8 May 2024

Committee Secretary

Senate Standing Committees on Environment and Communications

PO Box 6100

Parliament House

Canberra ACT 2600

Dear Committee Secretary

On behalf of Property Rights Australia (PRA) please find enclosed our submission regarding Glencore's proposed carbon capture and storage project to the Senate Standing Committees on Environment and Communications. For further information regarding this submission please contact Joanne Rea, PRA Treasurer on M: or E:

Regards,

Joanne Rea
Treasurer
Property Rights Australia

About Property Rights Australia

Property Rights Australia (PRA) is a non-profit organisation of primary producers and small business people from rural Queensland who are concerned about continuing encroachments on the rights of private property owners. The organisation was formed to seek recognition and protection of the rights of private property owners in the development, introduction and administration of policies and legislation relating to the management of land, water and other natural resources. Set up in South West Queensland in January 2003, PRA's membership now extends across most states and all major rural industries.

Introduction

Property Rights Australia is opposed to the pumping of liquid CO2 into the Great Artesian Basin or any other aquifer at any depth.

Although knowledge of the geography of underground aquifers has increased in recent years, there is still a great deal to be learnt and there is no guarantee that pumping 300,000 tonnes of liquid CO2 would not cause irreversible harm or that no leakage will occur.

The acidified liquid would find every fault in the aquifer, dissolve parts of it and mobilise harmful elements such as arsenic, lead and others, rendering potable water and non-potable water suitable for livestock, useless.

There have been a few studies around the world of CO2 leakage, both natural and pumped. These studies all seem to indicate a potential for harm to water, communities and livestock.

Rural communities have had the precautionary principle preached to them for decades with activities with a minimal risk curtailed.

In this case where the risk is high, it has rarely, if ever, been mentioned.

That there will be a risk to the immediate footprint is undeniable. That the effects will go beyond the footprint is high risk.

The aquifers of Australia, with the great Artesian Basin being the premier example, should not be subject to risk which may affect agriculture and communities.

What we also know is, that if this project goes ahead, others will follow.

Almost all of the available papers scanned on Carbon Capture and Storage (CCS), start with an introduction about how important the technology would be to climate policy and carbon mitigation. Is this likely to lead to a conscious or unconscious bias which might cause negative indicators not to be investigated and run down with the vigour that they ought to be?

Extracts of available studies

Study of natural CO2 leakage in Iran

A study of natural CO2 leakage, "Impacts of natural CO_2 leakage on groundwater chemistry of aquifers from the Hamadan Province, Iran" found that, "CO_2-rich deep saline water leakage deteriorates groundwater quality".

"In this study, the impacts of a natural CO_2 leakage from geological source into freshwater aquifers is introduced and investigated in western Iran for the first time. The natural CO_2 leakage through a number of water wells into four alluvial aquifers including the Hamadan, Chardoli, Razan and Komijan aquifers in Hamadan province (west of Iran) has degraded the quality of groundwater and has led to asphyxiation of people and animals, damage to crops, severe corrosion of pumps and water transfer pipelines, seepage into basements and buildings and potable water color and taste changes. Consequently, this phenomenon and its environmental impacts, has received much attention in recent years. The aim of this study is to evaluate the effects on groundwater quality of the natural release of CO_2 into these aquifers. This paper focuses on physicochemical parameters, the major and minor ions geochemistry, isotopes and water-rock reactions through the comparison of CO_2-rich and background groundwater samples occurring in the affected aquifers."[1]

Surat Basin near Wadoan

"Metal Mobilization From CO_2 Storage Cap-Rocks: Experimental Reactions With Pure CO_2 or CO_2 SO_2 NO"

The below quotes are from a laboratory analysis of core samples from the Sural Basin published in July 2022, so relatively recent. Although some useful results are offered about the mobilisation of

[1] https://www.sciencedirect.com/science/article/pii/S1750583619304463 "Impacts of natural CO_2 leakage on groundwater chemistry of aquifers from the Hamadan Province, Iran"

environmentally relevant elements, the paper calls for more research and points to areas which should be covered.

There is just not enough knowledge available for a project with such potential broad ranging risk factors for agriculture and regional communities. This is not a case where we try it and see what the consequences are and one where the precautionary principle should be invoked.

Quote:-
"This study has shown that metals and other environmentally regulated elements including As [Arsenic] can be mobilized by CO2–water–rock reactions during CO2 geological storage (Figure 10). The type and concentrations of metals mobilized depend on the rock mineralogy and the injection gas stream. Even low concentrations of SOx and NOx in the CO2 stream can affect metal mobilization. Carbonate minerals were the main mobilization sources and are ubiquitous in potential storage reservoirs and seals worldwide. Carbonates may be a source of metals even when present in small amounts, such as grain coatings, that may fall below the detection limit of XRD. Sulfides, apatite, and silicate minerals were additional sources in the current study, especially in the presence of impure CO2. CO2 storage sites worldwide should assess the potential risks to water quality in the CO2 storage complex and overlying formations."[2]

"This work should be expanded in future to assess metal mobilization from mudstone, evaporite, and shale seal rocks and overlying aquifer core, over a broader range of core mineralogies. The porosity and permeability of caprock seals and the CO_2 reaction–induced changes to the porosity

and permeability will have implications for CO_2 and fluid migration (Armitage et al., 2010). Although porosity and permeability were not measured in the current study, dissolution of calcite cement opened intergranular pores in the seal cores after CO_2 and CO_2SO_2NO reaction. Future work should also assess the CO_2 reaction–induced changes to seal rock permeability. In addition, in "hub" style storage sites where a range of CO_2 streams from different sources and with different compositions, are mixed and stored, a range of gas mixtures should be tested in laboratory experiments and experiments upscaled through geochemical models.

[2] https://www.frontiersin.org/articles/10.3389/fenrg.2022.873813/full July 2022

The results here are also relevant to predicting metal mobilization behavior in the unlikely event of a leak into low-salinity aquifers overlying active or target sites of CO2 storage worldwide."[3]
Carbonate minerals are ubiquitous in potential CO2 storage reservoirs and seals worldwide and were the main sources of metals mobilized in CO2–water–rock reactions. In impure CO2 reactions, sulfides, apatite, and silicates were secondary sources. Potential risks to water quality should be assessed in CO2 storage complexes and overlying aquifers worldwide."

Conclusion

To conclude, the aquifers of Australia, with the Great Artesian Basin being the premier example, should not be subject to risk which may affect agriculture and communities. The Great Artesian Basin should not be used as a dumping ground for carbon capture and storage projects.

[3] https://www.frontiersin.org/articles/10.3389/fenrg.2022.873813/full July 2022