

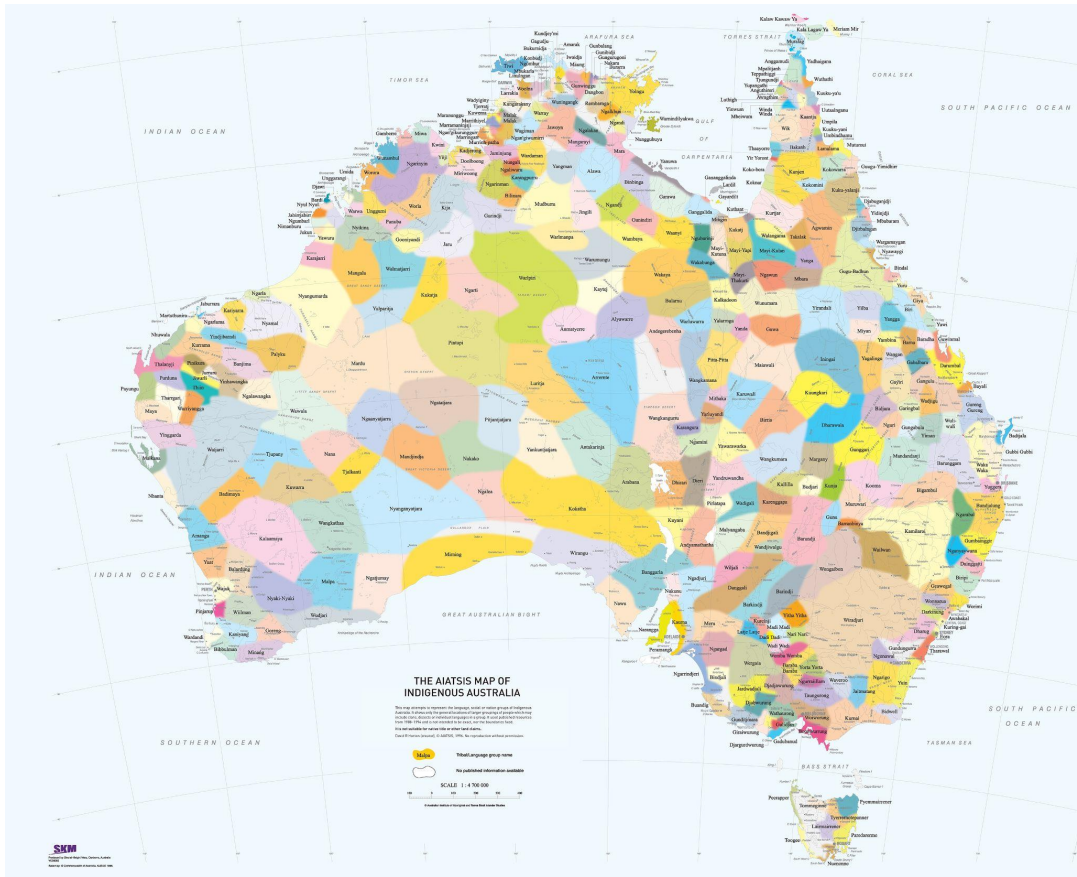


The case for reducing water in the Vales Point Ash Dam

Chain Valley Community Hall

Friday December 1 2023





Acknowledgement of Darkinjung Country

The case for reducing water in the Vales Point Ash Dam

1. Vales Point ash dam
2. Groundwater seepage complaint, 2021
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6. Groundwater monitoring results 2016 to 2023
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8. Key asks

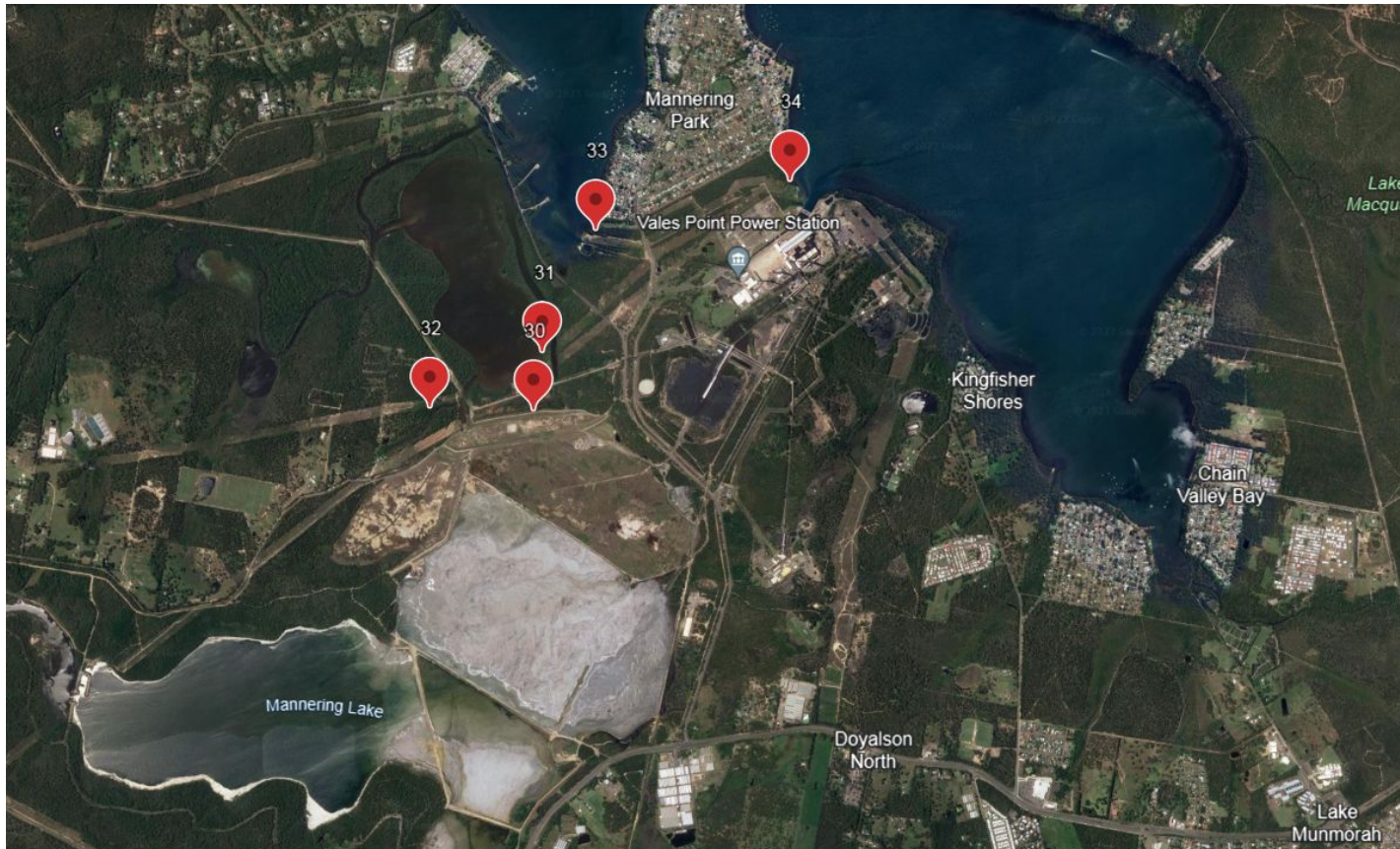


Figure 1: EPL groundwater monitoring bores (purple/red) and surface water monitoring points (white/yellow), also showing substantial volume of water sitting in the ash dam.

