

Submission
No 92

**INQUIRY INTO CURRENT AND POTENTIAL IMPACTS OF
GOLD, SILVER, LEAD AND ZINC MINING ON HUMAN
HEALTH, LAND, AIR AND WATER QUALITY IN NEW
SOUTH WALES**

Organisation: Cadia Community Sustainability Network
Date Received: 13 September 2023

Partially
Confidential

Cadia Community Sustainability Network (CCSN)

(A) The impact on the health of local residents and mine workers, including through biomagnification and bioaccumulation

The community in the Cadia Valley has been concerned by the dust from the mine for several years. Whilst we had no specific information regarding actual deposition and had been told many times that the emissions from the vents were steam, anecdotally many of us experienced a different reality, dust on vehicles and outdoor furniture, visible dust hazes and clouds which enveloped us (Appendix A1 Dust Diary 2019-2023). Many complaints have been made to the regulators and the mine.

The Independent Air Quality Audit dated August 2022 (Appendix A2 - the “Zephyr Report”) identified unfiltered emissions from vent 8 were being released at a rate of 360mg/m³ compared to the license level of 20mg/m³. The community received the Zephyr Report in October 2022 and began discussions with Assoc Prof Dr. Ian Wright regarding a preliminary round of water tank testing. The results of these tests and subsequent expanded round of testing are included in Appendix A3. In summary we identified that although the water tanks at the time were generally relatively full and very settled (after a couple of months of dry weather), there was in the sludge in the bottom of the tanks a significant cocktail of heavy metals which we would not ordinarily expect to be in rainwater.

The CCSN has consistently attempted to focus the EPA and NSW Health on the fact that there is something in the bottom of our tanks which should not be there and we did not put there. The issue was, at least initially, less about risk from the point of use (kitchen tap) and more about finding the polluter who has contaminated our tanks.

Following the Zephyr report, the EPA required Cadia Valley Operations (CVO) to commission a Human Health Risk Assessment (HHRA) (Appendix A4 – The Sage Report). This report was presented to the community on 4 September 2023. Although the CCSN believes this report is flawed in its fundamental dust distribution assumptions, it provided some significant information based upon ABS and PHIDU data.

Statistical Area PHA name	Blayney	Orange Nrth/ Orange Region	Orange	Central West	NSW
Premature mortality (deaths) by selected cause (0-74 yrs) Avg annual ASR per 100,000 (2016 to 2020)					
All circulatory system diseases	52.3	29.6	55.9	48.7	41.7
Ischaemic heart diseases	22.3	15.8	26.9	22.2	19.6
All respiratory system diseases	27.0	20.3	33.8	28.9	16.7
COPD	19.3	11.8	25.8	19.4	10.2

The community closest to the mine lives in the Blayney and Orange health districts. Premature deaths per 100,000 population from pulmonary disease are reported for the Blayney district as 19.3 and for Orange as 25.8. By comparison Orange North/ Region is only 11.8, NSW is 10.2.

- Why has this data, known to NSW Health, not triggered an investigation into the cause of the more than double premature death rate from respiratory disease in our district?

- When the community approached NSW Health this year with concerns regarding potential contamination following a preliminary series of blood tests, with this knowledge and in the context at that time of a potentially criminal dust pollution event under investigation, why did NSW Health issue a webinar (Appendix A5 – GP webinar) to local doctors which resulted in many local doctors refusing to test residents for heavy metal contamination unless they already had symptoms of heavy metal contamination?
- Was NSW Health attempting to impede the community from investigating what was actually happening in our district? This webinar has caused an extraordinary level of distress and anxiety in our community and has all but destroyed our trust in the regulatory system. (Refer Section (D) The adequacy of the response and any compliance action taken by the regulatory authorities...)

Case Study 1

Cadia Valley Residents Health Survey

During March and April 2023, a number of community members, as a result of concerns regarding test results from our water tanks, had blood tests taken. At this time, the group had no medical advisers to support us. Twenty-three (23) members of the community organised testing for various elements through their local GP's.

These tests, although taken by different pathologists and analysed for different elements appeared to identify a potential pattern of human contamination from heavy metals in the region.

Despite the relatively small number of elements tested for we noticed several potential patterns in our blood results:

- 22/23 samples had copper at high levels within the reference range, some over;
- 13/23 samples had selenium above the top of the reference range
- several samples were tested for creatinine, there was a 94% correlation between selenium and creatinine levels – several were well over the upper reference range, potentially indicating kidney stress
- 4/8 tests for Molybdenum were on the upper range or above
- 2/3 tests for cobalt were substantially above the upper reference range.
- 24-hour urine test for nickel indicated 5/9 samples were on or above the upper reference range.

Case study 2

Child – 5 years lives 13 km from mine

Element	Score	Ref range
Urine test 19/3/23		
Nickel	0.108	0.01-0.100
Selenium	1.6	<0.40 umol/day
Creatinine	19.9nmol/day	1.1-8.0
Urine test 15/5/23		
Nickel	0.012	0.01-0.100
Selenium	0.2	<0.40 umol/day
Creatinine	2.5	1.1-8.0

- Parents have reported significant behaviour change in child
Adult male - lives and works within 8km of tailings dam

- **Blood test 01/04/23**

Element	Score	Ref range
Selenium - plasma	1.7 umol/l	0.7-1.4 umol/l
Nickel	<0.04 umol/l	<0.05 umol/l
Blood test 7/08/23		
Selenium - plasma	1.31umol/l	0.89 – 1.90 umol/l
Nickel	11nmol/l	<22nmol/l
	=0.011umol/l	
Urine 24 hr test 1/5/23		
Creatinine	18.2 nmol/day	7-17.0nmol/day
Nickel	0.294 umol/day	0.10-0.100 umol/day
Urine 24 hr test 3/7/23		
Creatinine	16.1 nmol/day	7-17.0nmol/day
Nickel	<0.080 umol/day	0.10-0.100 umol/day

- This is a small data set, however drinking bottled water appeared to result in a significant reduction in nickel, selenium and creatinine for both residents.
- Is it possible that claims by NSW Health and the EPA, following point of use testing, that the water is safe to drink are incorrect?

On 19 June 2023 CCSN approached NSW Health, seeking assistance and advice for community testing. In view of significant pollution events at Cadia which had been happening for several years (resulting in several fines by the EPA, the most recent on 25 August 2022) and the test results received to date the group believed it would be prudent to test a broader section of the community.

On 14 June 2023, NSW Health conducted a webinar to local doctors (Appendix A5). This webinar resulted in many local GP's telling patients in the community that they could not be tested for heavy metal contamination, unless they had symptoms and then only for a very limited range of elements – lead. The community was not notified of the content of this webinar until sometime later.

This was after the group and community had repeatedly tried to alert NSW Health that there may be a problem. (Initial conversations 9 March 2023). All communications with NSW Health, staff have attempted to explain away individual exceedances, NSW Health appears to be unwilling to consider if there could be a pattern emerging from a group of people within the district.

Case Study 3 – Community Blood and Hair Testing

In August 2023, in preparation for this Inquiry the community undertook a more extensive program of blood and hair testing, a total of 47 blood and 45 hair samples were collected. The CCSN was advised by Dr Peter Bentivoglio and Pathology at Royal North Shore Hospital. The group created a GoFundMe page for this fundraising, to relieve the financial burden from local families. The CCSN also committed to pay for any child who came for testing with their parents' consent. To date we have spent almost \$50,000 testing water, blood and hair, and thousands of hours of volunteer community time.

A control group of 44 was established in the Mudgee district. At the time of taking samples, the Cadia group had, for the most part, been drinking bottled/filtered water for about 5 months. Mudgee group has not been drinking bottled water. The results of this community testing are summarised as follows:

Mudgee Regional Action Group – Control Group Blood Tests 44 participants

Lead	Arsenic	Copper	Selenium	Manganese	Cobalt	Molybdenum
<5.0 ug/dL	< 0.13 umol/L	11.8-22.8umol/L	1.19-2.53umol/L	86-330umol/L	<31nmol/L	3-16nmol/L
0.4 - 6.0	<0.01 – 0.15	13.5 – 25.2	1.42-2.81	51 – 25.7	4 - 160	3-30
2	1	3	1	0	1	2

Total exceedances = 10

Number of participants with 1 exceedance = 9

Proportion of participants with at least 1 exceedance = 20%

Cadia Valley – Blood Tests 47 participants

Lead	Arsenic	Copper	Selenium	Manganese	Cobalt	Molybdenum
<5.0 ug/dL	< 0.13 umol/L	11.8-22.8umol/L	1.19-2.53umol/L	86-330umol/L	<31nmol/L	3-16nmol/L
0.5-2.4	<0.01 – 0.19	12.6 – 38.9	1.38-1.61	80 – 284	3 -22	7-33
0	3	9	0	0	0	7*

Total exceedances = 19

*An additional 7 samples recorded a reading of 15nmol, within the error range for testing.

Number of participants with at least 1 exceedance = 13

Proportion of participants with at least 1 exceedance = 28%

Cadia Valley – Children (<16 yrs.) Blood Tests 7 participants

Lead	Arsenic	Copper	Selenium	Manganese	Cobalt	Molybdenum
<5.0 ug/dL	< 0.13 umol/L	11.8-22.8umol/L	1.19-2.53umol/L	86-330umol/L	<31nmol/L	3-16nmol/L
0.6-1.7	<0.01-0.19	14.3-28.0	1.42-2.81	134-242	7-10	16-33
0	3	2	0	0	0	4

Note: Ref range for children is the same as for adults

Total exceedances = 8

Number of participants with at least 1 exceedance = 4

Proportion of participants with at least 1 exceedance = 50%

Cadia Valley –Hair Tests 45 participants

Lead	Arsenic	Copper	Selenium	Manganese	Cobalt	Molybdenum
1.1-36.2nmol/g	<12nmol/g	0.13-1.51umol/g	6.1-23.3nmol/g	1.5-43.9nmol/g	<1.1nmol/g	<1.7nmol/g
0.3-30.7	<5	0.23-13.1	2-3005	1-249.5	0.1-15.9	0.3-1.2
0	0	15	4	3	15	0

Total exceedances = 37

Number of participants with at least 1 exceedance = 27

Proportion of participants with at least 1 exceedance = 73%

Cadia Valley – Children (<16 yrs.) Hair Tests 16 participants

Lead	Arsenic	Copper	Selenium	Manganese	Cobalt	Molybdenum
1.1-36.2nmol/g	<12nmol/g	0.13-1.51umol/g	6.1-23.3nmol/g	1.5-43.9nmol/g	<1.1nmol/g	<1.7nmol/g
2.1-30.7	<5	0.81-12.9	5.5-25.9	1.9-38.9	0.1-5.3	0.3-1.2

0	0	7	1	0	4	0
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Note: Ref range for children is the same as for adults

Total exceedances = 12

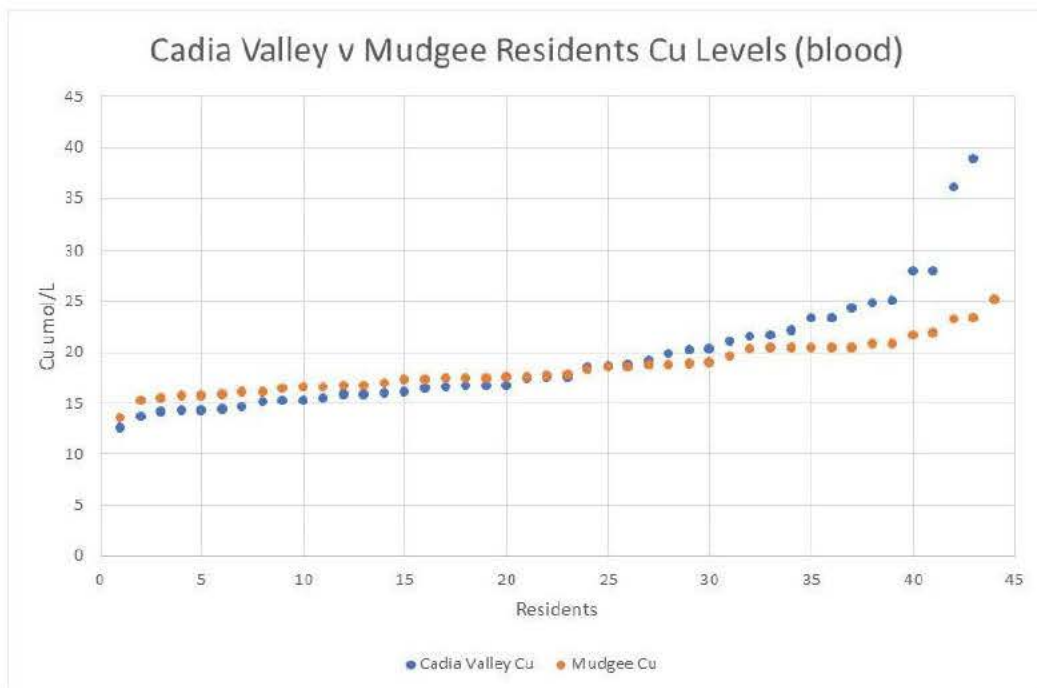
Number of participants with at least 1 exceedance = 10

Proportion of participants with at least 1 exceedance = 62%

Blood Test Results

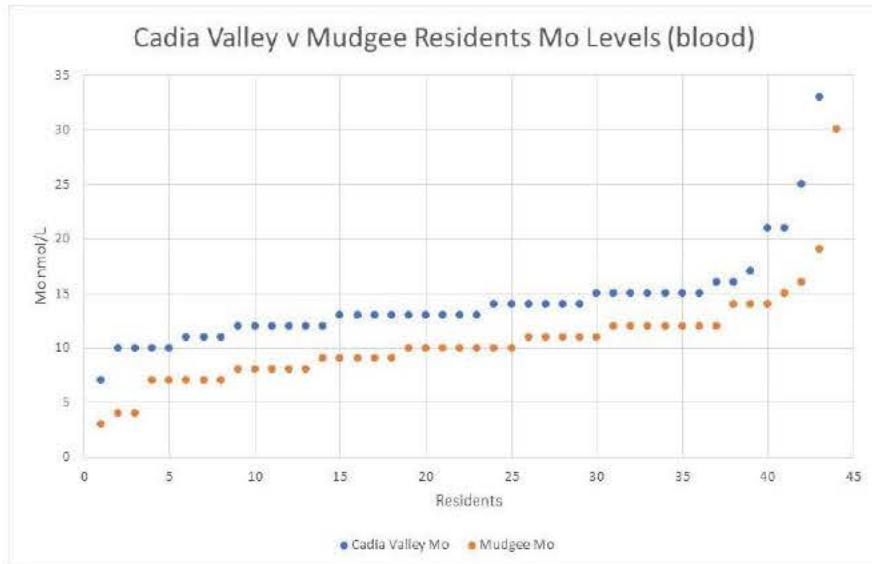
The CCSN believes the Mudgee and Cadia groups would have similar demographics and that both groups would have similar 'outside interferences' e.g., copper pipes. It is therefore appropriate to focus on the differences in trends between the two data sets.

