

Are you living in an area with mine tailings?

Arsenic and health



Environment
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Did you know?

Mine tailings from gold mining often contain high concentrations of arsenic. Many towns and cities in Victoria have been built in areas with a history of gold mining. Mine tailings that contain arsenic are spread over large areas of land, including land now used for housing.

This booklet contains information for people who live in these areas. It gives information on what you need to know and actions you can take to protect your family's health.

- Arsenic in mine tailings may be harmful to health.
 - Most people have only a very small chance of being affected.
 - Babies and young children are more likely to be affected than adults.
 - Children who eat small handfuls of mine tailings are especially at risk – they may even get arsenic poisoning.
- Unlike historical mines, licensed gold mines today are highly regulated, including the management of tailings.
- If you live near historical mine tailings, you can reduce the risk to your health by reducing the amount of soil and dust that you swallow.
- Fruit and vegetables that are grown on mine tailings may absorb arsenic.
 - Eating fruit and vegetables with raised levels of arsenic in soil or water may sometimes be harmful to health.

What is arsenic?

Arsenic is a substance that is found naturally in rock, often near gold deposits. It was used as a poison to kill insects that attack animals, timber, fruit and vegetables. In some situations, arsenic causes health effects in people.

What are mine tailings and why do they contain high levels of arsenic?

When gold is mined, rocks are brought to the surface and crushed to extract the gold. The crushed rocks that are left over after the gold is extracted are known as mine tailings (also called battery sand or tailings sand). Mine tailings are often found in large piles or tailings dumps. In many gold mining areas, mine tailings have been used for landscaping instead of normal soil. Mine tailings often look like clay or sand and, as they contain finely crushed rock, they can easily produce dust. They are usually white, pale yellow or grey in colour. As the rock surrounding the gold often contains high levels of arsenic, mine tailings can contain high levels of arsenic too. Sometimes the rocks containing the gold are roasted as well as being crushed. The mine tailings left over from this process are known as calcine sands and are usually red or purple. Calcine sands usually contain much higher levels of arsenic than mine tailings.

Further information

Contact EPA on
1300 372 842 (1300 EPA VIC)
or epa.vic.gov.au



If you need interpreter assistance or want this document translated, please call **131 450** and advise your preferred language.



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200 Victoria Street, Carlton VIC 3053
W epa.vic.gov.au | T 1300 372 842 (1300 EPA VIC)



Image: calcine sand



Image: mine tailings sand

How does arsenic enter and leave the body?

Small amounts of arsenic are normally taken into the body each day from the low levels of arsenic that are naturally present in soil, water, air and food.

- Arsenic commonly enters the body in food and water – usually in food. It can also enter the body when a person swallows soil or dust.
- Arsenic can also enter the body if a person breathes in fine dust that contains arsenic.
- Arsenic is not absorbed very well through the skin. Arsenic does not usually accumulate (build up) in the body. It leaves the body in a few different ways.
 - Most of the arsenic that is swallowed passes through to leave the body in urine and faeces (poo).
 - Most of the arsenic absorbed by the body is passed out in the urine.
 - Some of the arsenic is deposited inside hair and nails, and leaves the body as hair and nails grow.

How does arsenic in mine tailings enter the body?

Everyone normally swallows very small amounts of dust and soil every day. Young children swallow more dust and soil than older children and adults. This is because they get dust or soil on their hands when they crawl or play on the ground. This is swallowed when they put fingers or toys in their mouths. Arsenic can enter the body if we swallow dust or soil that comes from mine tailings that contain arsenic. As babies and young children swallow more dust and soil than adults, they can swallow more arsenic too. Arsenic in dust or soil is usually not as well absorbed by the body as arsenic in food or water. This is because arsenic is often held firmly inside the soil particles and is not as easily dissolved by the acids inside the stomach. Much of it then passes out in the faeces (poo).

How can arsenic affect your health?

People can swallow **small** amounts of arsenic every day for a long time without any obvious health effects. However, swallowing larger amounts of arsenic may be harmful to health.

- Swallowing **moderate** amounts of arsenic every day for many years may cause **long-term health effects**.
- Swallowing a **large** amount of arsenic in a short period of time (such as hours or days) can cause **arsenic poisoning**.

