The risk of bio-accumulation of Mercury in the Mary River.

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Mercury is a highly toxic heavy metal which has a tendency to bio-accumulate in some environments and is well known as a significant human health risk where this occurs. Queensland Health have produced an information sheet which provides a good summary of background information about the environmental health risks of Mercury

In natural soils and river systems, inorganic mercury does not normally pose any significant environmental or human health risks. However, under certain environmental conditions, inorganic mercury can be transformed into a number of soluble and highly toxic organic Mercury compounds. The best understood of these compounds is methylmercury, which is a powerful neurotoxin that is readily absorbed by plants and animals and tends to biomagnify in aquatic ecosystems. This is what occurred in the famous case of Minamata Bay disease in Japan.

Methyl mercury production occurs widely in natural waters and is particularly favoured by low-oxygen, nutrient-rich conditions with a great deal of biological activity in the presence of a source of mercury. These conditions already occur in times of low flow in the Mary River, and often occur in new water storages. Increased mercury bioaccumulation by aquatic organisms following the formation of dams is widely reported around the world and is generally recognized as one of the environmental health risks that needs to be addressed as part of the assessment of new dam projects. (McCartney et al. 2001).

There are two major sources of Mercury in the Mary catchment:
-naturally occurring Mercury in the soils and sediments of the Mary Valley. In some places these occur in highly concentrated sedimentary deposits such as those at Cinnabar near Kilkivan. (The locality was named after the deposit).
-Mercury released into the environment as part of the gold extraction process during historic gold mining and processing activities.

Mercury levels in the soil, air and water in the vicinity of Gympie are high as a result of past gold mining activities. This is documented in the study by Dhindsa et al. (2003), which estimated that 1902 tonnes of mercury from gold processing were released into the environment in the Gympie area alone between 1867 and 1926, and found mercury levels in sediments as high as 6.12 ug/g (Langtons Gully), which is more than 60 times the upper limit of typical background level for soils. This study recommended that Mercury concentration in air around Gympie and fish in the Mary River should be monitored.

In addition to gold mining in the vicinity of Gympie, there have been less well documented historic gold processing activities in the Mary Catchment upstream of Gympie, at Jones Hill, the Dawn and Mt Kelly, and in the upper tributaries of Yabba Creek (Imbil, Yabba and Jimna goldfields) and on Booloumba and Little Yabba Creek (Agricola mine and other minor prospects).

Bore sample data from near the proposed Traveston Crossing Dam site published in the EIS for that project show high levels of mercury in the groundwater at that site, with 9 out of 10 of the samples well above the ANZECC (1992) guidelines for fresh water. One sample (bore hole MA01) recorded a concentration 0.0021 mg/L, which is more than twice the Australian Drinking Water Guideline and more than 20 times the ANZECC freshwater guideline. In addition, soil leachate samples which were taken as part of an investigation into cattle deaths at the dam site also showed levels of Mercury which exceeded the guideline level. Some of this evidence was submitted by the Queensland Government to the 2007 senate inquiry on Traveston Crossing Dam and has since been published by the senate. The following professional advice was given to Queensland Water Infrastructure (QWI) on the matter by Golder and Associates. (QWI 2007 – response to question on notice).

'We found that concentrations of Mercury in the leachate of the 10 samples were elevated when compared with the Australian Drinking Water Guidelines, indicating that there are potential environmental and human health risks with respect to Mercury. We think that this potential environmental concern may be better quantified through further investigations"

The proposed dam at Traveston Crossing poses a significant risk of creating ideal conditions for the production of methylmercury in the storage, and the subsequent biomagnification of this mercury throughout the food web in the Mary River. The proposed dam would provide a wide, shallow, warm, exposed body of water in a sub-tropical environment, inundating very fertile soils, with high carbon and nutrient levels and high biological productivity, prone to anaerobic conditions. These conditions are clearly recognized in section 6 of the EIS for the project. In storages under similar climatic conditions, significant increases in methyl mercury concentrations have been reported in the

scientific literature. (Hylandera et al 2006). The high levels of mercury recorded in the soils of the impounded area and those likely to be in the catchment upstream of the dam site from past gold extraction activities adds considerable weight to these concerns.

In fact, evidence of mercury biomagnification has already been reported by the Chief Health Officer of Queensland Health in South East Queensland at Hinze Dam. (ABC 2006). In the Mary Catchment, there is also evidence of bio-accumulation of Mercury in the Cabomba harvested from Lake Macdonald. (Lake Macdonald Catchment Group 2000)

Although the water extracted from the storage for urban water supply may be able to be treated to remove undesirable levels of methylmercury, the possible requirement for this treatment needs to be recognized in advance. However, the main problem would result from the release of untreated water downstream from the storage downstream and the ecosystem effects within the food webs of the freshwater ecosystem in the river both upstream and downstream of the dam site. In fact, past experience suggests that the main impact of elevated Mercury levels could be expected to be felt in the river downstream of the storage (Hylandera et al 2006). In other rivers with upstream mercury sources the effect has caused health risks hundreds of kilometres downstream and in receiving estuaries and tidal wetlands. Davis et al (2003), Harada et al (2001).

It is absolutely astounding that a comprehensive assessment of the risks associated with biomagnification of mercury in the Mary Catchment as a result of the proposed Traveston Crossing Dam has been deliberately left out of the draft EIS for the project. The pre-existing knowledge within the Queensland State Government of the levels of mercury in the catchment and the widely recognized effect of new storages on increasing mercury levels in aquatic ecosystems suggests that a credible, independent and thorough assessment of this risk should form an important part of the EIS.

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