HCEC maintain an up-to-date summary of EPL monitoring results from data uploaded to their website by Delta Electricity.

Recent groundwater monitoring results show a significant increase in concentrations of:

- Ammonia**
- Arsenic**
- Copper**
- Manganese**
- Nickel**
- Potassium**
- Sodium, and**
- Zinc** - many the highest concentration readings since monitoring commenced.

Groundwater seepage complaint, 2021

A 2021 consultant's report¹ prepared for Delta Electricity in response to a complaint of contaminated groundwater seepage at a nearby nursery business, found **elevated metal concentrations (particularly aluminium, copper, lead, and zinc)** at all wells closest to the groundwater seepage.

Similar elevated total dissolved metal concentrations were reported at other groundwater seepage discharge points and the Ash Dam Pipe, suggesting groundwater impact at these locations through the dissolution of metals from ash caused by acidic groundwater conditions.

The consultant's report suggests:

"..it is likely that over this time the ash in the Dam have experienced anaerobic conditions resulting in sulfate-reducing bacteria in the ash converting dissolved sulfate present in the pore water to react with metals, particularly iron, resulting in the formation of metal sulphides (principally pyrite).

It is likely that wet-sluicing of the ash for disposal has resulted in RIS oxidation, and the resultant lowering of groundwater pH and the dissolution of trace metals and metalloids. Groundwaters and surface water affected by RIS oxidation can be characterised as highly saline, low pH and have elevated metal concentrations."

HCEC water and sediment sample analyses

On 23 April 2020, HCEC staff took two water samples from a brackish creek running along the northern ash dam wall that drains into the southern end of Mannering Bay, Point 3 (Figure 2).²

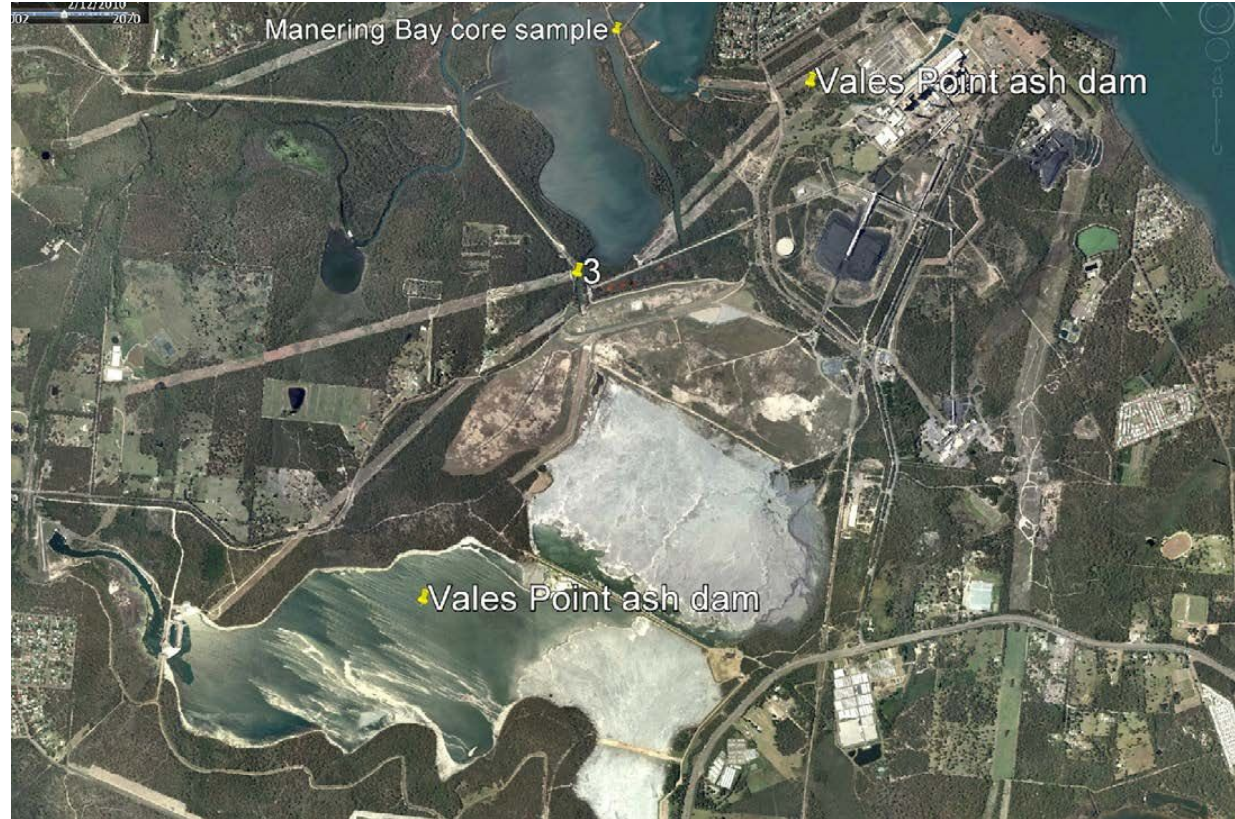


Figure 2: HCEC water samples and sediment core sample locations

Sample location					
Sample ID					
Field Prep.					
Type of sample				Water	Water
Date Sampled				23/5/20	23/5/20
pH.				4.5	
EC		uS/CM			
Metal/metalloid		Units	PQL		
Aluminium	Al	µg/L	10	81000	75000
Arsenic	As	µg/L	1	43	43
Boron	Bo	µg/L	20	100	100
Barium	Ba	µg/L	1	230	200
Cadmium	Cd	µg/L	0.1	0.1	0.2
Cobalt	Co	µg/L	1	59	60
Chromium	Cr	µg/L	1		
Copper	Cu	µg/L	1		
Iron	Fe	µg/L	10	1700	1700
Lead	Pb	µg/L	1	2	2
Manganese	Mn	µg/L	5	8600	8600
Molybdenum	Mo	µg/L	1		
Mercury	Hg	µg/L	0.05		
Nickel	Ni	µg/L	1	36	36
Selenium	Se	µg/L	1		
Thallium	Th	µg/L	1		
Vanadium	V	µg/L	1		
Zinc	Zn	µg/L	1	130	130

The results of laboratory analysis of the water samples provided to Envirolab P/L are set out in Table 1. They identify concentrations of;

- **Iron** 5 times the EPL 761 concentration limit for discharge to Wye Bay from LDP22
- **Cobalt, manganese, nickel, and zinc** above ANZECC Marine Trigger Values
- Aluminium, boron, iron, manganese, above ANZECC (2000) Recreational Use guidelines, and
- **Arsenic, manganese, and nickel** above NHMRC Drinking Water Guidelines.

