

## **IMC Task 14 Dioxin Formation Investigation**

Prepared by Dr Chris Clunies-Ross and Dr Mark Hibberd - 12 June 2007

*The Community Liaison Committee (CLC) request that Dr Chris Clunies-Ross and Dr Mark Hibberd meet with Dr John Lear from Orica to develop the scope, costs and benefits of a project to research the formation of dioxin at the Groundwater Treatment Plant. Orica will arrange the meeting.*

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On 7 June 2007 Dr Chris Clunies-Ross and Dr Mark Hibberd (by phone) met with Dr John Lear and Lucy Archer to discuss this task. This paper records the agreed scope, costs and benefits of a dioxin formation investigation and is submitted to the CLC for their consideration.

### **Scope of Dioxin Formation Investigation**

1. Develop a spreadsheet to extract the concentrations of the full suite of 210 dioxin congeners (rather than just the 17 toxic ones) from the analysis results already obtained by National Measurements Institute (NMI), for the purposes of undertaking a more detailed analysis of dioxin formation in the Orica Groundwater Treatment Plant (GTP).
2. Get NMI to use the above spreadsheet to extract results for the eight (8) most recent GTP dioxin sampling events (at both the stack and the quencher – a total of 16 samples), in order to list all the dioxin congeners present. These samples will include those taken by both Airlabs Environmental Pty Ltd (i.e. Dr Chris Clunies-Ross) and Stevenson's Environmental Management over the range of thermal oxidiser operating temperatures trialed earlier this year (900 – 1000 degrees Celsius).
3. Analysis by Dr Chris Clunies-Ross of the spreadsheet results to do determine which congener concentrations change between the quencher outlet and the stack of the GTP. Interpretation of the results by Dr Chris Clunies-Ross and Dr Mark Hibberd.
4. A brief report to the CLC outlining the findings of the investigation and any resulting recommendations.

### **Costs of Dioxin Formation Investigation**

A cost estimate for items 1-4 of the proposed scope is provided in the following table:

<b>Item</b>	<b>Work</b>	<b>Undertaken by</b>	<b>Estimated Cost (excl GST)</b>
1	Spreadsheet development	National Measurements Institute	\$5,000
2	Laboratory Extraction of extra data for 16 samples @ \$200 each	National Measurements Institute	\$3,200
3	Results interpretation	Dr Chris Clunies-Ross	\$ 1300
		Dr Mark Hibberd	\$ 800
4	Reporting	Dr Chris Clunies-Ross	\$ 800
		Dr Mark Hibberd	\$ 800
	<b>Total cost estimate</b>		<b>\$ 11, 900 excl GST</b>

### **Benefits of Dioxin Formation Investigation**

- Currently we know that from the monitoring results that there is an increase in dioxin concentrations (expressed as the TEQ, that is the toxic congeners only) between the quencher outlet and the stack of the GTP.
- The aim of the investigation is to determine if there is any change in the dioxin congeners distribution (relative concentrations) between the quencher outlet and the stack of the GTP.
- Knowing the change in congener distribution is likely to lead to a better understanding of which mechanism is at force in creating the very low concentrations of dioxins (i.e. de novo synthesis or desorption) after the quencher outlet.
- The results may also provide information as to why there have been differences in the dioxin sampling results obtained by Airlabs Environmental Pty Ltd and Stevenson's Environmental Management.
- It is not clear if the analysis will result in any changes to operation of the GTP, which has met the stack emission limits for dioxin for the past 6 monitoring events. Nor is it certain that the investigation will increase our understanding as to why the dioxin concentrations behave as they do in the GTP or increase confidence that Orica will be able to maintain stack emissions within the licence level.
- The investigation is, however, a cost effective way of obtaining more information using existing samples from the GTP in an effort to better understand the creation of dioxins at the plant.

### **Recommendation**

- Dr Chris Clunies-Ross and Dr Mark Hibberd provide this paper for consideration by the CLC and recommend that the investigation proceed.