOS IDENTIFIED

The number of samples received in the period 2003 to 2023 is displayed in Figure 1.1. The total number of samples analysed in 2023 was 65. The majority (n=63, 96.9%) of the samples came from South Africa. Of these, the types of samples received were bulk (n=42, 64.6%) and air filters (n=23, 35.4%). The types of bulk samples are displayed in Table 1.1.

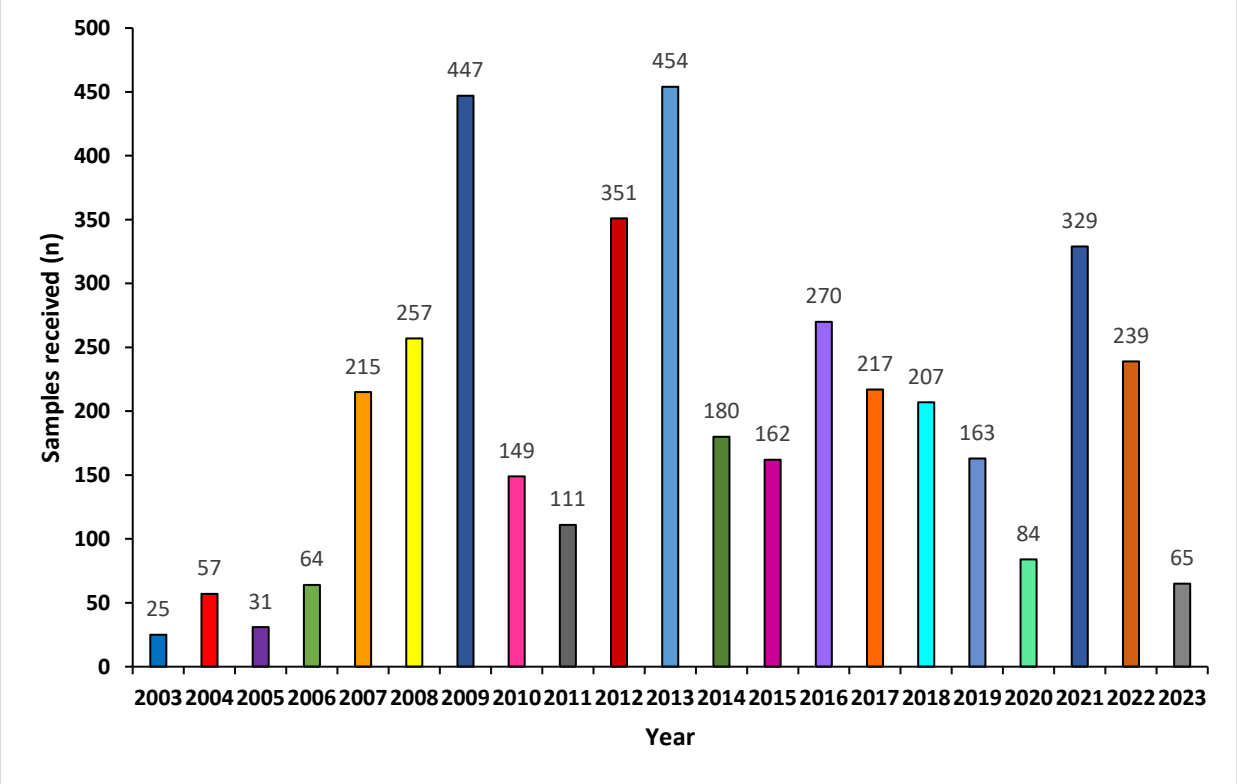

FIGURE 1.1: TOTAL NUMBER OF SAMPLES RECEIVED (2003-2023)

TABLE 1.1: THE TYPES OF BULK SAMPLES RECEIVED (2023)

Bulk type	N	%
Cement	28	66.6
Fascia board	8	19.0
Fibrous material	2	4.8
Vinyl Tile	2	4.8
*Other	2	4.8
Total	**42**	

*Other includes powder and roof tile

The number of samples that contained asbestos is displayed in Figure 1.2. Asbestos was identified in two thirds of the bulk samples (n=33, 78.6%), and in 13 (56.5%) of the air filter samples. The specific type(s) of asbestos identified per sample type are displayed in Table 1.2.

