Annual Pathology Asbestos Analysis Report

Bulk material and air filter data for 2021

Lucia Naddy Mhlongo

PO Box 4788
Johannesburg
2000

email: LuciaM@nioh.ac.za

NIOH Asbestos Surveillance Report 1/2022

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service

TABLE OF CONTENTS

List of figures

List of tables

GLOSSARY

Asbestos	A group of fibrous silicate minerals that include chrysotile (white asbestos), crocidolite (blue asbestos) and amosite (brown asbestos) and others 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 is 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
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 329 samples were received and analysed in 2021, greater than a three-fold increase compared to the previous year, 2020 (n=84). Of these, 189 (57.4%) contained asbestos.

The majority of the samples were received from Botswana, 194 (59.0%) and the remainder of the samples (n= 135, 41.0%) were received from South Africa. Of the samples that were received from South Africa, the majority were received from Eastern Cape (n=61, 45.2%) followed by Gauteng (n=37, 27.4%), Northern Cape (n=21, 15.6%), Free State (n=7, 5.2%), Western Cape (n=5, 3.7%) then Mpumalanga (n=3, 2.2%). The least number of samples were received from KwaZulu-Natal (n=1, 0.7%).

The majority of the samples received were bulk samples (n=297, 90.3%). The most common types of bulk samples were cement (n=223, 75.1%), cement roof/sheet (n=24, 8.1%), ceiling panel (n=23, 7.7%) and fascia board (n=14, 4.7%). Upon analysis, 185 (62.3%) bulk samples contained asbestos. More than half of these samples contained serpentine asbestos (n=93, 50.3%) followed by serpentine amphibole mixtures (n=68, 36.8%).

No soil samples were received in the year 2021.

The most common industries from which samples were received were public administration and defence and compulsory social security activities (n=192, 58.4%); professional, scientific and technical services (n=77, 23.4%); followed by mining and quarry (n=37, 11.3%). All the samples in 2021 were received with complete information after engaging the clients about the information required when submitting samples.

BACKGROUND

In terms of the 2002 Asbestos Regulations, the first step when working with asbestos should be its identification. The regulations specify all precautions that need to be considered when conducting any work on any structure containing asbestos. Draft Asbestos Abatement Regulations have been gazetted by the Department of Labour and will replace the Asbestos Regulations of 2002. However, the draft 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 include 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 and 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 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, detail of its extent and magnitude remain largely unknown. This database provides information about the location and type of asbestos that remains in the environment.

This report summarises the asbestos database. Data from the asbestos database was exported into, and analysed using STATA ver. 15 (Stata Corp, College station, TX, USA).

SECTION 1 – SAMPLES RECEIVED AND TYPE OF ASBESTOS IDENTIFIED

The number of samples received in the period 2003 to 2021 is displayed in Figure 1.1. The total number of samples analysed in 2021 was 329. Majority of the samples (n=194, 59.0%) came from outside of South Africa. This is the first time this observation has been made ever since the inception of this annual report in 2003. The sharp increase in the number of cases in 2021 may be attributed to a backlog of cases from the prior year as a result of the coronavirus pandemic. The types of samples received were bulk samples (n=297, 90.3%) and air filters (n=32, 9.7%). The types of bulk samples are displayed in Table 1.1.

