

**THIS INITIATIVE IS PROUDLY
SUPPORTED AND BACKED BY:**



Protecting the Great Artesian Basin

**Groundwater contamination concerns
with Glencore (CTSCo) proposal**

Statement in EIS and Stakeholder Engagement Materials

In EIS document but not promoted in Stakeholder Engagement Materials

Reference in EIS

“CTSCo will only be injecting food grade CO₂, such as that present in soft drink”

- **A responsibly presented message would be balanced with the fact that - this acidic CO₂ will result in the release of harmful levels of heavy metals into the aquifer.**
- This CO₂ injection will reduce the natural groundwater pH from 8.35 down to 4.
- CTSCo’s EIS laboratory reactive core testing and modelling shows that the injected CO₂ will result in a reduction in pH within the Precipice Sandstone aquifer from 8.35, as measured in the CTSCo injection well, down to a pH of 4 (CTSCo EIS Chapter 9, Table 9-45). Given pH units are a logarithmic scale, this equates to a greater than 10,000 times increase in acidity of groundwater.
- The CTSCo EIS states that this acidic plume **will dissolve the aquifer rock resulting in the release and mobilisation of heavy metals at concentrations hundreds of times greater than the human and stock drinking water guideline levels** (see table pg 3).
- University of QLD (UQ) modelling (EIS Chapter 9C) shows that **these metals will remain dissolved and migrating within the aquifer for >100 years** (see graphs in Figs 73, 75, 77, 79). At location 3 (Fig 77) concentrations of arsenic and lead can be seen still sharply rising when the modelling ends in 100 years.

While the language in the majority of the EIS is evasive, there is an entire EIS attachment (9C) dedicated to this topic which is easy to miss:

- **ANLEC Project 7-0320-C323 Final Report: South Surat Metal mobilisation and fate of heavy metals released – UQ February 2023.**

Selected brief excerpts from this report are provided in Chapter 9 – Groundwater (Section 9.9.4.3), although these findings are downplayed within the remainder of the EIS and not mentioned in Community Consultation presentations and instead replaced with misleading comments such as *“Only food grade CO₂ will be injected”*.

It is noted on UQ Figures 73, 75, 77, 79 (highlighted in yellow on page 4) that the dissolved metals concentrations in the aquifer groundwater would greatly exceed the maximum drinking water quality thresholds.

A comparison with the relevant Australian Human Health and Stock Drinking Water Guidelines is provided below. It is noted that only selected metals were modelled, and that many other metals and chemical contaminants will be released and mobilised through the CO₂ injection process

Water quality parameter	NATURAL PRECIPICE SANDSTONE WATER QUALITY in CTSCo injection wel	AFTER CO ₂ INJECTION and dissolution of Precipice Sandstone rock (CTSCo EIS Chapters 9 – Table 9-45)	DRINKING WATER GUIDELINE LEVEL (ADWG 2011, updated 2022)	STOCK DRINKING WATER TRIGGER LEVEL (ANZECC) (Levels in brackets are revised 2023 Draft Guideline levels)
PH	8.35	4		

HEAVY METALS

**Note ppb = parts per billion = micrograms per litre (µg/L).*

ARSENIC	0 PPB (not detected)	500 PPB	10 PPB	500 (250) PPB
CADMIUM	0 PPB (not detected)	160 PPB	2 PPB	10 (10) PPB
LEAD	0 PPB (not detected)	1,000 PPB	10 PPB	100 (100) PPB

Numerous other metals listed as being released and mobilised but not modelled.

ISSUES WITH ELEVATED HEAVY METAL LEVELS IN DRINKING WATER

SECTION 4.3.4 ANZECC (2000) LIVESTOCK DRINKING WATER GUIDELINES:

- “Many metal elements are essential nutrients for animal health, but **elevated concentrations of certain compounds may cause chronic or toxic effects in livestock.**”

REVISED ANZECC (2023) DRAFT LIVESTOCK DRINKING WATER GUIDELINES:

- “Level should not be exceeded. **Arsenic is a carcinogen**; assessments should be conservative and consider the potential accumulation of arsenic in edible tissues.”
- “Level should not be exceeded. **Lead is accumulative**, and livestock health problems may begin at 0.05 mg/L.”

AUSTRALIAN DRINKING WATER GUIDELINES (NHMRC, NRMCC (2011)):

- “The International Agency for Research on Cancer has concluded there is sufficient evidence in humans that **arsenic in drinking-water causes cancers** of the urinary bladder, lung and skin and has classified arsenic in drinking-water as carcinogenic to humans (IARC 2004).”
- **Cadmium:** In humans, long-term exposure can cause kidney dysfunction. The International Agency for Research on Cancer has concluded that **cadmium is probably carcinogenic** to humans (Group 2A, limited evidence of carcinogenicity in humans and sufficient evidence in animals) (IARC 1987).
- In humans, **lead is a cumulative poison that can severely affect the central nervous system.** The International Agency for Research on Cancer has concluded that **lead is possibly carcinogenic** to humans.