Copper



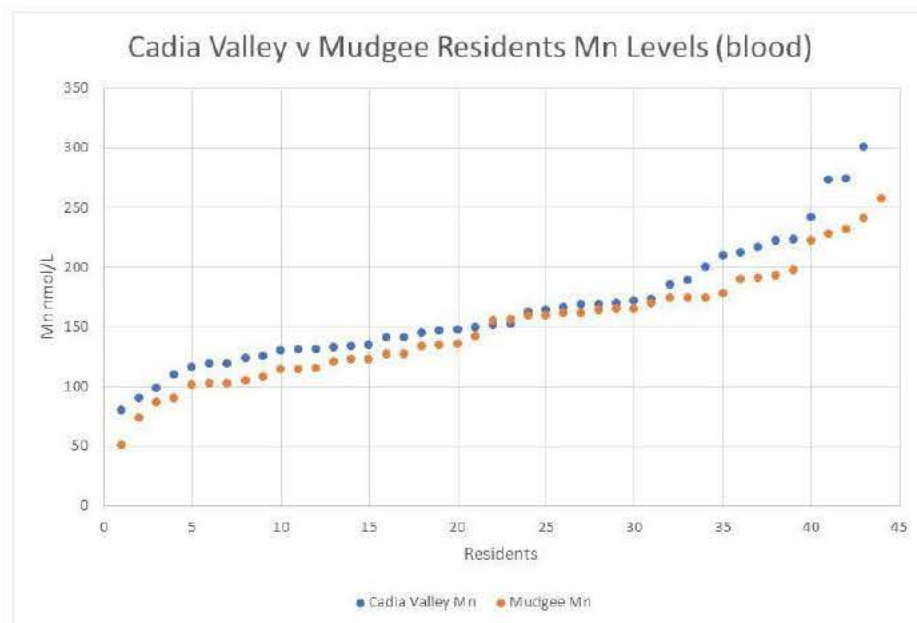
- Three times more exceedances (against health guidelines) for Cadia Valley residents than Mudgee residents
- Average measured copper levels within Cadia Valley residents' blood are 4.9% higher than Mudgee residents
- All the minimum, maximum and range values of copper in Cadia Valley residents' blood are greater than Mudgee residents.
- Higher standard deviation for Cadia Valley residents illustrates more variability and a greater spread in copper levels within blood.

Molybdenum



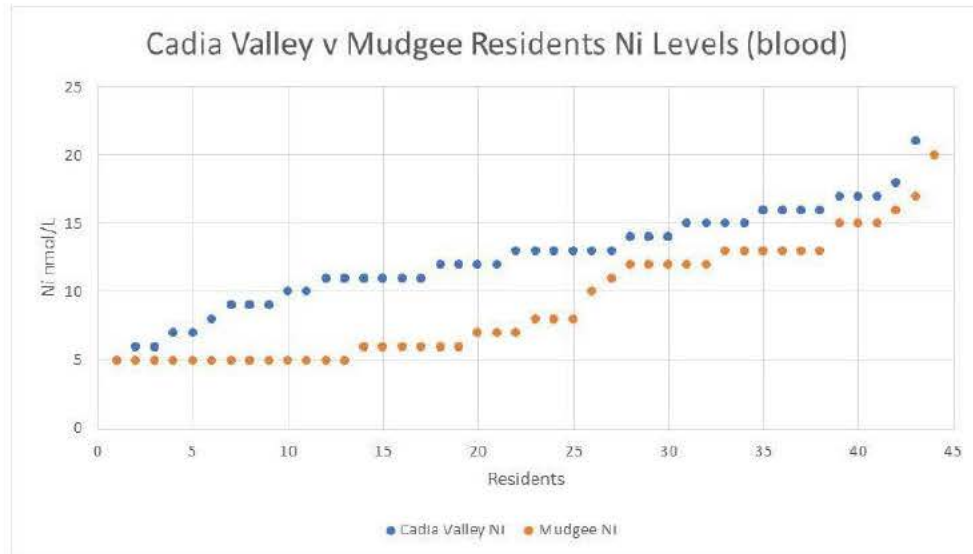
- Cadia Valley residents have higher measured Molybdenum levels in their blood
- Multiple times more exceedances (against health guideline) for Cadia residents than Mudgee residents
- Average measured Molybdenum levels within Cadia residents' blood is 34.4% higher than Mudgee residents
- All the minimum, maximum and range values of Molybdenum in Cadia residents' blood are greater than Mudgee residents.

Manganese



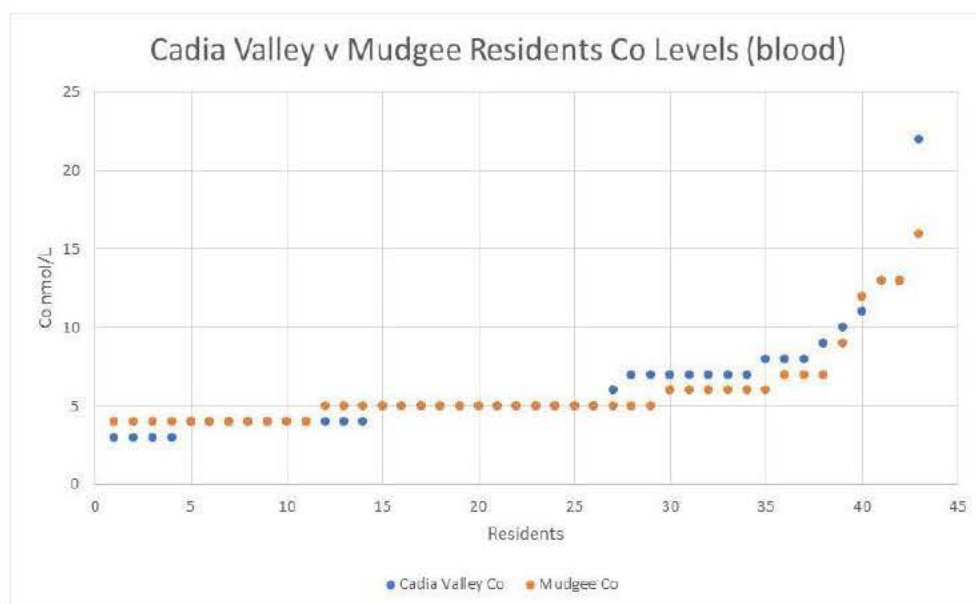
- Average measured Manganese levels within Cadia residents' blood is 9.2% higher than Mudgee residents
- All the minimum, maximum and range values of Manganese in Cadia residents' blood are greater than Mudgee residents.

Nickel



- Average measured Nickel levels within Cadia residents' blood is 35.6% higher than Mudgee residents. 24-hour urine is a more accurate test for nickel contamination.
- Comparison of earlier blood tests with this round of testing indicates that nickel levels have dropped since residents began drinking bottled water.
- Does this indicate that our tank water is not safe under all circumstances.

Cobalt



- One high value (outlier) from the Mudgee resident data set was removed from the graph only. Cadia Valley residents have higher measured levels of Cobalt in their blood than Mudgee for measured levels above 5 nmol/L.

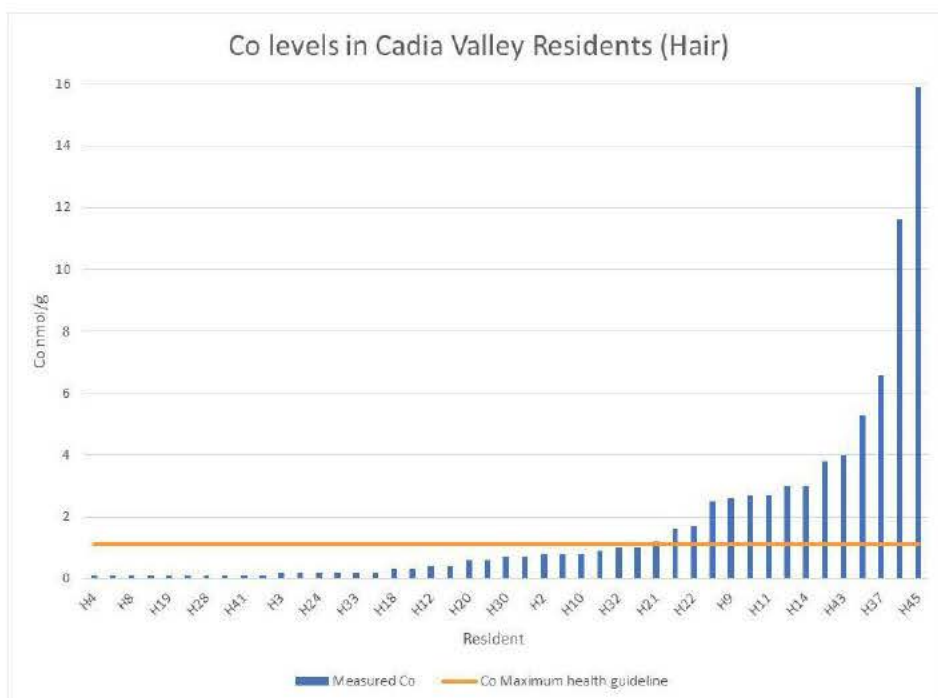
Conclusions

After 5 months of drinking bottled/filtered water we noticed:

- Cadia residents have almost double the number of exceedances of Mudgee
- Cadia residents reported higher levels for every element (except lead) tested than Mudgee, (is the lead discrepancy because the Mudgee group was centred around the Lue area, a known potential lead deposit?)
- Cadia residents' blood test exceedances appear to be focussed on a narrow set of elements, primarily Copper and Molybdenum. Whereas the Mudgee group is "scattered" across several elements. Is this a result of drinking bottled water? Have we flushed elements through our excretory systems such as liver and kidney? Is it possible there is a connection between the previously noted elevated creatinine levels and the additional work our excretory systems are doing to flush these elements?
- Selenium, Cadia residents' levels appear to have improved compared to earlier tests
- *Does this suggest that our drinking water was at least part of the problem?*
- Nickel, although Cadia recorded no exceedances, across the data set Cadia recorded significantly higher levels than Mudgee. The most appropriate test we are aware of for nickel is a 24hr urine test.

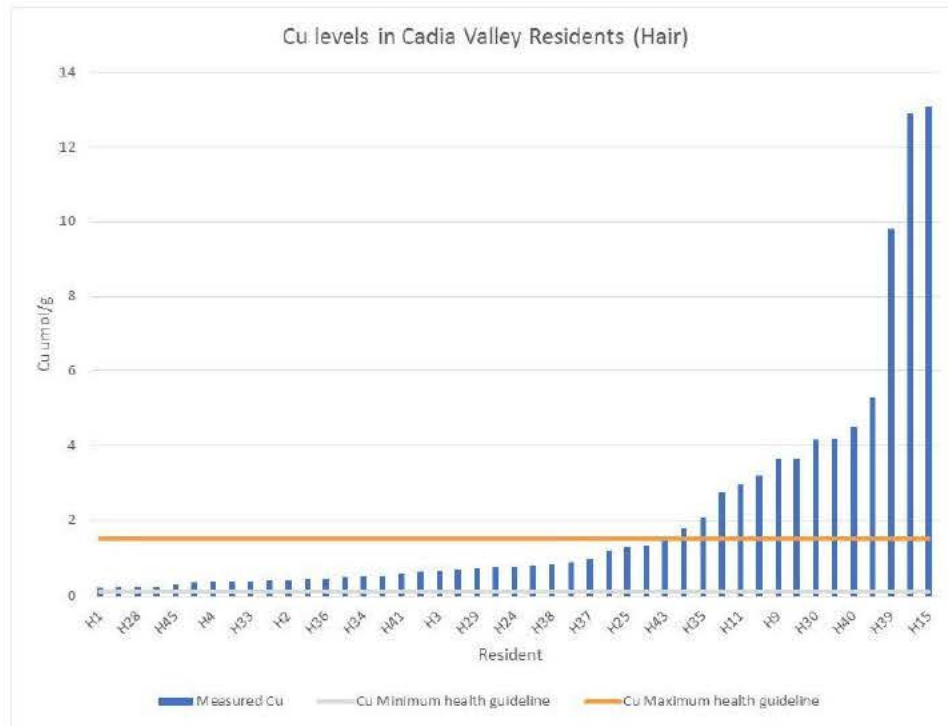
Hair test results

Cobalt



- One third (33.33% or 15 observations) of residents tested reported Co levels that exceed the health guidelines.
- The average Cobalt results (1.77 nmol/g) of residents tested is 61% greater than the maximum health guideline value (1.1 nmol/g) for Co within hair.

Copper



- Almost one third (31.11% or 14 observations) of residents tested reported Cu levels that exceed the health guidelines.
- The average Cu results (2.09 nmol/g) of residents tested is 38% greater than the maximum health guideline value (1.51 nmol/g) for Cu within hair.

In summary:

- 33% of hair tests reported an exceedance of cobalt
- 31% of hair tests reported an exceedance of copper
- none of the tests reported an exceedance in hair of molybdenum although many had it in their blood. Is this because molybdenum does not bioaccumulate?
- Do these tests indicate the population has been exposed to cobalt?

