

Community Liaison Committee
Botany Groundwater Cleanup Project
Briefing Paper for Meeting on 15 September 2009

1 INTRODUCTION

This briefing paper has been 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 April until early September 2009. This paper includes the following sections:

- Progress of BGC Project: extract from the Groundwater Cleanup Plan Progress Report No. 23;
- Springvale Drain infilling (extract from the Groundwater Cleanup Plan Progress Report No. 23) ;
- Preparation of a Voluntary Management Proposal for the BGC Project;
- Former ChlorAlkali Plant mercury investigations;
- Independent Monitoring Committee (IMC) matters; and
- Community communication update

Orica welcomes discussion on any of the matters in this briefing paper or the Groundwater Cleanup Plan Progress Report No. 23 at the upcoming June CLC meeting.

2 PROGRESS OF BGC PROJECT

Each quarter Orica provides a Groundwater Cleanup Plan Progress Report to the Department of Environment, Climate Change and Water (DECCW). The most recent report, No. 23, was submitted on 31 August 2009. The reporting period for Progress Report No. 23 is from 1 April to 30 June 2009. However, more recent information is included in the report where available. The report is distributed to stakeholders and regulators as requested. Sections 2 and 3 of the briefing paper have been extracted from Progress Report No.23.

2.1 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:

- The inferred contours and patterns of shallow and deep groundwater flow indicate that hydraulic containment was achieved at the Secondary Containment Area (SCA) and Primary Containment Area (PCA) during the monitoring period.
- Elevated groundwater levels were observed at the SCA in intermediate monitoring wells east of MWF01 (located just north of the Floodvale Drain outlet to Penrhyn Estuary). The increased levels have not resulted in a loss of hydraulic containment but corrective action is required to ensure that the water levels are lowered in the medium term. Orica has engaged URS to assist in determining the cause.
- Capacity constraints at the Groundwater Treatment Plant (GTP) do not always allow for full containment across the entire Botany Industrial Park (BIP) containment line. During the reporting period hydraulic containment was achieved at the central and southern portions of the BIP containment line in the shallow and deep aquifers, as they are the prioritised areas. Containment was not consistently achieved at the northern portion of the BIP containment line (this is an area of relatively low contaminant concentrations). Containment will be effected here as GTP capacity increases. Regardless, groundwater flow from this area is towards the central portion of the line and will effectively be captured at the PCA.
- Water levels at monitoring locations distant from the containment lines show no discernible water level impact due to hydraulic containment, thus indicating a limited potential to affect infrastructure (by subsidence) and water available to licensed groundwater users. A

significant increase in regional water levels was observed in response to the significant rainfall events in April and May 2009.

2.2 Chemical Monitoring

General

- Concentrations reported for offsite monitoring wells were similar to those previously reported.
- Minor increases in contaminant concentrations were observed at BP01 and BP115. These wells are located downgradient of the SCA and contaminants were present in this area prior to commencement of hydraulic containment at the SCA in 2005. The observed increases are minor and reflect slow changes to the distribution of contaminants south of the SCA.
- An historical maximum was observed at WG154D (adjacent to Botany Road) for ethylene dichloride (EDC) although the reported value was only slightly higher than historical concentrations. Importantly, WG154D is located upgradient of the SCA and groundwater from this location will be intercepted by the SCA.

Penrhyn Estuary

- Volatile chlorinated hydrocarbon (CHC) concentrations in pore water within Penrhyn Estuary are similar to or lower than historical concentrations.
- Vinyl chloride (VC) concentrations above the ANZECC (2000) Trigger Value for VC (0.1 mg/L) were observed at BP42 (0.1 m port) at both high and low tides. The concentrations are similar to those reported in September 2007 suggesting fluctuations at this location are seasonal in nature and not due to significant changes in contaminant distribution in Penrhyn Estuary.

Surface Water

- The concentrations of volatile CHCs in surface water sampling locations were generally less than the respective ANZECC (2000) Trigger Values. This is consistent with the monitoring rounds performed since the GTP commenced steady operation indicating that containment is having a significant effect on the surface water quality in the estuary.
- The VC concentration at SW049 (along the Orica Southlands section of Springvale Drain close to McPherson Street) exceeded the ANZECC (2000) Trigger Value for VC (0.1 mg/L). However, the reported concentrations at nearby locations are similar to recent and historical values and as such this result is not considered to change previous interpretations.

