

CSG Treated Wastewater Effluent Release into the Receiving Waters

Preamble

The Queensland Department of the Environment and Resource Management has been issuing licences to permit the discharge of treated Coal Seam Gas water into the headwaters of the Murray Darling Basin (MDB). The MDB provides drinking water for more than three million people, including in many capital cities. It not only provides irrigation and stock water for the main food bowl of eastern Australia but is also the recharge area for the Great Artesian Basin (GAB). The MDB and the GAB comprise eastern Australia's most vital water resources. The MDB is also home to approximately 30,000 wetlands, which are diverse ecosystems that create habitats for a wide variety of flora and fauna. The issuing of licences, which permit the discharge of hazardous levels of contaminants into these vital water resources is an issue, which should be of great concern to all Australians, as the impacts on public health and on wetland ecosystems are potentially disastrous.

Analysis of Data from PEN 100067807 (DERM, QLD)
“Release to Waters of Treated CSG Water”

The spreadsheet analysis that was undertaken is based on the Queensland Department of Environment and Resource Management PEN 100067807 (APLNG Walloons Gas Fields Exploration Project). Please refer to the following specific details from the QLD DERM PEN 100067807, with reference to the spreadsheet data and this explanation:

1. C18 (page 9 of 77) which explains that this project is for an 18 month period
2. C19 (page 9 of 77) which explains that the discharge limit for this project is 20 megalitres per day
3. Schedule C Table 3 (pages 11 – 13 of 77) which lists the “Final WaterQuality Release Limits”

In terms of the MDB, this means that APLNG is licensed to release the contaminants, as listed in “Schedule c Table 3” into the Condamine River at a rate of 20 megalitres per day over an 18 month period.

Spreadsheet Data: Analysis of Data from PEN 100067807 (DERM, QLD)

When reading the spreadsheet, please note the following information:

1. The use of US EPA Drinking Water Guidelines
2. The use of WHO Drinking Water Guidelines
3. The use of Australian Drinking Water Guidelines
4. The use of Australian Fresh Water Guidleines

Please also note that a message “LIMIT” or “ALERT” is given where contaminants are at or above the respective limits in each category.

Please refer to the column immediately to the right of the “ALERT” to reference the percentage (%) of this contaminant above the limit.

Please also note that there was no data available to reference many of the contaminants.

Analysis of Spreadsheet Data with Reference to:

“Australian and New Zealand Guidelines for Fresh and Marine Water Quality” – (2000)

According to these guidelines, the following contaminants are above the safe limits by the following amounts:

1. 1,2 Dichlorobenzene DI	by 1250.00%
2. 2,4,5 Trichlorophenol	by 666.66%
3. 2,4 Dichlorophenol DI	by 167.67%
4. Aluminium	by 740.74%
5. Ammonia	by 156.25%
6. Arsenic	by 875.00%
7. Boron	by 4444.44%
8. Cadmium	by 3333.33%
9. Chlorine	by 1250000.00%
10. Chromium (CRVI)	by 500000.00%
11. Copper	by 200000.00%
12. Cyanide	by 2000.00%
13. Lead	by 1000.00%
14. Nitrate	by 250.00%
15. Nitrite	by 294117.65%
16. Phenol	by 176.47%
17. Selenium	by 200.00%
18. Silver	by 500000.00%
19. Zinc	by 125000.00%

Cadmium bioaccumulates in living organisms. Consequently there is the “potential for cadmium to cause secondary poisoning in marine systems”. (page 8.3 -112, ANZECC WQG) It is also important to note that Chromium (VI) is highly carcinogenic. The fact that it is highly water soluble makes it very hazardous to all forms of life. Selenium is another element, which is hazardous

due to its capacity to bioconcentrate. According to the ANZECC WQG, "Food chain uptake, leading to secondary poisoning, is more significant than water uptake" (page 8.3 136). Further to this, phenol, cadmium, lead and mercury are known endocrine disruptors. "Disruption to the endocrine system affects hormonal production and distribution, ultimately impinging on basic life functions such as reproduction and the development of the reproductive system, growth, maintenance of the body's internal environment, and the production, utilisation and storage of energy (Wilson & Foster 1985 – as quoted in ANZECC WQG, page 8.3 -294).

Given the fact that the listed contaminants are being discharged at rates, which range from being tens, to hundreds and even thousands of times in excess of safe levels, is clear evidence of the extreme threats to our natural environment from the discharge of treated CSG waters into the MDB system.

Please note that there was no data available in the Fresh Water Guidelines for many of the other listed contaminants.

Analysis of Spreadsheet Data with Reference to:

"Australian Drinking Water Guidelines 6" (2004)

According to these guidelines, the following contaminants are above the safe limits:

1. 1,2 Dichloroethene DI by 2000.00%
2. Total Petroleum Hydrocarbons (PAHs) by 2000.00%

It must be noted that 1,2 Dichloroethene DI and PAHs are known carcinogenic and mutagenic agents.

A further 42 contaminants are being discharged at their limits and can therefore be categorised as being at a hazardous level. According to the document, ***Australian Guidelines for Water Recycling: Managing Health & Environmental Risks (Phase 2) Augmentation of Drinking water Supplies May 2008***,: paragraph 1.2.1 (Guideline Values) states that: *"Ascribed in the drinking water guidelines, the guideline values represent minimum requirements and boundaries for defining safety... Guideline values should never be seen or used as a licence to degrade water quality, to achieve marginal compliance."* It is of concern that this DERM PEN does not seem to comply with Federal Government documents that were written to ensure the preservation of water quality in Australia.

