

POLICY ON THE HANDLING AND DISPOSAL OF ASBESTOS AND ASBESTOS CONTAINING WASTE IN TERMS OF SECTION 20 OF THE ENVIRONMENT CONSERVATION ACT, 1989 (ACT 73 OF 1989)

1. Purpose of Policy

The purpose of this policy is to provide clarity regarding the handling and disposal of asbestos containing waste (ACW), both when disposing in a mono-disposal site, i.e. a site specifically design for asbestos, or a co-disposal site.

2. Introduction

Asbestos is an indigenous fibrous mineral that has been mined in a number of sites in Southern Africa and, because of its excellent resistance to heat, has been used for the manufacture of various products since the 1900's (see section 4). Many studies have described a link between occupational exposure to various types of asbestos and lung cancer and associated diseases and has therefore been designated as a *known human carcinogen*. This carcinogenic activity is directly linked to the air pathway and ingestion of the fibres when swallowed in water does not carry any associated cancer risks. Asbestos shows a slight solubility in water and the natural fibres tend to become blunted on a molecular scale thus greatly reducing the associated cancer risk. Water therefore serves as a natural route for the removal of fibres from the air and as a mechanism to suppress the emission of fibres into the air environment.

3. Legislative Framework

The disposal of asbestos is controlled under section 20 of the Environmental Conservation Act, 1989. This section states that waste may only be disposed on a site that is permitted by the Department of Water Affairs and Forestry. Other applicable legislation includes the:

- * Occupational Health and Safety Act (OHSA) (Act 85 of 1993)
- * The Asbestos Regulations (R773 of 10 April 1987) promulgated under the OHSA
- * Mine Health and Safety Act (Act 101 of 1993)
- * National Environmental Management Act (Act 107 of 1998)

The Department of Water Affairs and Forestry (DWAF) is committed to the principles of co-operative governance, therefore the handling and disposal of asbestos must take into account other applicable legislative requirements.

4. Sources and Classification of Asbestos Containing Waste

Asbestos containing waste (ACW) is divided into four hazard classes, A to D, table 1. The major types and are given in table 1:

Table 1: Classes of ACW and examples of waste falling each class:

ACW Hazard Call	Examples of ACW
<p>Class A: Any friable ACW</p>	<p>Raw asbestos (e.g. asbestos damaged in transit or no longer required).</p> <p>Bags previously used to transport raw asbestos (that have not been melted into a solid mass).</p> <p>Asbestos insulation, limpet spray of pipe lagging removed from power stations, buildings, boilers or pipe works.</p> <p>Pure asbestos rope or textiles</p>
<p>Class B: Any non-friable ACW that has become crumbled, pulverised or reduced to powder during manufacturing, installation, renovation or demolition operations, such that it is likely to release fibres into the air.</p>	<p>Dry swarf or cutting dust from the asbestos cement or friction material production process.</p> <p>Used filter bags from dust extraction units at the workplace.</p> <p>Asbestos cement that has unavoidably been crumbled, pulverised, or reduced to powder during demolition operations.</p> <p>Disposal equipment and clothing contaminated with asbestos.</p>
<p>Class C: Any Class B ACW that has been adequately wetted or otherwise encapsulated such that it will not release fibres into the air</p>	<p>Wet swarf or cutting dust from the asbestos-cement or friction material production process.</p> <p>Sludge, slurry or wet waste from the production process.</p> <p>Bags previously used to transport asbestos that have been melted into a solid mass in an autoclave.</p>
<p>Class D: Any non-friable ACW that is essentially in the same condition as when manufactured and is unlikely to release respirable fibres after being declared a waste product.</p>	<p>Asbestos cement sheets or pipes.</p> <p>Off cuts of asbestos-cement sheets or pipes.</p> <p>Disused friction products such as gaskets, brake pads or clutch plates</p>

In table 1, the potential hazard or risk associated with the release of fibres, see section 5, is highest in class A and decreases to class D, where the risk posed by the waste is extremely small.