Long-term health effects

If people swallow moderate amounts of arsenic every day for many years they may get **long-term health effects** which can include:

- Skin changes, such as light and dark spots, and thickened skin on the palms, soles and trunk of the body.
- Damage to the heart, liver, kidney, nerves, blood and blood vessels.
- Cancers of the skin, lung, bladder, liver, kidney and prostate. These health effects have been seen in the following situations:
 - In people who have higher than normal levels of arsenic in their drinking water for many years.
 - In people who, in the past, have taken medicines containing arsenic for a long time.
 - In people exposed to arsenic at their workplace for a long time.

Arsenic poisoning

Swallowing a large amount of arsenic over a short period of time can cause severe health effects or even death. Large amounts of arsenic can irritate the stomach and intestines and may damage the heart, liver, kidneys, nerves and blood.

Someone with arsenic poisoning may suffer from:

- Stomach pains, nausea (feeling sick), vomiting and diarrhoea (runny bowel actions).
- Extreme tiredness, weakness, abnormal heartbeat and bruising.
- A feeling of numbness or 'pins and needles' in the hands and feet.

Can arsenic in mine tailings affect your health?

It is considered that arsenic in mine tailings may be harmful to health in some situations. The risk (or chance) of health effects depends on several factors including:

- The concentration of arsenic in either mine tailings or calcine sands.
- The amount of soil and dust that is swallowed from mine tailings or calcine sands.
- The age and size of the person.
- Whether a person has any existing health issues that may affect metabolism of arsenic.
- The length of time that they are exposed.

Long-term health effects

Some studies have shown that some people living in areas with high levels of arsenic in soil or mine tailings absorb more arsenic than people living in other areas. From overseas research, most people who developed long-term health effects were exposed to arsenic in drinking water. A small number of studies reported long-term health effects in people living in areas with arsenic in mine tailings. However, it is not known whether these health effects were due to swallowing arsenic in the soil, or drinking water contaminated with arsenic, or both.

Health authorities have considered the available information and believe that:

- Adults and older children who swallow only very small amounts of soil and dust from mine tailings for a long time have a very small risk of long-term health effects.
- Babies and young children are more at risk of health effects than adults. This is because they usually swallow more soil and dust than adults and their bodies are smaller.

Arsenic poisoning

Some babies and young children have a habit of putting small handfuls of dirt or sand in their mouths and eating it. If they eat mine tailings or calcine sands that contain high levels of arsenic, they could get arsenic poisoning.

Eating small handfuls of mine tailings, particularly calcine sands, could be dangerous.

What can you do?

If you live in an old gold mining area, your health and your family's health may be at risk from arsenic in mine tailings. However, you can reduce any health risk by reducing the amount of soil and dust from mine tailings that you or your children swallow.

Here are some simple steps that you can take.

In all situations where there are mine tailings or calcine sands on or near your property

Do not let children play on mine tailings, especially young children. The soil and dust can stick to their hands and toys and can be swallowed when they put them in their mouths.

Prevent young children putting mine tailing sand or soil in their mouths. It may look like beach sand but it could be dangerous if swallowed.

Do not put mine tailing sand in your child's sand pit.

Do not use mine tailings in landscaping works.

Wash your hands before eating and sleeping.

Wash young children's hands frequently.

Wash children's toys frequently to remove soil and dust.

Wash all fruit and vegetables to remove dust or soil before eating.

Wash family pets often.

Mop dust frequently. Mopping and dusting should be done with a damp cloth.

Make sure that windows and doors are closed when the wind is blowing.

Consider sealing cornices which might allow dust from the ceiling into your home.

Place mats at the front and back doors to prevent soil being walked through the house.

Leave shoes outside, where possible.

Do not swim or fish in dams with walls made from mine tailings.

Do not eat fish or yabbies collected from areas with mine tailings.

If you think that there are mine tailings on your property

- If mine tailings are in a children's play area, cover them with a layer of clean soil and grow grass over the top.
- Cover mine tailings with soil and plants and grasses (especially those plants known as groundcovers) to reduce the dust.
- If you decide to remove mine tailings from your property, contact the Environment Protection Authority (EPA) on **1300 372 842** (1300 EPA VIC) for advice. This is because EPA regulates how mine tailings must be moved.