ALL OF THE BELOW FIGURES ARE FROM CTSCo EIS CHAPTER 9; ATTACHMENT 9C:

ANLEC Project 7-0320-C323 Final Report: South Surat Metal mobilisation and fate of heavy metals released – UQ February 2023.

These figures show modelled concentrations of dissolved heavy metals at various locations within the injected CO₂ plume in the Precipice Sandstone aquifer.

As = ARSENIC; Pb = LEAD

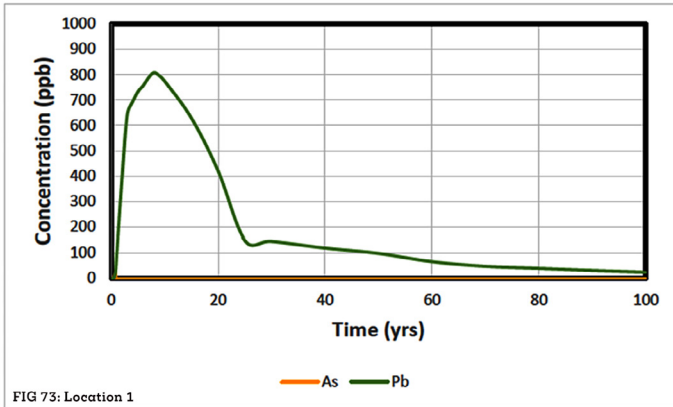


FIG 73: Location 1

FIG 73: LOCATION 1

(X 200m, Z -2054.5 m) As and Pb concentrations in ppb.

Maximum drinking water quality concentration for both As and Pb is 10ppb.

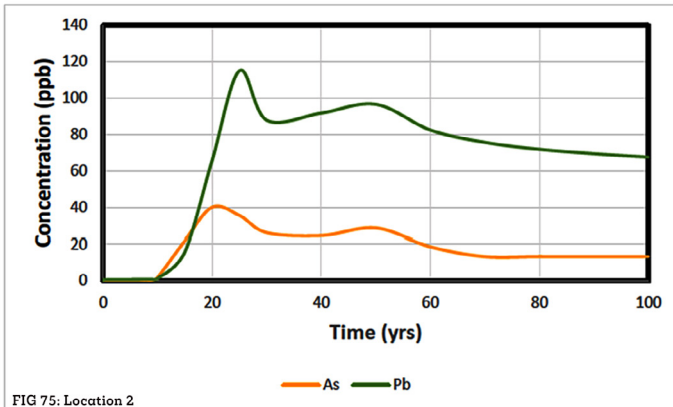


FIG 75: Location 2

FIG 75: LOCATION 2

(X 200m, Z -2065 m) As and Pb concentrations in ppb.

Maximum drinking water quality concentration for both As and Pb is 10ppb.

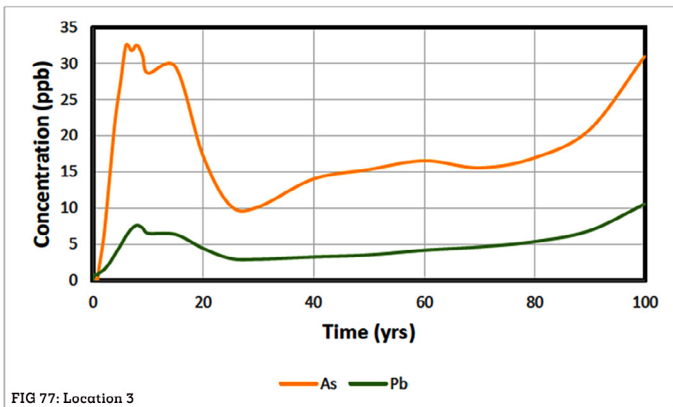


FIG 77: Location 3

FIG 77: LOCATION 3

(X 200m, Z -2043 m) As and Pb concentrations in ppb.

Maximum drinking water quality concentration for both As and Pb is 10ppb.

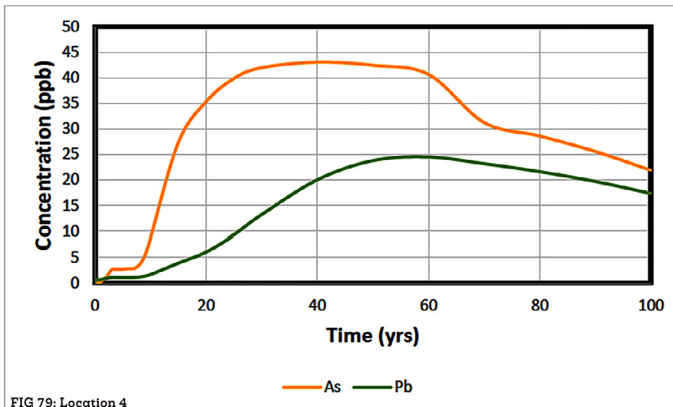


FIG 79: Location 4

FIG 79: LOCATION 4

(X 200m, Z -2031 m) As and Pb concentrations in ppb.

Maximum drinking water quality concentration for both As and Pb is 10ppb.



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Glencore
**Environmental
Impact
Statement
(EIS) HERE**