Netherlands Food and Consumer Product Safety Authority
Ministry of Agriculture, Fisheries, Food Security and Nature

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To the Minister of Health, Welfare and Sport and the Inspector General of the Netherlands Food and Consumer Product Safety Authority

Advice from the director of the Office for Risk Assessment & Research

on asbestos in play sand

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Advice from BuRO[1]

Play sand can be contaminated with asbestos fibres, when extracted from sources that are geologically contaminated with asbestos. These asbestos fibres can be released during play, as a result of which children may inhale the fibres. Asbestos is a carcinogenic substance if inhaled. With the help of the RIVM, BuRO has investigated the health risks for children from playing with play sand contaminated with asbestos fibres.

The exposure of children playing with the different types of play sand is at or below the value associated with a negligible risk. However, for four specific products, the calculated worst-case exposure exceeds the limit value for the maximum allowable risk. Whether this exposure occurs in practice depends on how often and for how long this particular product was played with.

BuRO has issued the following advices.

To the Minister of Health, Welfare and Sport

- Ensure that for toys, which contain raw materials extracted from natural minerals, a legal requirement is set for the asbestos content. An appropriate quantitative method should be used for the determination of asbestos content.
- Inform parents that in general, the health risk from playing with different types of play sand is negligible. For the children who have been exposed to one or more of the 4 specific products of decorative sand, it is important to make a realistic estimate of the frequency and duration of play with this product and to compare this with the worst case assumptions of RIVM.

To the Inspector General of the NVWA

- Supervise entrepreneurs responsible for the safety of toys extracted from natural minerals, including toy sand.

Yours sincerely,

Prof. Dr. Dick T.H.M. Sijm
Director of the Risk Assessment & Research Office

[1] In a previous version of this document the term 'kinetic sand' was used as descriptive designation of a category of toy sand products. This term has been replaced in the revised version by 'modelling sand'. This is an editorial revision; the conclusions and findings are substantively unchanged.

Introduction

In November 2025, there was an incident with play sand containing asbestos in Australia and New Zealand, which was found to originate from China. As a result of this case, the Human Environment and Transport Inspectorate (ILT) informed the Netherlands Food and Consumer Product Safety Authority (NVWA) about this issue and together they started an investigation. On February 4, 2026, the research of the newspaper Algemeen Dagblad (AD) made the news. According to the AD, 6 of the 12 types of play sand examined on the Dutch market contain too much asbestos. On February 6 2026, the NVWA decided to escalate to an incident given the potential risk to public health and because children in particular would have been exposed to the play sand. After the media attention, there was a lot of unrest among users and sellers of the play sand. Several sellers have removed the play sand from the market and many users, such as schools, have stored the sand or disposed of it as chemical waste[2].

Research question and answer

A research question has been asked to Office for Risk Assessment & Research (BuRO) by the NVWA. This will be answered below. The substantiation of this answer is found in the remainder of this advice.

What are the public health risks of play sand with asbestos?

Exposure to asbestos fibres by playing with different types of play sand has been modelled by the National Institute for Public Health and the Environment (RIVM) on the basis of worst-case assumptions, namely that children have been regularly exposed to contaminated products for 7 years (sandbox sand) or 13 years, both at schools and childcare centres and at home. This exposure at all exposure moments has been added up and averaged over a lifetime of 75 years for comparison with the reference values. Children do not play exclusively with sand with the highest content, but with different types of play sand. The variation in the level of asbestos found ensures that the estimated lifetime-average exposure is below or around the level for a negligible risk. The health risk associated with playing with sand is therefore negligible.

Two of the 10 samples of sand-filled toys and 4 of the 45 samples of decorative sand examined had an asbestos content higher than the general legal limit of 0.1% by weight. For the 2 samples of sand-filled toys, the health risk from the release of asbestos fibres is estimated to be negligible. For the 4 samples of decorative sand, lifetime-averaged exposure estimated by RIVM is higher than the maximum allowable risk level. This is calculated according to a worst-case scenario in which children play with these products alone for years at a time. For these 4 products, there is a potential health risk for children. In practice, this will almost certainly not occur. A child will have played with these specific products less frequently and for shorter periods than the worst-case assumptions, making it plausible that the estimated lifetime-average exposure remains below the maximum allowable level of risk.

Approach

The NVWA and ILT have jointly set up a framework for sampling play sand. This was done on the basis of an analysis of the Dutch market. Subsequently, a strategy was drawn up together with the RIVM for laboratory analyses that can serve as a basis for a risk assessment. This is mainly based on a previous BuRO advice on the risks of asbestos in talc-containing cosmetic products (BuRO, 2018). The analyses were carried out by an external laboratory, SGS Search in Heeswijk. RIVM was asked to carry out a risk assessment, based on the research question 'Is there a health risk for children when they play or come into contact with asbestos contaminated play sand' (RIVM, 2026a).

The analytical strategy aims to obtain a classification of the percentage by weight and identification of the asbestos in the play sand by means of an initial screening. In the event of a positive result, those samples were then quantitatively examined for the asbestos content in the play sand.

[2] Steeds meer speelzand teruggeroepen, NVWA breidt onderzoek uit

BuRO has asked the Netherlands Organisation for Applied Scientific Research (TNO) to carry out an assessment of the analytical methods used for suitability for the determination of the asbestos content in play sand (Arzoni & Tromp, 2026).

The advice was subjected to an external peer review.

Findings

Hazard inventory

- This risk assessment is limited to asbestos fibres in play sand. Different types of play sand are distinguished, based on playing location, playing behaviour, but also on stickiness of the sand:
  - (Squeeze) toys filled with sand, this sand is not meant to be released.
  - Decorative sand for arts and crafts
  - Cohesive modelling sand, clay-like material
  - Semi-cohesive modelling sand, sticky material still falling apart
  - Sandbox sand
- Six different types of asbestos are distinguished: chrysotile (serpentine asbestos); and anthophyllite, crocidolite, amosite, tremolite and actinolite (amphibole asbestos).

Hazard characterisation

- Asbestos is a natural mineral and has been used since ancient times in, among other things, pottery, shrouds and lamp pits. Since the end of the 19th century, asbestos has been used industrially and its mining and application have increased enormously. Since 1993, the use of asbestos has been banned in the Netherlands and in the European Union since 2005. Because it occurs naturally in the environment and because of the applications of asbestos in the past, an average background exposure of 35 fibres/m^3 (measured in 2016) has been measured in the Netherlands.
- Asbestos can cause several types of cancer, including lung cancer and mesothelioma (asbestos cancer). In addition, exposure to asbestos is associated with larynx cancer, ovarian cancer, throat cancer, stomach cancer and colon cancer. The International Agency for Research on Cancer (IARC) states that all forms of asbestos are proven to be carcinogenic to humans.
- The Health Council of the Netherlands has set so-called risk limits for asbestos: the maximum allowable risk level (MTR) and the negligible risk level (VR), based on the toxicological endpoints mesothelioma and lung cancer together. For amphibious asbestos fibres, the MTR is 300 fibres/m^3 and the VR 3 fibres/m^3.
- According to EU legislation (REACH Regulation (EC) No 1907/2006), asbestos may not be intentionally added to products. For toys, it is assumed that this is a non-intentional contamination. For toys, there is no specific legal requirement for asbestos. However, the generic limit value of 0.1% by weight applies to carcinogens in toys. In addition, toys should not pose a health risk to children when playing.