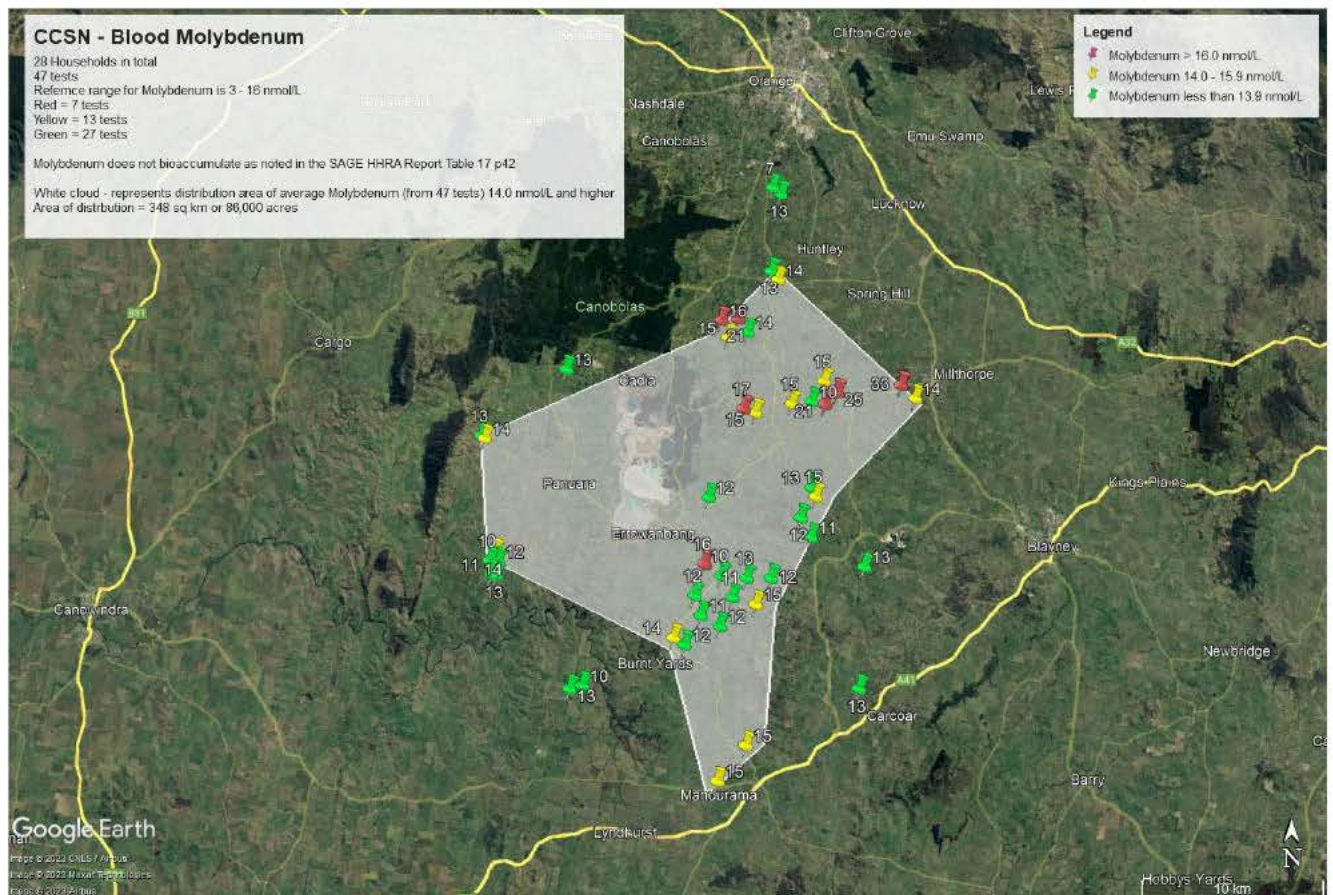
We acknowledge there is some uncertainty regarding the reliability of hair tests however the CCSN believes that where a significant proportion of a data set within a single district is reporting exceedances of very specific elements, this should not be ignored.

There is a developing area of research that suggests heavy metal contamination in human hair samples is linked to heavy metal contamination in blood and potential adverse health outcomes (Appendix A6 – *The effect of heavy metal contamination on humans and animals in the vicinity of a zinc smelting facility*)

Distribution of Blood and Hair Test Exceedances

Map 1 – Molybdenum

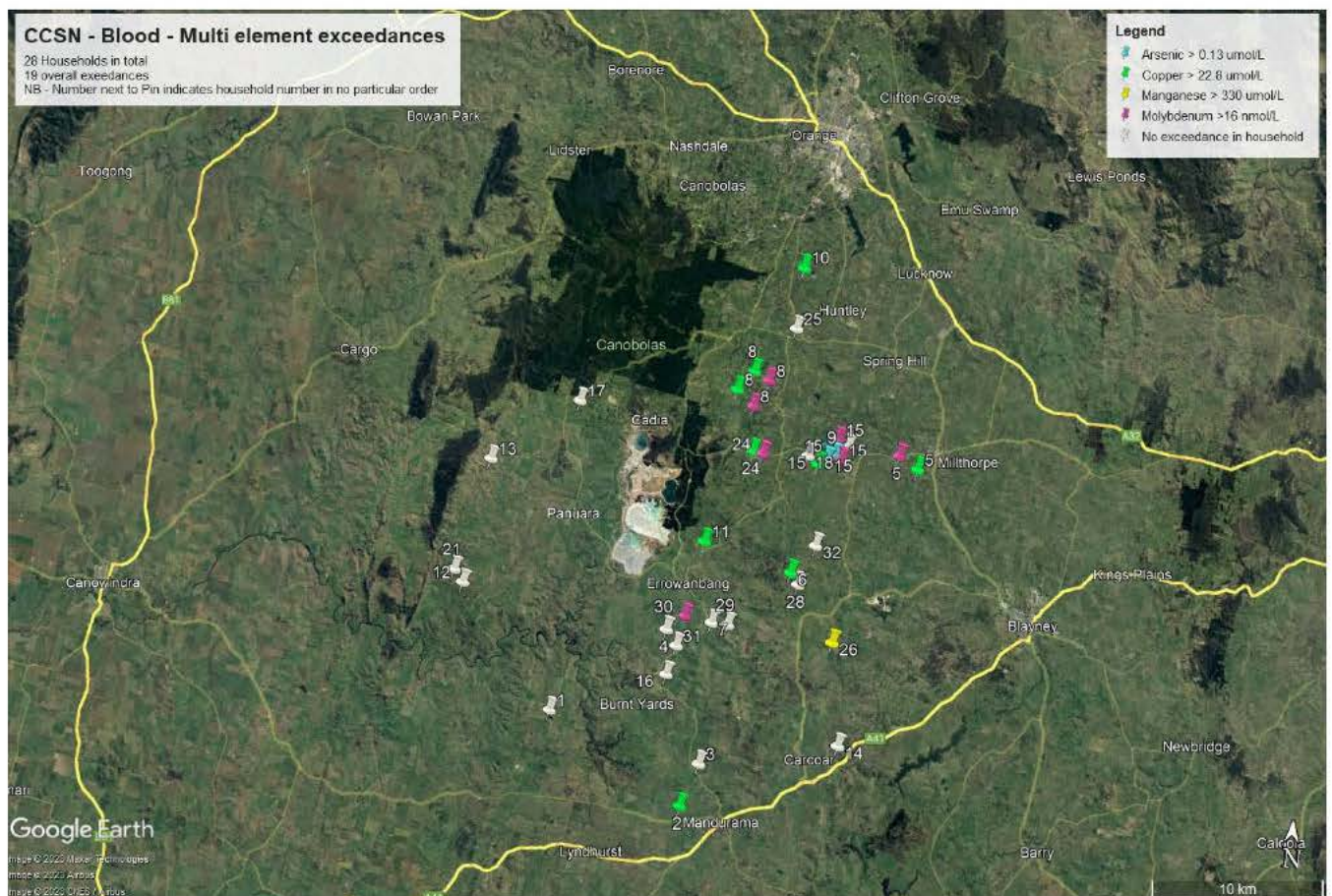
- Molybdenum is a relatively heavy element which we expect to decrease in blood tests as we move further away from a source.
- We may have identified the “drop out” zone to the North and West, it appears the distribution to the East and South East is yet to be determined.
- The distribution of Molybdenum appears to match the expected distribution of dust according to the Zephyr Report p36 of 101 (Appendix A2).
- Lead in the water tank for the residents closest to Millthorpe (Molybdenum levels 33 and 14) was isotope fingerprinted to match CVO ore.
- Copper distribution appears to match that reported in the ANSTO report.
- The estimated area of average distribution for the data set (14 nmol/L) is coloured white and is calculated as 348sqkm. That is equivalent to more than 6 x the area of Sydney Harbour.



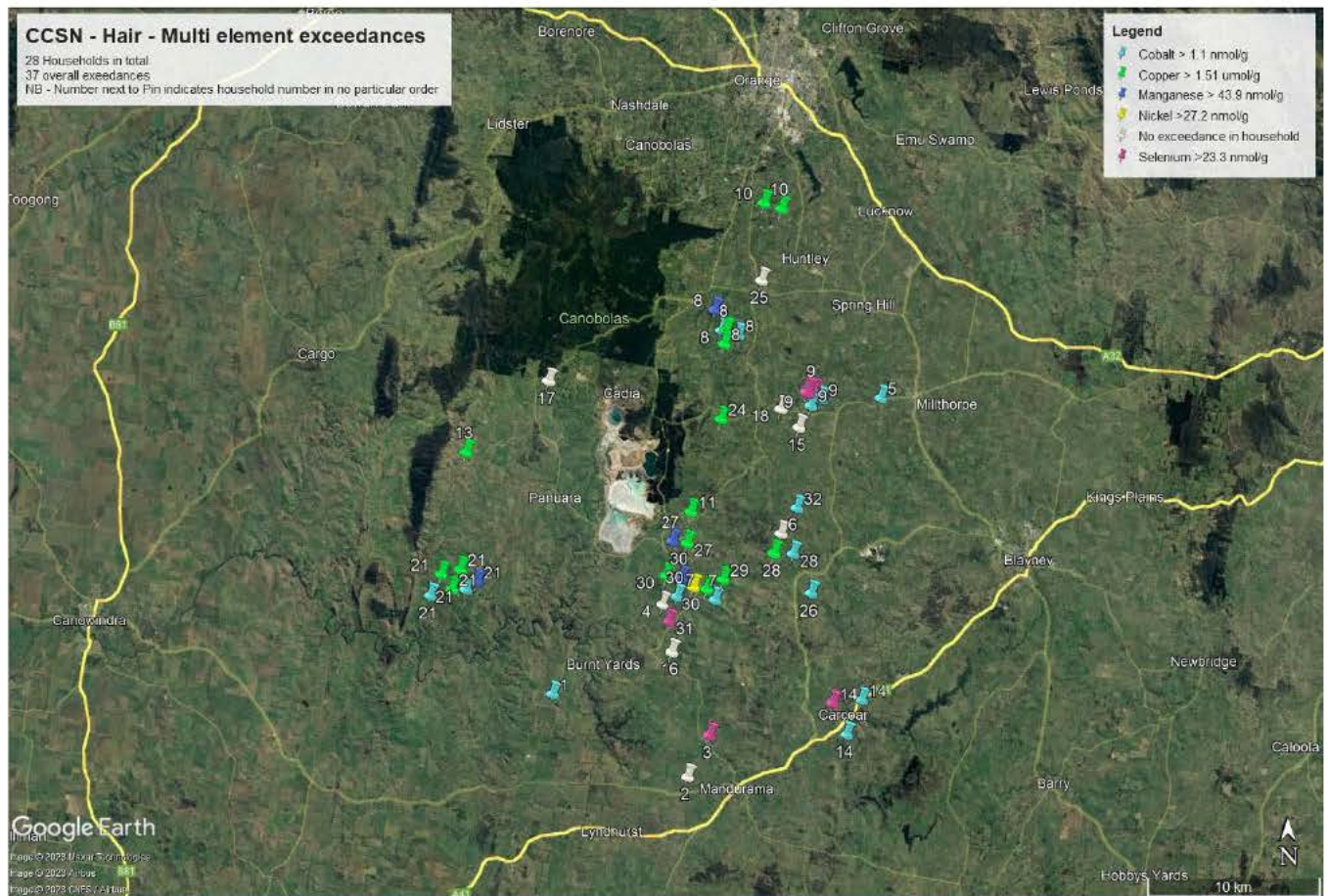
A4 size maps are included as Appendix A8

Map 2 Blood Multi Element Exceedances

- Similar distribution is consistent with the predicted distribution from the Zephyr report. Blood test exceedances are for a narrow range of elements, primarily copper and molybdenum.



Map 3 - Hair Multi Element Exceedances



- Multiple exceedances exist across the entire district. Does this demonstrate that whilst there is some concentration towards the North / East the scale of the operation at CVO is such that uncontrolled dust from the tailings dams and the vent shaft will be distributed across a vast area?

The Zephyr Report was commissioned by both the Department of Planning and Environment (DPE) and Cadia Valley Operations (CVO) as a condition of Modification 14. An increase in production from 32Mtpa to 35Mtpa was conditional on a satisfactory Independent Air Quality Audit. This report deemed CVO extraction vents – VR8-1 and VR3-1 were non-compliant.

The Zephyr Report notes 'Regardless, CVO do not currently meet the requirements of the EPL and Clean Air Regulation and work is needed to reduce these in-stack concentrations to below in-stack criteria' p30 of 101 (Appendix A2).

The Predicted 24-hour average dispersion pattern from CVO ventilation shafts below shows a purple haze moving in a north easterly direction. A large proportion of hair and blood exceedances within the dataset, in addition to rainwater drinking tank sludge testing results conducted by the CCSN are geographically positioned under this purple haze. We believe the consistency of this dispersion pattern indicates a potential source for these elements.

