

Post-bushfire water quality in farm dams and creeks

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EPA 1124/20: This information sheet is jointly prepared by the EPA, Department of Environment and Water, and Primary Industries and Regions SA and provides guidance relating to post-bushfire water quality in farm dams and creeks (with respect to livestock).

Introduction

Issues that may cause water quality concerns after a bushfire include:

- copper chrome arsenic (CCA) treated timber ash
- sediment
- decomposing natural organic matter
- blue-green algae.

CCA treated timber

Ash from burnt CCA treated timber has very high levels of copper, chromium and arsenic and these are hazardous to livestock, so efforts to minimise water contamination should be prioritised.

These substances do occur naturally (eg in soils) at low concentrations and in most circumstances there is no risk to livestock. If only a small amount of CCA timber ash enters a dam after a fire, it is unlikely to cause a problem.

Please refer to the [Australian and New Zealand Guidelines for Fresh and Marine Water Quality \(livestock section\)](#) for further information.

A preliminary investigation conducted by the state government at a property in the Cudlee Creek fire zone found *very low levels* of copper, chromium and arsenic in dam water even though there was a burnt CCA timber ash stockpile only a short distance from the dam. Such low levels represented *no risk* to livestock health.

Water quality testing

Water quality testing is recommended if a large amount of CCA timber ash has flowed into a dam or creek. If you think this happened, you must proceed to:

- 1 Collect a water sample from the dam or creek being used for livestock watering. The correct ('green cap') water sample bottles should be used and these are available free from the Cudlee Creek Bushfire Recovery Centre¹. Samples should be collected directly in the sample bottles provided. Please note:

¹ <https://dhs.sa.gov.au/services/disaster-recovery/cudleecreek>

- a When collecting a water sample in this context it is important to ensure it is representative of the water where livestock would be able to gain access.
 - b It is important to ensure that it is safe to access the water's edge to a depth of about 30 cm or more. Avoid disturbing the bottom sediments as much as possible.
 - c If there is no surface scum or debris, simply insert the bottle with the neck facing up until the bottle is full. If there is surface scum or debris, it is best to insert vertically with the neck facing down to about 10cm below the surface. Then the bottle can be turned up, allowing the sample water to flow in.
 - d Retrieve the full water bottle and screw the lid on tight. Clean and dry the outside of the bottle with a cloth.
 - e Label the bottle with your name, location and date. A permanent marker or sticky label with a pen is advisable. These (and other) details will also need to be recorded at the Cudlee Creek Bushfire Recovery Centre.
 - f As a general rule, it is best to keep the water sample refrigerated, although that is not essential for these tests.
- 2 Deliver the water sample back to the Cudlee Creek Bushfire Recovery Centre (as soon as practicable after collecting the sample). Fill in your details to help the laboratory and other authorities keep correct records. Your details will not be publicised:
- a name
 - b phone number
 - c street address
 - d email address
 - e type of livestock accessing the water
 - f dam identification.
- 3 The water sample will be tested (for free) by the Australian Water Quality Centre in Adelaide. The testing should be completed within a few days. The EPA will review the results and provide advice back to you as quickly as possible via email.

If there is copper, chromium and arsenic from CCA timber ash entering a dam or creek, these substances may be adsorbed by suspended sediments, settle to the bottom of the waterbody and represent minimal on-going concern to livestock. However copper, chromium and arsenic will not decompose to simpler substances and further evaluation may be necessary.

Management strategies

1 Controlling arsenic concentrations in water

Control may be achieved by adding gypsum (calcium sulfate). Arsenic exists in two chemical forms (arsenate and arsenite), although the arsenate is usually the most common. The calcium in gypsum can create very insoluble calcium arsenate, which settles to the bottom and is rendered relatively harmless.

2 Preventing CCA ash entering dams and creeks

CCA ash may be mixed in with shallow soil on a property after a fire. So controlling CCA ash is much the same as controlling fine sediment and soil erosion. That is best achieved by constructing sediment fences that follow contour lines in high-erosion risk areas. Refer to the next section on managing sediment in surface runoff.

Sediment

In the initial period after a fire, soil erosion may occur from some areas, causing high levels of sediment accumulation in farm dams and creeks after rainfall. High suspended sediment in the water is not a water quality concern for livestock.

Water quality testing

Testing is not necessary.

Management strategies

Soil erosion can be reduced by using jute matting and other types of cover materials, although this is difficult if the affected area is large and steeply sloped. Sediment fences can be used to capture sediment in surface runoff and help minimise it entering dams and creeks.

The Adelaide and Mount Lofty Ranges Natural Resources Management Board has a fact sheet on erosion control and farm water supply:

https://www.naturalresources.sa.gov.au/files/sharedassets/adelaide_and_mt_lofty_ranges/land/bushfire-recovery-soil-erosion.pdf.

Decaying organic matter

Runoff from a burnt landscape can contain a large amount of naturally occurring organic matter that will decompose/decay more rapidly in the water. The decaying process is natural and microbiological, and can consume large volumes of dissolved oxygen (ie the water turns anaerobic). If this happens and the water remains anaerobic for a few days, the water can generate odours. Yabbies and other animals can become stressed and fish can die from a lack of oxygen.

