

Community Liaison Committee
Botany Groundwater Cleanup Project
Briefing Paper for 16 June 2009 Meeting

1 INTRODUCTION

This briefing paper is prepared for the Community Liaison Committee (CLC), a community forum established for Orica's Botany Groundwater Cleanup (BGC) Project. It aims to update the CLC on the progress of the BGC Project, actions required of Orica as recorded at previous CLC meetings, as well as other matters of interest to the CLC. It covers the period from March until early June 2009. The paper includes the following sections:

- Progress of BGC Project: a summary of key points from the recent quarterly report;
- Springvale Drain infilling;
- Former ChlorAlkali Plant mercury investigations;
- Independent Monitoring Committee matters;
- Community communication update; and
- Regulation review of the BGC Project.

Orica welcomes discussion on any of the matters in this briefing paper or the Groundwater Cleanup Plan Progress Report No. 22 at the upcoming June meeting.

2 PROGRESS OF BGC PROJECT

Each quarter Orica provides a Groundwater Cleanup Plan Progress Report to the Department of Environment and Climate Change (DECC). The most recent report, No. 22, was submitted on 29 May 2009. The reporting period for Progress Report No. 22 is from 1 January to 31 March 2009. However, more recent information is included in the report where available. The report is distributed to stakeholders and regulators as requested.

2.1 Notice of Clean Up Action (NCUA)

Orica has achieved compliance with all ten conditions of the NCUA that had specific completion deadlines, and has also achieved ongoing compliance with 15 more conditions of the NCUA that typically relate to recurring or routine timeframes (e.g. progress reports).

2.2 Environment Protection Licence (EPL2148)

Orica provides an Annual Return each September to report compliance with its Botany EPL. The EPL includes requirements for the BGC Project and other Orica legacy projects at Botany. As agreed at the March CLC meeting, Orica will provide a presentation on BGC Project related results from the 2009 Annual Return to the CLC at the December 2009 meeting. The following points provide a summary of relevant EPL activity during the reporting period:

- Licence variations were issued with the following key changes:
 - Updates to monitoring methods at the GTP stack.
 - Inclusion of a Pollution Reduction Program for the temperature of treated water discharge to Bunnerong Canal, with the first report due in September 2009.
 - Removal of references to the Steam Stripping Unit – as that plant is no longer in use.
 - Permission to proceed with the Groundwater Injection and Recovery System trial (see Section 2.6 below).
- As reported to the CLC in March, Orica has identified an opportunity to treat contaminated stormwater, liquids and activated carbon from Hexachlorobenzene (HCB) Stores G & H of the HCB Waste Repackaging operation at the GTP. Orica has since met with the Department of Planning (DoP) and DECC to discuss the process for gaining approval for this proposal. Further discussion is required to determine the appropriate approach.

2.3 Hydraulic Containment

A key part of the BGC Project is to contain groundwater plumes to prevent the migration of further contamination to Botany Bay. Containment ensures that risks to human health or the environment remain at acceptable levels. Orica started pumping and treating groundwater in 2004. Hydraulic containment since that time has resulted in dramatic (in some cases 800-fold) improvements to surface water quality in Penrhyn Estuary.

A summary of results from the current reporting period is provided below.

PCA Containment Line

The main purposes of the Primary Containment Area (PCA) containment line are mass removal and hydraulic containment on Block 2, Southlands. Pumping at the PCA also provides protection to Springvale Drain.

The deep aquifer, where the majority of contaminant mass lies, has been successfully contained in this reporting period.

SCA Containment Line

The primary purpose of the Secondary Containment Area (SCA) is to minimise migration of groundwater contamination to Botany Bay. Hydraulic containment was achieved in both the shallow and deep aquifers.

Botany Industrial Park (BIP) Containment Line

Orica installed the BIP line to contain contaminated groundwater migrating from source areas located on BIP. Along the BIP line, priority is given to pumping from wells in the vicinity of Second Street (the location of a major contamination source area) and Springvale Drain (for the protection of surface water in the drain and downstream at Penrhyn Estuary). Wells at the northern end of the BIP line are not as important for the groundwater cleanup and are the first to be turned off if groundwater extraction is temporarily reduced due to periodic GTP capacity limitations.

Partial containment was achieved during the reporting period. This was sufficient for the purposes of intercepting contaminated groundwater from the major source area and for protecting Springvale Drain.