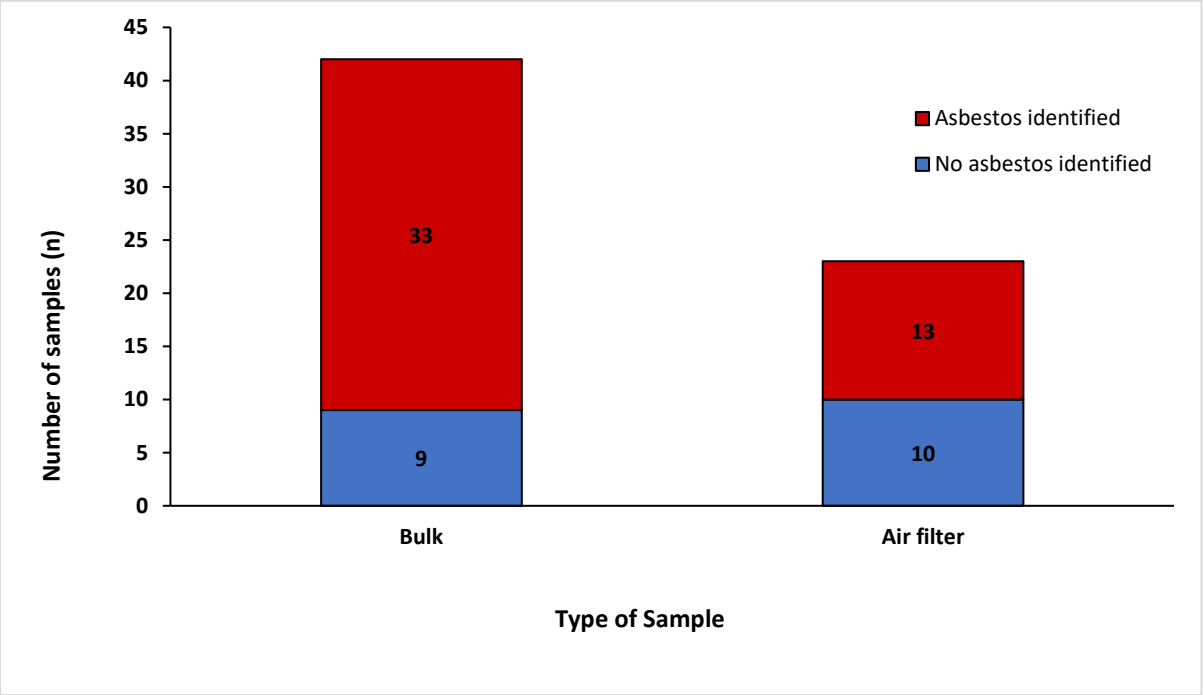

FIGURE 1.2: THE NUMBER OF SAMPLES THAT CONTAINED ASBESTOS PER SAMPLE TYPE (2023)

TABLE 1.2: THE TYPES OF ASBESTOS IDENTIFIED PER SAMPLE TYPE (2023)

Asbestos type	Bulk		Air filters		Total
	Number	%	Number	%	Number
Chrysotile only	13	39.4	3	23.1	16
Crocidolite only	2	6.1	1	7.7	3
Amosite only	1	3.0	2	15.4	3
Actinolite only	0	-	3	23.1	3
Tremolite only	0	-	1	7.7	1
Chrysotile, crocidolite mixture	7	21.2	0	-	7
Chrysotile, amosite mixture	1	3.0	1	7.7	2
Crocidolite, amosite mixture	0	-	1	7.7	1
Chrysotile, actinolite mixture	1	3.0	0	-	1
Chrysotile, crocidolite, actinolite mixture	6	18.2	0	-	6
Chrysotile, Crocidolite, Amosite mixture	2	6.1	0	-	2
Tremolite Actinolite series	0	-	1	7.7	1
Total	**33**		**13**		**46**

SECTION 2 – SAMPLE ORIGIN

Each sample is received with accompanying information including the country of origin of the sample and this is depicted in Table 2.1. The provincial origins for the samples received from South Africa in 2023 are displayed in Figure 2.1 below.

