



For the protection of the integrity of river systems and water sources against the impacts of mining and other extractive industries

26th October 2012

Submission to NSW EPA

Application to vary EPL 2504

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Rivers SOS is an alliance of 47 environmental and community groups concerned with the protection of the integrity of river systems and water sources from mining and other extractive industries.

Rivers SOS appreciated the information session provided by EPA staff on 18th October. We thank you also for the opportunity to comment on the licence application and we thank the company for its cooperation in the public consultation process.

Data collected by the company's consultants, the Georges River Combined Councils Committee and Dr Ian Wright establish unambiguously that the discharge from Brennans Creek Dam causes significant pollution of the Upper Georges River. Dr Wright suggests pollutants of greatest concern include salt, pH, turbidity, nickel, zinc, aluminium, sodium and bicarbonate. Some of these are considered in the pages that follow.

Salinity

This is discussed in the light of electrical conductivity measurements (EC) using units of $\mu\text{S cm}^{-1}$. National Water Quality Guidelines (NWQG) salinity limits for protection of slightly to moderately impaired systems in south-eastern Australia are 30 to 350 $\mu\text{S cm}^{-1}$ in upland rivers and 125 to 2200 $\mu\text{S cm}^{-1}$ in lowland rivers. Ecoengineers Pty Ltd¹ report average electrical conductivity (EC) readings of 2496 $\mu\text{S cm}^{-1}$ for Brennans Creek Dam (BCD) discharge. While acknowledging that the literature 'clearly indicates that salinity has adverse effects on freshwater biota' the consultants argue that:

- 'Streams that drain from the marine-derived Wianamatta Shale are naturally more saline' than those from Hawkesbury Sandstone.
- 'Salinity was not the primary determinant of aquatic ecotoxicity within the Georges River'².

The company cites its Pollution Reduction Program 10.1 report that reasoned: 'since no convincing scientific basis was found for setting a salinity limit on the discharge from Brennans Creek Dam, it is recommended that no such limit be set until more is known about the agent causing toxicity'³. The company may well be unjustified in seeking to identify a particular stressor responsible for observed effects on reduced populations of test species. As the chemistry of the ecosystem is complex, it can reasonably be assumed that synergistic effects of multiple stressors combine to cause ecotoxic effects.

The onus of proving that their activity is not causing the problem lies with the company. In the meantime, our regulatory bodies should be taking anticipatory and preventative action to avoid damage to sensitive ecosystems in the vicinity of BCD. This is in line with the precautionary principle.

Tippler et al. (2012)⁴ suggest an appropriate guideline would be $< 212 \mu\text{S cm}^{-1}$. This range is consistent with salinity levels measured by Dr Ian Wright⁵ above and below the BCD discharge point. It needs to be stressed that average readings can be misleading and that spot peak levels of salinity have significantly greater potential for adverse impacts than calculated means.

Recommendation 1

That suggestions made by Tippler et al. be considered in setting salinity limits in the licence variation.

¹ Ecoengineers Pty Ltd (2012) West Cliff Mine: Assessment of Potential Ecotoxicants Brennans Creek Dam Discharge, September 2012. No page numbers provided

² Ecoengineers Pty Ltd Pollution reduction program 11 – West Cliff Mine Water Discharge Ecotoxicity Study, July 2012, p.2

³ *Op. cit.*, p.3

⁴ Tippler, C. et al (2012) Development of regulatory water quality guidelines for the conservation of aquatic ecosystems: a case study from the Georges River catchment, p.5

⁵ Wright, I. Presentation to NSW EPA personnel and community members, 18.10.12

Aluminium

The levels of aluminium reported by Wright (2012)⁶ for Brennans Creek are elevated from 'background levels' by factors of between 2 and 7, and well above the NWQG trigger point for 95% ecosystem protection. Similar levels are implied by Ecoengineers Pty. Ltd. (2012)⁷.

The consultant indicates:

- The coagulant Magnasol 572 has contributed to elevated aluminium levels through the polyaluminium chloride it contains.
- Speciation modelling has shown approximately 98% of the aluminium is in the anionic $\text{Al}(\text{OH})_4^-$ form which 'is not believed to be ecotoxic to aquatic organisms'. The evidence upon which this assessment is based is said to be the lack of observed ecotoxicity to four test species in PRP-11.

Ecoengineers Pty Ltd acknowledge an Al concentration of 0.36 mg L^{-1} , well above the trigger value of 0.055 mg L^{-1} and posits lack of ecotoxicity suggests 'most of the filtered aluminium is in colloidal form or occurs as $\text{Al}(\text{OH})_4^-$, neither of which are (sic) appreciably ecotoxic'.