A similar approach is used by the US EPA which has published a document in terms of their National Emissions Standards for Hazardous Air Pollutants (NESHAP) [1], in which they define a number of important terms and conditions for asbestos products, i.e.

Friable Asbestos Material: is any material containing more than 1 % asbestos as determined using Polarised Light Microscopy (PLM), that when dry, can be crumbled, pulverised, or reduced to powder by hand pressure.

Asbestos Containing Waste Material: includes mill tailings or any waste that contains commercial asbestos. The term includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial

asbestos.

Non-friable asbestos Containing Material: is any material containing more than 1 % asbestos as determined by Polarised Light Microscopy (PLM), that when dry, cannot be crumbled, pulverised, or reduced to powder by hand pressure.

Note that in the US EPA definition a material must contain more than 1 % asbestos before it falls into the hazard category, which is similar to the proposed class A, ACW. However, due to the problems associated with this analysis, it is proposed that waste is even suspected of containing asbestos that is friable, be considered for class A.

5. **Toxicity and Hazard Rating**

Asbestos is classified as HG1, an extreme hazard, in terms of the Minimum Requirements for the Classification, Handling and Disposal of Hazardous Waste because it is a Group A carcinogen, i.e. it has definitely been shown to cause cancer in humans [2-3]. The fibres, which may not be present in all forms of asbestos, can cause lung and other forms of cancer. Six groups of asbestos fibres are recognised and these are further divided into two main groups, i.e. amphibole-asbestos and serpentine-asbestos. The latter, which is commonly known as white asbestos, is chrysotile, whereas the blue or amphibole asbestos group includes crocidolite, amosite, tremolite, actinolite and anthophyllite. Blue asbestos is classified as class 9(II) in terms of SABS 0228 and white asbestos as class 9(III) [3].

All forms of asbestos are assumed, in terms of the precautionary principle, to be extremely hazardous, HGI, i.e. to be a class A ACW, until proven otherwise. However, in the Minimum Requirements [2], it is a fundamental principle that a waste can be downgraded or “delisted”, if it can be shown that the concentration or availability of the hazardous component is below an acceptable risk limit. Provided the ACE is probably hazardous only because of its potential to release fibres and there are no other hazardous components, e.g. leachable heavy metals, then if no fibres are released above the accepted action level, it can be considered non-hazardous and delist.

The accepted action level for determining whether an ACW is hazardous is that defined in the Occupational Health and Safety Act (Act 85 of 1993) as the ability to release “0.5 regulated asbestos fibres per millilitre”. A regulated asbestos fibre means “a particle of asbestos with a length to diameter ratio greater than 3 to 1, a length greater than five micrometers (μm) and a diameter less than 3 μm .” The four classes of ACW are further defined below.

A **Class A, ACW** is that which has been shown to or because of its origin or form (table 1) is suspected to give off regulated fibres above 0.5 per millilitre and is classified as extremely hazardous, HGI.

A **Class B, ACE** is one that because of its origin may be not hazardous due to the release of regulated fibres but tests for fibres have not been conducted. Therefore, it is classified as an extreme hazard, HGI in terms of the precautionary principle.

A **Class C, ACW** is one that, because of its origin or form (table1), or because of treatment, e.g. by cementation, by containment in sealed drums or bags and/or is adequately wetted (section 6.2.1) cannot give off regulated fibres or the numbers of regulated fibres have been shown to be below the legal action level of 0.5 per millilitre. A Class C, ACW is not hazardous due to the production of regulated fibres and therefore delists in terms of the

Minimum Requirements [2].

A Class D, ACW is one that, because of its origin or form (table 1), i.e. one that is manufactured and has been adequately demonstrated to not give off regulated fibres above 0.5 fibres/ millilitre. As a precaution, treatment, e.g. by wetting prior to disposal, must be done. A Class D, ACW is not hazardous due to the production of regulated fibres and therefore delists in terms of the Minimum Requirements [2].