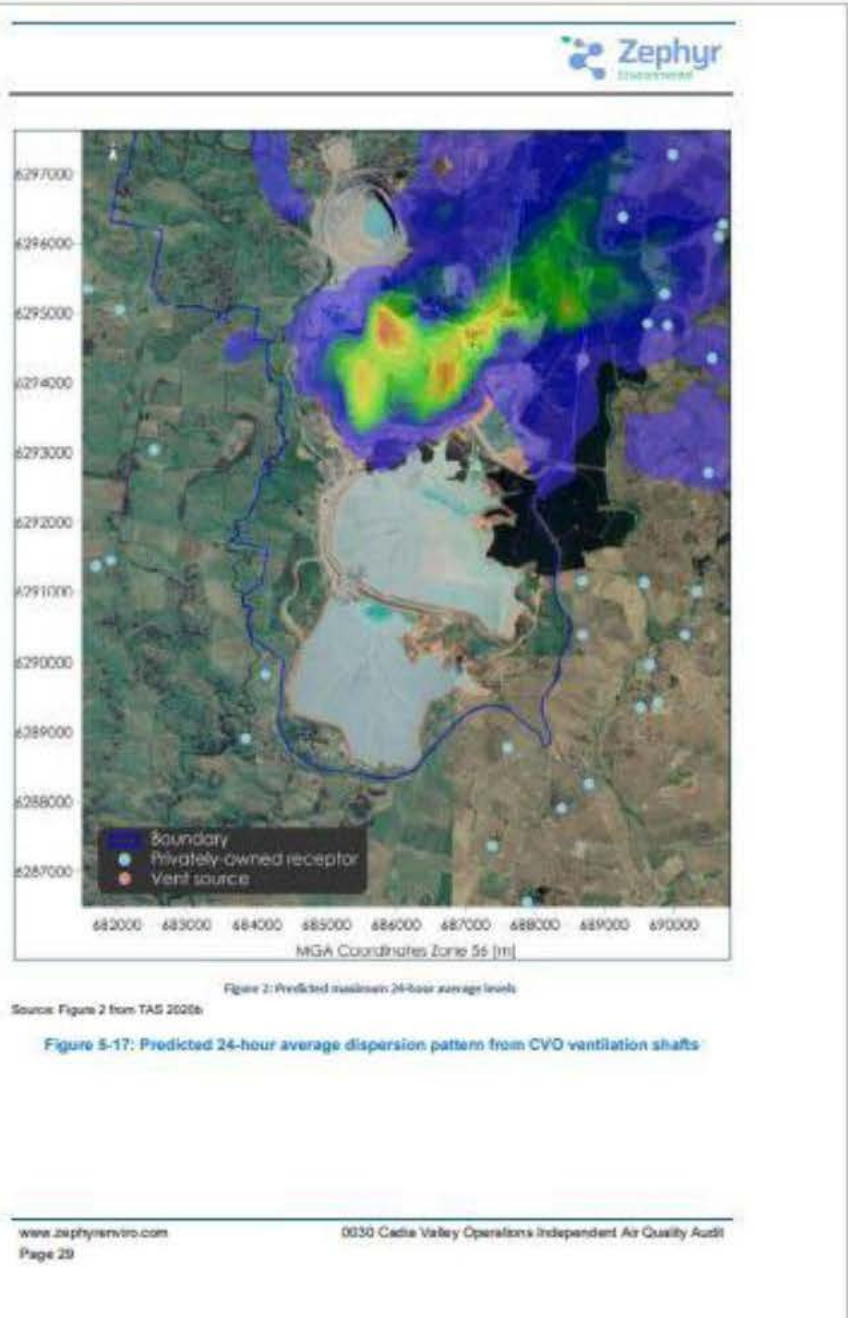


Figure 2: Predicted maximum 24-hour average levels

Source: Figure 2 from TAS 2025b

Figure 5-17: Predicted 24-hour average dispersion pattern from CVO ventilation shafts

Appendix A2 p36 of 101 from <https://media.caapp.com.au/pdf/tnwrjx/7d34220b-ce50-476e-8215-55ce5a160590/Cadia%20Independent%20Air%20Quality%20Audit%20August%202022.pdf>

Conclusions

All elements tested for and found in exceedance in the Cadia community’s blood and hair tests are found in the tailings (Appendix A7 – *Tailings dust environmental health assessment and monitoring*)

study review – Cadia Valley Operations p54 specifically columns STSF2 and NTSF4 are surface samples. The impact can clearly be seen of efflorescent salts drawing elements to the surface and concentrating them) and the dust extracted from the vents (Appendix A2 p36). Hair and blood test information is available upon request.

Some elements, such as Molybdenum, are rare. Their relative abundance in our hair and blood tests suggests a local source.

Some elements, such as cobalt, are found deep in the earth's core and would not usually be found in local surface dusts. The high levels of cobalt in our hair tests suggests the population has been exposed to this element.

We expect copper to be in greater abundance in the vent dust than the tailings, Cadia is a gold and copper mine and has extracted most of the copper before placing waste in the tailings dams.

The distribution of copper in the community's blood tests appears to be consistent with the findings of the ANSTO report (Appendix I "the Soil fingerprint at Millthorpe, Panuara and Orange sites also included Cu as a correlated elemental driver" p74)

Lead in water tanks close to Millthorpe, approximately 13km from the Cadia site has been isotope fingerprinted to Cadia ore (Appendix A9 - *An Evaluation of Lead Isotopic and other Geochemical Information of Relevance to the Cadia Mine operations*).

A precautionary approach requires assessment of the impacts of contamination to take into consideration the following:

- there is no research available into the impact on human health of long term exposure to multiple metal elements.
- the residents of this district already have double the rate of premature mortality from pulmonary disease when compared to North Orange and NSW. Dust is a key contributor to pulmonary disease.

The reference range for children is the same as for adults. As a community we are concerned by the impacts of long term exposure of multiple elements on developing bodies and question if that is an appropriate standard.

Recommendations

1. *We believe there are sufficient heavy metal exceedances in our data set to require a full independent study of the extent and impact of this human contamination in our region. The EPA and NSW health have focussed their testing on proving if the point of use is safe at a given point in time. This does not address how did these elements get into our tanks and if the water is safe at the point of use how did we get contaminated blood?*
2. *Buffer zones around mines seem to be totally inadequate.*
 - *Lead from Cadia has been fingerprinted in water tanks 13km from the mine. Other heavy metals are being broadcast over the community.*

- *There is no guarantee tailings dams won't fail (CVO NTSF 2018). In order to be rehabilitated a tailings dam must be dried out, this will cause significant dust events.*
 - *The approvals process has not properly recognised or considered the impact of a mine under all scenarios throughout the life of the mine.*
3. *Assumptions about risks associated with drinking water tanks are incorrect.*
- *Drinking water tanks act as an accumulator and concentrator of air borne contaminants*
 - *A mine as a neighbour should not results in an entire district having to clean their tanks and filter their water. That is an impost on the community caused by the mine.*
4. *Regulators need to be given serious enforcement powers to ensure health situations such as this never happens again.*
5. *Health assessments of current mines and proposed mines should be determined based upon **actual** environmental health data and should take into account the pre mining health data of a community. Desktop analysis is inappropriate and inadequate.*
- a. *In the case of the proposed McPhillamys mine in Blayney, how can this development be approved without taking into account the already poor health outcomes in the district. Residents live within 1km of the pit.*
 - b. *In the case of the proposed Bowden's mine at Lue, how can that be approved without taking into account the actual dust dispersion experienced in other districts. Lead in our district is travelling at least 13km, the drop out distance in this area is currently unknown and needs to be ascertained.*
6. *Environmental Health Assessments should be part of the Environmental Risk Assessment.*

Cadia Community Sustainability Network

(C) Impact on Land and Soil, Crops and Livestock, including through Biomagnification and Bioaccumulation.

Cadia Valley livestock producers are continuously exposed to levels of heavy metals both in feed and in their drinking water. There are concerns heavy metals accumulate within livestock. Residents within twenty kilometres of the mine are at greater risk as they are also exposed to airborne dust particles which also run off into drinking water tanks as well as the consumption of locally grown fruit, vegetables and animal products.

To state it another way, as one part of the contamination pathway, consumption may represent minimal risk, but if you were exposed to all pathways, there is considerable risk to humans through biomagnification.

Case Study

The impact of dust and associated heavy metals has been a long standing concern of residents surrounding the mine. There have been reports of dust emissions since the mine commenced operations. Dust events were reported by surrounding landholders when the tailings dams were raised, at which time the surface of the dams were dried to create a stable base to facilitate the raising of the tailing's dams' walls.

The Northern tailings dam wall failure in March 2018 resulted with both tailings dams been dried. At that time, the area was experiencing a major drought and experienced a number of large dust emissions events from the two tailings dams.

The Australian Broadcasting Commission (ABC) article (Appendix C1) "Newcrest's Cadia gold mine tailings dam collapse on 2018 causing concern", reported on 20 April 2020, an experience of a local landholder;

"Garry Haines was out checking calving cows on November 6 last year (2020) in the picturesque Errowanbang valley in New South Wales when suddenly he could not breathe."

Thick, white dust coated the pasture he was riding his bike through.

"The dust was coming up off the grass, from the dust event that happened a few days before," he said.

"And when you're following cattle along they're walking through it, so the dust is coming back up from them."



An example of dust settling on farmland from the tailings dams.



Thick white dust blowing over agricultural land as described by Mr Haines.



Dust lifting off the Northern Cadia Tailings Dam

This was one of many examples of dust contamination of pastures in the area surrounding the Cadia Valley operations (CVO) mine.

In response to the increased levels of dust being encountered, CVO increased the number of dust monitors.

This included one of the Gerathy's property, to the south of the tailings dam.

Mr Gerathy stated that due to the dust, there was a rapid failure of the monitor.

"After repeated dust events were reported by those living in the mine's neighbourhood, Newcrest Cadia personnel installed a solar-powered dust monitor on the neighbouring property to the Haines.

That property is called Errowanbang, owned by John and Hilde Gerathy.

The Gerathys claimed the monitor promptly failed due to dust covering the solar panels.

"I offered [Cadia personnel] full access to mains power," Mr Gerathy said.

Newcrest Cadia's representatives took the broken monitor away." (Appendix C1)

As well as the monitoring, CVO agreed to other measures to determine if the local community was exposed to dust and potential ramifications.

"Minutes from Newcrest meetings from October 2019, seen by the ABC, showed that then Cadia general manager Peter Sharpe agreed to the community's request for lung health assessments.

The minutes stated Newcrest agreed to replace Mr Gerathy's dust monitor and to test the pastures of properties subject to dust events.

The company conceded to the ABC, that none of these actions were completed.

When asked why these actions were not fulfilled, Cadia's current general manager, Aaron Brannigan, told the ABC that a 2020 Newcrest-led study into the dust concluded community lung health assessments were not necessary.

Results of that study have not been made public." (ABC, 20 April 2021)

The EPA imposed a fine of \$15,000 in July of 2020, which while welcomed by the local community, was considered as minimal punishment for what could have been long term health impacts.

In early July 2023, CVO finally admitted that they were omitting too much dust from the site.

"The head of Australia's largest gold mine admits the operation has been emitting too much dust in breach of clean air rules."

"The EPA has quite rightly pulled us into line on the lack of compliance because there's too much dust coming from the vent rise," CVO general manager Mick Dewar said.

"Our most recently installed vent rise was found to be emitting dust quite a way above acceptable compliance levels." (ABC, 6 July 2023.)

These revelations identify a second source of dust emissions from the CVO mine site, the vent shaft. This ventilation rise and associated fan has been operating since 2020. Residents have been reporting increased dust and dust haze in the air since the fan started operations.

Mr Dewar said CVO had taken steps to lower its dust pollution, which included installing additional filters in its underground operations.

"When the EPA required us to immediately comply, we did. We've adjusted our operations pretty heavily to do so and we're currently operating in compliance," he said. (ABC, 6 July 2023.)



Vent shaft dust emissions moving over agricultural land 24 hours a day seven days a week (Source: ABC, 6 July 2023)

The company was aware of noncompliance since April of 2022 but did nothing for twelve months.

CVO said it had known for some time that the air vent in question was not complying but believed it was not causing any issues off the mine site. (ABC, 6 July 2023.)

The provided photos clearly illustrate dust leaving the CVO mine site and entering agricultural and neighbouring land over a considerable area, these dust events have been happening for several years.

A study published in the US National Library of Medicine in 2019 found that “Serum protein parameters in affected humans and animals were significantly reduced ($P < 0.01$); therefore, it was concluded that heavy metal contamination caused harm to sheep, and also posed a significant risk to humans living in the vicinity of the zinc smelting facility.” (Sheweita. 2019)

There are also concerns with regards to Cadmium contamination of pastures and humans. Cadmium is contained in both the tailings and the vent emissions at reasonably high levels.

Meat and Livestock Australia advise

“The toxic heavy metal cadmium occurs in soil, water, plants and animals. Excessive levels of cadmium will cause health problems for humans and animals. Its concentration in different meat products used for human consumption is regulated and regularly monitored.”

“Excessive daily intake of cadmium can lead to health problems in humans and animals, causing kidney and bone disease in humans.” (Derrick J. 2019).

The next pathway, as previously mentioned is through Horticulture and the consumption of fruit and vegetables. There have been numerous studies into contamination of horticultural crops and potential impact on humans from heavy metals.

A study by Kachenko AG, Horticulture Innovation Australia and Singh B, University of Sydney (2006) (Appendix C2) stated “Dietary exposure to heavy metals, namely cadmium (Cd), lead (Pb), zinc (Zn)

and copper (Cu), has been identified as a risk to human health through the consumption of vegetable crops."

Kachenko and Singh (2006) investigated the source and magnitude of heavy metal contamination in soil and vegetable samples at 46 sites across four vegetable growing regions in New South Wales, Australia. The four regions Boolaroo, Port Kembla, Cowra and the Sydney Basin were a mix of commercial and residential vegetable growing areas.

Kachenko and Singh (2006) found "the extent of metal contamination in soils sampled was greatest in regions located in the vicinity of smelters, such as in Boolaroo and Port Kembla. Soil metal concentrations decreased with depth at these two sites, suggesting contamination due to anthropogenic activities. Cadmium, Pb and Zn contamination was greatest in vegetables from Boolaroo, and Cu concentrations were greatest in vegetables sampled from Port Kembla. At Boolaroo, nearly all the samples exceeded the Australian Food Standards maximum level (ML) (0.01 mg kg⁻¹ fresh weight) of Cd and Pb in vegetables. Over 63% of samples exceeded international food standard guidelines set by the Commission of the European Communities and the Codex Alimentarius Commission."

A study in Maharashtra, India about Heavy Metal Accumulation in Fruits and Vegetables and Human Health Risk Assessment (Appendix C3) found "Overall, vegetables showed higher metal accumulations than fruits. Some vegetables showed alarming levels of human health risk indices such as the Metal Pollution Index (MPI), Health Risk Index (HRI) and Hazard Index (HI), suggesting that reducing the intake amount of these vegetables may lower the adverse health effects." (Mawari G, Kumar N, Sarker S, Daga M K, Singh M M, Joshi K T, Khan N A. (2022)) The two most contaminated are Potatoes and Garlic, which are both grown in the area surrounding the mine.

Researchers at the University of Silesia- Poland, found "Chemical contamination of foods poses a significant risk to consumers. A source of this risk is due to the consumption of products contaminated with heavy metals such as cadmium (Cd) and lead (Pb). The aim of the study was to research the levels of Cd and Pb contamination of selected species of vegetables and fruits in the form of fresh, frozen, dried and processed products. (Rusin M, Domagalska J, Rogala D, Razzaghi M, Szymala I (2021) (Appendix C4).

Rusin et. Al. (2021), concluded "the contamination of these groups of food products can be a significant source of consumer exposure to heavy metals, because they are an important part of the diet of most people."