TABLE 2.1: THE COUNTRY OF ORIGIN FOR SAMPLES RECEIVED (2023)

Country of origin	Number of samples	%
RSA	63	96.9
Botswana	2	3.1
Total	**65**	

Of the cases received from South Africa, the majority of samples were received from Gauteng (n=26, 41.3%), followed by Eastern Cape (n=20, 31.7%), Northern Cape (n=10, 15.9%), Western Cape (n=3, 4.8%) and Free State (n=2, 3.2%). The least number of samples were received from Limpopo (n=1, 1.6%) and North West (n=1, 1.6%) provinces.

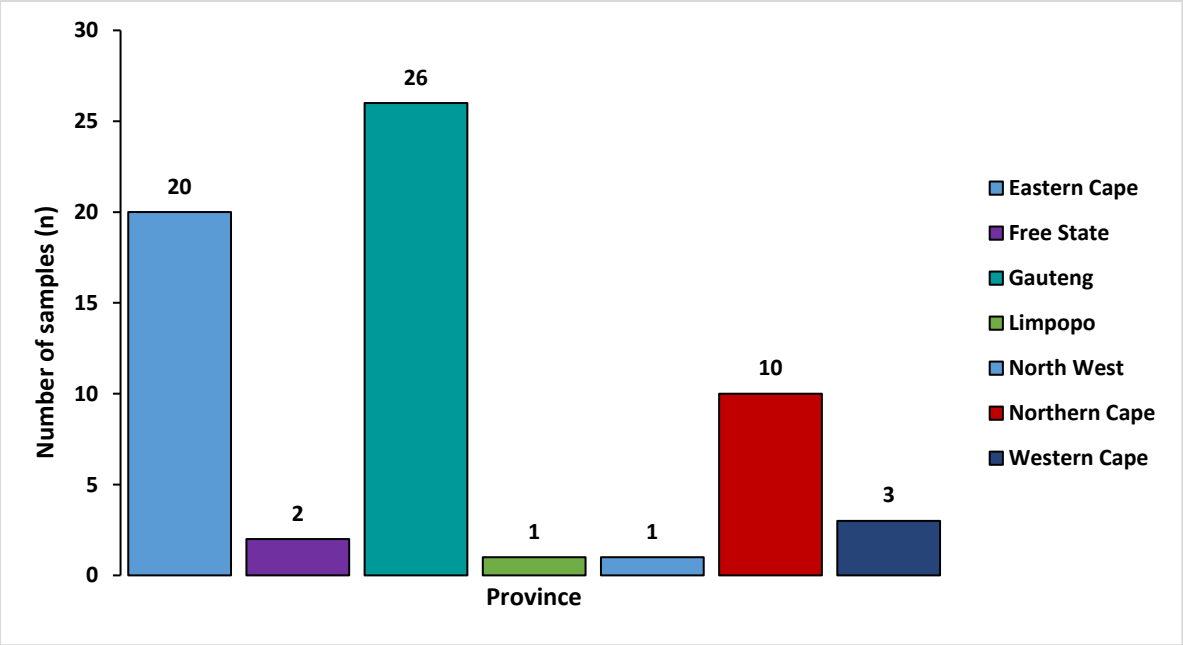

FIGURE 2.1: THE SOUTH AFRICAN PROVINCES FROM WHICH THE SAMPLES WERE RECEIVED (2023)

SECTION 3 – INDUSTRY CLASSIFICATION OF SAMPLES

The industrial sector from which each sample was collected was assigned according to the Standard Industrial Classification of all Economic Activities. The various industries are displayed in Table 3.1.

TABLE 3.1: THE INDUSTRY CLASSIFICATION FOR SAMPLES RECEIVED (2023)

Industry classification	N	%
Agriculture	5	7.7
Food Industry	8	12.3
Manufacturing	4	6.2
Mining and quarrying	23	35.4
Professional, scientific and technical activities	10	15.4
Real estate	1	1.5
Residential	3	4.6
Public administration and defence; compulsory social security	11	16.9
Total	**65**	

The percentage of samples that contained asbestos per industry classification is displayed in Figure 3.1. All the samples received from the food industry, real estate, professional, scientific and technical activities and residential/professional industries contained asbestos. The manufacturing industry had the lowest proportion of samples (n=1, 25%) that contained asbestos.