Such water quality impacts from decaying organic matter are unlikely to affect livestock health, although some animals may avoid drinking the water.

Water quality testing

Testing is not necessary.

Management strategies

As the rate of organic material decaying slows down the water will naturally improve as dissolved oxygen levels increase. If livestock continue to avoid the water, aerating is by far the most effective way to increase dissolved oxygen levels and make the water more palatable. Aeration options may include:

- spraying the water into the air
- bleeding air into the intake side of a pump
- agitating the water with propellers or paddles (but avoiding stirring up the bottom sediments)
- cascading water over baffles into a settling tank.

Algae and blue-green algae

The ash remaining after a bushfire contains high levels of plant nutrients (especially phosphorus). Decomposing organic matter will also release nutrients into water. Those nutrients can trigger the growth of algae and also blue-green algae.

- **Algae**

Algae are plants with a very simple cell structure, are mostly aquatic (living on, in or near water) and usually very small (microscopic) in size. Many can form visible filaments (strings) and mats, and some can grow quite large and appear plant-like. Some algae may float or attach to rocks, shells and other plants.

Algal blooms can clog pipes and when the decay, the water can become anaerobic as described in the decaying organic matter section above.

Algae are not harmful to livestock.

- **Blue-green algae**

Blue-green algae, known as cyanobacteria, are actually a form of aquatic bacteria. They are microscopic but can appear like pea soup or spilled green paint and create visible scums.

There are various types of blue-green algae, and some produce toxins that can be harmful to livestock. Identifying blue-green algae can be difficult and trained expertise may be required to assist if there is some concern.

For further information, please refer to the following website on blue-green algae poisoning in livestock (WA)

<https://www.agric.wa.gov.au/animal-welfare/blue-green-algae-poisoning-livestock>.

Water quality testing

Testing is not recommended.

Laboratory tests for blue-green algae may be warranted in rare instances, although sampling procedures are complicated and the results are not always informative.

Management strategies

- 1 There is some evidence to suggest that barley straw can prevent blue-green algal growth.
 - a Barley straw releases chemicals that are active agents against *Microcystis* blue-green algae and this is the strain that is most likely to release a toxin that is harmful to livestock. Oat and wheat straw will not work. The suggested methodology is to add approximately 50 grams of barley straw per square metre of surface area to a dam. This releases enough naturally occurring chemicals to prevent blue-green algal activity from occurring for approximately six months. When the surface layer of water is greater than 21°C, adding barley straw to an existing bloom may be effective within two weeks. However, barley straw is more effective as a preventative than a treatment for blooms.
 - b Place the straw in coarse-weave bags (such as onion bags) and suspend the bags from floats, such as sealed large drink bottles, drums or a pontoon. The floating straw bags will sink as the straw rots. Remove the straw at this stage, and spread it on paddocks away from the dam.
 - c If there is an incoming flow of water, place the straw net where there is a continuous flow of water over and through the straw. This will help to keep the straw oxygenated and spread the active chemicals throughout the water surface.
- 2 Dosing with treatments such as gypsum (calcium sulfate) and ferric alum can reduce the phosphorus level in the water which can limit the growth of blue-green algae.
- 3 Dosing with an approved copper-based algicide (eg cupricide) to kill blue-green algae can be effective (only in offline farm dams – not in creeks). Do not use copper sulfate. Be mindful that if using an algicide during a significant outbreak of blue-green algae will cause a large amount of organic matter to be released into the water. Organic matter can rapidly decay, causing low dissolved oxygen conditions – see the section above on decaying organic matter.

Managing blue-green algae on farms (WA): <https://www.agric.wa.gov.au/livestock-biosecurity/managing-blue-green-algae-farms-western-australia>

Managing blue-green algae in farm dams (NSW): <https://www.wsc.nsw.gov.au/uploads/795/managing-blue-green-algae-in-farm-dams.pdf>

Further reading

[Australian and New Zealand Guidelines for Fresh and Marine Water Quality \(livestock section\)](#)

Smith H, Cawson J, Sheridan G and Lane P 2011, *Desktop review – Impact of bushfires on water quality*, Department of Forest and Ecosystem Science-Melbourne School of Land and Environment, A report for the Australian Government Department of Sustainability, Environment, Water, Population and Communities, viewed 3 March 2020, <https://www.waterquality.gov.au/issues/bushfires/impact-review>

Water NSW, Identifying algae and blue-green algae, viewed 3 March 2020, <https://www.watarnsw.com.au/water-quality/algae/identifying-algal-blooms>

Further information

Environment Protection Authority

Telephone: (08) 8204 2004
Freecall: 1800 623 445 (country)
Website: <https://www.epa.sa.gov.au>
Email: epainfo@sa.gov.au

Department for Environment and Water

Telephone: (08) 8204 1910
Website: <https://www.naturalresources.sa.gov.au/adelaidemtloftyranges/home>

Primary Industries and Regions SA

Telephone: (08) 8226 0995
Website: <https://www.pir.sa.gov.au/>