Please note that a large number of the contaminants listed on the spreadsheet are being discharged at levels that are either in excess of recommended levels or are at the limits, according to US EPA and WHO Safe Drinking Water Guidelines and therefore represent health risks in terms of these guideline values.

What is also important to understand is the total amount (kg) of pollutants discharged, not only their concentrations. Certain contaminants that have specific weights heavier than water will accumulate in river sediments and in particular behind weirs and in wetlands. In turn, these will then bioaccumulate in living organisms. Accordingly, the volume of heavy metals and other serious contaminants that are being discharged are of particular concern. These include:

- | | |
|------------------|------------------------|
| 1. Aluminium | a total of 2184.00 kg |
| 2. Arsenic | a total of 76.44 kg |
| 3. Cadmium | a total of 21.84 kg |
| 4. Chromium (VI) | a total of 546.00 kg |
| 5. Copper | a total of 21840.00 kg |

6. Cyanide	a total of 873.60 kg
7. Lead	a total of 109.20 kg
8. Manganese	a total of 5460.00 kg
9. Mercury	a total of 10.92 kg
10. Molybdenum	a total of 546.00 kg
11. Nickel	a total of 218.40 kg
12. Selenium	a total of 109.20 kg
13. Sulfate	a total of 5460000.00 kg
14. Xylene	a total of 6552.00 kg

Additionally, the ratio of discharged waste water effluent (L/s) to the flow of the receiving water (L/s) is an important parameter, so that an overall dilution factor can be calculated. At certain times of the year and under certain conditions where evaporation rates are rise, concentration factors would exist. It must also be stated that contaminant concentration could occur downstream of the discharge point in times of drought.

It is very important to note that no data was available for 30 additional contaminants, including the radionuclides strontium and vanadium. A total of 43,680 kilograms of strontium, 546 kilograms of vanadium and 218.46 kilograms of uranium are licensed to be discharged into the Condamine River over the 18 month period of this DERM petroleum exploration number.

According to the **Australian Guidelines for Water Recycling** document, "*Protection of public health is of paramount importance and should never be compromised*" (paragraph 2.1, page 7). According to the results of the spreadsheet analysis, it would seem that this precautionary principle is not being followed. This same document also specifically states that "*Some contaminants should be precluded from discharge (eg ... radionuclides...).*" (paragraph 2.6, page 10)

It is also a major concern that the CSG company mentioned in the DERM PEN 100067807 is required to self-monitor the waste water discharge into the receiving water under the terms of the exploration licence. In paragraph 2.3 (Institutional Capability) of the **Australian Guidelines for Water Recycling** document, it is stated that: *"Regulatory agencies must have the expertise to understand the complexities and challenges of managing and monitoring recycling schemes, and the ability to either audit schemes themselves or critically assess audits undertaken by third parties."* (page 8)

The fact that most Australians are completely unaware of the fact that treated CSG water is being released into the rivers of the Murray-Darling Basin is in itself alarming. In paragraph 2.7 of the **Australian Guidelines for Water Recycling** document (Regulatory Surveillance) it is stated that: *"Independent regulatory surveillance and auditing needs to be applied to drinking water augmentation, and needs to include involvement of public health agencies. The public has a reasonable expectation that such schemes will be subject to rigorous regulatory oversight. Surveillance and auditing verify that recycled water systems are being managed and operated correctly and at a high standard, and that public health is being protected. Outcomes should be published in publicly available reports"*. (page 10)

Finally, it must be emphasised that this analysis focuses on one exploration licence held by one company only. It does not take into account the cumulative effect of other such licences to discharge CSG treated water into the headwaters of the Murray-Darling Basin system (or other river basins that support large populations). With the rapid expansion of CSG projects and the initiation of production licences, the cumulative effects of contaminants from CSG treated wastewater entering the receiving water from numerous discharge points into the Murray-Darling Basin are potentially extremely hazardous in terms of the risks to the natural environment and to public health. The same applies to the integrity, purity and the security of water supplies, as well as the capacity to maintain production of food in terms of its integrity, purity and security of supply.

CONSULTATION

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LIST OF REFERENCES

1. US EPA

<http://water.epa.gov/drink/contaminants/index.cfm>

2. WHO

http://www.who.int/water_sanitation_health/dwq/guidelines4/en/index.html

3. Australian Drinking Water Guidelines 6 (2004)

<http://www.nhmrc.gov.au/publications/synopses/eh19syn.htm>

4. Australian and New Zealand Guidelines for Fresh and Marine Water Quality – 2000 (also known as the ANZECC Water Quality Guidelines)

<http://www.environment.gov.au/water/policy-programs/nwqms/>

4. National Water Quality Management Strategy, *Australian Guidelines for Water Recycling:*

Managing Health & Environmental Risks (Phase 2) Augmentation of Drinking Water

Supplies March 2008, National Resource Management Ministerial Council, Environment

Protection & Heritage Council, National Health & Medical Research Council

http://www.ephc.gov.au/sites/default/files/WQ_AGWR_GL_ADWS_Corrected_Final_%20200809.pdf

5. Environmental Authority (Petroleum Activities) PEN 100067807 (DERM, QLD, 29.6.2010)

Available from the QLD Department of Environment and Resource Management:

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