Many local people living in the immediate area surrounding CVO mine grow fruits and vegetables on their properties and consume these products. There are concerns that consumption of these products by humans could be leading to increased risks from contamination of plant tissues and through plant roots. The presence of elevated levels of heavy metals on roofs and in roof gutter mud analysed by CVO and supplied with this report, need serious consideration for further analysis by health and agricultural authorities.

Biomagnification and bioaccumulation of heavy metals in humans and animals is a significant concern amongst residents in the areas surrounding CVO. The blood test results from a number of residents lays testament these concerns particularly the impacts on resident children and adults surrounding the mine.

Recommendations

- 1. In the Cadia Valley there is a major unknown regarding the impact on the long-term human health impacts on residents within a 20 kilometres radius of this mine and serious analysis of this impact should be undertaken by public health and agricultural authorities.*
- 2. Widespread baseline soil and human testing for a broad range of elements is required in the Cadia district. This should be completed in a completely transparent manner by an independent expert, scope of the study to be agreed by DPE and the community with all drafts of the report made public as they become available. Further, This testing to be updated every 3 years.*
- 3. All prospective mines should be required to complete widespread baseline soil water and human testing. This testing should be updated every 3 years to effectively monitor mine activity impacts. All testing and reporting to be completed by an independent expert co-agreed with the mine operator and the appropriate regulator and similarly the scope of the testing and reporting.*

Cadia Community Sustainability Network

(D) the adequacy of the response and any compliance action taken by regulatory authorities in response to complaints and concerns from communities affected by mining activities

The response from regulators has been completely inadequate, and in our view, unacceptable.

Complaints and evidence from the community of pollution events have not been taken seriously or genuinely investigated, between 2018. Now, after four years, the EPA has begun to take compliance and investigation actions. Whilst welcome, it was too long in coming. Other state government authorities are still not responding to community concerns.

If we are to have a sustainable future, for the people living in regional NSW, for our productive agricultural country, for our water ways and ultimately for the mining industry, wholesale change is required in the culture of our key regulators.

- Are we at a tipping point?
- Will we in 10, 20, 30 years be counting bodies and wondering how to reverse the damage already done?
- Do we risk deciding there can be *no* mining in our populated regions with major waterways?
- Is our political inaction putting at risk the very resource and industry our politicians and regulators are trying to protect?

The CCSN believes the mining industry in NSW and our regulators do not meet the requirements of the UN Principles of Sustainability (<https://sdgs.org.au/goals/> Appendix D1) or the Law Councils Policy on Sustainable Development (Appendix D2).

Cadia Case Study – Dust

Since October of 2018 the community has officially complained about tailings and vent dust on many, many occasions (Appendix A1 – Dust diary 2019 - 2023) One family alone has submitted complaints to the EPA regarding tailings and vent dust 36 times during the period October 2018 – May 2023. Of these complaints to the EPA hotline, they have received 4 emails acknowledging an email has been sent to the Environment Line and/or short questions relating to the complaint. No formal in depth reply has been received by this family.

The family also received one visit, where a USB was given to the local EPA unit with 3 years' worth of photos and video footage. A further phone call was received on 24 August 2021 not long after the USB was handed over whereby the local EPA staff member stated that landholders needed to call the EPA or email the Environment line with concerns of deposition on site and request EPA callout for contamination collection, rather than send tailings dust lift off photos. Invariably, within hours of a complaint a storm event would wash whatever may have been deposited off site onto local soils and pasture, further impacts of Covid meant that any dust deposition collection never occurred.

After many discussions and complaints to DPE regarding the dust, as part of the December 2022 Modification 14 approval, an increase in production was granted subject to a satisfactory

independent air quality audit (Appendix A2 - Cadia Valley Operations Independent Air Quality Audit - The Zephyr Report).

This report was provided to the community in October 2022 and concluded that:

- none of Cadia's vent shafts had filtration systems installed
- that VR8 was emitting metalliferous dust from the crusher at a rate of 360mg/m³ which is 18 times the permitted level of 20mg/m³
- VR 3 was also non-compliant.

During the period of Mod 14 through to early this year the community has made many complaints about dust with a confusing array of responses by the EPA, some of which are noted below. (Appendix D3 – Correspondence from the EPA):

- 26 July 2021 – ...' You have requested information on why CVO are not required to operate under air emissions requirements of 2.5 ppm instead of the required 10 ppm. PM2.5 are very small particles commonly associated with a burning of a product and are usually found in smoke.'
- 14 October 2022 - ' Photographs of dust lifting off the tailings storage facility, do not necessarily indicate a breach of the license. The EPA needs to be able to obtain evidence that this dust lift off has been deposited outside of the premises to commence an investigation'
- 13 December 2022 - 'At this stage of the investigation, the EPA will not be conducting sampling on neighbouring residence properties however if this is required at any stage of the investigation the EPA may be in contact with you in the future'.
- 10 February 2023 - 'As such, in this instance, the photographs do not provide conclusive evidence of dust deposited off premises so we are unable to commence an investigation of a breach of license condition relating to your report. If you experience dust deposited at your residence or in a paddock that are outside of CVO premises, then please let the EPA know ...'.

CCSN notes that whilst the findings of the Zephyr report were under investigation by the EPA, several residents attempted to report additional dust events and requested the EPA to come and collect samples from their property.

If the EPA refuses to collect samples, because there is no evidence that dust has left the site, there never will be any evidence that dust has left the site. Is it the intention of the EPA to find no evidence?

Since July 2020, Cadia has received three (3) Penalty Infringement Notices of \$15,000 (the maximum penalty):

- July 2020: fined for a dust event in April 2022
- March 2022: fined \$15,000 for failure to conduct continuous air quality monitoring in 2020 and 2021.
- August 2022: fined for a dust event in April 2022, dust cloud tracked by plane to travel approximately 50km to the SE of the mine.

If the maximum penalty is \$15,000, it is not economically rational for Cadia to comply with the dust mitigation requirements, financially the mine is better off to incur an occasional fine.

The Cadia Mine is one of Australia's largest gold mining operations, it is highly profitable. How was Cadia, operating in close proximity to residential areas (estimated 1,000 homes within 15 km radius) allowed to build ventilation shafts with no filtration? Why was no approval required for the

installation of a fan operating at 100km/hr designed to ventilate the dust from the main crusher plant and effectively launch this dust over the community?

Cadia has for years told the community individually and in community meetings that the vent was emitting steam, and the inversion layer we repeatedly saw was 'steam' (Appendix D4 – Cadia Annual Environmental Management Report FY22, this document was published 31 October 2022). The mine knew the problem had been identified by the regulators when the vent emissions were measured in May 2022 and still did nothing.

At a Residents meeting held by CVO on 25 October 2022, the community was informed by CVO Executives, that in early 2021 (D5 – Vent Shaft Commissioning Dates) a new fan had been installed on VR81, this fan operated at 100km/h. Prior to the fan installation, mud was removed by mechanical loaders from the base of the vent shaft, after the new fan was installed, there was no mud at the base of the vent. The extraction of the dust with potential risks to the community was known.

The CCSN was able to meet with Tony Chappell (CEO EPA) on 12 May 2023. This meeting seemed to break the cycle of denial within the local team and we believe has led to a change in strategy from the EPA.

In June and July 2023, the EPA conducted domestic water tank testing in the district. Multiple residences reported that the testing was conducted utilising 'a cup on a pole' which in practice means a sample is not successfully collected from the base of the tank for a sludge test. Imagine dipping a cup into a bucket of water, it fills at the top and remains full to the bottom, it is almost impossible to collect a sludge sample from the bottom of the tank using a cup. It was also noted for the EPA team that for many of the EPA testing staff were not allowed under WHS to climb a ladder, and therefore could not correctly sample many of the tanks.

In August 2023 the EPA announced it was commencing proceedings against Cadia gold mine in the NSW Land and Environment Court in relation to exceedances for the concentration of solid particles as a result of the extraction fans. (Appendix D6)

- The Zephyr report found Cadia was emitting particles at a rate of 360mg/m³ and that the required rate was 20mg/m³
- The EPA in correspondence in June 2023 had measured emissions at 200mg/m³ and 570mg/m³ and referred to a limit of 50mg/m³
- In a community meeting in Blayney on 5 September 2023, the EPA referred to a limit of 100mg/m³

Has the EPA "walked back" the regulatory requirement? A limit of 100mg/m³ can only be appropriate if the EPL dated 21 November 2000 is assumed to still be in force despite the five (5) license reviews made in the interim, and we ignore the massive change in operations since the original and now outdated EPL and the fact that the dust from the now underground operations is primarily from the crushing and grinding activities.

Members of our community have been told by senior staff of the EPA on several occasions that "standing up to the mining lobby" is career suicide. This culture has to change. The role of the EPA is to regulate mining and other industries. Politicians, the Minerals Council and mining companies need to understand this. The EPA needs to be supported, so its staff can carry out their roles, to uphold and enforce the legislation without fear of retribution. (Appendix D7 - How Mark McGowan pressured the EPA boss to remove WA's tough emissions targets in one brief phone call)

Under apparent influence from the mining industry and the minerals council successive governments have prioritised mining, associated royalties and jobs over regulatory enforcement. The result is after years of this behaviour the CCSN now questions if the EPA culturally is a protector of the environment and our communities?

Cadia Case Study – NSW Health

27 July 2021 Mr Scott McLachlan, CEO of Western Area Local Health District was emailed regarding community concerns of upper respiratory issues, 5 cases of cancer (3 diseased) (Appendix D8). A community member spoke with local Environment Health Staff member in Bathurst. The Environmental Health Unit in Bathurst directed the community member to Mr McLachlan with concerns regarding local community health in the Cadia/Panuara areas and the tailings dust that has been blowing off these dams for the past 3 1/2 yrs. This information was shared at length and he was adamant that the community member 'take this to the top'. As COVID was emerging by this time, the group understood that the state was triaging priorities. Confirmation of this email being received was noted on 5 Aug 2021.

No further contact was received from NSW Health.

7 February 2023 – group member spoke with Environmental Health Unit, Bathurst 18 months after first having spoken with the same team member, to share preliminary water results. An email was sent to Environmental health on 17 Feb 2023. The Environmental Team were also after the groups local EPA contacts for discussions at this time, this request was sent via email.

3 March 2023 – CCSN Meeting with Senior Members of Western Local Area Health District (WLAHD) RE – Water tank testing

9 June 2023 after receiving consent from landholders who participated in the group water testing, a spreadsheet of contacts was emailed to Environmental Health Unit in Bathurst. The staff member was keen to replicate bottom of tank sampling along with point of use (POU) in kitchens of homes. It was also made clear that NSW Health had to work 'within our lanes' i.e., not do testing that may be another government departments, tank samples are the EPA responsibility.

On 19 June 2023 CCSN approached NSW Health, seeking assistance and advice for community testing. In view of significant pollution events at Cadia which had been happening for several years (resulting in numerous PIN by the EPA, the most recent on 25 August 2022) and the test results received to date the group believed it would be prudent to test a broader section of the community.

On 14 June 2023, NSW Health conducted a webinar for local General Practitioners (Appendix A5). This webinar resulted in many local GP's telling patients in the community that they could not be tested for heavy metal contamination, unless they had symptoms and then only for a very limited range of elements – lead.

A resident shared the following comments from their experienced GP;

'...due to the country in which we live, we don't often go looking for heavy metal contamination to explain a range of symptoms...'

'.... How much contamination is being missed due to NSW Health downplaying the risks of heavy metal contamination in the webinar?...'

In effect, the GP response to the webinar has either been to;

- not support testing regardless of a patient's geographical location and/or water test results.
- or regardless of the webinar advice to offer testing to patients, with some (and by no means all) being offered financial support through Medicare.
- The webinar has placed roadblocks for many in the community and impeded them from finding out if they have levels of heavy metal contamination.

Many in the region have stated clearly in their feedback to the CCSN, that the lack of support by NSW Health has **significantly elevated stress in the community.**

Esperance Case Study, WA

The difference in both extent and rapidity of the response by the governments of Western Australia and New South Wales is alarming and is summarised in Appendix D8.

In Esperance, following identification of a potential risk to the community in March 2007;

- 12 March 2007 the WA Government put an immediate halt to any shipments of lead carbonate through the port
- March – August 2007 – blood testing offered to all residents. 2219 samples were analysed
- April – June 2007 – Dept of Health tested approx. 1,600 water tanks
- Dec 2008 – WA state government launches clean up and recovery project

The NSW government, in comparison, has not responded quickly. The tailings dam wall collapsed in March 2018. Residents started to raise their concerns regarding dust originating from the Cadia mine site in 2018, and these reports of dust continue to the present day.

In late 2022, Dr Ian Wright, University of Western Sydney, undertook testing of water tanks and dust from verandah furniture of residents. This study identified the presence of heavy metal contaminants. This contamination was reported to NSW EPA, DPE and NSW Health. The community then moved to blood tests to determine their level of exposure to heavy metal contaminants. NSW Health provided a webinar to local GP's telling them that their patients in the community could not be tested for heavy metal contamination, unless they had symptoms and then only for a very limited range of elements – lead. The community has now moved to privately paid for blood testing. Results to date show, in comparison to a control group, Cadia residents have higher levels of heavy metals. Cadia resident have almost double heavy metal exceedances of the control group (refer Section A)

The community has repeatedly raised their concerns with NSW EPA, NSW Health and DPE, and continues to do so.

Recommendations

If as a society we want the mining industry to continue to provide jobs and royalties to NSW, it is in *all* of our interests for this to be done in a sustainable manner with a view to not just short-term profitability for the primarily foreign shareholders and executive compensation schemes but long term viability of our communities, waterways, agricultural production and the health of our people.