Method of analysis

- NEN 5896:2003 is a qualitative method for determining asbestos in various matrices using light microscopy. The method is useful for identifying and estimating the content of asbestos in products. Due to the high inaccuracy and the too high detection limit, this method is not suitable for quantitative determination of asbestos in play sand.
- VDI 3866 part 5: 2017 is considered by TNO to be the most suitable method to use in addition to NEN 5896:2003 for the quantitative determination of the asbestos content. Asbestos fibres and fibre structures are measured using electron microscopy at various magnifications and converted into a mass, from which the 'weighted' content of asbestos is calculated.
- For the different types of play sand, TNO has made proposals for suitable pre-treatment methods, in order to increase the sensitivity of the method.
- It is not known whether the asbestos fibres are homogeneously distributed within play sand products of the same batch and even in one sample of play sand. The NVWA surveillance is at the product level, as it is also offered to the consumer. SGS Search visually checked the play sand samples for homogeneity and also compiled a representative sub-sample for asbestos content analysis.

Exposure estimate

- In February 20026, a total of 106 different samples of play sand was sampled by the NVWA: sandbox sand (n=16), decorative sand (n=45), semi-cohesive modelling sand (n=15), cohesive modelling sand (n=20) and sand-filled toys (n=10). These samples were analysed by SGS Search for asbestos. Asbestos fibres of chrysotile, actinolite, anthophyllite and tremolite have been found in the play sand. Tremolite (amphibole asbestos) was the most commonly found. In the majority of these samples (94%), no asbestos was detectable according to NEN 5896:2003 (62%), or lower than the applied limit value of 0.1% by weight according to VDI 3866 Part 5: 2017 (32%). For 2 samples of sand-filled toys and 4 samples of decorative sand, the content was higher than this limit value. The highest measured content was 0.42 % by weight, i.e. decorative sand.
- With these results, RIVM then modelled the exposure of children to asbestos fibres by playing with play sand. A distinction has been made between the different types of play sand. Based on worst-case assumptions, the maximum exposure per type of play sand has been calculated. This worst-case calculation assumes intensive playing with sand over a long period of time (7 to 13 years) and with a high weekly frequency. This has been converted to a lifetime-average exposure, so that the values can be compared with the VR and MTR. The calculated lifetime-average exposure varies by type of play sand from 0.012 fibres/m^3 for sand-filled toys to 3.4 fibres/m^3 for decorative sand. Asbestos was not found in any of the sampled products cohesive modelling sand, on this basis no exposure to asbestos is expected for these products.
- For the 4 samples of decorative sand with a content higher than 0.1 % by weight, RIVM calculated the lifetime-average exposure for each individual sample, based on worst-case assumptions. The calculated lifetime-average exposure for these 4 products ranges from 460 to 840 fibres/m^3.
- For sand-filled toys, there is exposure to asbestos fibres only if the toy ruptures and the sand is released. This will happen incidentally. It is a relatively small amount of sand and it is a short-term exposure. For the 2 samples of sand-filled toys, with an asbestos content exceeding 0.1 % by weight, the lifetime-average exposure calculated in the worst case was 2.6 fibres/m^3.

Risk characterisation

- To characterise the health risk, the calculated exposure is compared with the VR and MTR, respectively 3 and 300 fibres/m^3. The background exposure in the Netherlands should also be taken into account. The average level in the air was 35 fibres/m^3 (of which 29% amphibole fibres) with a variation of less than 30 to 81 fibres/m^3 (measured in 2016).
- Lifetime-averaged exposure calculated by RIVM for the different types of play sand ranges from 0 to 3.4 fibres/m^3. This is in order of the VR or lower. This means that the health risk of exposure to asbestos fibres from playing with play sand is negligible.
- Specifically for the 4 samples of decorative sand with an asbestos content higher than 0.1 % by weight, the calculated lifetime-average exposure is higher than the MTR. This means that there is a potential health risk for these 4 products based on worst-case assumptions.
- For these 4 products, the lifetime-average exposure has been calculated on the basis of worst-case assumptions, that a child has been regularly exposed to contaminated products on a weekly basis for 13 years, both at school, shelters and at home. When a child has played with this specific product less frequently and/or for shorter time in practice, it is likely that the lifetime-average exposure is lower than the MTR and the health risk is acceptable.
- For the 2 samples of sand-filled toys with an asbestos content higher than 0.1 % by weight, the calculated lifetime-average exposure is lower than the VR. The health risk is therefore negligible.

Uncertainty analysis

- For children, it is assumed that they have the same sensitivity to asbestos as adults. However, due to the long latency period of asbestos cancer, exposure at a young age may increase the risk.
- Only the inhalation route of exposure has been assessed. It is generally assumed that this is the main route of exposure.
- Based on information on the internet, an overview of the market has been made. The sampling proposal is based on this, with each brand appearing once in each type of play sand. Not all products were available at the time of sampling. It is uncertain whether the sampling was

representative of the play sand that children have played with in recent years. In addition, there may also be a variation of asbestos content within a batch of products and it may be that the sample examined was not representative of the batch of this product.
- There are no data on the release of asbestos fibres from play sand as a result of playing with this sand. This has therefore been estimated on the basis of previously published experiments carried out by TNO with regular sand contaminated with asbestos.
- The fibre dimensions have not been taken into account in the risk assessment. It is generally believed that fibres larger than 5 µm can lead to serious effects such as mesothelioma. However, the VR and MTR is also based on the total number of fibres.
- It is not known how the released asbestos fibres behave in a room. This strongly depends on air circulation, the size of the room, ventilation, precipitation of the fibres and cleaning of the room. Worst case assumptions have been made for this.
- It is assumed that children play with play sand both at home, at school and at the childcare centre. This is added together to calculate the total lifetime-average exposure to one type of play sand. Exposure to asbestos fibres due to other children playing with play sand in the same room has been taken into account. However, the aggregate exposure from playing with different types of play sand is not included.
- RIVM has also made worst-case assumptions about the exposure period, the frequency of play, the amount of sand played simultaneously, the amount of time spent daily in an asbestos-contaminated living room and class room.

Conclusions

- Most of the play sand investigated complied with the general limit for carcinogens in toys of 0.1% by weight. Of the 106 samples examined, a total of 6 samples had a content higher than 0.1 % by weight. The highest asbestos content in play sand was 0.42% by weight (decorative sand).
- NEN 5896:2003 is not suitable for the quantitative determination of asbestos content in play sand. At present, VDI 3866 part 5: 2017 is best used for this.
- The lifetime-average exposure to asbestos fibres by playing with play sand, calculated by RIVM, is worst case. This calculated lifetime-average exposure is lower than or around the negligible risk of 3 fibres/m^3 for all types of play sand. Taking into account the average background exposure in the Netherlands of 35 fibres/m^3 and the fact that this estimated lifetime-average exposure does not or hardly exceeds the level of negligible risk, the health risk of exposure to asbestos fibres by playing with play sand is considered to be negligible.
- For 4 samples of decorative sand, where the asbestos content was higher than 0.1 % by weight, lifetime-averaged exposure has been calculated for each individual sample. RIVM has calculated that in a hypothetical worst-case scenario in which children would only play with these products for 13 years, the lifetime-average exposure is higher than the maximum allowable risk. There is therefore a potential health risk for these 4 products.
- In practice, children will play with this specific decorative sand less often and/or shorter than the worst case assumptions of RIVM. It is plausible that the lifetime-average exposure for the individual child will be lower than the maximum allowable risk and the health risk for the individual child is therefore acceptable.
- For 2 samples of sand-filled toys with an asbestos content higher than 0.1 % by weight, the calculated lifetime-average exposure remains below the negligible risk and the health risk is considered negligible.
- Based on this sampling and this assessment, the generic limit of 0.1% by weight of asbestos fibres in play sand appears to be protective for children’s health.
- Asbestos can be naturally present in minerals and is most likely not intentionally added to play sand. Companies and authorities cannot test toys for all possible contaminants. By setting a legal requirement for asbestos in toys containing minerals, it is ensured that companies and authorities do check the toys for this.