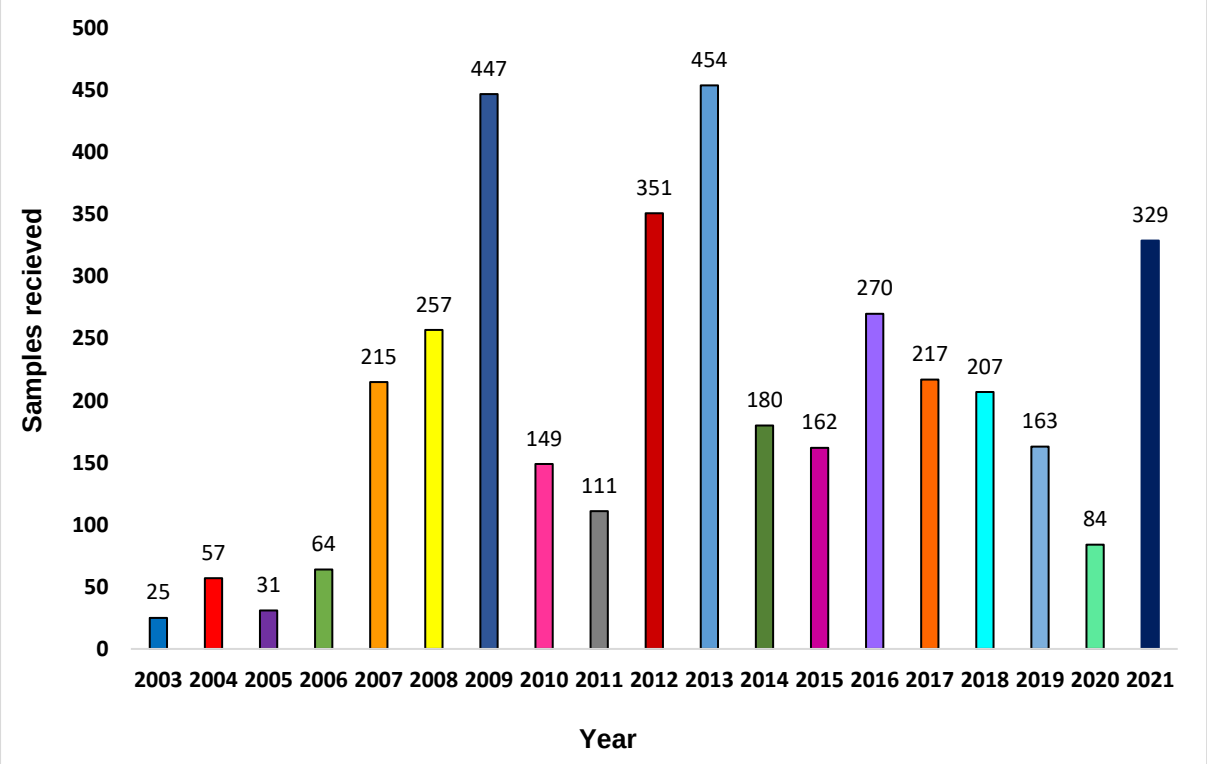

FIGURE 1.1: TOTAL NUMBER OF SAMPLES RECEIVED (2003-2021)

TABLE 1.1: THE TYPES OF BULK SAMPLES RECEIVED 2021

Bulk type	N	%
Cement	223	75.1
Cement roof/ sheet	24	8.1
Ceiling panel	23	7.7
Fascia board	14	4.7
Floor tile	6	2.0
Cement pipe	4	1.4
Fibrous material	2	0.7
Gutter	1	0.3
Total	297	

The number of samples that contained asbestos is displayed in Figure 1.2. Asbestos was identified in 185 (62.3%) of the bulk samples received, and four (12.5%) of the air filters received contained asbestos. The type(s) of asbestos identified per sample type are displayed in Table 1.2.

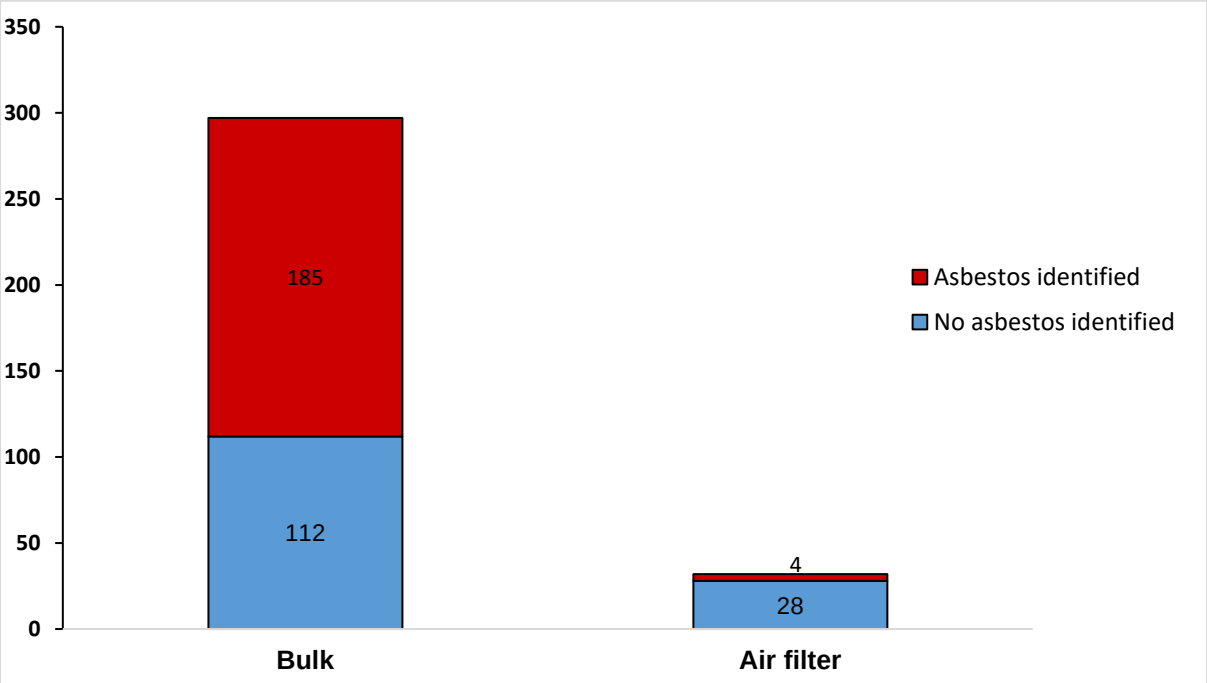

FIGURE 1.2: THE NUMBER OF SAMPLES THAT CONTAINED ASBESTOS PER SAMPLE TYPE 2021

TABLE 1.2: THE TYPES OF ASBESTOS IDENTIFIED PER SAMPLE TYPE 2021

Asbestos type	Bulk	Air filters
Chrysotile only	93	1
Crocidolite only	15	0
Amosite only	5	1
Chrysotile, crocidolite mixture	62	2
Chrysotile, actinolite mixture	3	0
Chrysotile, amosite, crocidolite mixture	2	0
Crocidolite, actinolite mixture	2	0
Chrysotile, crocidolite, actinolite mixture	1	0
Tremolite, actinolite mixture	1	0
Crocidolite, tremolite, actinolite mixture	1	0
Total	185	4

SECTION 2 – SAMPLE ORIGIN

Each sample is received with accompanying information including the country or provincial origin of the sample. Information regarding the sample's country of origin (Table 2.1) was available for all samples received. The provincial origins for the samples received from South Africa in 2021 are displayed in Figure 2.1 below.