- *Regulation of the mining industry must be independent of political pressure . The regulatory body should remain separate from the assessments and approvals body.*

- *Does the Minerals Council have too much influence over the regulation and assessment of the mining industry, and of greater concern, NSW Health?*
- *Comprehensive human health risk assessments should be part of the environmental risk assessment.*
- *Regulators must be supported and encouraged to use every tool they have available to bring about cultural change in the mining industry. Regulators should be given extra resources to carry out more investigations, and if required, prosecutions.*
- *Enforcement actions must be proportionate to the scale of operations, \$15,000 fines are completely inadequate.*
- *The CCSN believes the new team at the EPA is seeking to bring about change, they must be supported throughout this process.*
- *Local councils should take greater responsibility for planning decisions. It seems inappropriate that housing developments can be approved less than 1km from a known ore reserve (known to Council) and within a year or two years a mine applies for approval. Local residents are entitled to believe that if a council has approved a new housing development the ore reserve is not viable.*
- *Health assessments must be based upon actual data, not on theoretical bench top analysis.*
- *Is it possible that some mines being approved are not viable:*
 - *too close to current towns and housing and the mine cannot afford an appropriate buffer zone but receives approval regardless of the real health risks to the community.*
 - *too small to justify full rehabilitation, in truth there may be a significant risk of catastrophic and permanent environmental damage but approved anyway. In reality, rehabilitation bonds appear to be hopelessly inadequate. The size of these bonds must be of a sufficient size to cover the realistic costs of rehabilitation and permanent monitoring.*

*If that is the case, isn't the answer to not sacrifice reasonable health and safety standards for the community but **accept that some resources may not be viable.***

Cadia Community Sustainability Network

(E) The effectiveness of the current regulatory framework in terms of monitoring, compliance, risk management and harm reduction from mining activities.

Considerable frustration is experienced by both miners and the community in understanding the total integrated system of multiple statutory regulations and consents. Miners in general do not appear to have a good understanding of the regulatory system and often see it as bureaucratic red tape holding them back and regard compliance as an exercise in ticking boxes in the most economically rational manner. (Appendix E1 – ‘Bigger Mines’ Newcrest digs into reputation dilemma)

Good community understanding of their rights under the; *Protection of the Environment Operations Act 1997* (POE Act), *Biodiversity Conservation Act 2016*, *Mining Act 1992*, *Environmental Planning and Assessment Act 1979* and their subordinate legislation, along with the Land and Environment Court, principles of ecological sustainability, Environment Protection Licence (EPL), Resource Regulator approval and compliance directives, directorate BDR, Natural Resources Access Regulator, ANCOLD, Dam Safety, NSW Water, NSW Health, is poor and the study necessary to become properly informed is beyond the time constraints and budget of most affected communities.

The result of the complexity of the planning process and a lack of clarity of outcomes gives little confidence that the various planning requirements or agencies will protect communities. This complexity also allows agencies to point the finger at other agencies to deal with the problem.

Case Study

For some years the community adjacent to the Cadia Valley Gold Mine was concerned about the high level of dust being emitted from the ventilation system shafts. Newcrest stated that as the mine lease boundary dust gauges were in compliance, they were not culpable and they repeatedly advised the community that the obviously visible plumes were merely steam and water vapour and the mine was operating in accordance with its licence.

Numerous residents have commented to the CCSN the visual dust plume got much worse after the ventilation fans were modified in February 2021 and the ventilation air volume was increased. At this point in time many in the community did not know what had changed underground. (Appendix D5)

Following a modification proposal (Mod14) and after further complaints, the Department of Planning and Environment (DPE) requested an Independent Air Quality Audit. It was found that the ventilation was operating at a dust exceedance of 18 times the limit of 20 ug/m³ (Appendix A2)). This level of pollution significantly

exceeds the prescribed limit of the *Protection of the Environment Operation (Clean Air) Regulation 2022*.

Knowledge of the point of discharge regulations required familiarity with the section 128 (1)a *Protection of the Environment Operations Act 1997* with cross reference to *Protection of the Environment Operations (Clean Air) Regulation 2022* Division 3 General Activities and Plant, Page 92 “Crushing, grinding, separating or materials handling activity” Group 6. These amendments to the licence were made in 2005.

Neither the Environment Protection Licence or the Conditions of consent alluded to the POE Act point of discharge requirements. Applicability required judgement as to whether EPL 5590 and MP06-0295 somehow supercede the POE Act. The license condition was further complicated by the fact that EPL 5590 was originally approved on the basis of an open cut mine in 2001 then subsequently in 2009/2010 used for the underground mine.

Though the point of discharge requirement was largely either ignored or unknown it proved to be vital to protect the community from heavy metal exposure from the crusher dust. It transpired that the point of discharge at ventilation fan VR8 was extracting from the underground crusher more than 15 tonnes per day of solid particles at high velocity (100 km/hr) in a vertical direction, dust was passing well clear of the boundary dust monitors and was depositing on roofs and being washed into drinking water tanks, this resulted in significant heavy metal contamination of the community’s drinking water.

Recommendations

From our specific case study and experience it would appear that there is a large historical suite of laws, directions and regulations available.

Practical application of the POE Act requires in depth knowledge of the Project and the whole regulatory system. However, EPL 5590 is totally inadequate as it does not quantify dust operating parameters and is at odds with the specific development consent MP06-0295. In addition, complications arise in regard to the applicability of the development consent and the POE requirements and Clean Air Regulation. Further complications arise as the specific project is modified on a regular basis.

1. One stop shop for all current documents

Documents relating to development consents for large State Significant Projects and the Environment Protection Licence *should be an all-encompassing single document*. This would enable easier access by the community. Fact sheets that summarise the documents may also help in explaining the documents.

2. Improve Dust Standards

Dust standards for metalliferous mines are more complicated than for construction projects. In addition to the quantity of particulate matter *the composition of particulates, which elements are in the dust and the amount of individual elements needs to be measured*.

3. Increasing buffer zones around mines

Buffer zones should be a mandatory requirement for establishing a mine and must be based on actual dust distribution and spatial analysis.

Based upon the Cadia district's actual experience it is clear that buffer zones are inadequate and human health is at risk. Refer to Section A of the group submission.

4. Air quality monitoring

PM_{2.5} is an important part of the National Environment Protection Measures (NEPMs). It is a critical component of the National Pollution Inventory. PM_{2.5} distributes over a vast distance and can be air borne for weeks or months having the potential to affect a larger population than just the local district.

For example, the PM_{2.5} component from VR8 was 3.7 tonnes per day discharged in a vertical plume estimated to be some 200m in height. It is not possible to effectively monitor this discharge with the current licence conditions boundary monitors.

Due to the known long term health consequences of PM_{2.5}, emitters should be controlled and monitored with a broader statewide or even national perspective. Small changes in the concentration of PM_{2.5} have a measurable effect on mortality rates for the whole population.

Real time, ongoing, independent air quality monitoring to be made compulsory and results made available to the public as a licence condition for all mine sites.

The current standard specifies a concentration limit at point of discharge in the air of 20 mg/m³. If a mine operating at 40mg/m³ doubled the air throughput it would comply with the regulations required 20mg/m³ by reducing the concentration but would not achieve any reduction in pollution. *The point source regulations for air pollution need to consider the actual quantity and composition of pollutants.*

5. Independent reporting

Reports generated by the mine are not regarded as independent by the community. If the mine organises the production of the report, they have every opportunity to manipulate the data and conclusions of that report. *There is a need for independent reporting as it provides greater transparency and trust in both the conclusions produced by these reports and greater faith in the decisions made on the basis of these reports.*

These reports should be organised by regulatory bodies such as the EPA or DPE, or by independent expert panels, with independent members appointed by the EPA. The cost of these reports can be directly paid by the mine. There is already the legislative power to do this.

In addition, unannounced inspections from the EPA to visit mine sites should be increased.

6. Oversight of public communications

There is legislation in place to deter mines from providing false and misleading information to the EPA, but what about false and misleading information provided to the public by the mine? A recent example is Cadia mine's claim that the lead found in Cadia residents' water tanks was not linked to the mine. The recent Human Health Risk Assessment report commissioned by Cadia mentions that lead matching Cadia's isotopic signature was found in 40 per cent of tank sludge samples collected by Newcrest.

We suggest that the legislation be amended to give the EPA the power to stop mines from providing false and misleading information to the public. False and misleading behaviour should be prosecuted, at the company level, its directors and executives. This is critical to achieving cultural change in the industry.

Perhaps a system could be incorporated where the community gets to ask questions in writing, like a notice, and mines must answer honestly, in writing, within set timeframes. The EPA would provide oversight to this system.

7. Increasing compliance

Penalty infringement notices (PINs) are not enough to deter mines from wrongdoing. The maximum penalty of \$15,000 is small change to a mine and not enough to instigate positive change. *Penalties for non compliance need to be commensurate with the size of the operation.*

Regulatory bodies such as the EPA need better resourcing for their compliance and litigation teams, so they can increase the number of effective prosecutions. Successful prosecutions and the substantial fines that result from these prosecutions provide an economic incentive for mining operations to comply.

8. Helping to offset costs to local communities

Mining companies like Cadia contribute substantial royalties to the NSW Government, and only a small proportion of these funds is expended in those areas in which these mines operate. Consequently, the NSW government reaps the benefits while the local community bears the costs associated with the impact of mining in the area where it occurs. These costs include negative effects on both physical and mental health, increased traffic, road damage, noise, light and dust pollution, environmental damage and reduction in property values.

There needs to be a way of offsetting the costs incurred by residents that are adversely affected by living near a mine. *A scheme that involves annual payments from the mine to affected residents living in affected households could be considered.*

The NSW Government's Royalties for Rejuvenation Fund is a model that could be used. This fund will set aside at least \$25 million each year from mining royalties to support coal mining communities in NSW.

If local authorities with mining operations in the Local Government Areas were exempted from rate capping in regard to mining operations, this could allow greater revenue to flow to the affected communities. This revenue could be used to improve local infrastructure and services.

Cadia Community Sustainability Network

(F) The effectiveness of the current decommissioning and rehabilitation practices in safeguarding human health and the environment.

“Statistically it is extremely rare for any mine to be successfully rehabilitated.

- *Close to 200 Australian mines are projected to close in the next 10 years*
- *Approximately 75% of mine closures are unplanned or premature*
- *Less than 30 Australian mines have ever achieved complete closure and relinquishment*
- *More than 200 major Australian mines are currently in care and maintenance*
- *There are over 50,000 mines with legacy environmental issues in Australia.*

(Appendix F1 Allens Linklaters – Mine Rehabilitation and Closure)

The ability to effectively rehabilitate a mine is determined at the initial mine design stage. The cheapest designs such as modern cavern mines or large wet tailings deposits covering thousands of acres are either impossible to stabilise or may take decades to achieve a stable land form. Though regulations may insist on progressive rehabilitation over the mine life, mining companies see short term cash flow benefits in designing mines that require no rehabilitation during the mine life or that can be possibly delayed until the end of the theoretical ore reserve. Most company Boards would consider technical rehabilitation liabilities possibly in 60 years to be of no consequence to their operation in the time frame of their tenure.

Regulators are well aware of the poor history and low likelihood of any form of mine rehabilitation in the mining industry. Rehabilitation bonds are held and (non mandatory) progressive rehabilitation directives are issued by the resource regulators. Generally, the rehabilitation bonds are inadequate and ignore historical mines often on the same mine lease.

Progressive rehabilitation requirements are not seen as a priority.

Case Study 1

Historic Mine Adjacent to Blayney Residents

Cadia Valley Operations are responsible for the rehabilitation of the historic Annandale copper mine site on the outskirts of Blayney. While the company has over the years given certain commitments to local residents, there appears to be a lack of will to rehabilitate this site. This is of major concern given the company’s commitment four years ago to full rehabilitation of the site within four years. Nothing has been done since.

This should be a priority due to the very close proximity to residents of contaminated mine materials.



Old Copper Mine on the outskirts of Blayney, with delayed rehabilitation by Newcrest Mining. Google Earth.

Case Study 2

Cadia Valley Mine Rehabilitation



Northern tailings fan, which Newcrest has now indicated will no longer be used but does not have a rehabilitation plan which will be enacted before 2031. Google Earth

The northern tailings dam, as shown above has been closed since March 2018. Newcrest has indicated that it cannot repair this tailings dam wall failure and will entomb the failure by 2050, if an extension of the mining licence is granted. Given the current rehabilitation plan focuses on mine closure by 30 June 2031, there is no indication on how rehabilitation would take place on this failure site, which is a major deficiency of the current plan.

Best Practice Tailings Rehabilitation versus Cadia Valley Operations Proposed Rehabilitation

Tailings Management: Leading Practice Sustainable Development Program for the Mining Industry 2016 the following were listed as the strategic objectives of a closure:

- The principal objectives of Tailings Storage Facility (TSF) closure, decommissioning and rehabilitation are to leave the facility safe, stable and non-contaminating, with little need for ongoing maintenance.

In some cases, it will be possible to enhance the value of mined land to create a modified landscape that offers recreational, commercial or natural value that can be enjoyed in the future.

- TSF closure and rehabilitation should always aim to establish sustainable ecosystems, with sustainable revegetation and biodiversity outcomes analogous with the original land values.

To achieve such outcomes, it is essential that post-mining land use and ecological function objectives are developed and agreed with regulators, the local community and stakeholders.

- The Strategic framework for tailings management (MCMPR–MCA 2003) considers the following objectives when planning the final TSF landform:
 - containing/encapsulating the tailings to prevent their escape to the environment
 - minimising seepage of contaminated water from the TSF to surface waters and ground waters
 - providing a stabilised surface cover to prevent erosion from the TSF
 - creating a substrate conducive to the establishment of appropriate revegetation
- Designing the final landform to minimise post-closure maintenance. Factors to be considered when planning the closure, decommissioning and rehabilitation of a TSF include:
 - ore type and geochemistry, which will dictate the potential for the tailings to contaminate, taking into account the variable nature of the ore
 - the crushing and grinding approaches and process reagents used for ore extraction, which dictate the particle size distribution of the tailings and the pore and seepage water quality
 - the quality of the water after processing
 - tailings disposal technique
 - operating the TSF in preparation for closure (for example, depositing benign tailings or discharging centrally to create a water-shedding surface)
 - the environment and climate in which the TSF is located
 - post-closure land use

- closure cost estimation
- long-term landform stability, including geotechnical and erosional stability
- managing surface run-off and ponding on the tailings, which will affect seepage, and the need for a closure spillway
- off-facility drainage and clean water diversion measures
- suitability and proximity of closure materials
- long-term seepage to the environment of potentially contaminated tailings water
- potential for dust generation before, during and after rehabilitation
- the need for, and the desired function and selection of, cover systems for the tailings
- surface treatment and vegetation of the tailings
- profiling, surface treatment and vegetation of outer batter slopes
- perimeter requirements, including drainage requirements, long-term seepage interception and access ways, which may be affected by reprofiling.

Benchmarking Cadia against Best Practices

In considering the effectiveness of the current decommissioning and rehabilitation practices in safeguarding human health and the environment, the best way to assess these issues is to consider the best practice objectives.

The CCSN notes following issues on each of the best practice objectives when planning the final TSF landform:

- *containing/encapsulating the tailings to prevent their escape to the environment*

The shallow depths of proposed soils on both tailings dams. The company has indicated a soils depth of about 20 centimetres which would likely become contaminated with tailings materials during rainfall events.