Substantiation

Contents

1 Introduction

Sand is a natural material and consists of grains: very small pieces of stone. Sand is extracted from rivers, dunes or grooves and is then stripped of impurities, shells and twigs. Asbestos occurs naturally in rocks and rocks. Inadvertently, asbestos can end up in sand during extraction.

Sand specifically intended for children to play with is called play sand. Play sand for outdoors, for example sandbox sand, consists entirely of sand. In most cases, indoor play sand consists of 98% sand and 2% additions[3]. Those additives, such as glycerol, dimethicone or polyisobutene, ensure that the sand stays soft and somewhat sticky. Sometimes there is food colouring in play sand to give it an attractive colour.

In November 2025, there was an incident with play sand containing asbestos in Australia and New Zealand, which was found to originate from China. As a result of this case, the Human Environment and Transport Inspectorate (ILT) informed the Netherlands Food and Consumer Product Safety Authority (NVWA) and together they started an investigation. On 4 February 2026, an investigation by the newspaper Algemeen Dagblad (AD) made the news. According to the AD, much of the play sand on the Dutch market also contain too much asbestos. On February 6 2026, the NVWA decided to escalate to an incident in view of the potential risk to public health and because it concerns children in particular. After the media attention, a lot of unrest arose among users and sellers of the play sand. Several sellers have removed the play sand from the market and many users, such as schools, have stored the sand or disposed of it as chemical waste[4].

The NVWA has asked the Office for Risk Assessment & Research (BuRO) the following question:

What are the public health risks of play sand with asbestos?

2 Approach

2.1 Sampling

The AD investigation involved 12 samples of indoor play sand, such as sand in sand tables and decorative sand. The NVWA wanted to expand the research: a broadening to all types of play sand, both indoors and outdoors, and also a larger number of samples. Based on information on the internet, an overview of the market was made and a sampling proposal was made, where each brand occurs once within one of the following types of play sand:

- (Squeeze) toys filled with sand, this sand is not meant to come free.
- Decorative sand for arts and crafts
- Cohesive modelling sand, clay-like material
- Semi-cohesive modelling sand, sticky material still falling apart
- Sandbox sand

These types of play sand are distinguished because of the location where they are played with, such as at home, at school / shelter, inside or outside, the way in which the product is played with and the difference in stickiness.

The products were sampled by NVWA inspectors in February 2026. A total of 106 samples had been examined by 25 March 2026. These 106 results were used for this risk assessment. All results are made public and if a legal limit was exceeded, enforcement took place by the NVWA.

2.2 Analysis

Before the start of the investigation, the National Institute for Public Health and the Environment (RIVM) was consulted which research data they need to carry out a risk assessment. RIVM indicated that they need the type of asbestos fibre and its percentage by weight.

The samples of play sand were examined for asbestos fibres by an external laboratory: SGS Search (Heeswijk). For samples that consisted of multiple colours of play sand, a mixed sample was made. SGS first examined the samples with stereomicroscopy to see if any suspicious fibres or particles

[3] https://waarzitwatin.nl/producten/speelzand
[4] Steeds meer speelzand teruggeroepen, NVWA breidt onderzoek uit

were visible at that magnification. It was also assessed whether the sample was homogeneous. All samples were tested according to NEN 5896:2003[5] for the presence of asbestos fibres and the type of asbestos was identified.

Samples in which asbestos fibres were visibly present were then examined according to VDI 3866 Part 5: 2017[6]. SGS Search spread the original sample in a container and took small subsamples at around 15 different locations. These subsamples were then mixed manually, from which a quantity was weighed to be examined via VDI 3866 Part 5: 2017. The samples were pre-treated by ashing at 450°C and then suspended. Part of this suspension was filtered and analysed using scanning electron microscopy (SEM).

SGS Search is accredited by the Dutch Accreditation Council for the determination of asbestos in products in accordance with NEN 5896:2003 and VDI 3866 Part 5: 2017. See also 5. Analysis of asbestos in play sand for a more detailed description of these methods.

The analytical results of all sampled play sand are made public by the NVWA.

2.3 Interpretation of analytical results

For more insight into the methods used and for a correct interpretation of the analytical results, BuRO asked the Netherlands Organisation for Applied Scientific Research (TNO) to give an opinion on the following questions (Arzoni & Tromp, 2026):

1 A statement regarding the determination of asbestos content according to NEN 5896 and VDI 3866-5: can we assume that, when following the standard, the VDI determination represents the most accurate value of the weight percentage of asbestos in a sample?

2 A review and interpretation of the available measurement results from the analyses of the samples taken by the NVWA. To this end, NVWA will submit the raw analysis results from the external laboratory to TNO, together with information on sample preparation and sampling, insofar as this is not clear from the analysis certificates and standards.

3 A general description of the framework of standards used for determining the content of asbestos (NEN 5896, NEN 5898, VDI 3866 (part 5 in particular), NEN ISO 22262-2, NEN ISO 16000-27 and possible other standards), including:

   a) an indication of the suitability of these standards for specific purposes;

   b) a description of the similarities and differences between the analyses described in the standard;

   c) a description of the possible (significant) differences in the results of these methods (i.e. asbestos weight percentage);

   d) a description of any shortcomings of the analyses and the value of the various standards in determining exceedance of the limit value of 0.1 weight percent asbestos.

4 The best available analysis for the quantitative determination of asbestos content in a sand sample, across the entire range of available quantities of packaged play sand (in practice from 200 grams to 25 kilograms).

5 Specific question regarding batch size, sampling and analysis: How does TNO view the theoretical possibility that, even within the same batch code, there may be variations in asbestos content between individual 200 g packs? In other words: is a single package of 200 g representative of an entire batch (code) of play sand, or would it better test five combined packages from the same batch? How does TNO view these same questions when it comes to larger packages, for example 25 kg?

6 A review of the methods that manufacturers/importers can use to obtain an asbestos-free declaration.

[5] NEN 5896:2003. Kwalitatieve analyse van asbest in materialen met polarisatiemicroscopie.
[6] VDI 3866 Part 5. June 2017. Determination of asbestos in technical products. Scanning electron microscopy method.

2.4 Risk assessment

BuRO asked RIVM to carry out a risk assessment (RIVM, 2026a). The results of the SGS Search lab study were used by RIVM for this risk assessment.

BuRO asked RIVM the following research questions:

1 What are the relevant routes of exposure for children to asbestos fibres in play sand?

2 What is the estimated exposure to asbestos fibres of children playing with play sand?

   a. Is it possible to make a difference in age groups?
   b. Is there a difference between types of play sand?
   c. How does this compare to other types of sand, such as sandbox sand?

3 What is the health risk for children when they play with play sand?

2.5 Scope

This risk assessment is limited to the health risks that can arise for children from playing with play sand that is contaminated with asbestos. The health risk for workers, for example at nurseries and schools, is not included in this advice. Also other possible substances, micro-organisms or parasites that may be present in play sand are not included.