The water samples HCEC took in 2020 were found to exceed ANZECC & ARMCANZ 2000 trigger values for:


- **Cobalt - 60 times** the marine high reliability trigger value of 1 µg/L at 95% protection.³
- **Manganese - over 100 times** the marine low reliability trigger value of 80 µg/L at 95% protection.⁴
- **Nickel – over 5 times** the marine high reliability guideline value of 7 µg/L for 99% protection level recommended for slightly to moderately disturbed marine systems.
- **Zinc -15 times** the very high reliability DGVs of 8 µg/L⁵ for 95% species protection.⁶

Table 1: Laboratory results of HCEC water samples taken at point 3 in Figure 2.

Crabs in Lake Macquarie contaminated with 'unhealthy' levels of cadmium

ABC Newcastle / By Ben Millington

Posted Mon 11 Mar 2019 at 6:28am, updated Mon 11 Mar 2019 at 11:41am



Documents obtained by the HCEC in 2020 from the then-NSW Office of Environment and Heritage (OEH) under NSW freedom of information law suggest these concentrations have not changed markedly over the intervening 24 years.⁶

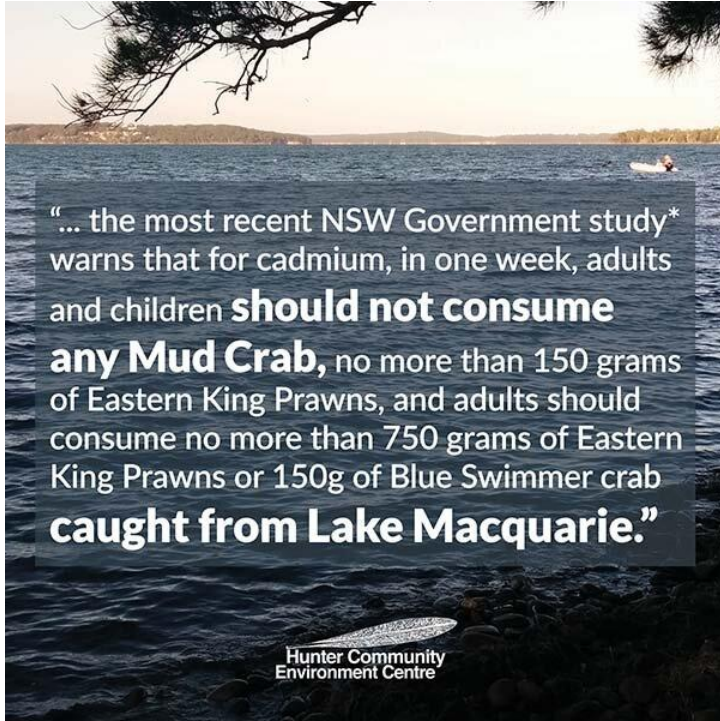
Mud crabs, however, were found to have concentrations above levels that could cause human exposure to cadmium toxicity if consumed more than once a week.

- Mean concentrations of **cadmium in Mud Crabs** was found to be **2.5 mg/kg**, and **Blue Swimmer Crabs** was **0.75 mg/kg**.

- The maximum **arsenic concentration** was **70 mg/kg** from a **Blue Swimmer Crab** from the very southern end of Lake Macquarie.

- Maximum **selenium** was **3 mg/kg** from a **bream** caught in central Lake Macquarie. The maximum **selenium in a crustacean** was found in a **Mud Crab (2 mg/kg)** from the very northern part of the Lake.

- *C&R risk assessment and advice for metal concentrations in seafood from Lake Macquarie, NSW, June 2018*



“... the most recent NSW Government study* warns that for cadmium, in one week, adults and children **should not consume any Mud Crab**, no more than 150 grams of Eastern King Prawns, and adults should consume no more than 750 grams of Eastern King Prawns or 150g of Blue Swimmer crab **caught from Lake Macquarie.**”

Hunter Community
Environment Centre

“The OEH risk assessment did not present an analysis of metal concentrations in seafood in different zones, other than for selenium and cadmium, but HCEC has analysed the data to show the geographic distribution of results for all species and metals. Fish caught in the northern area of the Lake generally show higher concentrations of heavy metals, particularly lead and mercury, but this was not the case for selenium. Selenium in all species was higher in samples caught in the southern areas, as was arsenic in Mud Crabs, Sand Whiting, and Yellowfin Bream; copper in Silver Trevally, and zinc in Sea Mullet.”

- ‘Out of the Ashes: water pollution and Lake Macquarie’s ageing coal-fired power stations’, HCEC, 2019

Results: HCEC crab bio-sampling

HCEC collected flesh, organs and shell from two male Blue Swimmer Crabs and one male Mud Crab caught in a dilly trap from the southern end of Wyee Bay in late 2020, and sent them for metal analyses.⁷

- The flesh and organs of the Mud Crab were found to contain significant concentrations of **Selenium - 4 mg/kg and 3 mg/kg respectively.**
- **Cadmium** was found in the shell and organs, but not the flesh, of all three crabs. The organs contained significantly higher concentrations of cadmium; the **Blue Swimmer Crabs 5.3 mg/kg and 5.7 mg/kg, and the Mud Crab 9.1 mg/kg.**
- Significant concentrations of **arsenic** was found in the flesh and organs of all three crabs;
 - **Blue Swimmer- 9 mg/kg; 9 mg/kg,- 8 mg/kg; 6 mg/kg,**
 - **Mud Crab - 8 mg/kg; 6 mg/kg.**

HCEC Mannering Bay sediment core sampling

In 2019, HCEC staff took a 30cm sediment core from Mannering Bay for which ANSTO provided a lead 210 isotopic dating analysis.

ANSTO identified 15 dates from 1930 to 2019.

Laboratory analysis of the sediment samples taken from these time stamps, shows a substantial increase in metal concentrations between 1960 and 1970.

Coal ash waste was first dumped in Vales Point ash dam in 1962.