- *minimising seepage of contaminated water from the TSF to surface waters and ground waters*

There are major concerns about contamination of ground water given the quality of the ground under the tailings dams. As shown with the northern tailings dam failure, the original ground may contain voids which will allow for leaching for perpetuity. This may have to see ground water pumping on a perpetual basis.

- *providing a stabilised surface cover to prevent erosion from the TSF*

The proposed 1% slope on the tailings dams may lead to major water logging and the creation of swamplands. There are also concerns about the establishment of perennial vegetation, which in drier times may lead to dust erosion.

- *creating a substrate conducive to the establishment of appropriate revegetation*

The 20 centimetre depth is not considered sufficient to provide a suitable around to establish much vegetation and only allow shallow rooted vegetation to establish. It would be considered the material in the tailings would be too caustic to allow root development.

Designing the final landform to minimise post-closure maintenance. Factors to be considered when planning the closure, decommissioning and rehabilitation of a TSF include:

- *ore type and geochemistry, which will dictate the potential for the tailings to contaminate, taking into account the variable nature of the ore*

The shallow depth of the proposed soil cover has been highlighted as a risk of contamination. There is a high-risk acid pockets will form on the tailings dam surface, leading to damage to vegetation and highly acid water leaving the site and entering nearby waterways, including the Belubula River.

- *the crushing and grinding approaches and process reagents used for ore extraction, which dictate the particle size distribution of the tailings and the pore and seepage water quality*

There is a high risk the crushed tailings will set in a similar way to concrete over the 27 years it takes to settle. This will not allow vegetation roots to penetrate leading to a plough pan effect, which will create environment issues for centuries.

- *the quality of the water after processing*

There are concerns the two tailings dams will create to some extent a bathtub effect, filling during the wetter times and bringing heavy metals and acids to the surface. This will potentially create soil pH issues in the rehabilitation areas and an acidification of waterways. The rehabilitation plan has proposed a wetland but is considered grossly insufficient during period of sustained wet weather like the site went through from 2020 to early 2023.

- *tailings disposal technique*

The CCSN questions whether this mine is using industry best practice. The company currently uses wet stacking by depositing sludge on the tailings dams. It is proposing under an extension of its current mine licence, which expires on June 30th 2031, to use hydro cyclone technology. This technology has seen tailings dam wall failures around the world. There is the alternative dry stacking technique but this uses more capital-intensive technology, which most miners current shy away from.

- *operating the TSF in preparation for closure (for example, depositing benign tailings or discharging centrally to create a water-shedding surface)*

There is currently no indication the mine has any intention of rehabilitating to its current mine closure timeline of June 30th 2031. The new rehabilitation plan indicates there may be some small areas of rehabilitation on the northern end, near Rodd's Creek Dam, but no substantive rehabilitation until 2031, even though Newcrest have indicated to the community that the damage to the northern tailings dam is irreparable. The other challenge with the northern tailings dam was because of its sudden closure there has been no management if the landscape and slope and may require considerable earthwork to get a final sustainable landform which enable a rehabilitated landscape to operate effectively with the current tailings layout.

- *the environment and climate in which the TSF is located*

The site of the two tailings dams is located in a temperate climate with about 750mm average annual rainfall. The rainfall is highly variable and under climate change modelling could change dramatically, with a more summer dominant rainfall pattern. It can suffer from extreme heat in summer, with up to 40 degree days and up to minus 8 nights during winter. The area also suffered from a severe

bushfire in the early 1980's. This makes the establishment and maintenance of a vegetation cover extremely difficult.

- *post-closure land use*

Originally, when the mine was proposed, it was proposed to return the area to farmland and grazing. Much of the required topsoil for this rehabilitation was covered by tailings and so the mine now has limited stockpiles to cover the entire tailings dams with any depth. It subsequently changed its rehabilitation plan to only cover the area with around 20 centimetres of soils and some biosolids on top of this. Given the shallow depth of the soil on top of the tailings, the mine is now proposing to rehabilitate with small vegetation and some grasses to stabilise the surface. This proposal would not enable grazing to take place as hooved animals would potentially break through the soil over time and expose the tailings. Hooved animals can also dig up soils to chance minerals under the surface which could also see exposure of tailings. There is also a high risk of soil erosion as seen on the southern tailings dam.



Soil erosion creating gullies on the southern tailings dam as seen from Google earth.

- *closure cost estimation*

There are concerns this mine could be sold off to a small and unviable company towards the end of mine life. While there is a mine rehabilitation deposit provided, it is considered as greatly insufficient to cover the extensive cost of rehabilitating the site. Consideration should be given on imposing much higher bonds on the company when they apply for their new EIS.

- *long-term landform stability, including geotechnical and erosional stability*

The current northern tailings dam has not been formed correctly for rehabilitation and further tailings deposits appear to have been ruled out by the company, as the Northern tailings dam wall can't currently be repaired. This will create major challenges in getting a final landform which is suitable for rehabilitation. To get a final landform before soil application will also be a very expensive exercise but should be compulsory for the company to under in the next few years, given the intention not to reuse this tailing storage facility.

- *managing surface run-off and ponding on the tailings, which will affect seepage, and the need for a closure spillway*

As discussed previously, the northern tailings dam is not in a final landform format, because of the sudden forced closure of the tailings dam operations. One of many challenges is how water would be discharged from the dam during major rainfall events. This water is currently harvested and used for processing. There is a proposed wetland for both the southern and northern tailings dams at closure. The indications from the plan are these are extremely small for the catchments and would provide next to no wetland filtration during wetter periods, seeing potentially acid water entering the Belubula River system. There is also a real risk of ponding on the tailings dams given the very limited slope towards the rear of each dam. This could create dryland salinity issues across large sections of the tailings dam.

- *off-facility drainage and clean water diversion measures*

As previously discussed, wetlands are proposed for each tailings dam before water would enter Cadiangullong Creek. The wetlands would be considered to be grossly deficient in fielding the amount of water coming from the associated tailings dam. There is a high risk of pollution if the current rehabilitation plan is allowed to proceed. There is also the tailings dam pit and how any water overflow would be managed from it. There appear to be very limited processes proposed for what would be a very acid concentrated, low pH, water mix entering Cadiangullong Creek.

- *suitability and proximity of closure materials*

There appears to be a considerable limitation of materials for closure. A proportion of suitable soils on the two tailings dams were never harvested. This will see a very shallow soil coverage on the two current two tailings dams. There are also concerns about the pit tailings with indications from the company that the former pit, which is now a tailings dam, will be left as an acid swamp.

- *long-term seepage to the environment of potentially contaminated tailings water*

As previously mentioned, there may be some leaching of water and tailings into the water table, as there appears to be no substantive clay cap on top of the tailings. There is therefore a high risk of contamination of the water table. Mitigation measures need to be considered, including pumping of the water table into wetlands for either evaporation or filtration. This may need to continue for many decades after closure, if not centuries.

- *potential for dust generation before, during and after rehabilitation*

There are already dust events, even though rehabilitation given the northern tailings dam is essentially closed, except for a hydro cyclone tailings trial, the community is already seeing the potential for dust generation. The company is proposing an irrigation system, to keep the dam moist during high wind events. If rehabilitation is to take place, this dam would have to be dried and reshaped to allow for sufficient drainage, before soil was brought in and spread on top. This would create substantial risk of dust events while this was taking place. While rehabilitation is taking place, large amounts of soils is being moved and there are dust risks. Post soils movements, there is a risk of vegetation establishment failure and slow establishment, depending up seasonal conditions. Given the changing climate there are also water erosion risks in the establishment of vegetation on the rehabilitated tailings dam.

- *the need for, and the desired function and selection of, cover systems for the tailings*

The company is currently proposing to establish shrub like vegetation and grasses on much of the tailing's dams. Given the potential contamination and current industrialisation of the site, some residents have proposed to establish a solar facility on the site. As the mine currently has a high voltage line coming onto the site, it could be further utilised post mine.

- *surface treatment and vegetation of the tailings*

It is proposed to cover the tailings with a soil clay mix of around 20 centimetres upon closure. The vegetation mix centres around grasses and shrubs with limited larger vegetation because of the shallow soil depth and makeup of the tailings. There would also be penetration issues for roots to establish in what would be considered a harsh environment.

- *profiling, surface treatment and vegetation of outer batter slopes*

Due to the continued raising of the dam storage walls on the southern tailings dam, rehabilitation can't take place until the final rise. This work sees the base to the top widened for each rise. The company says the expense of final landform of the base of the wall would be prohibitive and closure of the mine. The final landform would be a one in three drop. Drainage from the top surface of the tailings storage facilities down the batters would be managed via engineered structures. These structures could involve, but are not necessarily restricted to, concrete channels, rock gabions or rock lined channels. The structures would direct the runoff to sediment stilling dams, and possibly through a constructed wetland (if required to achieve appropriate water quality), prior to release. The revegetation objective for the South Waste Rock Dump is to provide scattered trees and pasture on the dump surface, and to provide woodland on the batters.

- *perimeter requirements, including drainage requirements, long-term seepage interception and access ways, which may be affected by reprofiling.*

Three areas, being the tailings pit, Cadia East mine and Ridgeway Mine have all been foreshadowed for fencing off, tree planting for screen and permanent access restrictions. The ultimate goal is for all three areas to fill with water, which may take 150 years and then drain into wetlands. The question is who maintains and monitors these sites for this period of time. The rock embankments will see a slope of one in three. This will also be the case with the tailings dam walls. All the slopes will be required to have drainage channels to minimise erosion. Another issue is concerns about long term seepage, particularly into the water table. This issue would like see a need for site maintenance for decades to come.

36 (h) Managing and Minimising Social Impacts

Social impacts have not been considered, CVO states that the Social Impact Assessment Guide for State Significant Projects 2021 trigger date based on PA06 – 0295 30/6/2031 does not require it to be done (S 6.2).

Based upon a review of the SIA Guidelines we believe that if the specific Project Approval requires a specific condition, then that applies. Hence, the CCSN believes the omission of the Social Impact considerations is a non – compliance with the approval PA06 -0295.

Regardless of the specifics of the SIA requirements, to suggest this Guide is not relevant based upon a technicality demonstrates the level of disregard CVO has for its impact on the community. In the

final analysis the rehabilitation of the site is critical to determining the future socio – economic impacts post mine closure.

The CCSN believes the social impact of the rehabilitation is an important consideration in the design of the strategy and should be pro-active rather than reactive.

36 (b) Consultation of Rehabilitation

Following Modification 14, November 2021 a Rehabilitation Working Group was formed under the advice of DPE for interested CCC members and stakeholders.

None of this work is included or even mentioned in Section (6) Stakeholder Consultation.

The voluntary work of the CCSN was further inhibited by multiple resignations over the last two years: Newcrest CEO (Sandeep Biswas),

As a result, there has been no effective stakeholder engagement, the proposal presented appears to be the work of Umwelt consulting with little input from the operations or consideration of historic understanding between CVO management and the community.

The existing strategy specifies consultation with the Resources Regulator, Department of Planning and Environment - Water, Biodiversity and Conservation, Mining, Exploration and Geoscience, Cadia – Community Consultative Committee, Orange City Council, Blayney Shire Council and Cabonne Shire Council. Leading Practice Sustainable Development program for Tailings Management considers community engagement as particularly important in the decommissioning and closure of tailings storage facilities at which time stakeholder consultation, information sharing and dialogue should intensify.

The greater the uncertainty the more proactive approach is required.

36 (c) Investigate options for future use of disturbed areas including voids upon completion of mining.

The rehabilitation plan proposes no rehabilitation of the voids. As potential water sources they have no use, being saline and acidic. Both the open pit and the Ridgeway slump area have potential for tailings deposition and total rehabilitation. This approach would minimise degradation of land for storage of tailings, minimise evaporative water losses and improve environmental water flows in perpetuity.

Underground flooded tunnels and infrastructure can be used as an energy storage system using compressed air storage supplying peak demand electricity generation. This system which is used elsewhere in redundant underground mines is probably the only useful option for these areas.

36 (d) Proposed rehabilitation strategy for the site

The proposed treatment of the tailings dams based on 20cm of soil would not provide a stable ecosystem / soil biota and due to the presence of soluble heavy metals could not be used for agricultural purposes. To enable effective use of the tailings storage area consideration should be given to a capillary break, a clay seal and a greater depth of soil.

Suitable capping systems are described in Leading Productive Sustainable Development Program for the Mining Industry 2016.

Consideration should also be given to better contouring of the existing flat surface by the use of dewatered tailings to improve water shedding and conformation with the existing land forms, this would reduce the final tailings footprint and provide a more stable better drained less permeable surface.

Consideration should be given to both the Australian Government Ips/dp Tailings Management handbook and the NSW RR Compliance Priorities Outcomes July 2020. Both publications outline the issues and limitations in regard to the rehabilitation of wet tailings dams and suggest and recommend alternatives such as Dry Filtered Tailings (Prof. David S Williams UQ).

There is a high likelihood that the site cannot be effectively rehabilitated and will need to be managed in perpetuity, the development of sustainable uses such as electricity generation (solar) and storage, with the high voltage power lines, may provide alternate economic options.

The current rehabilitation bond assumes the site will be a passive system and has not factored in ongoing management, monitoring and rehabilitation costs in perpetuity. The bond is probably significantly understated due to issues with the NTSF foundations which cannot be repaired and known contamination of the underlying aquifer.

The CCSN believes this bond should be reviewed as a priority.

Conclusions

There has been no history or prospect of successful remediation or containment of mine tailings in any tailings storage facility in the Blayney Shire.

- Browns Creek, abandoned after the mine flooded, now a source of acid mine drainage directly into the Belubula River.
- Junction Reefs Mine, failed rehabilitation after multiple attempts to control cyanide and acid mine drainage directly into the Belubula River
- Historical mines at Cadiangullong Creek, Marangulla/Belubula River, McPhillamys, all abandoned with high levels of copper, arsenic cyanide and acid mine drainage into the Belubula River
- Cadia Valley Operations
 - Collapsed wall of northern tailings dam facility which is now condemned
 - Condemned containment wall on Southern tailings dam which is currently under construction.