On behalf of the Ministry of Social Affairs and Employment, RIVM has drawn up a separate risk assessment for workers (RIVM, 2026b).

3 Hazard inventory

This risk assessment is limited to asbestos. Asbestos is a nomenclature for a group of fibrous metamorphic naturally occurring minerals, which, due to their properties such as resistance to fire, heat, corrosion and electricity, are mined and have historically been used in various industrial sectors (Curado et al., 2024).

Asbestos is a (silicate) mineral. The REACH Regulation (EC) No 1907/2006[7] distinguishes a total of six types of asbestos:

- chrysotile (CHR, white asbestos)
- anthophyllite (ANT, yellow asbestos)
- crocidolite (CRO, blue asbestos)
- amosite (AMO, brown asbestos)
- tremolite (TRE, grey asbestos)
- actinolite (ACT, green asbestos)

Serpentine asbestos, whose best-known form is chrysotile, is a mineral mainly made up of flexible, curved fibres, and has been commonly used in the past in asbestos cement applications such as roof slabs, roof tiles, water pipes, curbs and siding (Curado et al., 2024).

Amphibole asbestos includes the other free asbestos species (anthophyllite, crocidolite, amosite, tremolite and actinolite). These types of asbestos are characterized by straighter and more rigid fibres compared to chrysotile. Crocidolite, in particular, is notable for its strength and durability, but it is also considered the most dangerous to human health due to its fineness and the ease with which its fibres can be inhaled (Curado et al., 2024).

The different types of asbestos generally consist of fibres that are very difficult to break, but easily split in the longitudinal direction. The physical structure of a substance determines its properties (as is also seen for carbon, which can form graphite, carbon fibres and diamonds with completely different properties). Not all forms of asbestos are fibrous: a mineral such as tremolite, which is found in some products, can also have a form other than a fibrous structure; that is called non-

[7] Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. OJ L 396, 30.12.2006, pp. 1–849.

asbestiform tremolite. Only (electron) microscopic (with X-ray microanalysis, RMA) examination of samples after a specific pre-treatment, in combination with information on the chemical composition, can provide conclusive information on the nature and amount of the contamination.

4 Hazard characterisation

4.1 (Historical) use of asbestos and background values

Asbestos was already used in ancient times in pottery, shrouds and lampshades. Modern industrial use began around 1880 and since 1910 the mining and application have increased enormously. Around 1900 world production was about thirty thousand tonnes per year; in 1975 it peaked at about five million tonnes per year, see Figure 1 (Gezondheidsraad, 2010).

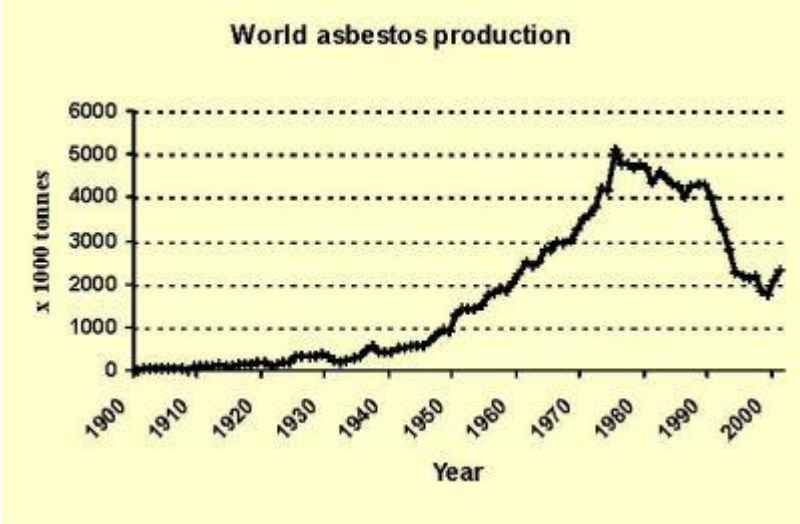

Figure 1: World production of asbestos from 1900 to 2002 (Gezondheidsraad, 2010)

More than 90% of asbestos applications are chrysotile (white asbestos); this type of asbestos is cheap and this fibre is the most flexible. Amosite (brown asbestos) is mainly used for insulation purposes and fire protection, and crocidolite (blue asbestos) in insulation and asbestos cement products. According to the Health Council of the Netherlands, these are the common uses of asbestos (Gezondheidsraad, 2010;2024):

- Corrugated roofing on barns
- Facade cladding
- Vinyl flooring underlay
- Planters
- Window sills
- Insulation material in old electrical appliances (such as toasters, hairdryers, irons)
- Spray coatings on steel structures
- Brake linings
- Clutch plates
- Partition walls and ceilings
- Insulation around boilers
- Fire-resistant board
- Asbestos textiles (fire blankets, welding blankets, gloves, etc.)
- Water pipes

The use of asbestos has been banned in Europe: in the Netherlands since 1993 and in the European Union since 2005. According to the World Health Organisation (WHO), more than 50 countries have completely banned asbestos (WHO, 2001). These countries oppose the controlled use of asbestos because scientific studies have not established a minimum level at which its handling and consumption would not cause damage to health and the environment. However, mines are currently operating in countries including South Africa, Russia, Brazil, Kazakhstan, Zimbabwe, and China (Curado et al., 2024).

Asbestos occurs naturally in the environment, so it is also present in the open air. In addition, the various applications of asbestos in the past (e.g. weathering of asbestos roofs) also contribute to the background concentration of asbestos in the Dutch outdoor air. In 2016 TNO carried out outdoor asbestos fibre concentration measurements at seven relevant measurement sites (TNO, 2016). Under worst-case conditions (low to no precipitation with moderate winds), asbestos concentration measurements were carried out that give an indication of the background concentration of asbestos in the open air. An important conclusion from the accompanying TNO report is that the measured nominal asbestos fibre concentrations in the outside air are low. Most of the asbestos fibres found (71%) are chrysotile (serpentine asbestos). In addition, fibres of crocidolite (25%) and amosite (4%) have also been found, both amphibole asbestos.

Figure1 shows the measured average asbestos fibre concentration for different measurement periods: the total and the concentration of asbestos fibres greater than 5 µm (TNO, 2018). Over the years, several asbestos bans have come into force that have contributed to the visibly decreasing asbestos fibre concentration in the outdoor air. This concerns the ban on blue asbestos and spray asbestos (1978), the ban on asbestos-containing brake linings (1991) and the total ban on asbestos-containing products (1993).

The average asbestos fibre concentration over the seven measuring sites is 35 fibres/m^3, with a range of less than 30 to 81 fibres/m^3 (TNO, 2018).