Asbestos is normally inert to the leaching of heavy metals and other hazardous species, but a TCLP or Acid Rain leaching test must be done, if contamination with other hazardous species is suspected due to its prior use or subsequent contamination.

6. Approved Treatment and Disposal Methods

All operational procedures must be in accordance with the Asbestos Regulations

6.1 Waste Minimisation

In accordance with the National Environmental Act (Act 107 of 1998), the Department of Water Affairs and Forestry will encourage any procedures that result in the avoidance and/or recycling of asbestos waste. Recycling of waste produced within the production process is preferred and only unavoidable waste should be disposed. The utilisation and destruction of asbestos, when used as part of the feedstock into cement kilns or incineration processes, may be acceptable, but application for a permit must be made to the Department of Water Affairs and Forestry and the Department of Environmental Affairs and Tourism.

6.2 Treatment Technologies

6.2.1 Wetting

The major technology used to minimise the formation of asbestos fibres is to wet it normally with water. The US EPA has defined the term “Adequately Wetted”, when water is used to control the emissions of particulate asbestos [1] and this terminology has been accepted for use in South Africa.

“Adequately wetted means to sufficiently mix or penetrate the ACW with liquid to prevent the release of airborne fibres. Suitable liquids include a wetting agent, amended water (water to which surfactant chemicals have been added, such as a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether in a 0,16 % solution of water) or plain water.”

The ACW should be visibly wet and, if bagged, droplets of moisture should be evident. Control procedures, see section 6.3, must be in place to ensure that the ACW is adequately wetted and does not dry out during handling, transport or disposal.

6.2.2 Solidification

Solidification of asbestos wastes can be accomplished utilising cement and

other fixation agents such as water based silicates. Cementation by the addition of Ordinary Portland Cement or other Department of Water Affairs and Forestry approved poliozanic material can be cost effective, particularly Class A and B ACW. Note that cementation into a massive form would result in a Class D ACW. Any procedure must be approved by the Department and include test data on the final product showing that the fibre levels have been reduced to the accepted level.

6.3 Landfilling

Application must be made to the Department of Water Affairs and Forestry for permission to dispose asbestos at any site. Information required for full permitting include:

- The design plan for the proposed disposal area;
- A operational plan approved by the Department of Labour that the proposed operating procedures comply with the Asbestos Regulations;
- A rehabilitation plan; and
- Proof of Land Zoning

Asbestos can be disposed to a mono-disposal site or a co-disposal site.

6.3.1 Mono-disposal Sites

A mono-disposal site is one *solely for the purpose of accepting asbestos* and, because asbestos does not pose a pollution risk to water resources, the normal lining requirements for waste disposal facilities, as outlined in the Minimum Requirements for the Disposal of Waste to Landfill [4] do not apply. The liner must be an impregnable layer of at least 500mm, consisting of material such as cement or solidifies ash. A mono-disposal site for asbestos must be closed by covering with a 500mm layer of ash followed by an ashcrete or concrete dome. An ashcrete dome must consist of at least 10 % by mass of cementitious material, be compacted to ~2 % above optimum moisture content and must be 1 metre wider and longer than the trench width and length.

6.3.2 Co-disposal Sites

The Department requires all waste to be treated in order to minimise the risk to human health and the environment. All classes of ACW can be so treated before disposal.

Because Class A, ACW is a known human carcinogen with a hazard rating of 1, and Class B, ACW are potentially hazardous, the Department requires direct disposal of these categories to HH co-disposal sites.

However, all classes of wastes, A to D can be treated before disposal, section 3.2, and

Hh or G Landfills can apply for a permit amendment to accept other forms of asbestos provided that the correct treatment and control procedures are in place or/and the practice of disposal does not constitute a hazard and is fully compatible with the Minimum Requirements.