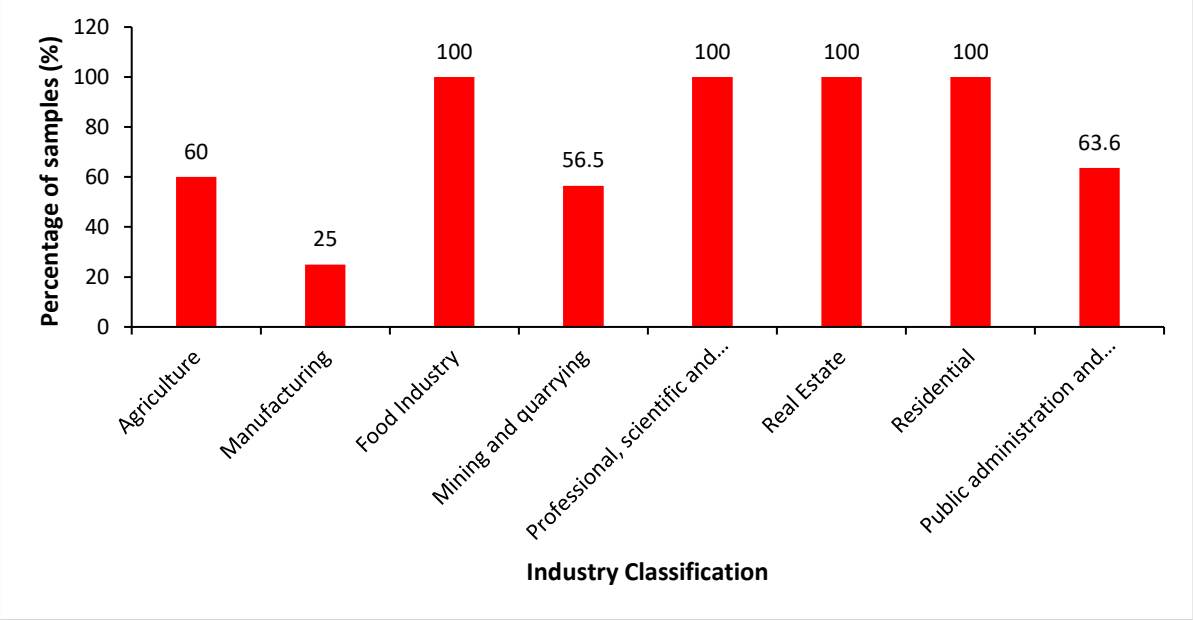

FIGURE 3.1: THE PERCENTAGE OF ASBESTOS CONTAINING SAMPLES BASED ON INDUSTRY CLASSIFICATION FOR SAMPLES RECEIVED (2023)

#The percentage of asbestos containing materials is based on the samples that were received and analysed in the NIOH Pathology department in 2023.

SECTION 4 – ACTIVITIES BEFORE, AT OR AFTER SAMPLE COLLECTION

The activities taking place before, at or after sample collection were categorised and displayed in Table 4.1. In 2023, all air filter samples were sent from mining activities (n=23, 100.0%), while most of the bulk samples were sent from inventory (n=27, 64.3%).

TABLE 4.1: ACTIVITIES BEFORE, AT OR AFTER SAMPLE COLLECTION (2023)

Activity	Sample type			
	Air filters	%	Bulk	%
Mining / Air monitoring	23	100	0	-
Quality Control	0	-	1	2.4
Inventory	0	-	27	64.3
Renovations	0	-	14	33.3
Total	**23**		**42**	

The percentage of samples based on the activities taking place before, at or after sample collection that contained asbestos were categorised and displayed in Figure 4.1. The activity that had the highest percentage of asbestos containing samples was inventory (n=23, 85.2%), followed by renovations (n=10, 71.4%) and air monitoring (n=13, 56.5%). A single sample was received for quality control purposes and it did not contain asbestos.