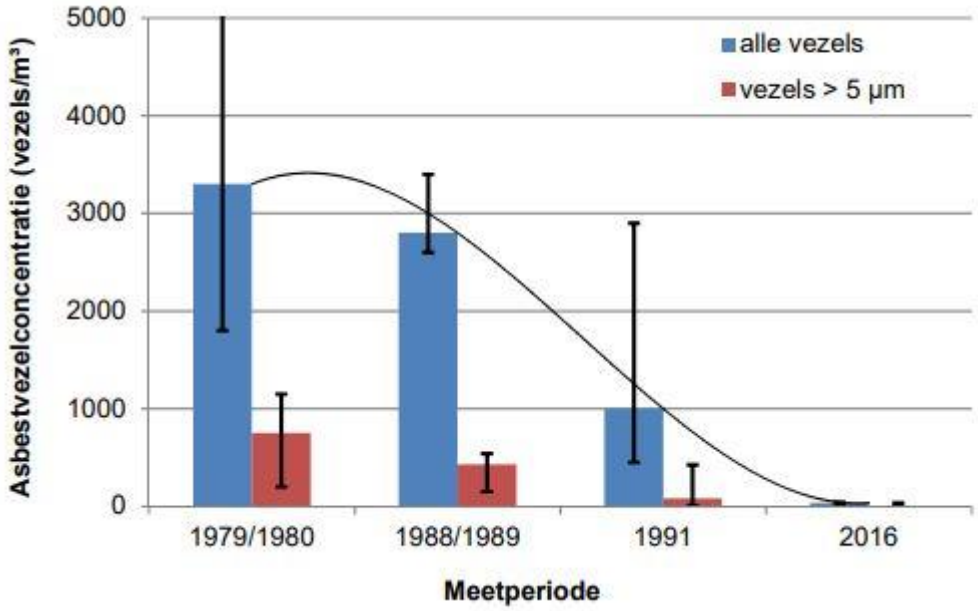

Figure1: The asbestos fibre concentration in 2016 compared to previous measurement periods (the black line shows the trend for the decrease in background concentration) (TNO, 2018)

4.2 Health effects of asbestos

Extensive epidemiological research on asbestos has been carried out. The associations between asbestos exposure, lung cancer, and mesothelioma (asbestos cancer) have been well established in numerous epidemiological investigations (IARC, 2012). In addition, a positive association has been observed with cancer in the cancer in the larynx, ovaries, throat, stomach, and colon. The International Agency for Research on Cancer (IARC) further states that all forms of asbestos are proven human carcinogens.

The degree of penetration into the lungs is determined by the fibre diameter, with thin fibres having the greatest potential for deep lung deposition. Long, strong and thin asbestos fibres (length greater than 5 µm, with a ratio of length and thickness of at least 3:1) cannot be drained properly from the lungs after inhalation and can therefore, often after decades, lead to serious effects such as mesothelioma (cancer that develops in a membrane, usually in the thin layer covering the lungs).

Inhaled asbestos fibres can reach the smallest airways and alveoli. There, provided they are not too large, they are absorbed by macrophages (Gezondheidsraad, 2010). Macrophages are a type of white blood cell that detects, destroys and cleans up pathogens. Fibres that are too large for the macrophages can migrate into the tissue. Coughed up fibres can be swallowed, after which they leave the body through the intestinal system. However, they can also pass through the tissues via the lymphatic vessels and thus end up in places far away from the lungs (Gezondheidsraad, 2010). Different then for lung cancer, mesothelioma has strong evidence of a clear difference in carcinogenic potential between chrysotile and amphibole asbestos (Gezondheidsraad, 2010).

4.3 Risk limits

Asbestos is a carcinogenic substance. The exact mechanism of asbestos carcinogenesis is not known. The probability of this increases with the total amount of asbestos fibres inhaled, usually expressed as cumulative exposure.

In the Netherlands, the Health Council has calculated risk values for asbestos (Gezondheidsraad, 2010). A risk value is an exposure level (a concentration in the air) that corresponds to a predetermined (by the government) additional chance of the occurrence of cancer as a result of that exposure. Epidemiological and animal experimental data are analysed for the calculation of risk values (Gezondheidsraad, 2012) .

For substances in the environment, such as asbestos, two risk limits play a role: the maximum allowable risk level (MTR) and the negligible risk level (VR). For genotoxic carcinogens, a certain (policy-based) allowable probability of the specific tumour occurring after exposure to the carcinogen has been chosen.

In asbestos risk analyses, a concentration is calculated that corresponds to the probability of developing mesothelioma or lung cancer (later in life) with lifetime exposure. It can be deduced from the policy memorandum 'Omgaan met risico's' (Dealing with risks) (Tweede Kamer, 1988-1989) that a chance of dying from cancer of 1 in 10,000 (10^4), with lifetime exposure, corresponds to the MTR in terms of policy. Since the VR is defined as 100 times lower than the MTR, the VR corresponds (policy-wise) to a probability of 1 in a million (10^6), at lifetime exposure (Gezondheidsraad, 2010).

The Health Council of the Netherlands has formulated MTR and VR values based on the endpoints of mesothelioma and lung cancer together. The difference in potency between chrysotile and amphibole asbestos for the endpoint mesothelioma has been taken into account by breaking down the values by asbestos type and a mixed form (chrysotile, amphibole and mixed chrysotile with up to 20% amphibole). The values are shown in Table1 and apply to lifetime exposure expressed in fibres per m^3 measured by transmission electron microscopy (TEM) or SEM.

Table1: MTR and VR values in number of asbestos fibres/m^3 (Gezondheidsraad, 2010)

	Chrysotile	Mixed exposure to chrysotile and up to 20% amphibole	100% amphibole
MTR (1 in 10,000)	2800	1300	300
VR (1 in a million)	28	13	3

4.4 Legislation

4.4.1 REACH Regulation

At EU level, asbestos is regulated by the REACH Regulation (EC) No 1907/2006. REACH stands for Registration, Evaluation, Authorisation and Restriction of Chemicals. This Regulation regulates the production of and trade in chemicals to protect human health and the environment.

REACH Regulation, Annex XVII, entry 6, prohibits the manufacture, placing on the market and use of asbestos fibres and of articles and mixtures to which certain asbestos fibres have been intentionally added. This applies to crocidolite, amosite, anthophyllite, actinolite, tremolite and chrysotile. These fibres are classified as carcinogen 1A (and STOT RE cat 1), with no specific

concentration limit. The generic classification limit for carcinogenic substances category 1A is 0.1 % by weight.

Asbestos fibres can end up in sand because the sand is extracted from mines where asbestos fibres are naturally present in the ground or in the soil or in rocks, or through contamination from the use of asbestos-containing equipment (see also 5.3.3 Sampling strategy). It is highly unlikely that asbestos fibres are added intentionally.

4.4.2 General Product Safety Regulation

In the EU, consumer products, including play sand, are subject to so-called essential safety requirements set out in the General Product Safety Regulation (EU) 2023/988[8]. Only safe products may be placed on the market. A safe product is defined in this Regulation as follows:

'A product which, under normal or reasonably foreseeable conditions of use, including the actual duration of use, does not present any risk or only the minimum risks compatible with the product's use, considered acceptable and consistent with a high level of protection of the health and safety of consumers.'

This Regulation does not lay down specific requirements for asbestos fibres.

4.4.3 Toy Safety Directive

For toys there is also specific legislation in the EU: namely the Toy Safety Directive 2009/48/EC[9]. Article 10 of this Directive lays down an essential safety requirement for toys: toys, including the chemicals they contain, shall not jeopardise the safety or health of users or third parties when they are used as intended or in a foreseeable way, bearing in mind the behaviour of children.

Point 3 of Chapter III of Annex II to the Toy Safety Directive 2009/48/EC states that substances classified as carcinogenic, mutagenic or toxic for reproduction categories 1A, 1B or 2 under Regulation (EC) No 1272/2008[10] shall not be used in toys, in components of toys or in micro-structurally distinct parts of toys. This does not apply if the levels of these substances are lower than the classification limits as carcinogenic, mutagenic or reprotoxic, or if these substances are present in parts of the toy that are inaccessible to children (Section 4, Chapter III, Annex II of the Toy Safety Directive).