Chemical Monitoring Results

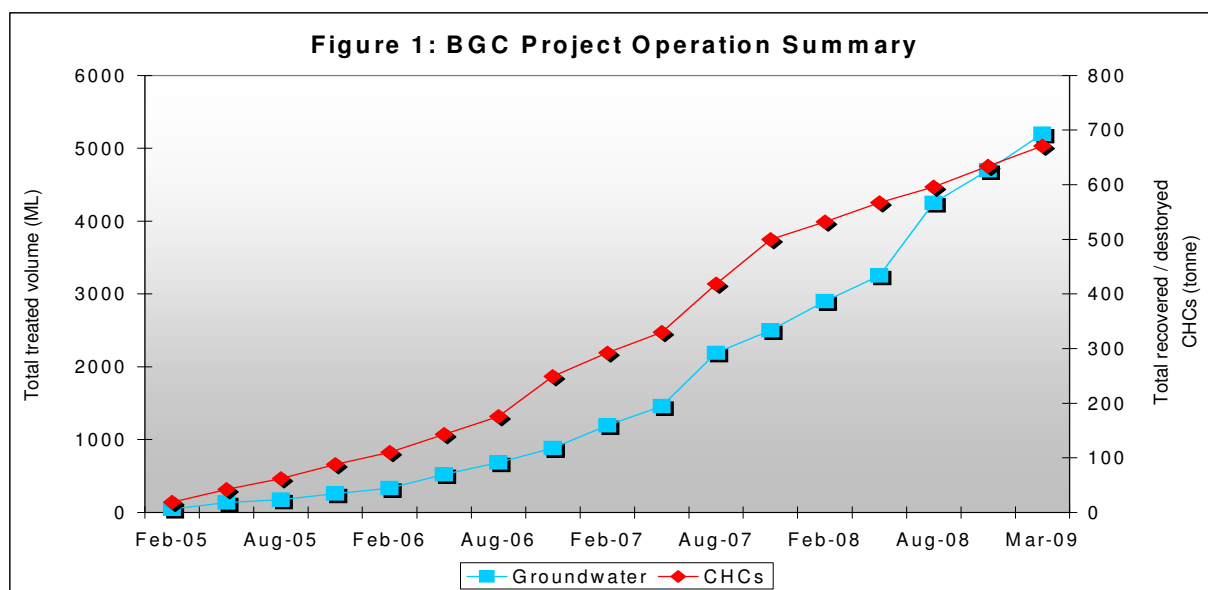
- The large majority of the samples collected from monitoring wells and surface water samples were consistent with previous results. Large-scale variations in concentrations of contaminants in groundwater and surface water are not expected in the short term.
- Higher concentrations of some contaminants were recorded in a small number of offsite monitoring wells. These included vinyl chloride (VC) in BP95 (at a depth of 3.0 m below ground surface) in the railway corridor adjacent to BIP and BP115 (at a depth of 5.0 m) in the dunes close to the SCA. These were considered by Orica's consultants URS Australia Pty Ltd (URS) to be largely consistent with historic fluctuations and do not change the conclusions of the Consolidated Human Health Risk Assessment (CHHRA). Areas such as these will continue to be monitored to ensure the conclusions of the risk assessment remain relevant.
- All concentrations of surface waters in Penrhyn Estuary were less than ANZECC (2000) trigger values with the exception of SW031 located near the Springvale Drain outlet. This location marginally exceeded the trigger value for VC at high tide. However, the conclusions of the CHHRA remain unchanged.
- Pore water samples from bundled piezometers in the estuary were all below ANZECC (2000) trigger values with the exception of one sample from BP43 which exceeded the VC trigger value. URS considered this to be consistent with historic seasonal fluctuations.

2.4 Groundwater Treatment Plant Operation Update

Since commencing the BGC Project, Orica has treated over 5.2 GL of contaminated groundwater and has recovered and destroyed 671 tonnes of chlorinated hydrocarbons (CHCs). These numbers are included as a measurable indicator of progress.