Implications for Human Health Risk Assessment

- There are no additional data presented in the June 2009 round of sampling with respect to the western margin of the Northern Plumes that affect the conclusions of the Consolidated Human Health Risk Assessment (HHRA) (URS, 2005c¹) and Addendum (URS, 2006). That is, the groundwater contamination within the Northern Plumes near the western margin is not considered to pose an unacceptable risk to human health, assuming that groundwater is not extracted and used.
- There are no additional data presented in the June 2009 round of sampling that alter the conclusions of the Consolidated HHRA (URS, 2005c) and Addendum (URS, 2006) with respect to existing commercial/industrial workers in the areas above the main plumes. That is, the groundwater contamination within the main plumes is not considered to pose an unacceptable risk to human health, assuming that groundwater is not extracted and used untreated.
- With respect to Penrhyn Estuary, conclusions presented within the HHRA associated with exposures within the inner and outer estuary remain unchanged. That is, given the conservative nature of the range of assumptions and the safety factors applied to toxicity values, the risks to human health for all exposure scenarios are considered to be low. Some exceedances of target values occurred in the inner estuary, however the potential for exposure within the inner estuary is effectively eliminated by access restrictions associated with the Port Botany expansion works.

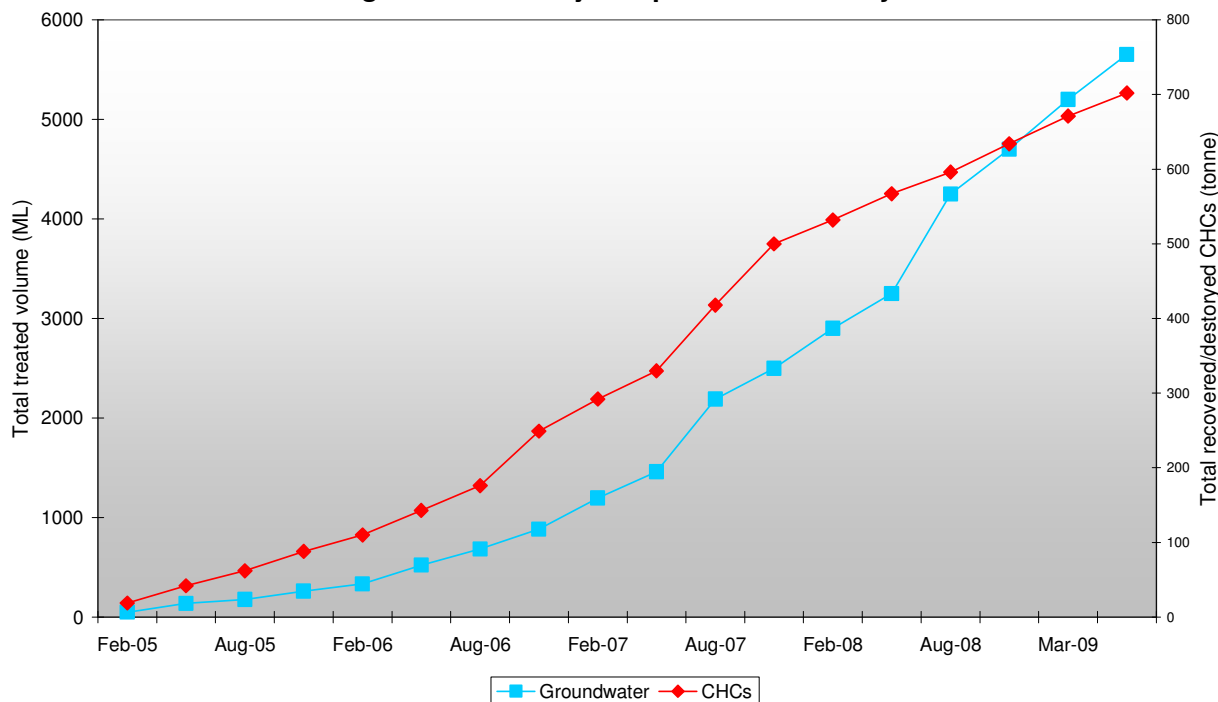
¹ Refer to Progress Report No. 23 for details of the references included in this Briefing Paper.

2.3 Groundwater Treatment Plant Operation Summary

Since commencing the BGC Project, Orica has treated over 5.6 GL² of contaminated groundwater and has recovered and destroyed 702 tonnes of chlorinated hydrocarbons (CHCs). These numbers are included as a measurable indicator of progress³.

Figure 1 provides a graph of the cumulative volume of groundwater treated and tonnes of CHCs destroyed. Over time the total mass of CHCs recovered and destroyed (the diamond shapes on graph below) will start to level off as the amount of contamination dissolved in the groundwater (which is easier to recover) decreases and it becomes harder to 'detach' the contaminants from the soil particles in the aquifer.

Figure 1: BGC Project Operation Summary



2.4 Planned GTP Shutdown

The annual shutdown of the GTP for repairs and preventative maintenance is scheduled for November 2009. A range of works are currently being planned, but the duration of this shutdown will be determined by the time taken to remove and replace the heat exchanger. (The heat exchanger uses the heat of the hot gas from the thermal oxidiser system to heat the air feed to the thermal oxidiser, thus improving the energy efficiency of the thermal oxidiser process.) Improvement works have been undertaken at the heat exchanger in previous years and a replacement is now required.