Asbestos is prohibited in toys at contents higher than the classification limit for substances classified as carcinogenic category 1A (0.1%).

For play sand, therefore, no more than 0.1% by weight of asbestos may be present. In addition, there should be no health risk when children play with it. To test this limit, it is necessary to carry out a risk assessment.

5 Analysis of asbestos in play sand

All play sand samples have been analysed in accordance with NEN 5896:2003. Samples in which asbestos was found were then analysed in accordance with VDI 3866 part 5:2017. Below is a brief description of both methods.

TNO has, on behalf of BuRO, assessed the available methods for suitability for asbestos analysis in play sand (see 2.3 Interpretation of analytical results) (Arzoni & Tromp, 2026). In addition to this assessment, TNO also looked at the sample pre-treatment and sampling strategy.

[8] Regulation (EU) 2023/988 of the European Parliament and of the Council of 10 May 2023 on general product safety, amending Regulation (EU) No 1025/2012 of the European Parliament and of the Council and Directive (EU) 2020/1828 of the European Parliament and the Council, and repealing Directive 2001/95/EC of the European Parliament and of the Council and Council Directive 87/357/EEC. OJ L 135, 23.5.2023, pp. 1–51.
[9] Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys. OJ L 170, 30.6.2009, pp. 1–37 .
[10] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. OJ L 353, 31.12.2008, pp. 1–1355.

5.1 NEN 5896:2003

NEN 5896:2003 is a qualitative method for analysis of asbestos in various matrices using light microscopy. The method is useful for identifying and estimating the content of asbestos in products. With this method it is possible to distinguish asbestos from other fibrous constituents and also to determine the type of asbestos. The content is estimated by comparison with reference materials with a known composition. The method is suitable for a concentration range from 0.1 to 100 % by weight of asbestos. Results are reported in weight classes:

- Samples showing no asbestos are reported as <0.1%.
- Samples showing asbestos at a certain magnification, or where a very limited number of fibres are seen on an image, are reported as 0.1% –2%.
- Samples that rapidly detect asbestos are reported as 2%-5%.

5.2 VDI 3866 part 5: 2017

This standard describes a method for SEM for the quantitative detection of asbestos in technical products with an asbestos content of at least 1%.

Sample pre-treatment takes place, during which interfering substances are removed. The material is then suspended in a liquid. A known amount of this suspension is filtered over a gold-coated Nuclepore filter and examined with SEM. The detected asbestos fibres and fibre structures are measured at various magnifications and converted to a mass, from which the 'weighted' concentration is calculated.

5.3 TNO's opinion on the determination of asbestos in play sand

TNO has, on behalf of BuRO, assessed the methods for suitability for the determination of asbestos in play sand (Arzoni & Tromp, 2026). Most common analytical standards are designed for bulk materials with relatively high asbestos content (> 0.1% by weight). These levels are easily detectable with a light microscope. When asbestos levels are below this range, additional pre-treatment steps are needed to increase sensitivity. The sensitivity can also be increased by the use of electron microscopy, because thin, short fibres can be observed at low concentrations.

In addition, TNO has investigated which pretreatment is most suitable for the different types of play sand.

TNO also has made statements about the homogeneity of asbestos fibres in play sand.

5.3.1 Analytical methods

NEN 5896:2003 is suitable and intended for the identification and estimation of the asbestos content of products containing a macro quantity of asbestos, such as construction and insulation materials, to which asbestos has been intentionally added during the production process. Quantification in NEN 5896:2003 is based on a visual estimate of the percentage by weight of asbestos and is not considered accurate by TNO.

The detection limit of this method is 0.1% by weight according to the standard. This means that when asbestos is observed it is classified at least in the range of 0.1-2 % by weight. This is also the case if the actual content is less than 0.1% by weight.

NEN5896:2003 is not suitable for determining asbestos content in play sand, because the detection limit is too high and the method is semi-quantitative. NEN5896 is being revised and will be complemented by a method to quantify the asbestos content.

NEN-ISO 22262-2:2026[11] describes the quantitative determination of asbestos in bulk materials using gravimetric and microscopic methods. This ISO standard applies a point counting method using electron microscopy. This is a standardised statistical approach to quantify the content of asbestos. NEN-ISO 22262-2 uses one magnification (100x). This is where the method differs from VDI 3866 part 5 differs, where at different magnifications the fibres are examined and measured (50x to 1000x).

[11] NEN-ISO 22262-2 (en). Air quality - Bulk materials - Part 2: Quantitative determination of asbestos by gravimetric and microscopic methods.

Both NEN-ISO 22262-2 and VDI 3866 part 5 can be used to determine the asbestos content in play sand. However, ISO 22262-2 is less sensitive. According to TNO, VDI 3866 part 5: 2017 is the most suitable method for determining the asbestos content in play sand in addition to NEN 5896 (Arzoni & Tromp, 2026).

5.3.2 Sample pre-treatment

Sample pre-treatment techniques can be used for matrix reduction, to remove interfering particles and increase the visibility of the asbestos fibres. The pre-treatment methods described in NEN 5898 and NEN-ISO 22262-2 can be used for this purpose. The pre-treatment depends on the nature of the material. Play sand consists mainly of quartz with a small amount of feldspar and other minerals, therefore an acid treatment is not effective.

TNO has proposed the following sample pre-treatments (Arzoni & Tromp, 2026):

- If the product (partly) consists of calcium carbonate (limestone or marble), the matrix can be removed with an acid treatment (according to NEN-ISO 22262-2 and VDI 3866-5).
- If the product consists of different grain sizes, sieving is the most appropriate pre-treatment technique to improve the visibility of asbestos (in accordance with NEN 5898). If the play sand has already been sifted, additional sieving is not necessary.
- In the case of (semi-)cohesive modelling sand, additives have been added to make it sticky. These can be removed by ashing the material at up to 450 °C (according to NEN5896).

5.3.3 Sampling strategy

The homogeneity of asbestos in play sand has not been investigated by TNO. No specific data are available on the distribution of asbestos within individual consumer packages or production batches. The following considerations are therefore based on general knowledge of the origin of the raw material, production processes and the applicable normative framework (Arzoni & Tromp, 2026).

It is considered plausible that any asbestos present in play sand has not been deliberately added, but originates from natural mineral impurities or from an external contamination. Most play sand comes from sand extraction from rivers, the sea or special sand pits. Crusher sand (from crushed rock) is normally not used, because the grains are angular and sharp and not save for children. Sand remains a natural raw material where so-called geological contamination with asbestos is possible. In certain areas of China there are veins of asbestos. Sand extraction in these areas can cause sand to become mixed with asbestos. In the Netherlands, strict regulations apply to sand extraction, whereby sand extraction sources are extensively checked in advance for contamination. In China, environmental regulations and control of these sources are less strict. Cross-contamination during transport and storage and the use of asbestos containing equipment can also be the origin of contamination. Sand can be transported in bulk carriers, trucks and conveyor belts, processed in sieving installations or stored in silos that contain asbestos or are previously used for asbestos-containing materials.

The asbestos is most likely heterogeneously distributed in the sand. During excavation in a quarry, the sand often comes from different layers. If one specific layer contains an asbestos vein, that asbestos ends up in "clusters" or "pockets" in the entire batch. Additional sieving of the sand will result in some degree of mixing, but the asbestos will remain heterogeneously distributed. During transport, segregation will occur due to the difference in shape and size of the sand grains and asbestos fibres. All this can lead to a variability in contamination at the level of individual product units.