As discussed at the Strategy Review workshop held in March this year, work has been undertaken to estimate the total mass of contamination in the aquifer and the cleanup timeframes under a range of remediation scenarios. The mass of contamination removed from the aquifer to date is a small portion of the total, and the rate of contaminant removal will slow down as the concentrations gradually decrease. Until Orica is able to find suitable cleanup technologies, the current 'pump and treat' approach is considered to be the most effective way forward.¹

Figure 1 provides a graph over time of the volume of groundwater treated and tonnes of CHCs destroyed. Over time the total mass of CHCs recovered and destroyed (diamond shapes on graph below) will start to level off.



The following table summarises the key operating matters at the GTP that Orica has worked on during this reporting period. These matters have been previously reported to the CLC and the table below provides a status update.

Updates for reporting period	Progress	Comment
Biological fouling in air stripping unit	Planning has commenced for the construction of a new concrete tank at the GTP to store sodium chlorite to produce chlorine dioxide that is used to treat biological fouling in air strippers.	Refer below for further details

¹ Orica recognises that Action #03 from the March 2009 meeting required Orica to consider how the mass of contamination and groundwater cleanup timeframes are reported in progress reports. These are complex matters that cannot easily be summarised in a few words. Orica wishes to discuss this item further at the upcoming meeting.

Updates for reporting period	Progress	Comment
Stripped Water Treatment Plant	<ul style="list-style-type: none"> • Installation of Biological Aerated Filter (BAF) units has increased GTP run times and treatment capacity. • A temporary reduction in treatment capacity in the latter half of the reporting period was experienced due to rectification works on two of the five BAFs. • Planning has commenced for the construction of a new tank at the GTP to store sodium hypochlorite to produce chloramine. 	<ul style="list-style-type: none"> • Rectification works on the two BAFs are complete and the plant's treatment capacity has been brought back to more than 5 ML/day on average. • Refer below for further details.
Chloramine in GTP discharge water	<ul style="list-style-type: none"> • The removal of Total Organic Carbon in the groundwater by the BAFs has substantially lowered the need to apply chloramine to control biological fouling of the reverse osmosis membranes 	
Ammonia Pollution Reduction Program (ammonia results from chemically eliminating chloramine in discharged treated water, by using sodium bisulphite)	<ul style="list-style-type: none"> • Orica has committed to providing a further update by 1 July 2009 	<ul style="list-style-type: none"> • Some improvement achieved. • Future work on better chloramine dosing control should yield further improvements. • Orica is maximising water reuse to minimise discharge.

Orica plans to build two new storage tanks to store sodium hypochlorite and sodium chlorite at the GTP. These chemicals have been used at the GTP to control fouling issues at the GTP (refer to table above). These chemicals are currently being delivered to the GTP in 1000 L containers that provide for only a few days' supply. Permanent storage is required to better manage the receipt and transfer of these chemicals and to improve the management of potential worker-handling risks. Although no development consent is required for these works, Orica has notified DECC and the DoP of the proposed works. Prior to construction, HAZOP (Hazard and Operability) studies will be conducted and the emergency response plan will be updated. WorkCover will also be notified of the new dangerous goods stores.

2.4.1 Beneficial Reuse of Treated Water

The GTP began supplying the Orica ChlorAlkali Plant with treated water in December 2006. Qenos is regularly receiving treated water for use in cooling towers. Solvay Interlox continues to receive and utilise treated water. As at the end of May 2009, approximately 1 GL of treated water had been supplied for reuse to date. Orica has works underway to further improve the quality and reliability of the treated water supply to users.

Under the *Water Industry Competition Act, 2006*, Orica is required to submit an application for a combined Network Operator and Retail Supplier licence for the supply of treated water from the GTP. Applications are due to be submitted to the Independent Pricing and Regulatory Tribunal of NSW by 8 August 2009.

As previously reported, Orica commenced an investigation in order to determine the maximum sustainable volume of groundwater the aquifer could provide to the GTP from the existing groundwater extraction network and to assess the impacts that this extraction would have on the built and natural environments (e.g., subsidence). A D Laase Hydrologic (Colorado, USA) has been engaged to perform the groundwater modelling assessment in order to determine the

maximum long-term extraction rates, and Pell Sullivan Meynink (geotechnical consultant) has also been engaged to assess subsidence risk.

The subsidence assessment work is almost complete and Al Laase has commenced the groundwater model recalibration. These investigations are expected to be complete in July 2009.

2.5 GTP Hazard Audit 2008

Karin Nilsson from Planager Pty Ltd conducted a hazard audit at the GTP in November 2008. The results have been reported to the DoP and a presentation on the audit scope and findings will be made at the June CLC meeting.

