

What was the Tailings Dust Environmental Health Assessment and Air Quality Monitoring Study?

In response to community concerns, Cadia Valley Operations (Cadia) completed a comprehensive Study into the potential environmental health impacts of the tailings dust and commenced additional testing and monitoring. The Study also included assessments on dust emitted from Cadia's mine ventilation system, which ventilates Cadia's underground mining operation.

Through 2020 and early 2021, Cadia engaged a range of specialists to undertake and peer review the Study. This factsheet summarises the key findings of that Study.

What is tailings and tailings dust?

Tailings is the finely-ground rock product, left over once ore processing has been completed and the gold, copper and molybdenum has been extracted. Tailings is pumped as a slurry (i.e. mixed with water) to one of Cadia's Tailings Storage Facilities (TSF) for disposal (refer to the Tailings Fact Sheet for further detail).

Upon deposition of the tailings slurry to the TSF, the slurry separates and some of the water is collected and is re-used for ore processing. Without further deposition or rainfall, the tailings can dry out and under certain windy conditions become airborne dust.

Why is there currently more tailings dust?

The Northern Tailings Storage Facility (NTSF) embankment slump in March 2018 led to the cessation of tailings deposition on the NTSF, and deposition to the Southern Tailings Storage Facility (STSF) is currently limited by a lack of available capacity, with further construction underway to increase the capacity. Without tailings deposition, the NTSF and STSF have progressively dried resulting in an increased occurrence of dust lift-off. Cadia has made significant investment in dust management and continues to pursue multiple management measures to mitigate this complex and challenging issue until normal operation of the TSFs can resume. For further information on Cadia's Tailings Dust management activities, refer

to: <https://www.cadiavalley.com.au/site/community>.

Monitoring of air quality at Cadia

Cadia's Air Quality Monitoring Program is managed in accordance with the Cadia Air Quality Monitoring Program (Cadia AQMP) which was approved by NSW Department of Planning, Industry and Environment (DPIE). Air Quality monitoring is conducted using Tapered Element Oscillating Microbalance (TEOM) monitors (see Figure 1) and Dust Deposition Gauges located in various locations (see Figure 2). Monitoring undertaken includes:

- PM10 Ambient Dust Monitoring,
- Deposited Dust Monitoring,
- Visual Dust Monitoring, and
- Meteorological Monitoring.

For details on Cadia's Air Quality Monitoring Program and monthly Air Quality reports refer to: <https://www.cadiavalley.com.au/site/air-quality>.



Figure 1: A Tapered Element Oscillating Microbalance (TEOM).

Who was involved in the Study?

Cadia used a range of specialists and specialist laboratory services to undertake the Study, including Todoroski Air Services, Earth Systems Consulting, Callander & Johnson, ALS Laboratory Group and University of Queensland's Central Analytical Research Facility.

Additionally, Cadia engaged Mr. Paul Harrison, from Serinus Health, Safety and Environment, to peer review the program of work and reports. Mr Harrison is a specialist consultant in occupational health and safety and environmental management with more than 30 years of experience and expertise in the field.

What did the Study cover?

The Study work program encompassed:

1. Laboratory testing of the tailings and tailings dust to determine its geochemical and mineralogical composition,
2. Monitoring of ambient air concentrations of respirable crystalline silica (RCS) from vent emissions,
3. Assessment of the exposure risk to the community from RCS based on ambient air monitoring and comparison to relevant guidelinesⁱ,
4. Monitoring of ambient air concentrations of PM10 and PM2.5 particulate matter,
5. Assessment of the exposure risk to the community from PM10 and PM2.5 based on ambient air monitoring and comparison to relevant guidelinesⁱ,
6. Testing and reporting on drinking water and water from farm dams used for livestock watering at local residences, and
7. Undertaking HSE Materials Hazard Assessment for Cadia's tailings, including a review of ore processing reagents, dust suppression products and potential breakdown by-products of reagents and dust suppression products.