The NVWA assesses a single packaging of play sand, as it is offered to the consumer. Each single pack of play sand must comply with the legal requirements. Therefore, it is important to take a representative sub-sample for research. SGS Search examined the samples for homogeneity (see 2.2 Analysis). For the determination of the asbestos content in accordance with VDI 3866 part 5, small sub-samples were taken and mixed at 15 different locations. Subsequently, a sub-sample was taken for examination.

6 Exposure estimate

6.1 Analysis results

At the time of the RIVM's risk assessment, 106 products had been examined by SGS Search. In Table 2 below an overview of the results is given. The asbestos content as stated in this table was determined using VDI 3866 part 5.

Table 2: Overview of asbestos in samples analysed for play sand

Type of play sand	Number of samples examined	Number of samples of asbestos present	Number of samples of asbestos >0.1 weight %	Asbestos content (% weight)
Sand-filled toys	10	7 (70%)	2	0,000005-0,31
Decorative sand	45	26 (58%)	4	0,00004-0,42
Cohesive modelling sand	20	0 (0%)	0	-
Semi-cohesive modelling sand	15	2 (13%)	0	0,0005-0,01
Sandbox sand	16	5 (31%)	0	0,000009-0,001

In 66 samples of play sand (64%) no asbestos fibres were found. In 34 play sand samples, asbestos fibres were found, but below the limit value of 0.1% by weight. Fibres of chrysotile, actinolite, anthophyllite and tremolite have been found in the play sand. Tremolite was the most frequently found. No asbestos fibres were detected in cohesive modelling sand. Asbestos fibres are most commonly found in decorative sand and sand-filled toys. For 6 products, the content was higher than 0.1 % by weight. The NVWA took official measures on the basis of these findings.

6.2 Exposure to asbestos

RIVM performed an exposure assessment for the different types of play sand (RIVM, 2026a). Exposure of children to asbestos-contaminated toy sand will primarily take place at childcare centres (including daycare and out-of-school care), in primary school, at home, and in outdoor sandboxes. Exposure depends on the concentration of fibres in the product, the release rate during play, the distribution of the fibres in the air, and the time children are in the vicinity of the product during and after its use and the period in their life that children play with this type of play sand. The exposure to asbestos during the use of the various play sand products has been estimated by RIVM. It was assumed, among other things, that children have been regularly exposed to contaminated products for 7 years (sandbox sand) or 13 years (other types of play sand), both at schools, childcare centres and at home. This exposure at all exposure moments has been added up and averaged over a lifetime of 75 years to compare with the reference values.

Because these parameters differ between the types of play sand and locations, RIVM has calculated the exposure separately for each combination of type of play sand and location that is expected. To assess the total risk from each type of play sand, RIVM also calculated the sum of exposures to one type of play sand at all locations. This is done based on the geometric mean content of asbestos fibres found within a type of play sand. The geometric mean content is a reasonable representation of the typical content of a product within a type of play sand and is therefore seen as the most representative value, as exposure to different products over a lifetime will vary.

The RIVM risk assessment describes and substantiates how all parameters were selected and how the calculation was carried out (RIVM, 2026a). The result is summarised in Table 7 of the RIVM assessment and is also presented below in Table 3. In the current investigation, no asbestos was found in cohesive modelling sand, therefore in Table 3 no lifetime-average exposure is reported.

Table 3: Estimated lifetime-average exposure to asbestos from toy sand (fibres/m^3) (RIVM, 2026a)

	Decorative of sand	Semi-cohesive modelling sand	Cohesive modelling sand	Sand-filled toys	Sandbox sand
Lifetime-average exposure from all exposure moments at all locations, based on the geometric mean content of asbestos	3.4	2.9	—	0.012	0.54

7 Risk characterisation

For the risk assessment, the estimated lifetime-average exposure is compared to the risk limits for amphibole asbestos: VR and MTR of 3 and 300 fibres/m^3 respectively. The estimated lifetime-average exposure per toy sand species is be used (see Table 3).

The average background exposure in the Netherlands was 35 asbestos fibres/m^3 in 2016, with a range of less than 30 to 81 fibres/m^3 (TNO, 2018). This background exposure consists for the most part (71%) of serpentine asbestos and 29% of amphibole asbestos (TNO, 2016). This background exposure is higher than the VR of 3 fibres/m^3 for amphibole asbestos.

7.1 Decorative sand

Decorative sand is used for example for sand painting or filling bottles. Because it is dry and fine sand, the estimated fibre release during spraying is relatively high. In 26 of these 45 products, asbestos was found (58%). For 4 products, the content of asbestos fibres was higher than 0.1 % by weight. The lifetime-average exposure, based on all play moments at all locations, is estimated to be 3.4 fibres/m³. This is in the order of magnitude of the VR of 3 fibres/m^3. The health risk for playing with decorative sand is therefore estimated to be negligible.

7.2 Sand-filled toys

A total of 10 samples of sand-filled toys were investigated. Asbestos fibres were detected in 7 samples, 2 of which were above the standard of 0.1 % weight. Exposure to asbestos fibres from sand-filled toys following an incidental rupture of the toy is expected to be limited. The total amount of sand is also relatively small. It is estimated that a child is exposed once a year for 13 years due to toy rupture. The lifetime-average exposure over all these incidents with sand-filled toys is 0.012 fibres/m³. Because this is an incidental exposure of short duration and with a relatively small amount of sand, the asbestos contamination in these toys will pose a negligible health risk.

7.3 Cohesive modelling sand

No asbestos fibres were found in the examined samples of adhesive modelling sand. This means that there is no health risk for these products with regard to exposure to asbestos fibres.

7.4 Semi-cohesive modelling sand

The release of asbestos fibres from semi-cohesive modelling sand is estimated to be limited due to the stickiness of the sand (RIVM, 2026a). Asbestos was found in 2 of the 15 (13%) products examined. The lifetime-average exposure, based on all incidents at all sites, is estimated at 2.9 fibres/m³. This is equivalent to the VR of 3 fibres/m³ for amphibole fibres. The health risk is therefore estimated to be negligible.

7.5 Sandbox sand

Sandboxes are usually used outdoors, but sometimes also indoors in nurseries or kindergartens. The amount of sand used in sandboxes is greater than with the other types of play sand. Asbestos fibres were found in 5 pre-packaged bags of sandbox sand. Concentrations of asbestos fibres were

low compared to other products (see Table 2). A conservative assumption has been made that children play with sandbox sand containing asbestos fibres for two hours a day for 7 years. The lifetime-average exposure of 0.54 fibres/m³ is below VR. The health risk from exposure to asbestos fibres from sandbox sand is therefore estimated to be negligible.

7.6 Play sand with too high asbestos content

Of the 106 samples examined, 100 were samples with an asbestos content lower than 0.1% by weight. The above paragraphs show that the health risk of these products is estimated to be negligible. In addition, there were a total of 6 play sand samples with an asbestos content higher than 0.1% by weight. This involved 4 samples of decorative sand and 2 samples of sand-filled toys. For these individual samples, the characterisation of the health risk is examined in more detail.

7.6.1 Decorative sand with too high asbestos content

RIVM has calculated lifetime-averaged exposure for all individual samples of decorative sand, when a child would frequently play with this decorative sand at the different locations for 13 years (see Table 6 of RIVM assessment (RIVM, 2026a)). RIVM has used a hypothetical worst-case scenario for this, namely that if a child plays with these products weekly at school and at home for 13 years. Because the lifetime-average exposure for these 4 products is higher than the MTR, there is an unacceptable health risk.