The time series also shows that from 1930 to 1960 little increase in metal concentrations was apparent.

However, the next time stamp (1970), records a substantial increase in metal concentrations in the sediment of Mannering Bay;

1. Cadmium concentrations had increased by a factor of 15,
2. copper by 12,
3. zinc by 10,
4. selenium by 8 to 10,
5. lead by 4,
6. manganese by 3,
7. arsenic by 2 to 3, and
8. iron by 2.

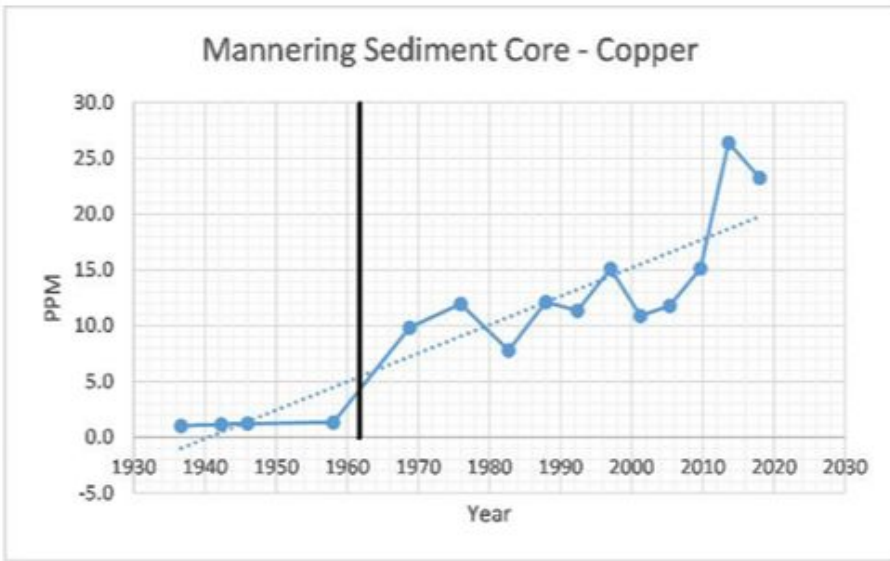


Chart 1. Mannering Bay sediment copper concentrations 1930 to 2019. Black line indicates commissioning of Vales Point A.

Copper concentrations had increased by a factor of 12 in Mannering Bay sediment after 1962.

Cadmium concentrations had increased by a factor of 15 in Mannering Bay sediment after 1962.

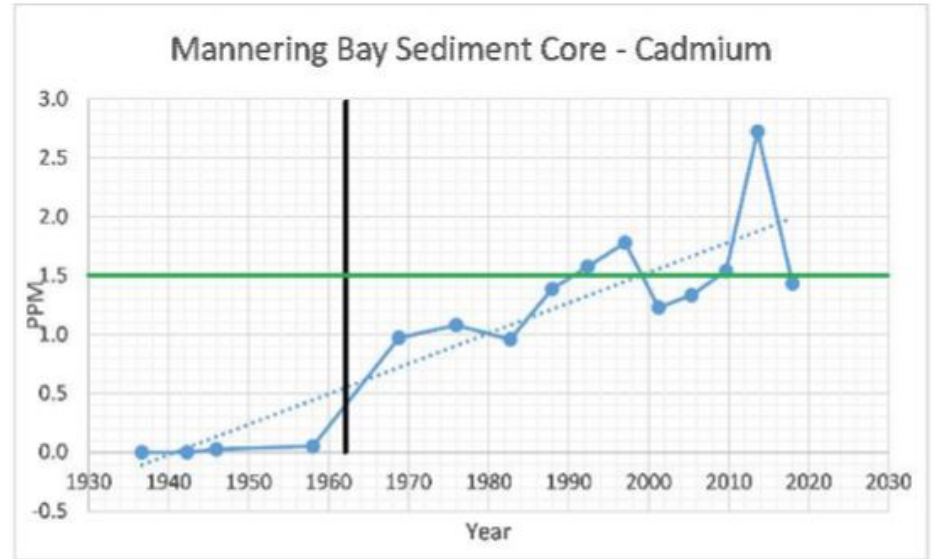


Chart 2. Mannering Bay sediment cadmium concentrations 1930 to 2019. Black line indicates commissioning of Vales Point A.

EPL groundwater monitoring results, 2016 - 2023

AMMONIA

Delta Electricity's quarterly monitoring results for October 2023 identifies a spike in ammonia at **three of the five groundwater monitoring points.**

Samples from a further monitoring bore identifies a spike in July 2023.

These are the **highest ammonia concentrations identified in groundwater since July 2020**, when EPL groundwater ammonia monitoring began.

POTASSIUM

Delta Electricity's quarterly monitoring results for October 2023 identifies a spike in potassium at **one of the five groundwater monitoring points.**

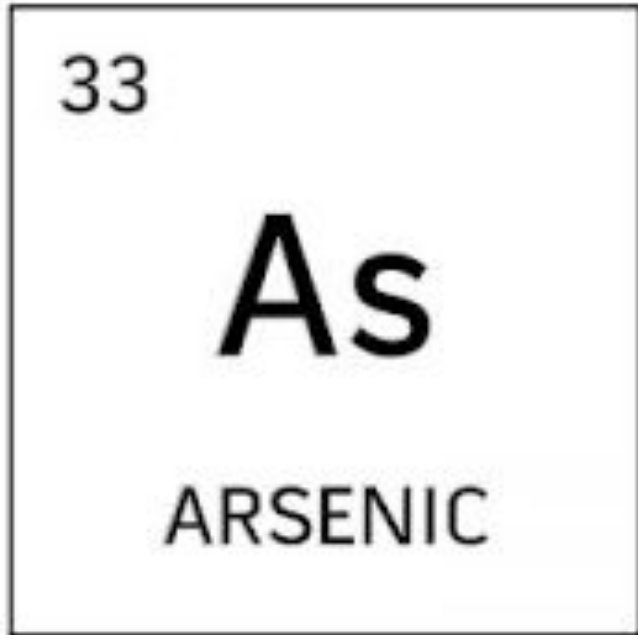
This is the **highest potassium concentration identified in groundwater since April 2021**, when EPL 761 groundwater potassium monitoring began.

SODIUM

Delta Electricity's quarterly monitoring results for 2023 identifies a **spike in sodium at two of the five groundwater monitoring points.**

These are the **highest sodium concentrations identified in groundwater since April 2021**, when EPL 761 groundwater sodium monitoring began.

In October 2023, Delta's monthly groundwater monitoring shows the highest concentrations of ammonia, potassium and sodium since monitoring commenced.



Arsenic III is highly soluble in water and can easily dissolve in groundwater.