Recommendations

- *In the case of Cadia, a request should be made for a Ministers Review of the assessed security deposit under S261 B of the Mining Act 1992.*

- *Regulatory requirements need to specify and enforce progressive rehabilitation as a requirement of acceptable mine operating plans for the mine.*
- *An acceptable standard of rehabilitation needs to be mandated based on a realistic usable and stable land form. Revert to previous use? Maintain a stable land form? Be repurposed to some useful intention.*
- *Establish a clear performance criteria and time frame for completion of rehabilitation. Where a progressive rehabilitation is achieved financial incentives could include a reduction in the rehabilitation bond or calculate the bond so that rehabilitation at the end of the mine life is not a viable financial option.*
- *Ban wet tailings dam and mandate adoption of dry filtered tailings disposal as recommended by the Resource Regulator.*
- *Introduce additional regulations to safeguard the environment and communities when mines and or tailings storage facilities are either placed in care and maintenance or there is a change of ownership*

References:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=MP06_0295%2120191124T233957.672%20GMT

<https://media.caapp.com.au/pdf/o94pli/e5b518da-19e5-4ee1-af8b-da006ed40fcc/Cadia%20Forward%20Works%20Program.pdf>

Cadia Community Sustainability Network

(I) Other matters

Misleading Communications – A Lack of Independence and oversight by Regulators

Since the EPA commenced its investigations into the findings of the Independent Air Quality Audit (Appendix A2) and the community provided early water tank test results to Cadia, the EPA and NSW Health, Cadia has been required to produce a number of so called independent expert reports.

- June 2023 ANSTO Stage 2 Report of 12 month Cadia Valley Operations PM_{2.5} Study (100 pages) (Appendix i1)
- July 2023 An Evaluation of Lead Isotopic and other Geochemical Information of Relevance to the Cadia Mine Operations - Emeritus Professor Brian Gulson (47 pages) (Appendix A9)
- July 2023 Cadia Valley Operations Air Dispersion Model 2022 - Todoroski (95 pages) (Appendix i2)
- September 2023 Cadia Valley Operations Human Health Risk Assessment – SAGE Environmental Services (4,130+ pages) (Appendix A4)

All reports have been commissioned by Cadia, utilising experts selected by Cadia, draft reports have been provided to Cadia before the regulators (SAGE had 3 drafts before issuing the Final report) and the community and reports have been paid for by Cadia. None of these “experts” can be described as independent.

The only expert report which the community has found to be consistent with our lived experience is the Zephyr Report (referred to on many occasions throughout out this submission Appendix A2). This report was commissioned jointly by DPE and CVO as a condition of Mod14.

Since July 2023 Cadia has released many media statements (a selection is included as Appendix i3) claiming no health risks to the community and Cadia not linked to lead in district water tanks. Could this be viewed as a propaganda campaign based on disinformation to the wider community?

The community has refuted these reports with the EPA and DPE (copies of this correspondence is included as Appendix i4) In short, our primary concerns with each document are summarised as follows:

- Ansto – Study is focused on PM2.5, of the four monitors installed by ANSTO 2 were described based upon the results as being too far away from the mine (Orange & Millthorpe) and one was too close (Panuara). The dataset achieved after one year of sampling has been described as being ‘very small’ further years of sampling may help to produce a more reliable study.
- Lead Isotope Report
 - The report concluded that 14 of 89 sludge samples have data lying within the ‘Ore field’ range
 - And 5 of 12 tank water samples have isotopic ratios which lie in the ‘Ore field’ range
 - That is Gulson determined that a substantial proportion of the sludge samples tested matched the isotope range for the Cadia ore. Some of these water tanks were more than 9km from the mine site.
 - Despite this Cadia repeatedly issued public statements stating “Cadia not linked to lead in district water tanks” (Refer Newcrest submission to NSW Parliament Legislative Counsel Portfolio Committee No.2 Health p19 of 29)

- Gulson has publicly attempted to correct the record, but it appears that Newcrest / Cadia believe that if they state something often enough, they may be able to rewrite the narrative.

(Appendix i5 – Prof Brian Gulson says Cadia Hill goldmine could not be ruled in or out as the source of the lead, despite miner saying there was ‘no evidence’)

- Air Dispersion Model

- This model assumes that because a monitor approximately 1km to the East of the mine site is substantially compliant nothing can be leaving the site. The report effectively ignores the fact the Vent 8 is operating at 100km/h and can frequently be seen to blast emissions upwards, possibly as much as 200m where they catch an upper air stream. It is not unusual to see an inversion layer form as the emissions are moved in an upper air current to the east.



- “The modelled emissions for upcast vent VR8 were scaled down by 90% of PM_{10} and TSP and 50% for $PM_{2.5}$ in order to reasonably correlate with the actual ambient measurements at Woodville.” That is the report assumes that the actual emissions are only 10% of those measured in the Independent Air Quality Audit Report (Appendix A2) and retested by the EPA.

- Human Health Risk Assessment Report

- We have not had an opportunity to review this report in detail, however we note:
 - The HHRA model adopts the air dispersion model above, that is no dust leaves the site and is fundamentally flawed.

Newcrest Cadia gold mine report confirms lead contamination connection to rainwater tanks

[ABC Central West](#)

/ By [Micaela Hambrett](#)

Posted Mon 11 Sep 2023 at 12:30pm Monday 11 Sep 2023 at 12:30pm, updated Mon 11 Sep 2023 at 1:00pm Monday 11 Sep 2023 at 1:00pm



The source of rainwater contamination has been examined in areas surrounding the mine. (ABC Central West: Supplied)

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abc.net.au/news/newcrest-cadia-gold-mine-report-lead-contamination-rainwater/102820632

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A report commissioned by a gold mine in central west NSW has confirmed lead matching its ore has been found in the rainwater tanks of Orange district residents.

Key points:

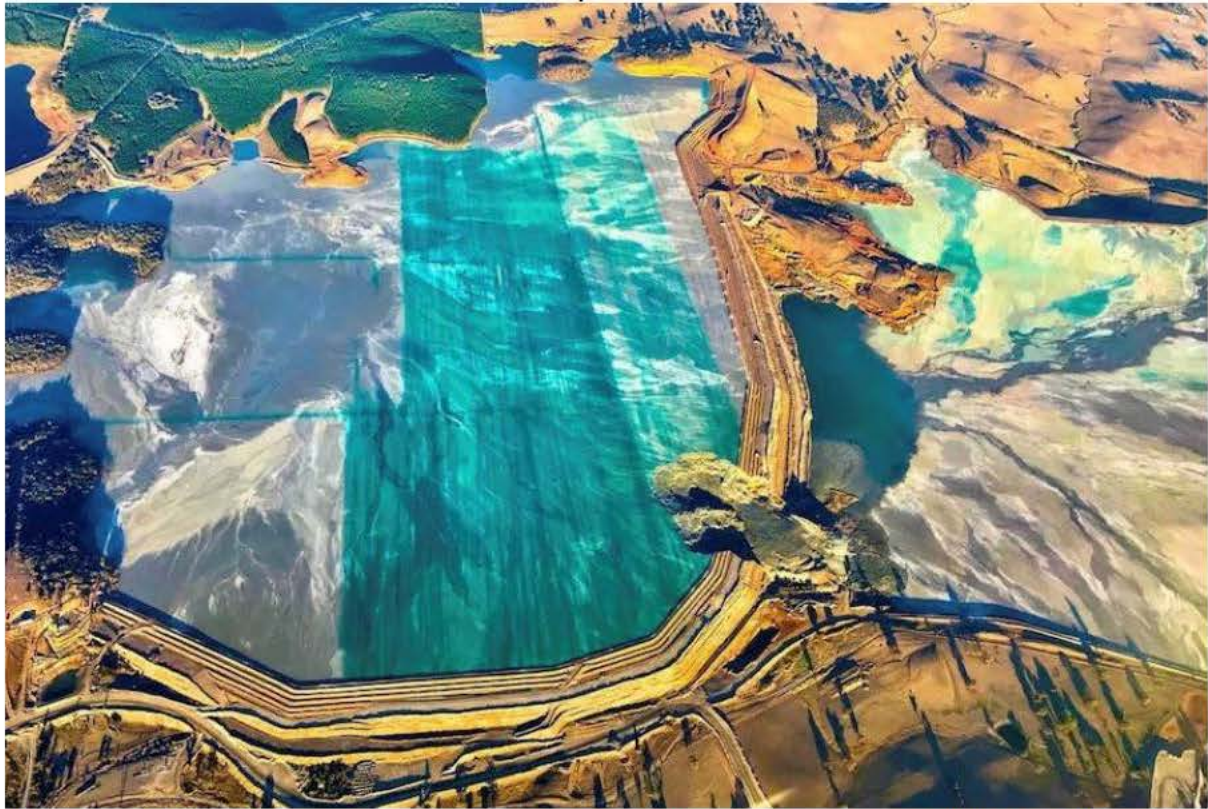
- A new report by Cadia gold mine contradicts earlier mine communications about lead contamination
- The EPA says it will supply the report to its Cadia-focused expert panel
- An upcoming parliamentary inquiry wants to address misinformation from mining companies

The Human Health Risk Assessment (HHRA) was commissioned by Newcrest's Cadia Valley Operations as part of a raft of regulatory requirements in the wake of the mine being [found to be non-compliant by the NSW Environment Protection Authority \(EPA\)](#).

Residents living in the mine district have [been reporting dust events since 2018](#), when a dam holding mining waste called tailings failed.

The HHRA identified that point of use water, such as kitchen tap or tank tap, was the largest risk factor for heavy metal exposure and recommended that tank maintenance and monitoring "guidance is followed".

Released to the public on September 1, the report concludes that the "potential risks to human health from emissions from CVO is low and acceptable".



An aerial photograph shows a wall slump at Cadia's northern tailings storage facility. (Supplied: Farmer from Down Under)

Lead matches Cadia

The report recaps independent studies commissioned by the mine to predict community exposure to date, including a tailings dust study, micro particle shed and lead fingerprinting work done by the University of South Australia.

Lead fingerprinting allows lead to be traced to its source using isotopic signatures.

Under the lead fingerprinting section, the report mentions that lead matching Cadia's isotopic signature was found in 40 per cent of tank sludge samples collected by Newcrest.

This contradicts the mine's July press release that stated there was "no evidence linking Cadia to the lead sampled in district rainwater tanks".

Media Release

19 July 2023



Cadia not linked to lead in district water tanks

A new lead fingerprinting analysis has found no evidence linking Cadia to the lead sampled in district rainwater tanks.

The study, conducted by the University of South Australia, examined 88 sludge samples collected by Cadia during the district water sampling program against samples from Cadia's ore body, and other soil and rock samples from the surrounding area.

The report was independently interpreted by Emeritus Professor Brian Gulson from Sydney's Macquarie University and found that 74 of the 88 samples (84%) had no correlation with Cadia ore. Of the remaining 14 samples (16% of the total), both the Cadia orebody and district soil samples exhibit similar characteristics, and they recorded the lowest concentration of lead amongst all the sludge samples.

Cadia General Manager, Mick Dewar, said the isotope analysis is part of a suite of studies commissioned in response to concerns raised by the community, and is the second independent air and water quality investigation to be undertaken over the last 15 months in the Cadia District.

Newcrest's July media release asserts Cadia could not be linked to lead found in district water tanks. *(ABC News)*

In a statement, the report's author said: "The information presented in the report is accurate based on available information at the time of completion of the report".

Newcrest did not comment on why the HHRA report included information that contradicted previous communication by the company.

"The findings of the Human Health Risk Assessment conducted by Sage Environmental shows that Cadia is operating within established health standards, and the potential risk of emissions to human health is low," it said in a statement.

Cadia Community Sustainability Network chair Gem Green said the changing messages had undermined the community's trust.

"The process with Newcrest and Cadia over the last several months has completely destroyed the relationship with the community," Mrs Green said

Twice state average

Using national health data from the Australian Bureau of Statistics, the assessment built a picture of the health of the Blayney and Orange districts that flank the mine and compared them to the wider region.

It did this to "accurately assess the potential impact of the CVO operations on the population". Statistics showed premature respiratory mortality rates for the Orange district were double the state average, and rates for Blayney were approaching double. Childhood asthma rates were also elevated.



Dust clouds sometimes blanket parts of the district near Cadia Gold Mine. (Supplied: Gem Green)

Mrs Green said regulators weren't doing enough.

"We have an entire district which appears to have significantly worse outcomes than surrounding areas," Mrs Green said.

"In that context shouldn't we expect the regulators to be doing everything possible to reduce emissions from all sources?"

In a statement, an EPA spokesperson said the Independent Health Risk Assessment was "extensive" and was under review by the watchdog.

"We required Cadia to have this assessment peer reviewed before its submission and the EPA will now have its own technical specialists review the report before it is provided to our independent expert panel for advice," the spokesperson said.

"All reporting and monitoring provided by Cadia is closely interrogated by the EPA."

Inquiry to look at communication

A parliamentary inquiry into the impacts of metal mining on health, water and air was announced in July with the committee expected to table its findings in November.



Cate Faehrmann says public communication from mining companies will be examined. (AAP: Bianca De Marchi)

Greens MLC Cate Faehrmann, who will chair the inquiry, said it would closely examine how Newcrest had communicated pollution incidents to the community.

"This is critical to the committee being able to make recommendations to government, including where the law needs to be strengthened," Ms Faehrmann said.

She said there was very little oversight when it came to mining companies' public communication.

Conclusions

Residents in the Cadia district have over the last few months been overwhelmed by a range of highly technical reports which have been incredibly difficult for the everyday person to understand. We do not have access to and cannot afford our own experts to interpret this information and have been dependent on the support of a few generous but overstretched academic experts. It is our view that many of these reports have been reverse engineered to suit the proponent rather than investigate in a transparent manner what has actually happened in terms of pollution in the district.

Without a complete and transparent investigation, it is impossible to find a solution to the ongoing pollution of our air and water. In April 2023, the CCSN wrote to the board of Newcrest requesting a meeting to discuss a solution, which might include cleaning of district tanks, filtration of tanks etc. The Board refused to meet with us and were satisfied with the process being run the local team at CVO. (Appendix i6)

These documents have been used in what we believe is a misleading manner in public statements, no regulators have challenged this process.

We must re-establish independence and transparency in the design, development and monitoring of mines. These resources are part of our sovereign wealth, development of the mining industry should not be put at risk by a process which allows mining companies to prioritise short term profits ahead of the long term health and safety of our environment and people.

Recommendations

DPE establish an expert panel for all areas of mine operation, air modelling, health risk assessment, water, rehabilitation etc

All critical reports should be prepared by an expert selected from this panel by DPE, instructed in conjunction with the proponent, drafts provided to DPE and the proponent simultaneously. Experts paid for by the proponent.