Botany Groundwater Cleanup Project

Fact Sheet 10 **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

Groundwater Treatment Plant

Why do we need a Groundwater Treatment Plant?

The EPA, through its Notice of Clean Up Action (Cleanup Notice), which was issued to Orica on 26 September 2003, mandated the hydraulic containment and *ex situ* (above ground) treatment of the contaminated groundwater for the Primary Containment Area (Block 2 of Orica Southlands). This is to contain the spread of the central plume, which is made up of high concentrations of 1,2-dichloroethane (also known as ethylene dichloride, EDC). It also mandates contaminant containment at the Secondary Containment Area (downgradient of the Primary Containment Area, e.g. at Botany Gold Course/Foreshore Road) and at source areas. Hydraulic containment coupled with *ex situ* treatment is a widely used technology for achieving required contaminant containment. It is often referred to as "pump and treat". Orica needs to develop a Groundwater Treatment Plant on the Botany Industrial Park (BIP) in order to treat the contaminated groundwater which is pumped from extraction wells.

What alternatives have been considered?

A comprehensive list of options and alternatives is described in the Groundwater Cleanup Plan under "treatment options" (available online at www.oricabotanygroundwater.com), and in the Environmental Impact Statement (see Fact Sheet 11), that is required as part of the statutory approval process for constructing and operating the Groundwater Treatment Plant. In summary, options to treat the contaminated groundwater include on- and off-site treatment. Off-site treatment (e.g. disposal at Waste Service NSW's Lidcombe liquid waste treatment plant) for all of the extracted groundwater is not practical due to the large volumes of contaminated water requiring treatment, operational constraints at the Lidcombe Plant and the associated infrastructure and operational support (such as pumping and road transfers).

A range of on-site treatment technologies were evaluated at the time of developing the Groundwater Cleanup Plan. These included:

- Air stripping of volatile chlorinated hydrocarbons (CHCs) and thermal oxidation;
- Chemical oxidation;
- Steam stripping for recovery of CHCs, followed by CHC destruction (which may occur off-site or on-site, probably using plasma arc technology).

Of these, air stripping with thermal oxidation emerged as the preferred choice because of its reliability and its capability to meet regulatory emission standards. It is also proven, robust and effective technology that will achieve the required level of treatment in the necessary timeframe.

How would this plant operate?

Groundwater would be pumped from a line of extraction wells in the containment areas and piped into a groundwater feed tank. Hydrochloric acid would then be dosed into the feed tank to acidify the groundwater and reduce the chance of mineral fouling in the air strippers. The acidified water would then be pumped to the air stripping section.

Air stripping is performed by blowing ambient temperature air up through a falling column of water, transferring the chlorinated hydrocarbons from the water to the air. The water and air are then treated separately.

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Contaminated air from the air strippers passes through a thermal oxidation unit. The oxidation process generates hydrogen chloride gas as a by-product, which is recovered by absorption in water to form hydrochloric acid in the acid absorber. The air stream then continues to the caustic scrubber for further treatment to meet emission specifications agreed with the EPA. Air exits the plant via a proposed 10 m high EPA licensed stack. A small flow of backlog EDC recovered from the operation of the Steam Stripping Unit (SSU – See Fact Sheet 2) will be sent to the thermal oxidation unit with the contaminated air for treatment. This will consume the backlog EDC over the first few years of operation.

Stripped water from the air strippers is treated with caustic soda to raise the pH to approximately 8. This causes dissolved iron to precipitate. Precipitated iron from the iron removal stage will be removed (probably using a sand filter) and sent to sewer as trade waste in agreement with Sydney Water Corporation. The high iron content of this effluent can be beneficial to the sewer system, as it acts as a scavenger for odour compounds in sewage and assists in sludge flocculation. The stripped water then passes through activated carbon to remove trace organics that were not air stripped. Finally, the dissolved solids (salt) will be removed, using a reverse osmosis filter unit.

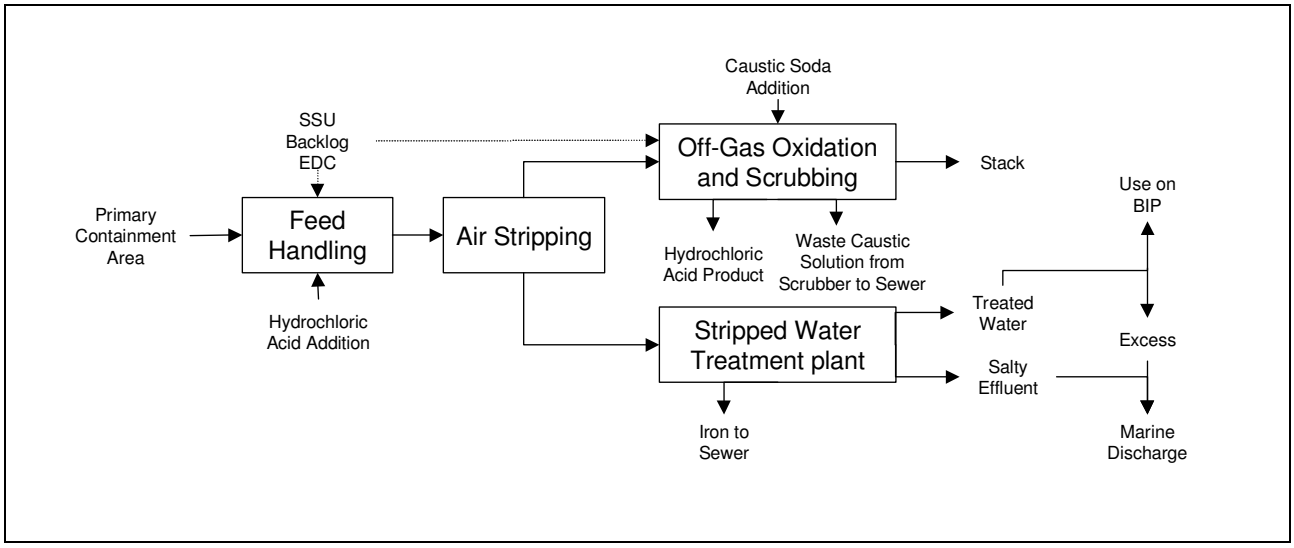

Figure 1 – Groundwater Treatment Process – Conceptual Schematic

What will Orica do with the treated water?

Treated water discharge from the Groundwater Treatment Plant will meet Australian Drinking Water Guidelines and ANZECC Guidelines for marine discharge. Most of the treated water will be reused by process operations around the Botany Industrial Park. Orica is working to identify and gain approval from off-site users. Any excess treated water will be discharged through an existing pipeline to the existing Bunnerong salt water channel that discharges into Botany Bay at Brotherson Dock. The salt removed in the Reverse Osmosis unit will also be discharged with the excess treated water into the Bunnerong salt water channel and hence into Brotherson Dock.

When is construction expected?

Orica will need to obtain planning approval for the plant and this will take some time to obtain. Assuming approval is obtained, Orica hopes to begin construction in February 2005. If that is the case, we would expect the plant to be operational by November 2005.

How long would the plant be operational?

This will depend on the rate of cleanup of the contaminated groundwater and source areas. At this stage, the plant is expected to operate for up to 30 years.

Links to further references

Kirk-Othmer, *Encyclopedia of Chemical Technology*

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