A significant spike in groundwater arsenic concentrations was identified between July 2019 and January 2020 and in July 2020, Delta began publishing quarterly monitoring results for the two oxidation states of arsenic - arsenic (III) and arsenic (V).

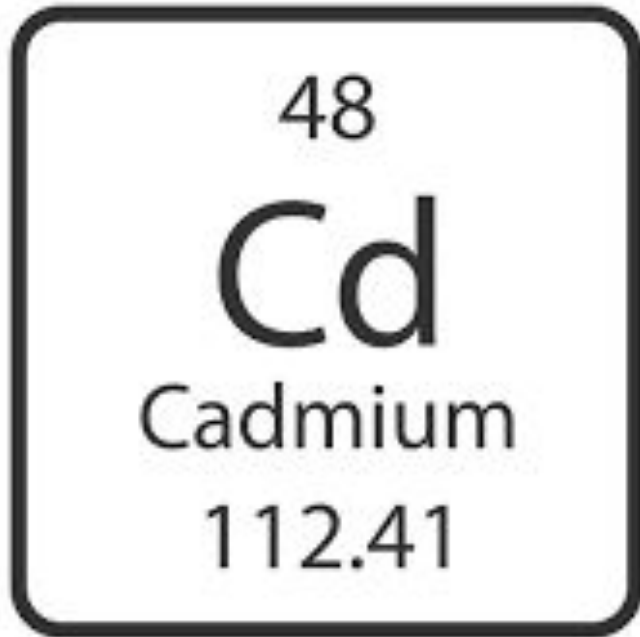
ANZECC & ARMCANZ (2000) provides an Environmental Concern Level (ECL) of 2.3 µg/L (0.0023 mg/L) for As (III) in marine waters, suggesting it could be adopted as a marine low reliability trigger value. **A low reliability marine guideline trigger value of 4.5 µg/L (0.0045 mg/L) for As (V)** is also recommended, as an indicative interim working level.

Arsenic (III & V) from Jan 2021 Vales Point - Point #30 (prev #19)



Concentrations of arsenic III at Point #30 spiked to 0.005 mg/L (5 $\mu\text{g/L}$) in July 2022 and again in July 2023, double the ANZECC (2000) ECL.

Chart 11b: Groundwater arsenic concentrations October 2016 to April 2020 at EPL Monitoring Point 30. Units in mg/L (1 mg/L = 1000 $\mu\text{g/L}$)

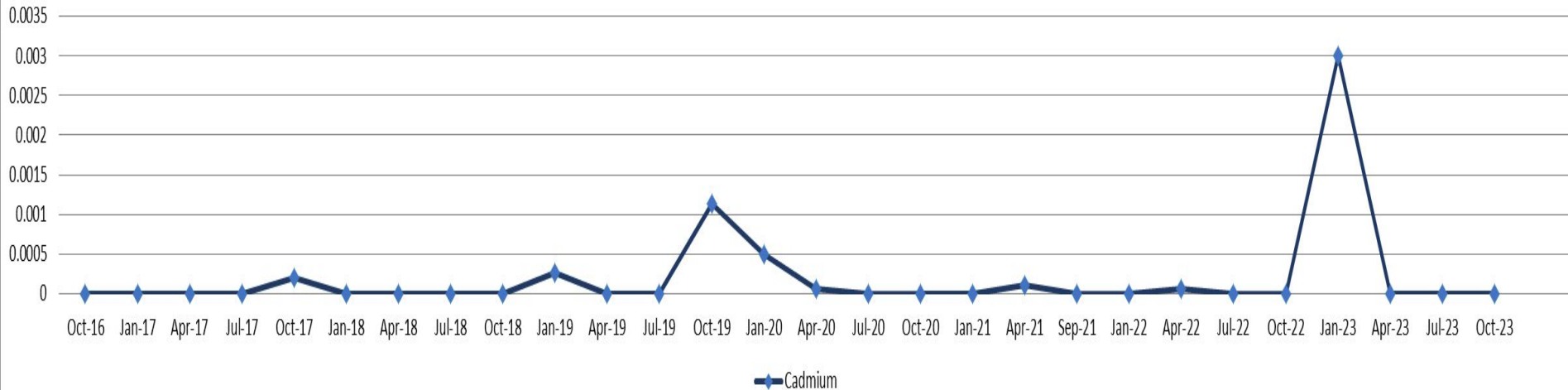


ANZECC & ARMCANZ (2000) recommend a high reliability marine guideline value for cadmium of **5.5 µg/L for 95% protection.**

The **99% protection level of 0.7 µg/L** is recommended for slightly to moderately disturbed ecosystems.

If in an area where shellfish are likely to be used for human consumption, the trigger value should be reduced to **0.2 µg/L.8**

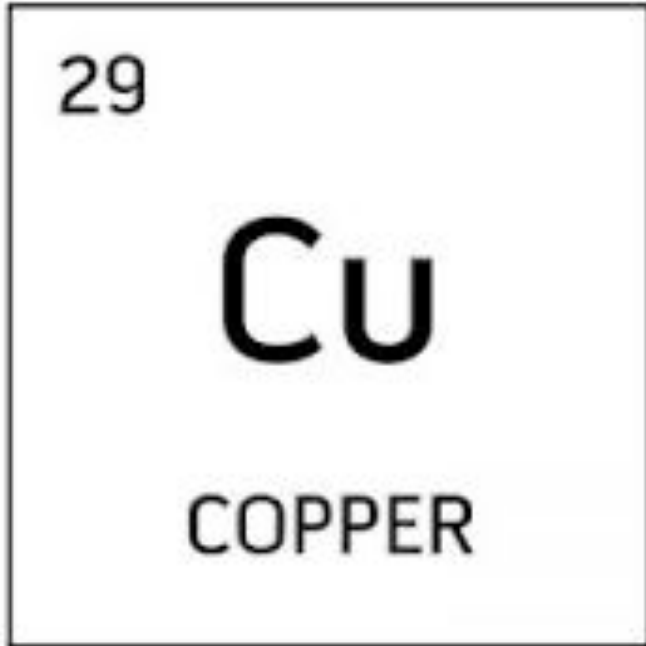
Cadmium from Oct 2016 Vales Point - Point #30 (prev #19)



Chat 12a shows a spike in cadmium concentrations at Point #30 to **0.003 mg/L (3 µg/L)** in the monitoring results for **January 2023 - the highest concentrations of cadmium since October 2016 and 4 times the ANZECC & ARMCANZ (2000) recommended high reliability marine guideline value for cadmium of 0.7 µg/L**, which is to protect against chronic toxicity and bioaccumulation of cadmium, particularly bivalves and crustaceans.