2.6 Groundwater Injection and Recovery System (GIRS)

As previously reported, Orica is proposing GIRS as a backup for the GTP in the event of a significant GTP shutdown. A detailed proposal was submitted to DECC in July 2008. Earlier this year, DECC provided feedback regarding monitoring requirements and necessary approvals for the proposal.

Orica has received a variation to EPL2148 allowing for the completion of a trial injection of groundwater. Orica has also applied for test bore licences from the Department of Water and Energy (DWE) to allow the drilling of injection and monitoring wells required for the trial. At the time of writing, DWE had advised that the licences would be issued shortly. Work will commence shortly thereafter.

3 SPRINGVALE DRAIN INFILLING

Previous progress reports have detailed the monitoring of chlorinated solvent vapours in air close to Springvale Drain caused by the influx on contaminated groundwater into the drain. Orica has observed that reducing the groundwater level at Southlands (through pumping at the BIP and PCA containment lines) has decreased CHC concentrations in the surface water in Springvale Drain and resulted in improvements to air quality.

The monitoring also determined that the realignment channel located adjacent to Springvale Drain in Southlands contains concentrations of contaminants far greater than in the main channel of the drain. Consequently, as a precautionary measure to protect against possible elevated concentrations of CHCs in air close to the realignment channel, it was determined that it would be prudent to infill the realignment channel. The channel is not a natural feature, but was created for the sediment remediation works performed by Orica in the late 1990s.

Orica applied to DWE for a permit under Part 3 Chapter 3 of the *Water Management Act, 2000* for the infilling works and DWE has advised Orica that the works may proceed. Preparations for the works are underway.

4 FORMER CHLORALKALI PLANT MERCURY INVESTIGATIONS

4.1 Background

As previously reported, mercury was detected in groundwater and soil at the site of the now demolished former ChlorAlkali Plant at the BIP. Orica has conducted soil investigations on the BIP site, and groundwater investigations both on and off the site. These investigations have detected mercury in groundwater at off-site monitoring wells. All off-site wells included in these investigations are situated on industrial properties and Orica has confirmed with property occupiers that groundwater is not used at these sites.

Reports on groundwater and soil investigations, including test pitting, the hydrogeochemical conceptual model (for the fate and transport of mercury in the soil and groundwater) and the Human Health and Environmental Risk Assessment (HHERA) were submitted to DECC in 2008.

4.2 Planning for Remediation

Orica plans to remediate the site in winter 2010 using soil washing technology and aims to render the site suitable for future industrial/commercial use. The following activities are in progress:

- Orica is preparing a Voluntary Remediation Proposal (VRP) for remediation of the former ChlorAlkali Plant area that will be submitted to DECC for approval.
- Orica will soon engage a consultant to prepare a Remediation Action Plan (RAP).

- Further sampling of soil will be undertaken to determine the likely extent of the full-scale remediation.
- To assist in designing the remediation plant and equipment to meet safety, health & environment requirements, Orica plans to conduct small-scale trials of cutting and lifting concrete slabs in the area formerly occupied by the cell block. Some excavation will occur to determine the accessibility of plant foundations. All excavated soil will be returned to the excavated site and concrete slabs replaced. Air monitoring will be conducted during the work and dust control measures will be implemented. These trials are planned to commence on 15 June, and are planned to be complete by the end of that week.
- Laboratory-based technical tests will also be conducted at the BIP in June to fine-tune the soil washing process.

4.3 Air Monitoring

Orica conducts regular instantaneous air monitoring at the former plant site to ensure that nearby BIP workers are not exposed to any adverse occupational health risk. No results have exceeded occupation exposure limits. Additional fixed-point air monitoring was undertaken in early May 2009 at the BIP boundary (near the salt pile and an adjacent building) following a request from DECC to validate some of the HHERA calculations. The results will be issued to DECC once available, and will be shared with the BIP workers and with the CLC at the September 2009 meeting. Further air monitoring will be undertaken in June 2009 as part of remediation scoping investigations discussed above.

5 INDEPENDENT MONITORING COMMITTEE (IMC) MATTERS

As the CLC may recall, Prof Acworth has been engaged by Orica to contribute to the project to determine the maximum sustainable groundwater extraction volume. He will be providing feedback to the CLC following the completion of the modelling and geotechnical works (discussed at Section 2.4.1), as specified by Action June 06 #11.