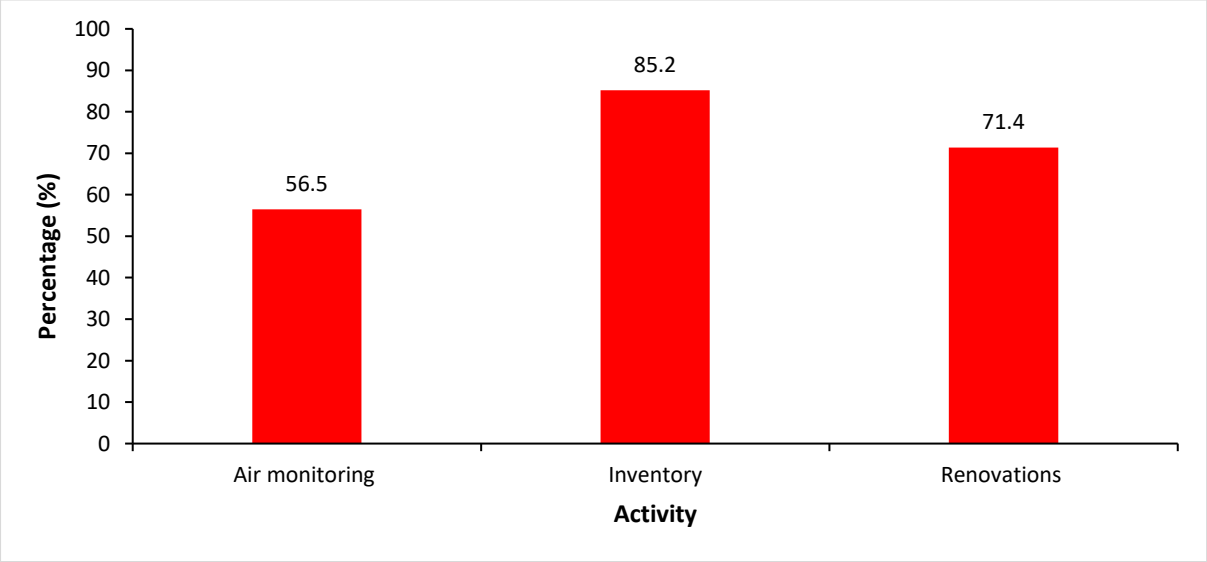

FIGURE 4.1: THE PERCENTAGE OF ASBESTOS CONTAINING SAMPLES PER ACTIVITIES BEFORE, AT OR AFTER SAMPLE COLLECTION (2023)

#The percentage of asbestos containing materials is based on the samples that were received and analysed in the NIOH Pathology department in 2023.

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APPENDIX 1: PUBLICATIONS, PRESENTATIONS AND POSTERS UTILISING THE ASBESTOS DATABASE

Publications:

Vorster T, Kgokong N, Phillips JI. Exploring the South African legacy of asbestos using routinely collected data. *Occupational Health Southern Africa,* 2018 pp 5-9.

Rees D, Phillips JI. The legacy of in situ asbestos cement roofs in South Africa, *Occupational and Environmental Medicine*, 2017;74 (Suppl 1): A76-A77.

Phillips JI, Norman G, and Renton K. Asbestos in soil around dwellings in Soweto. *Occupational Health Southern Africa*, 2009;15(2):24–27.

Phillips JI, Rent K, Murray J, Garton E, Tylee BE, and Rees D. Asbestos in and around Soweto dwellings with asbestos cement roofs. *Occupational Health Southern Africa*, 2007;13(6):3–7.

Milne SJ, Garton E, Nelson G, Murray J, Davies JCA, Phillips JI. A South African database of samples analysed for the presence of asbestos. *Occupational Health Southern Africa*, 2003;19(6):14–21.

Oral presentations:

Kgokong N, McCabe M, Mhlongo LN. The NIOH asbestos database (an update). Asbestos Land and Remediation workshop; 12 March 2020. Sierra Burgers Hotel, Pretoria

Rees D, Phillips JI. *In situ* asbestos and the risk of exposure for workers. An International challenge. EPICOH conference; 28 – 31 August 2017. Edinburgh Scotland

Kgokong N, Vorster T, Kereeditse KR, Phillips JI. The NIOH asbestos database – What can it tell us? World day for Safety and Health at Work; 30 May 2017. NIOH Braamfontein

Vorster T, Kgokong N, Kereeditse KR, Phillips JI. The NIOH asbestos database – What can it tell us? Research Forum; 19 April 2017. NIOH Braamfontein

Poster presentations:

Ngcobo Z, Mhlongo L, Keyter M, de Bruin J, Lakhoo D. How far are we in ending the legacy of asbestos: an overview from the 2021 surveillance report? Poster presentation at NIOH Biannual Research Day, 30 November 2022, Johannesburg, S.A

Vorster T, Kgokong N, Phillips JI. The possible health implications of the legacy of asbestos cement roofs in South Africa. Pathology Research and Development Congress; 23-24 June 2017. Emperor's Palace, Johannesburg, South Africa