As this monitoring point is near to an area where shellfish are likely to be used for human consumption, a case could be made for the trigger value to be reduced to 0.2 µg/L. The **January 2023 monitoring results for this bore is 15 times this human consumption trigger value.**

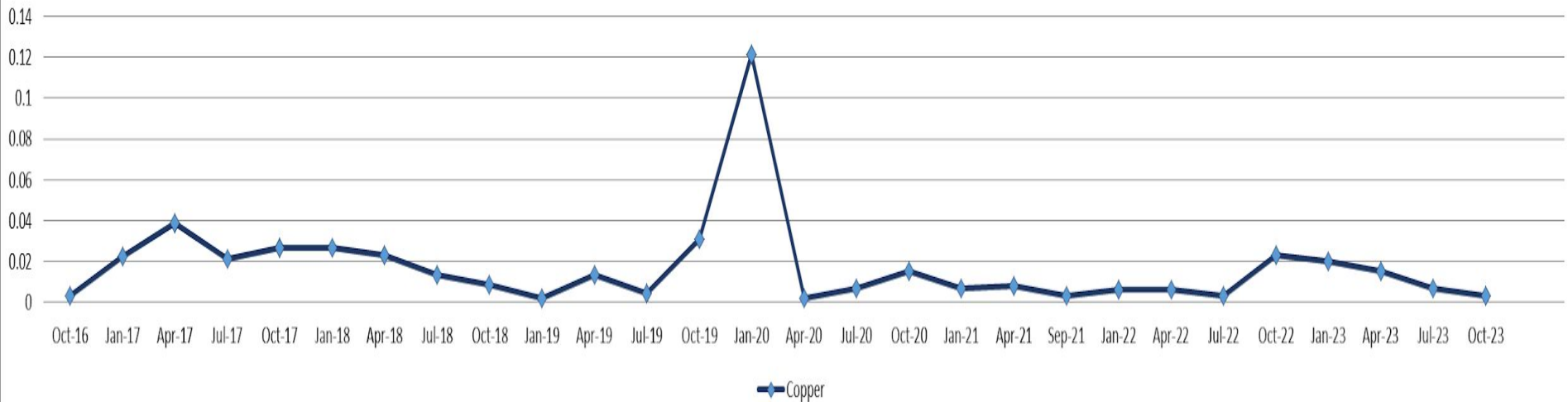
Chart 12a: Groundwater cadmium concentrations October 2016 to October 2023 at EPL Monitoring Point 30 (formerly 19). Units in mg/L (1 mg/L = 1000 µg/L)



Delta Electricity's quarterly monitoring results for October 2023 identifies a spike in copper at two of the five groundwater monitoring points representing the highest copper concentrations identified in groundwater since October 2016, when EPL 761 groundwater copper monitoring began.

ANZECC & ARMCANZ (2000) recommend a **marine high reliability trigger value for copper of 1.3 µg/L (0.0013 mg/L)** for 95% species protection in slightly-moderately disturbed systems.

Copper from Oct 2016 Vales Point - Point #34 (prev #23)



In January and October 2020 and October 2023, substantial spikes in copper concentrations are recorded in monthly groundwater bore monitoring data representing exceedances of **up to 90 times the ANZECC & ARMCANZ (2000) recommended trigger value of 1.3 µg/L (0.0013 mg/L)** for slightly-moderately disturbed systems.

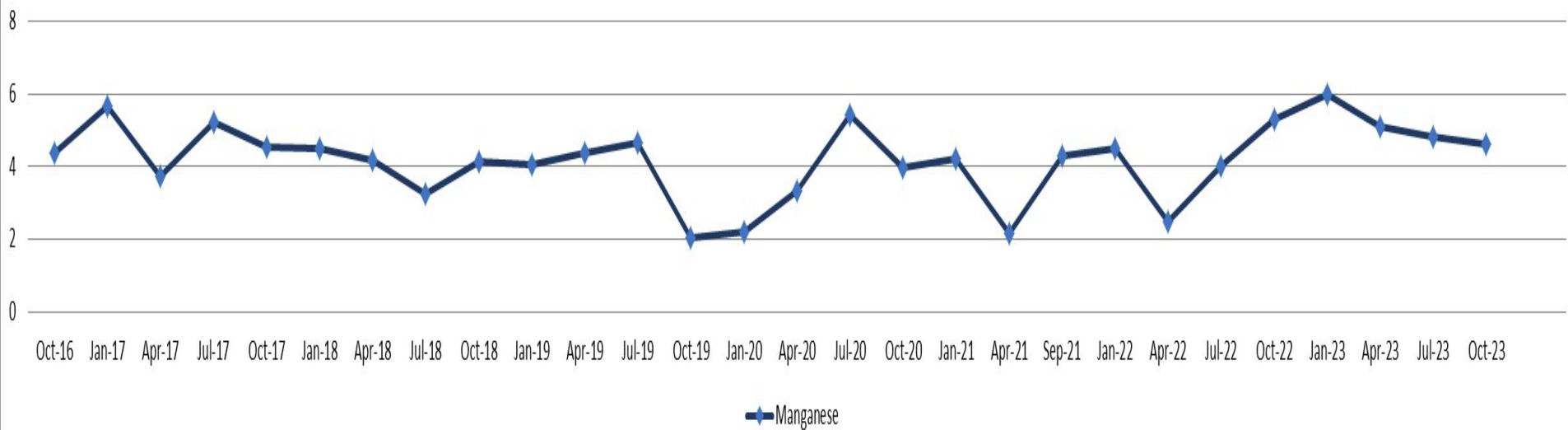
Chart 13e: Groundwater copper concentrations October 2016 to October 2023 at EPL Monitoring Point 34. Units in mg/L (1 mg/L = 1000 µg/L)



Delta Electricity's quarterly monitoring results for 2023 identify a **spike in manganese concentrations at three of the five groundwater monitoring points which again,** show the highest manganese concentrations identified in groundwater since October 2016, when EPL 761 groundwater manganese monitoring began.