TABLE 2.1: THE COUNTRY OF ORIGIN FOR SAMPLES RECEIVED IN 2021

Country of origin	Number of samples	%
Botswana	194	59
RSA	135	41
Total	329	

A majority were received from Eastern Cape (n=61, 45.2%) followed by Gauteng (n=37, 27.4%), Northern Cape (n=21, 15.6), Free State (n=7, 5.2%), Western Cape (n=5, 3.7%) then Mpumalanga (n=3, 2.2%). The least number of samples were received from the KwaZulu-Natal (n=1, 0.7%).

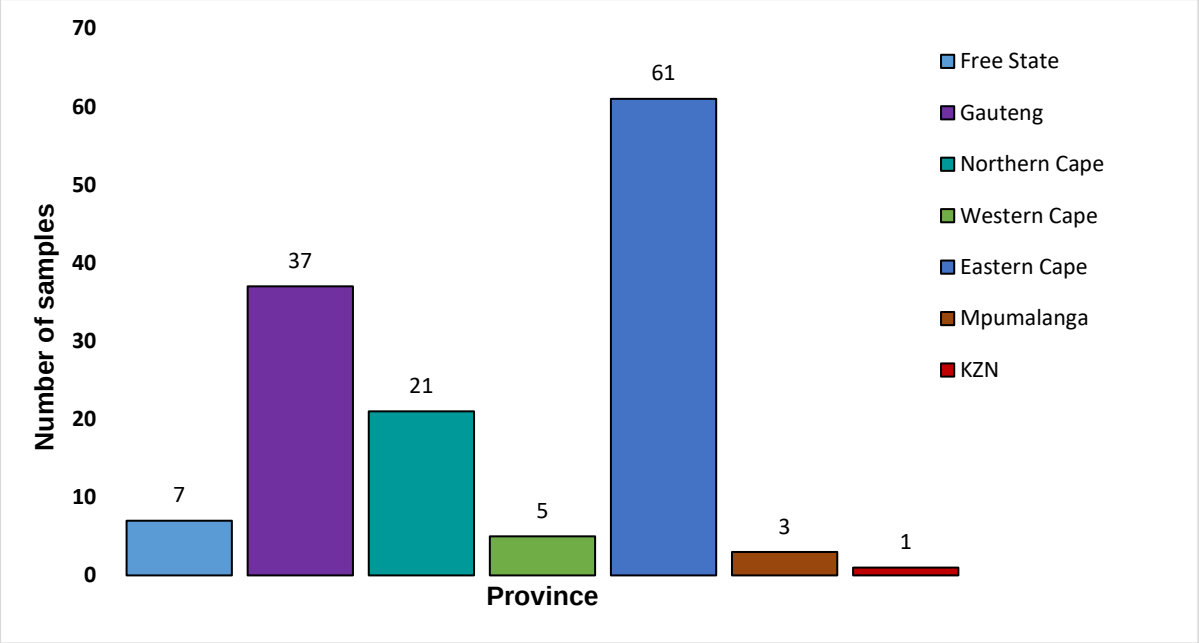

FIGURE 2.1: THE SOUTH AFRICAN PROVINCE FROM WHICH THE SAMPLES WERE RECEIVED 2021

SECTION 3 – INDUSTRY CLASSIFICATION OF SAMPLES

The industrial sector was assigned to each sample 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 2021

Industry classification	N	%
Mining and quarrying	37	11.3
Professional, scientific and technical activities	77	23.4
Construction	9	2.7
Manufacturing	5	1.5
Real estate activities	9	2.7
Public administration and defence; compulsory social security	192	58.4
Total	329	

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. All of the air filter samples were sent for monitoring (n=32, 100.0%) purposes. Most of the bulk samples were sent for inventory purposes (n=295, 99.3%).

TABLE 4.1: ACTIVITIES BEFORE, AT OR AFTER SAMPLE COLLECTION 2021

Activity	**Sample type**			
	Air filters	**%**	**Bulk**	**%**
*Air monitoring	32	100	-	-
Inventory	-	-	295	99.3
Renovation	-	-	2	0.7
Total	32	100	297	100

*Air monitoring includes, but is not limited to, the monitoring of asbestos landfill/waste sites, communities and clean ups.

ACKNOWLEDGEMENTS

We thank the following for their contributions to this report:

The NIOH Department of Occupational Hygiene

Zethembiso Ngcobo
Thembi Mashele
Kedibonye Kereeditse
Kerry Wilson
Deepna Govind Lakhoo

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:

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