5.1 Task 21

Following on from IMC Task 21, in which Dr John McCracken reviewed results from monitoring conducted by Orica for compliance with EPL2148, the BIP Trade Waste Service Agreement and the Ammonia Pollution Reduction Program, DECC asked Orica to conduct a scan of GTP feed and product water for semi-volatile compounds (SVOCs).

Dr McCracken was concerned that there might have been some contaminants (specifically SVOCs like phenols and chlorophenols) that were being discharged from the GTP without regulation.

As reported previously, Orica conducted analysis in late 2008, which showed that while low concentrations of SVOCs are present in the feedwater to the GTP, there were no detections above the relevant ANZECC Trigger Values in treated water discharged from the GTP.

In the March 2009 Briefing Paper Orica noted that some of the analytes were identified to have detection limits greater than the relevant ANZECC Trigger Value and that a re-sampling at lower detection limits was planned, if available. Further analysis of the data from the 2008 sampling determined that only one SVOC (2,4-dichlorophenol) was detected above the limit of reporting, but the concentration was well below the ANZECC Trigger Value for fresh water. Orica provided the complete set of results to DECC on 4 April 2009 with the conclusion that treated water discharged from the GTP does not present a risk to human health or the environment with respect to the presence of SVOC. DECC provided its acknowledgement for the work on 28 April 2009 and has not requested any further action.

5.2 IMC Contract Renewal / IMC Membership Review

As the CLC is aware, members of the IMC have a contract for their service to the CLC with Orica. As agreed at the March meeting, Dr Mark Hibberd's contract has now been extended for a year to bring it in line with all other IMC members' contracts, which will expire in early 2010. An agenda item is scheduled for the upcoming June meeting for the CLC to discuss IMC membership. This provides an opportunity to review the areas of expertise needed and membership for both core and auxiliary IMC members.

6 COMMUNITY COMMUNICATION UPDATE

6.1 Community Workshops

A workshop on the BGC Project Remediation Strategy Review/DNAPL technology investigations was held on 31 March 2009. The majority of the presentations given at the session have been uploaded onto the Orica website. A workshop report is being drafted and will be made available on the website when ready.

6.2 Newspaper Columns

Two newspaper columns were published in the *Southern Courier* since the last quarterly Progress Report. A column was also published in the *St George and Sutherland Shire Leader* in March 2009. The columns incorporate information on a range of Orica projects and are made available on the Botany Transformation Projects website.

6.3 Website

The following material has been posted on the website during the reporting period:

- Groundwater Cleanup Plan Progress Report No. 21;
- Recent newspaper columns;
- The March 2009 CLC newsletter;
- Presentations to the 31 March workshop;
- The Briefing Paper, and all presentations from the CLC March 2009 meeting; and
- Final report (No. 3) on the Orica Community Ambient Air Monitoring Program.

There were 3,210 visits to the Botany Transformation Projects website from 23 February to 19 May 2009, of which 1,805 visits were to BGC Project pages and 159 visits to Treated Water Recycling Program pages.

6.4 1800 Number

Calls during this reporting period related to requests for residential bore testing, requests to tour the BIP site and queries about the BGC project from new purchasers of property in the local area.

6.5 Email Feedback

Several e-mails were received in this reporting period from browsers of the Botany Transformation Projects website and from readers of the CLC newsletters included requests regarding the availability of previous CLC newsletters. There were no emails received via the CLC feedback facility in this reporting period.

7 REVIEW OF REGULATION OF THE BGC PROJECT

At the December 2008 CLC meeting, DECC advised that the regulation of the BGC Project was being reviewed to take into account cleanup progress and recent developments. Orica's remediation of contaminated groundwater at Botany is currently administered under the NCUA first issued in 2003. The majority of the tasks outlined in the NCUA and its subsequent Variation Notices have now been completed (see Section 2.1). Certain aspects of the Project are also administered under Orica's EPL (EPL2148).

At the March 2009 meeting, Orica provided its suggested approach, which is to streamline its EPL to focus on operational matters, and replace the NCUA with a Voluntary Remediation Proposal.

DECC outlined the proposed regulatory approach in a memo to the CLC on 4 June. This item will be discussed further at the upcoming CLC meeting.