RIVM calculated this lifetime-average exposure on the basis of worst-case selected parameters (see Table 4 of the RIVM assessment(RIVM, 2026a)). A number of parameters have been estimated based on expert judgement due to the lack of data, including the total exposure period and the time a child spends in the living room and classroom.

In practice, it is likely that a child will play with decorative sand less often and for less time. In addition, it is also likely that different types of decorative sand and different batches of this sand are being played with. This investigation showed that there is a large variation in the asbestos content of the 45 samples of decorative sand examined. In order to give an impression of the effect on the lifetime-average exposure with a somewhat shorter exposure period and shorter residence period in the living room, BuRO has also calculated the following scenarios:

- Scenario 1: The exposure period has been adjusted from 13 years to 8 years. RIVM and BuRO assume that children play with decorative sand in the primary school period. In addition, RIVM has extended this period for cases where a young child is present in a room where other children play with this sand, and/or continues to play with this sand after primary school. BuRO assumes that decorative sand is not used by very young children (under 4 years) because it is fine and loose sand.
- Scenario 2: The number of hours a child of primary school age spends in the living room has been reduced by BuRO from 12 to 6 hours per day. This is based on the total number of hours in a day, the estimate that a child of this age often spends 10 hours in his bedroom, will also stay in other rooms, and in addition to school and childcare centres (estimated together at 10 hours per school day) also plays or sports outside.
- Scenario 3: This is a combination of scenarios 1 and 2.

The calculated lifetime-average exposure to asbestos fibres from decorative sand is shown in Table 4. The left column shows the asbestos content as determined by SGS Search according to VDI 3866 part 5. The next column shows the lifetime-averaged exposure per sample as calculated by RIVM (RIVM, 2026a). The three columns to the right of this column show the lifetime-average exposure per sample based on the scenarios described above.

Table 4: Calculated lifetime-average exposure to asbestos fibres for decorative sands with an asbestos content exceeding 0.1 % by weight (RIVM, 2026a), complemented by BuRO scenarios

Asbestos content (% weight)	RIVM (fibres/m^3)	Scenario 1 (fibres/m^3)	Scenario 2 (fibres/m^3)	Scenario 3 (fibres/m^3)
0,24	480	290	250	230
0,42	840	520	440	400
0,33	660	410	350	320
0,23	460	280	240	220

From Table 4 appears that for some samples of decorative sand, the lifetime-average exposure falls below the MTR with a shorter exposure period and/or residence time in an contaminated area (scenarios 1, 2 and 3). In practice, many more exposure scenarios are conceivable, which may differ from the worst-case scenario due to less frequent and/or less long play with this specific product. As a result, a child who has played with these products may have experienced a lifetime-average exposure lower than the MTR, the maximum allowable level of risk. In the case of a lifetime-average exposure below the MTR, the health risk is considered acceptable.

7.6.2 Sand-filled toys with too high an asbestos content

In two toy samples, filled with sand, the content of asbestos fibres was higher than 0.1 % by weight, namely 0.15 % and 0,31 % by weight. For these toys, it has been calculated, based on the parameters selected by RIVM (see Table 4 of RIVM assessment (RIVM, 2026a)), that lifetime-averaged exposure is 1.3 and 2.6 fibres/m^3 respectively. This is based on the scenario that over a period of 13 years, once a year, the toy ruptures. This is lower than VR, so the health risk is considered to be negligible.

8 Uncertainty analysis

This risk assessment has a number of uncertainties.

- There are no child-specific data for the risk of asbestos exposure, it is assumed that they have the same sensitivity to asbestos as adults. However, due to the long latency period of asbestos cancer, exposure at a young age may increase the risk. Also, only the inhalation route of exposure has been assessed. It is generally assumed that this is the main route of exposure.
- Through a search on the internet, the NVWA has made an overview of the brands per type of play sand in order to arrive at a sampling proposal. Not everything was available anymore and could be sampled. It is uncertain whether the current investigation is representative of the play sand that children have played with in recent years. In addition, TNO indicates that variation in asbestos content is possible within a batch of play sand because asbestos is present as a contaminant This means that asbestos can be unevenly distributed between different products from the same batch. It is uncertain whether the sample examined was representative of the batch of this product.
- The fibre dimensions (length, diameter and ratio) were not included in the risk assessment. It is assumed that fibres larger than 5 µm, in particular, can lead to serious effects such as mesothelioma. The VR and MTR are also based on the total number of fibres. This may be an overestimation of the health risk.
- For the exposure, RIVM has calculated what the exposure is over a period of 13 years in which children frequently play with play sand (7 years for sandbox sand). This is then extrapolated to a lifetime-average exposure, to compare with the VR and MTR. For each type of play sand, an estimate has been made of the playing frequency. However, there is no data on the playing behaviour of children with play sand. Both the period of play and the frequency of play are highly likely to be overestimated.
- The amount of sand used for play was taken as a worst-case scenario, based on the assumption that multiple children in this room play with this play sand simultaneously.

- The number of hours per day that children spend in the room where asbestos-containing play sand was played with has been estimated in the worst-case scenario at 12 and 5.5 hours per day, respectively.
- It is assumed that children play with play sand both at home, at childcare centres and at home. This is added up for the different locations to calculate the total exposure to a type of play sand. Exposure to asbestos fibres has been taken into account caused by other children play with play sand in the same room. However, the aggregate exposure from playing with different types of play sand is not included.
- There is no data on the release of asbestos fibres from play sand as a result of playing with this sand. This has been estimated on the basis of experiments with regular sand.
- It is not known how the released asbestos fibres are distributed in the room and how they are removed. This strongly depends on air circulation, the size of the room, ventilation and cleaning of this room. Worst case assumptions have been made for this.

9 Conclusions

- For the determination of the asbestos content in play sand, NEN5896:2003 in combination with VDI 3866 part 5: 2017 is currently the most suitable method. NEN5896:2003 is not suitable for quantitative determination of the content of asbestos fibres in play sand.
- In the majority (62%) of the samples examined play sand, no asbestos was found. In a number of samples (32%), asbestos was found below the limit value of 0.1% by weight. In 2 samples of sand-filled toys and in 4 samples of decorative sand, a content higher than this limit value has been found. These samples do not meet the requirements of the Toy Safety Directive.
- On the basis of worst-case calculations, it can generally be stated that the health risk from the exposure of children to asbestos fibres by playing with play sand is negligible, namely at or below the level of a negligible risk.
- For the 4 samples of decorative sand examined with an asbestos content higher than 0.1 % by weight, the worst case calculated lifetime-average exposure is above the maximum allowable risk limit. This means that there is a health risk for these 4 products. It is plausible that a child has played with these specific products for less time and/or less frequently in practice, so that the lifetime-average exposure is below the maximum allowable risk limit and the health risk is acceptable.
- On the basis of this sampling and this investigation, it was found that the limit value of 0.1 % by weight, the generic limit value for carcinogens in toys, is sufficiently protective for the health of children with regard to exposure to asbestos fibres in play sand.
- There is no specific legal requirement regarding asbestos in toys. Because asbestos is most likely not intentionally added but present as a contamination, it is normally not tested for this. By formulating a legal requirement for asbestos in toys containing natural minerals, it is ensured that companies and regulators do check the toys for this.

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