All sites must be specifically permitted for the acceptance of ACW and application must be made to the Department for an amendment.

The requirements should be discussed with the Regional office of the Department, but permission will not be granted where informal recycling is taking place or where there is any potential for risk to the public or workers. Note that a demarcated area and surveyed area must be set aside for asbestos disposal (see section 6.3.3).

6.3.3 Landfilling Practice. The following practices must be observed:

- ❑ All fibrous material falling into classes A to C (see table 1) must be double bagged in plastic bags with a minimum thickness of 75 microns before the waste is brought to the landfill. Transparent bags are referred, since they allow inspection of the waste to see if it is “adequately etted” without having to undo the bag. This avoids having the operator, auditor or inspector potentially exposed to fibres. Droplets of moisture should be visible on the inside of the bag.
- ❑ Class D wastes (see table 1) that includes larger items such as pipes and boards should be kept wet as a precautionary measure at all times before disposal at the site. Class D wastes should be transported in vehicles or stored should be covered with a tarpaulin and wetted immediately prior to disposal.
- ❑ All asbestos waste (classes A to D) that has been treated and packaged as required in these regulations, must be deposited into trenches and immediately covered. Options include:

On a mono-disposal site, the waste must be deposited in a trench ash and immediately covered with, at least, a metre of ash.

On a co-disposal site, the waste must be immediately covered with domestic waste and carefully compacted. Otherwise it can be deposited in a deep trench, the waste must be completely covered with layer of ash, at least 25cm in depth. This will provide sufficient protection to the waste before a second layer is deposited on top. The trench should be closed, by adding a final layer of ash and/or general waste of at least 50cm in depth and compacting.

- ❑ During disposal, care must be taken to minimise the potential breaking of bags.
- ❑ *Only essential personnel* should be allowed to be close to the waste and should, as far as is possible, stand up wind, while the waste is being disposed. Personal protective equipment required in terms of the Occupational Health and Safety Act and the Asbestos Regulations must be worn at all times.
- ❑ No scavenging or other reclamation activities are allowed on or near the ACW disposal area within a waste disposal site, although the general

presence of scavengers does not automatically disqualify a site.

- ❑ On a co-disposal site, a surveyed area with the coordinates must be designated as the ACW disposal area. Other waste can be disposed in this area, but records must be maintained in order to prevent trenching or other operations taking place that could lead to the release of asbestos fibres.
- ❑ The ACW disposal area must be demarcated with hazard tape and signs erected to indicate that it is an asbestos area in terms of the asbestos regulations and that the appropriate protective clothing and equipment must be worn.
- ❑ No further trenching will be allowed on top of an area previously used for ACW unless it is cover with a layer of compacted waste that it at least 3 metres in depth.
- ❑ A monitoring programme for staff required by the Occupational Health and Safety Act should be implemented. This requires an initial analysis followed by regular monitoring at intervals of between 6 months and 2 years depending on the initial level.
- ❑ The procedures for disposal of ACW must be maintained at all times and must be specifically included in the internal auditing programme and annual external auditing programmes.

7. **Permit Requirements for Landfilling**

The Department requires any site that wishes to dispose of ACW to apply for an amendment to its permit. The requirements are those listed in these regulations but before formal application, it is recommended that the applicant discuss the requirements with the Regional office of the Department.

8. **References**

- [1] US EPA: Asbestos NESHAP Adequately Wet Guidance; EPA340/1-90-019, December 1990
- [2] Department of Water Affairs and Forestry, “Minimum Requirements for the Classification, Handling and Disposal of Hazardous Waste”. 2nd edition, Pretoria, 1998
- [3] SABS, “Code of Practice for the Identification and Classification of Dangerous Substances and Goods, 0228 – 1990, Pretoria, 1990
- [4] Department of Water Affairs and Forestry, “Minimum Requirements for Waste Disposal by Landfill”, 2nd edition, Pretoria, 1998