At point #30, **manganese concentrations peaked at this bore in January 2023 at 6 mg/L (6000 µg/L) and in October 2023 it was recorded to be 75 times the ANZECC & ARMCANZ (2000) recommended marine low reliability trigger value of 80 µg/L (0.08 mg/L).**

Manganese from Oct 2016 Vales Point - Point #30 (prev #19)



At point #30, manganese concentrations peaked at this bore in January 2023 at 6 mg/L (6000 µg/L) and in October 2023 it was recorded to be 75 times the ANZECC & ARM CANZ (2000) recommended marine low reliability trigger value of 80 µg/L (0.08 mg/L)

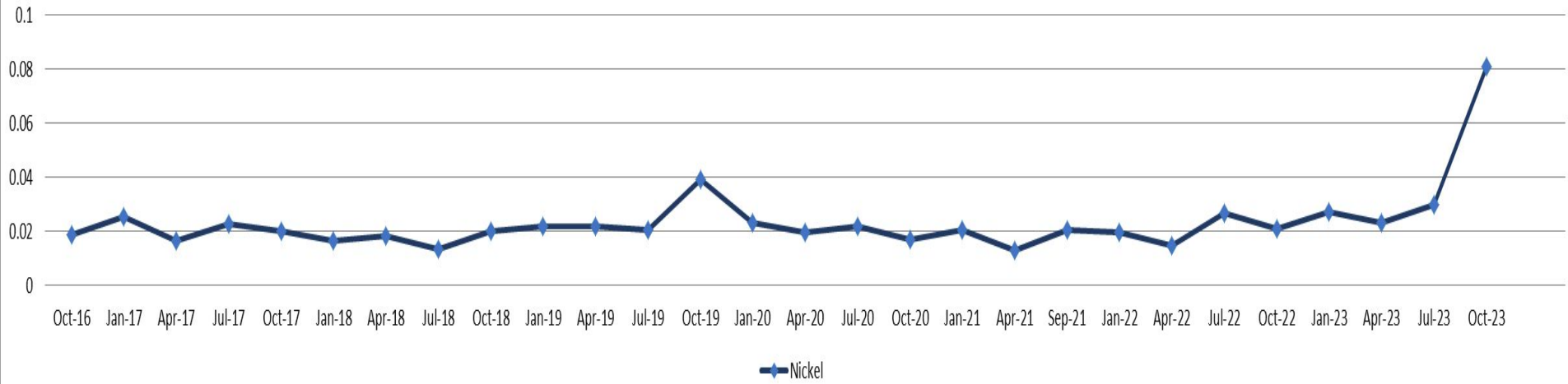
Chart 14a: Groundwater manganese concentrations October 2016 to October 2023 at EPL Monitoring Point 30 (formerly 19).
Units in mg/L (1 mg/L = 1000 µg/L)



Three of five groundwater monitoring bores identify spikes in nickel in the October 2023 monitoring data, representing the highest concentrations identified in groundwater since October 2016, when EPL 761 groundwater nickel monitoring began.

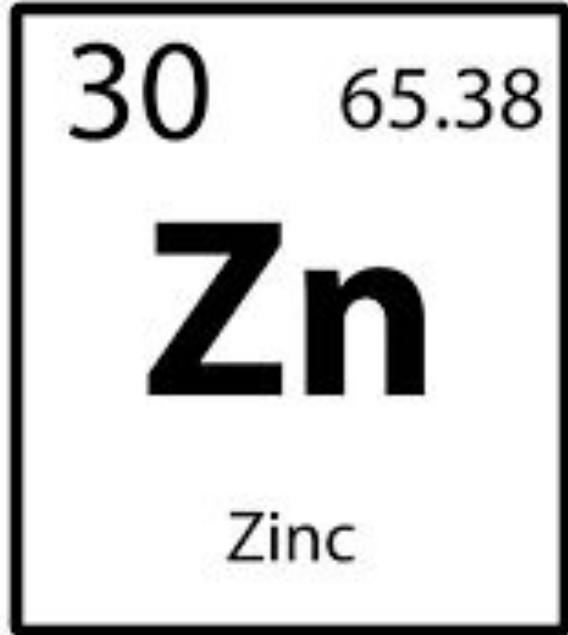
The ANZECC & ARMCANZ (2000) specifies a **99% protection level of 7 µg/L** for slightly to moderately disturbed marine systems for nickel.

Nickel from Oct 2016 Vales Point - Point #30 (prev #19)



The peak concentration of 0.8 mg/L (800 µg/L) recorded at Point #30 in October 2023 is ten times the ANZECC & ARM CANZ (2000) recommended high reliability marine guideline of 70 µg/L at 95% protection, and 100 times the 99% species protection level recommended for slightly-moderately disturbed marine systems, to give sufficient margin of safety from acute toxicity in some species.

Chart 15a: Groundwater nickel concentrations October 2016 to October 2023 at EPL Monitoring Point 30. Units in mg/L (1 mg/L = 1000 µg/L)



Spikes for zinc were recorded in one of five groundwater monitoring points, again representing the highest zinc concentrations identified in groundwater since October 2016 when EPL groundwater monitoring began for this pollutant.

The Default Guideline Values for **95% species protection is 8.0 µg/L**. The 95% species protection DGV may be under-protective for key sensitive species (e.g. bivalve molluscs, cnidarians) and the **99% species protection DGV of 3.3 µg/L** could be adopted if there are concerns about the protection of key sensitive species.¹¹

Zinc - October 2016 to October 2023 Vales Point #32

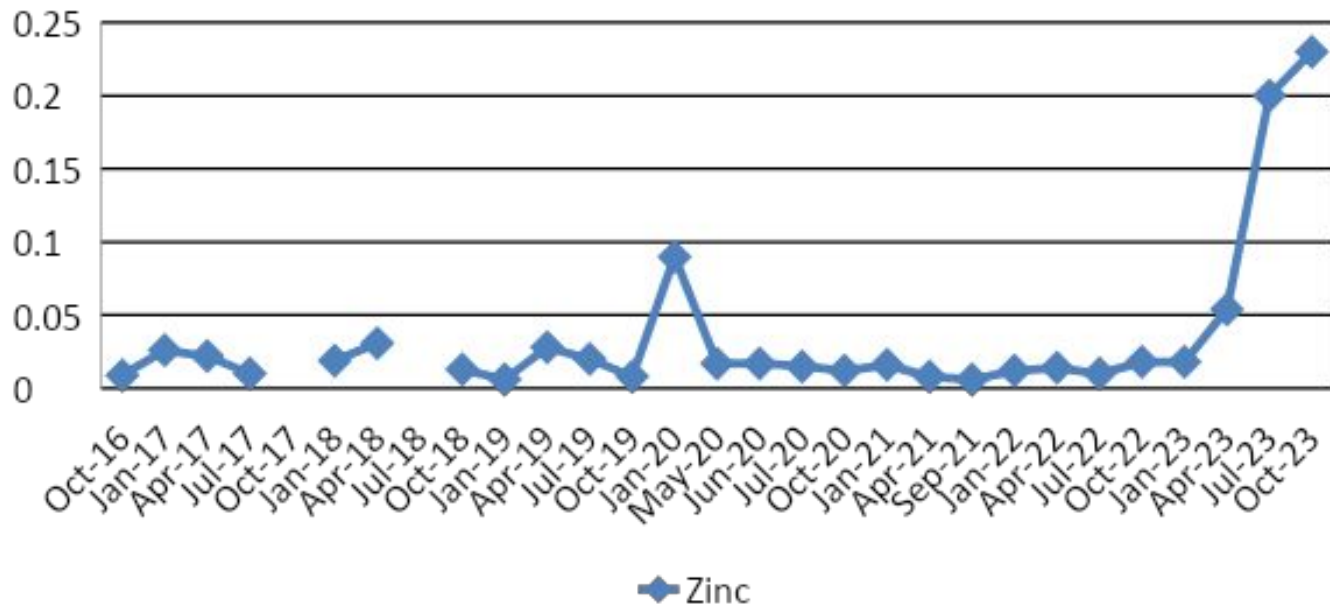


Chart 17a shows that at point #32 a peak concentration of zinc was reported in **October 2023**, almost **0.23 mg/L (230 µg/L)**- **28 times the ANZECC & ARMCANZ (2000) very high reliability marine draft guideline value of 8 µg/L**, and almost **70 times the 3.3 µg/L 99% species protection level** for protection of sensitive species.