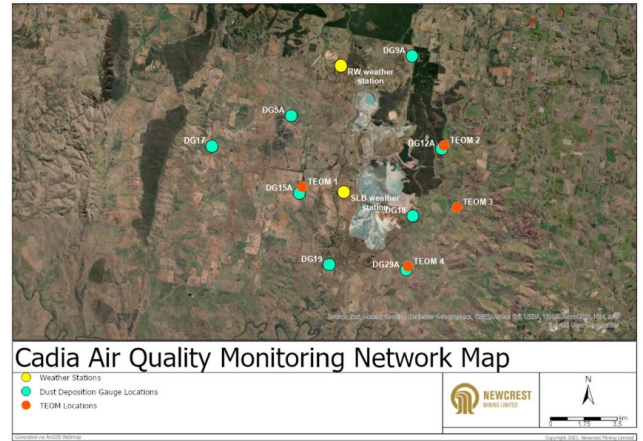


Figure 2: Map insert of Cadia's Air Quality Network.

What did the Study find?

A summary of the key technical findings is provided below.

Tailings mineral and chemical composition and health risk:

- The tailings can be classified as non-hazardous in all categories of classification under the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (GHS) and the European Commission 2008 Regulation (EC) No. 1272/2008.
- The tailings are composed primarily of inert minerals (i.e. non-reactive) comprising mainly aluminosilicates which are one of the most abundant sets of minerals in the earth's crust.
- Secondary minerals (i.e., salts that form on the tailings) are mostly hydrous calcium-sodium-magnesium sulphates (e.g., gypsum, blodite, glauberite) with lesser chlorides (halite) and iron sulphates (rhomboclase).
- Tailings samples were tested for the presence of 26 metals, and none of the metals were found in concentrations that cause adverse health effects based on International Agency for Research on Cancer (IARC) and United Nations GHS classifications.
- All metals were found at levels well below the health criteria for hazardous materials based on the United Nations GHS (used to assess the health, safety and environmental hazard level of all chemicals, mixtures and waste materials).

- No asbestos or asbestiform materials were present.
- Samples of the tailings had quartz concentrations of 14% to 17% by weight. Quartz concentrations in the PM10 fraction of the tailings (the respirable fraction) was found to average 0.23% by weight; well below levels that would classify the tailings as hazardous according to the United Nations GHS.
- The pH of water that was exposed to the tailings in the laboratory was neutral to alkaline (pH results range 7.4 to 8.0).

Dust testing and health risk:

- The monitoring of metals in PM10 particles in ambient air indicated that airborne concentrations were within relevant ambient air quality guidelinesⁱ.
- The monitoring of PM2.5 particulate matter in ambient air, indicated that at community sites, airborne concentrations were trending*ⁱⁱⁱ below the relevant ambient air quality guidelineⁱ.
- The monitoring of ambient air Respirable Crystalline Silica (RCS) indicated that airborne concentrations were trending

below the relevant ambient air quality guidelineⁱ.

Drinking Water testing results:

- Household water tank testing results met Australian Drinking Water Guidelines.

Livestock water testing results:

- All water sources from the farm dams met the Australian livestock watering guidelines.

Dust Suppressant testing results:

- Dust suppressant chemicals used to coat the surface of the tailings dam are classified as non-hazardous under the United Nations GHS.

Conclusion

At the completion of the Study, Serinus concluded, “Based on the data and information available from the Tailings Dust Environmental Health Assessment and Air Quality Monitoring Study, and the ambient dust levels measured by the Study, there is no current evidence to suggest that dust from the Cadia tailings storage facilities or emissions from the mine ventilation system pose a health risk to the community.”

Is Cadia continuing its Study?

Cadia has concluded the Study that was being overseen by Serinus. Cadia will continue with the expanded air quality monitoring to collect data to support ongoing assessment. The community will be periodically updated to maintain confidence in the findings and provide reassurance that tailings dust does not pose a health risk to the community.

For enquiries or further information please contact Matt Armstrong on 1800 063 043 or matthew.armstrong@newcrest.com.au.

ⁱ A range of air quality criteria guidelines were used. The order of priority given to the air quality criteria used as benchmarks for the Study is listed below. Where a criterion did not exist for the substance of interest or for the averaging time required, one was sought from the next source down in the priority list:

1. NSW Environmental Protection Authority (NSW EPA 2017),
2. Other Australian federal or state jurisdiction, e.g., Queensland Government (2019), Environmental Protection, Authority Victoria (EPA Victoria 2008).
3. Ontario Ministry of Environment (MOE 2012).

ⁱⁱ As above.

ⁱⁱⁱ To be confirmed when a full dataset is obtained and analysed at the completion of 12 months of continuous monitoring.