Home-grown fruit and vegetables

It is difficult to know how much arsenic is absorbed by fruit and vegetables that are grown on mine tailings (or soil containing mine tailings). Research has shown that, in some situations, arsenic in soil can be taken up by vegetables. This can happen in vegetables that are grown in the ground (such as radishes, turnips and carrots) or those grown above the ground (such as silverbeet and beans). Other fruit and vegetables may also be affected. Studies have also shown that washing and peeling may not remove all the arsenic.

If you have mine tailings on your property, your home-grown fruit and vegetables may contain raised levels of arsenic. If you eat fruit and vegetables containing raised levels of arsenic, you may increase the chance (or risk) of long-term health effects. This is because any arsenic that you absorb from these home-grown fruit and vegetables adds to any arsenic that you absorb from the soil and dust from the mine tailings. Children are most likely to be affected. Adults who regularly eat home-grown fruit and vegetables may also be at risk.

- To grow vegetables that contain little or no arsenic, bring in clean soil for garden beds. The clean soil will need to be at least 30 centimetres deep. You can also grow vegetables in pots that contain clean soil or potting mixture.

Rainwater tanks

If you are not on a reticulated supply of water, you should manage your own rainwater tanks to maintain your drinking water quality. Dust containing arsenic can be blown onto your roof and washed into your tank leading to a build-up of arsenic over time.

Guidance to maintain your drinking water supply is here:

[https://www.health.gov.au/internet/main/publishing.nsf/Content/0D71DB86E9DA7CF1CA257BF0001CBF2F/\\$File/enhealth-raitank.pdf](https://www.health.gov.au/internet/main/publishing.nsf/Content/0D71DB86E9DA7CF1CA257BF0001CBF2F/$File/enhealth-raitank.pdf)

Guidance on use of rainwater tanks – Department of Health: www.health.gov.au

Your private drinking water supply: www2.health.vic.gov.au

https://www2.health.vic.gov.au/getfile/?sc_itemid=%7b85AA8BA6-E2A4-4220-BF69-E6CE8907B071%7d&title=Your%20private%20drinking%20water%20supply

Are all types of arsenic the same?

There are two main types of arsenic: inorganic arsenic and organic arsenic. Inorganic arsenic is found in minerals, rocks and mine tailings. Organic arsenic is found in fish and shellfish, and is sometimes called 'fish arsenic'. Organic arsenic is much less harmful than inorganic arsenic.

Is there a medical test to check for arsenic?

There are several medical tests to check if the body is absorbing high amounts of arsenic. However, some of these tests are not suitable for checking the amount of arsenic that is absorbed from mine tailings.

Urine testing

Urine testing can show if people have been absorbing large amounts of arsenic in the few days before the test. This test is suitable for people living in areas with arsenic in mine tailings. However, the test also measures the non-toxic type of arsenic contained in fish and some other seafood (known as 'fish arsenic'). These foods should not be eaten for three days before the test. If this is not possible, you should let your doctor know that you have eaten these foods.

Blood testing

Blood testing is not usually recommended as the body removes arsenic from the blood within a few hours.

Hair testing

Hair testing is not recommended for people living in areas with arsenic in mine tailings. This is because the arsenic in dust that comes from the mine tailings can stick onto the outside of the hair. This makes it difficult to test for arsenic that has been absorbed by the body and deposited inside the hair. It can be useful to test whether exposure is occurring.

Nail testing

Arsenic can build up in the fingernails and toenails. Nail testing can show if people have been exposed to arsenic over several months. It too can be a problematic test as the arsenic can be present on the outside of the nails. It can be used as a measure of exposure.

Where can you get more information?

For general information on arsenic and health and growing fruit and vegetables or for advice on managing mine tailings/calcline sands on your property or in your local area:

- Environment Protection Authority Victoria on **1300 372 842** (1300 EPA VIC) or epa.vic.gov.au
- Your local council

For advice about grazing stock on arsenic containing land:

- Agriculture Victoria on **136 186**

For information about active mining sites:

- Department of Economic Development, Jobs, Transport and Resources on **136 186**