Even should these hypotheses be valid, there would be new challenges for the company if lower pH limits were stipulated in the varied licence conditions, as the bioavailability of Al^{3+} would increase sharply with decreased pH. Even if the company were permitted to continue to discharge at the current very high pH range, water containing a variety of aluminium species would be carried downstream where the hydrogen ion concentration is about 100 times greater than it is at the BCD discharge point (e.g. O'Hare's Creek⁸). Presumably, the speciation modelling would predict the bioavailability of the aluminium would progressively increase as the water is carried away from the high pH discharge point.

Copper, zinc and nickel

These metals are all present in the discharge water at levels in excess of those in nearby natural surface waters and well in excess of NWSQ guidelines for ecosystem protection.

Recommendation 2

That appropriate limits be set for aluminium, copper, zinc and nickel in the discharge licence.

⁶ Wright, I. Presentation to NSW EPA personnel and community members, 18.10.12

⁷ Ecoengineers Pty Ltd (2012) West Cliff Mine: Assessment of Potential Ecotoxicants Brennans Creek Dam Discharge, September 2012. No page numbers provided – in the vicinity of heading number 11

⁸ Wright, I. *op. cit.*

Bicarbonate

Ecoengineers (September, 2012)⁹ acknowledge the potential toxicity of bicarbonate as a component of salinity. It has been recorded at 1450 mg L⁻¹ (at 2750 μS cm⁻¹), while NWQG for 95% ecosystem protection has been derived by EPA at 225 mg L⁻¹. However, Ecoengineers maintain that 'there is absolutely no field evidence to suggest that bicarbonate is a recognisable stressor on the aquatic ecosystem of the Georges River'.

Rivers SOS submit that the high concentrations of bicarbonate do pose problems because this is the species that may be responsible for the very high pH of the discharge water. Why is such a high pH permitted for discharged water when that of the natural surface waters is much lower? We can only suggest it is carried to the surface with the water pumped from the mine. The discharge of significant volumes of highly alkaline water into surface waters that are close to neutral clearly disturbs the equilibrium conditions of the natural ecosystem.

Discharge pH

Ecoengineers Pty Ltd propose maintenance of existing licence levels for pH, 6.5<pH< 9.0¹⁰. This range permits hydrogen ion concentrations well below those found in comparable nearby streams¹¹ and also well below those suggested as appropriate for this river system by Tippler at al. (2012), 5.1<pH<7.1.

The company seems to be relying heavily on maintenance of high pH levels of their discharge water to render toxic pollutants from mine water unavailable to the natural biota. This is not scientifically justifiable as the high pH levels of themselves introduce significantly altered chemical conditions to the aquatic organisms.

The stipulation of a pH range below that currently permitted would have significant implications for increased bioavailability of both anionic and cationic toxicants in the mine discharge.

Recommendation 3

That the pH licence criterion be reduced to values much closer to that in comparable nearby streams than is currently the case.

⁹ *Op. cit.* Under Salinity heading 4

¹⁰ Ecoengineers Pty Ltd, September 2012, *op. cit.*, under heading 5 – no page numbers provided

¹¹ Dr I. Wright presented pH readings of around 7.4 above the BCD point and 6.5 below it to the meeting between NSW EPA personnel and community members on 18.10.12

Source of pollutants in BCD discharge waters

The impact of the discharge from Brennans Creek Dam on a suite of sensitive organisms can almost certainly be attributed to the synergistic effect of multiple stressors in the water derived from underground. We recognise that removal of pollutants and pH adjustment would be both difficult and costly. However, BHP Billiton is a company that has enormous resources available to it and reports huge profits annually. It is unconscionable that a licence should be issued for their continued pollution of such a significant river system as the Georges. Coal is a resource that can be extracted only once while local ecosystems will be dependent on high quality water for the foreseeable future. Water extracted from underground could be recycled underground or returned underground if in excess. Other options are no doubt available. The onus should be on the company to determine the most efficient process by which continued pollution is avoided.

Recommendation 4

That discharge of treated surface water quality only be permitted from Brennans Creek Dam.

Concluding remarks

Rivers SOS view the Georges as one of Sydney's iconic rivers. We point to the multiplicity of data collected on the BCD discharge water which establishes the need for limits to be placed on aluminium, copper, nickel, zinc and conductivity. We support the recommendations from Tippler et al. (2010) for specification of lower a pH range and urge that future discharge into Brennans Creek reflect non-polluted background levels of nearby pristine streams.