Botany Groundwater Cleanup Project

Fact Sheet 12 **September 2004**

Fact sheets are designed to provide the community with simple and easy-to-understand information on environmental science and technology. Readers requiring greater detail should contact Orica:

- by email at info@oricabotanygroundwater.com
- by phoning our Community Feedback Line - 1800 025 138
- by writing to - Community Matters, 16-20 Beauchamp Road, Matraville 2036

Thermal Oxidation

What is Thermal Oxidation?

Thermal oxidation is a treatment process in which air laden with organic contaminants is captured by an industrial ventilation system and heated to a high temperature in the presence of air to break down the contaminants to form carbon dioxide and water vapour, as well as hydrochloric acid, which is scrubbed from the air stream.

Why is Orica designing for Thermal Oxidation?

The EPA, through its Notice of Clean Up Action (Cleanup Notice), which was issued to Orica on 26 September 2003 and varied on 17 February 2004, mandated the hydraulic containment and above ground treatment of contaminated groundwater from the Primary Containment Area. It also mandated containment at the Secondary Containment Area and at source areas. Orica needs to develop a Groundwater Treatment Plant on the Botany Industrial Park (BIP) in order to achieve this. On-site treatment technologies which have been assessed are:

- Air stripping of volatile CHCs and Thermal Oxidation;
- Steam stripping and Plasma Arc; and
- Chemical oxidation.

These are standard treatment technologies for contaminated groundwater. Of these, air stripping with thermal oxidation emerged as preferred because of its reliability and its capability to meet regulatory emission standards. It is also a proven, robust and effective technology that will meet the required level of treatment in the necessary timeframe. Thermal Oxidation is used in a wide range of applications, including destroying contaminants in gases generated in the destruction of medical waste, refrigerant plants, pharmaceutical manufacture and municipal waste in Europe and North America, as well as hundreds of remediation projects and for odour control.

Modern thermal oxidisers meet the most rigorous environmental standards in developed countries and are standard items of plant equipment.

Orica is also continuing with evaluation of bio-remediation for possible future implementation.

Thermal Oxidation and the Stockholm Convention

The Stockholm Convention aims to reduce the production of persistent organic pollutants (POPs) including dioxins and furans. Dioxins and furans are naturally occurring chemicals that are highly toxic (see Fact Sheet 13). As reported in “National Dioxins Program, Dioxins in Australia: a summary of the findings of studies conducted from 2001 to 2004”, the largest source of dioxins in Australia is bushfires. By design, the proposed thermal oxidiser will produce minimal dioxins If it was to operate at the existing Australian limits for dioxin emissions, this would account for 0.008% of the total current Australian emissions, however the current design aims to satisfy standards better than these limits, ie 0.1ng/m^3 TEQ, currently the tightest emission standard known. In addition the technology will operate to best practice expectations.

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Current sources of dioxin emissions in Australia[1]

Source	% to Air
uncontrolled combustion processes (including bushfires)	66.52%
ferrous and non–ferrous metal production	22.83%
production of chemicals and consumer goods	0.09%
power generation and heating	7.01%
Waste incineration	1.29%
mineral products	0.37%
Transportation	1.82%
Miscellaneous	0.06%
Total	100.00%

Monitoring and compliance of the thermal oxidiser

Now that Australia has ratified the Stockholm Convention (20 May 2004) as a nation we are required to minimise our production of dioxins and furans as by-products of industrial processes. Through the use of best practice, the thermal oxidiser will meet Australia's obligations under the Stockholm Convention. The Convention suggests that the design process for such oxidisers should be modified to improve combustion and prevent formation of the chemicals through the control of parameters such as incineration temperature and residence time.[2] The design and operation of the thermal oxidiser will ensure that incineration temperature and residence time, and flue gas system performance will lead to minimal, if not zero dioxin emission. Orica will undertake required monitoring to demonstrate that the plant complies with best practice air emission standards.

Further references

"Dioxins in Australia: a summary of the findings of studies conducted from 2001 to 2004", National Dioxins Program, Department of the Environment and Heritage, Commonwealth of Australia, 2004, ISBN 0 642 55014 X

http://www.deh.gov.au/industry/chemicals/dioxins/community-summary/index.html

STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS (STOCKHOLM, 22-23 MAY 2001)

http://www.austlii.edu.au/au/other/dfat/treaties/notinforce/2001/7.html

[1] Dioxins in Australia: a summary of the findings of studies conducted from 2001 to 2004

[2] Stockholm Convention on Persistent Organic Pollutants (Stockholm, 22-23 May 2001) Annex C Part V B (b) (iv)