Chart 17a: Groundwater sodium concentrations April 2021 to October 2023 at EPL Monitoring Point 31. Units in mg/L (1 mg/L = 1000 µg/L)

Seagrass and thermal pollution – inlet & outlet impacts



Recommendation 3: To offset seagrass loss in Myuna and Wyee Bays, a Lake Macquarie Seagrass Trust be established with funding of \$12M a year from Delta Electricity and \$8M a year from Origin Energy to enhance seagrass meadows within Lake Macquarie and replace seagrass damaged and killed by the operations of Vales Point and Eraring power stations.

Recommendation 4: To encourage the rejuvenation of *Zostera* seagrass within Wyee Bay, a study be undertaken that determines ambient water quality, appropriate seasonal temperature differentials, seagrass sensitivity, and the assimilative capacity of Wyee Bay, and EPL 761 be varied accordingly to incorporate a scientifically established thermal mixing zone south of Wyee Marina.



Recommendation 5: Monitoring and reporting of inlet impacts including figures of species entrained, injured and killed should be disclosed in monthly monitoring data.



Since late September, we have collected 100+ signatures from local residents in support of:

1. Safe, beneficial recycling of coal ash waste dumped in unlined dams amounting to well over 100 million tonnes contributing to extensive metal/metalloid contamination;
2. Full rehabilitation of contaminated land, water and ecosystems including the replenishment of fish stocks and complete restoration of fish habitat (seagrass meadows) in Myuna and Wyee Bays most affected by thermal pollution;
3. Installation and operation of best practice plant equipment to reduce air, water and land pollution and avoid preventable environmental damage and to improve worker safety;
4. Improved frequency and transparency of environmental sampling and monitoring data, including publication of point-source air pollution data in real-time and increased reporting frequency for water contaminants at the outlet including chlorine and mercury;
5. The establishment of a Community Consultative Committee for Delta Electricity Vales Point power station.

References

1. Douglas Partners, 2021. Report on Groundwater Assessment In the Vicinity of Lot 421 in DP 578194, Doyalson North for Delta Electricity, Accessed under NSW Parliamentary Standing Orders 52
 2. HCEC, 2020. Out of the ashes II. NSW water pollution and our aging coal-fired power stations.
https://static1.squarespace.com/static/5e22ffdfa732e601799afba2/t/5f962ea21d206d227a96ba32/1603678044609/Out+of+the+ashes+II_final-min.pdf
 3. See <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/toxicants/cobalt-2000>
 4. See <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/toxicants/manganese-2000>
 5. Although the 95% species protection DGV of 8.0 µg/L is still recommended for adoption in the assessment of slightly-to-moderately disturbed ecosystems, the 99% species protection DGV of 3.3 µg/L could be adopted if there are concerns about the protection of key sensitive species
 6. ANZG 2021, Toxicant default guideline values for aquatic ecosystem protection: Zinc in marine water. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. CC BY 4.0. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia https://www.waterquality.gov.au/sites/default/files/documents/zinc_marine_dgv_technical-brief.pdf
- HCEC, 2022. TOXIC HABITAT Heavy metal impacts on water birds near NSW coal fired power stations
https://static1.squarespace.com/static/5e22ffdfa732e601799afba2/t/62bbf4ad5a599362c42e38d4/1656485083192/Toxic+Habitat+Heavy+metal+impacts+on+NSW+water+birds+E2%80%A6coal+fired+power+stations_FULLREPORT_HCEC_July_2022.pdf

Source: HCEC submission, NSW power station EPL review 2023

Thank you!



NEWS

Ash dams' pollution legacy a hot topic

BY MATTHEW KELLY

THE NSW Environment Protection Authority is reviewing the regulation of the state's ash dams in response to growing concerns about their impact on human and environmental health.

It follows the declaration of the Kerosene Vale ash dump, which is adjacent to the former Wallerawang power station at Lithgow, under the Contaminated Lands Act.

NSW Environment Minister James Griffin told last week's Budget Estimates hearing that coal ash pollution remained a "significant problem" that many MPs and communities had expressed concerns about.

EPA chief executive Tony Chappel acknowledged the repositories posed a risk to environmental and human health.

"I think recycling and the waste hierarchy is always something we think about but our top priority is protecting the human health and the environment," Mr Chappel told the hearing.

The EPA has recently collected about 350 water samples and over 80 sediment samples from Lake Mac-



The Eraring ash dam on the shores of Lake Macquaire. The dam's owner, Origin Energy, is liaising with the EPA over the site's ongoing management.

quarie as part of assessment of the current state of coal ash deposits.

The owners of the state's ash dams have been asked to comment about the future regulation of the sites, which include heavy metals and other toxins. All the sites will require extensive remediation and stabilisation following the closure of the adjoining power stations.

A spokesman for Origin Energy, which owns Eraring

Power Station, confirmed the company had received correspondence about its ash dam. He said the company would respond in due course and would continue to engage with the EPA about the site's management.

The Hunter Community Environment Centre, which has campaigned for the clean-up of the region's ash dams, welcomed the listing of Kerosene Vale under the contaminated lands act.

"The listing of Kerosene Vale ash dump will require NSW Treasury to re-evaluate its \$2.2 billion contingent liability for the remediation of all formerly publicly-owned power station sites in NSW," a spokeswoman said.

"We are interested in the implications of this listing for ash dumps in Lake Macquarie and the Hunter, and will be watching closely the response of Delta and AGL to the EPA request to review

reporting requirements."

The state government has allocated \$37 million for a Carbon Recycling and Abatement Fund to trial new approaches to recycling, including for coal ash.

AGL signed an agreement earlier this year with waste remediation company NuRock to investigate the feasibility of converting millions of tonnes of coal ash at Bayswater Power Station into construction bricks.