

Item 4 of list of dioxin issues requiring clarification by DEW

DEW comment:

DEW have enquired whether there are other methods than the US EPA (2005) methodology for calculating the concentration of dioxin that may be in sediment as a result of long term discharge of effluent into Bass Strait. In particular DEW are interested over what area the dioxin load would need to be dispersed in order to meet the Canadian Sediment Quality Guideline taking into account the half life of dioxins.

Response:

Other methodologies other than the US EPA (2005) approach are not known to Gunns or its toxicology consultants. The dispersal and settlement of buoyant particles to which the discharged dioxins will be adsorbed is quite complex. Removal processes such as consumption by microorganisms and burial by particles need to be accounted for. The latter is emerging to be particularly important as many pulp mill effluent studies have shown rapid decreases in biota dioxin levels as dioxin concentrations in pulp mill effluent decrease, despite there remaining high concentrations of dioxins in sediment of the receiving waters (e.g. Servos et al. 2003). In fact the uncoupling of the dogma association of sediment dioxin concentrations and biota concentrations raises a question regarding the applicability of the Sediment Quality Guideline for dioxins and furans. Of much more importance is the measured dioxin data in biota.

To assume a simple box model to support such calculations as tacitly suggested by DEW markedly over simplifies the situation to the point of un-realism and will almost certainly yield misleading information. Such calculations have not been attempted by the consultants providing advice on the impact of discharged dioxins to the marine environment.

It should also be remembered that Environment Canada almost arbitrarily applied a factor of 10 to the threshold effect level for dioxins in sediment that was statistically determined from toxicity experiments or field observations. Their procedure calls for the threshold effect level to be declared as the Sediment Quality Guideline. However this was not done for dioxins because there was concern that almost 80% of Canadian sediments were already below the threshold level and that the field data in the statistical threshold determination may not have reflected the range of dioxin concentrations in Canadian sediments. To apply the 10 fold factor was essentially a policy decision that does not reflect the toxicological data; based on the data the Sediment Quality Guideline should actually be ten times higher than 850 pg/kg, which would still be markedly below the probable effect level of 21,500 pg/kg sediment.

Servos, M., R., Luce, S., Toito, J., McMaster, M., E., Munckittrick, K., R., Huestic, S., Y., Hagen, M., E., Colodey, A., G (2003). The rapid decline of polychlorinated dibenzo-p-dioxins and furans in fish exposed to pulp and paper mill effluents in Canada. Chapter 2 p 208-215. In "Environmental Impacts of Pulp and Paper Waste Streams" Proceedings of the 3rd international conference on environmental fate and effects of pulp mill effluents. Rotorua New Zealand November 1997.