2.5 Groundwater Injection and Recovery System (GIRS)

As previously reported, Orica is proposing GIRS as a backup for the GTP in the event of an extended GTP shutdown. Orica has received a variation to its Environment Protection Licence (EPL2148) from DECCW allowing for a trial injection of groundwater, and has obtained a trial injection licence from the NSW Office of Water (formerly the Department of Water and Energy) allowing the drilling of injection and monitoring wells required for the trial.

At the time of writing works were well advanced. Several injection bores had been constructed and the civil and electrical engineering works for the trial were nearing completion. The trial injection of groundwater is planned for early September 2009.

² 5.6 billion litres.

³ The groundwater cleanup will take a very long time and Orica is only in the early stages of the project. Groundwater contamination is not uncommon, but a complete cleanup on this scale, including removal of all the subsurface source areas (i.e., the material that is slowly dissolving in the groundwater), has not been achieved before. The approach taken by Orica is consistent with that applied to similar contamination problems overseas. Orica will continue to search for ways to speed up the groundwater cleanup.

2.6 Residential Bore Monitoring

In the first week of May 2009, Orica sampled 14 residential bores in the Groundwater Extraction Exclusion Area (GEEA) for volatile CHCs associated with its past manufacturing operations.

Results are compared with the National Health and Medical Research Council Australian Drinking Water Guidelines (2004) and the World Health Organisation Guidelines for Drinking Water Quality (2004 with rolling revisions). That is, a detection of volatile CHCs is described as being either below or above these guidelines. A reading above these guidelines means that a chemical is at a concentration that is unacceptable for drinking. A reading below these guidelines means a chemical is within the range that is acceptable in drinking water. Although it would not be common practice to drink the groundwater (and the use of bore water from domestic bores is prohibited in the GEEA), these guideline values are used as a reference to assess the results from the bore water sampling.

Results for the May 2009 event are summarised in the following table.

	May 2009
Number of bores tested	14
Bores with no detection of vCHCs	3
Bores with detections of vCHCs below drinking water guideline values	4
Bores with detections of vCHCs above drinking water guideline values	7

Residents are provided with the results from their bore and a fact sheet with information on the testing process, risk assessments that have been conducted for Orica, contact details for relevant government agencies, and a non-Orica groundwater contamination source in Pagewood that is being investigated by DECCW. A report summarising the results is also provided to DECCW, the NSW Office of Water and NSW Health. The next residential bore testing event is scheduled for the first week in November 2009.

3 SPRINGVALE DRAIN INFILLING

As reported previously, CHC vapours in air close to Springvale Drain are 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 the NSW Office of Water for a permit for the infilling under Part 3 Chapter 3 of the *Water Management Act, 2000*. The NSW Office of Water has advised Orica that the works may proceed. Environmental management plans have been prepared and a civil contractor will soon be engaged. It is expected that these works will be completed by the end of 2009.

4 VOLUNTARY MANAGEMENT PROPOSAL FOR BGC PROJECT

As the CLC is aware, the DECCW has made a decision to replace the Notice of Clean Up Action (NCUA) with a Voluntary Management Proposal (VMP) to regulate the BGC Project as the majority of the tasks outlined in the NCUA and its subsequent Variation Notices have now been completed. Orica is currently preparing a VMP to submit to DECCW for its review.

5 FORMER CHLORALKALI PLANT MERCURY INVESTIGATIONS

5.1 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. Figures showing the delineation of mercury in the shallow, intermediate and deep aquifer are attached to this briefing paper (Action Jun 09#6).

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 DECCW throughout 2008.

5.2 Planning for Remediation

Orica plans to remediate the site using soil washing technology and aims to render the site suitable for future industrial/commercial use. The following activities will need to take place prior to remediation:

- Prepare and submit a remedial works scope to DECCW for its consideration. This will become a foundation for the VMP.
- Prepare and submit a VMP for remediation of the former ChlorAlkali Plant area for DECCW review and approval.
- Engage a consultant to prepare a Remediation Action Plan for submission to DECCW
- Further sampling of soil to determine the likely extent of the full-scale remediation. The method and timing of the investigations is still being determined.

As reported previously, Orica conducted small-scale trials of cutting and lifting concrete slabs in the area in mid June to assist in designing the remediation plant and equipment to meet safety, health and environmental requirements. The excavation trials were completed successfully, and the results of air monitoring are still being evaluated. The results will be shared once available.

5.3 Air Monitoring

Orica conducts regular instantaneous air monitoring at the former plant site to ensure that nearby BIP workers are not exposed to any unacceptable occupational health risk. No results have exceeded occupational 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) to better understand whether there is any unacceptable risk to the community. A report was submitted to the DECCW for review. The results indicate that average concentrations are at acceptable levels to maintain worker and community safety.

6 INDEPENDENT MONITORING COMMITTEE (IMC) MATTERS

As the CLC may recall, Prof Ian Acworth has been engaged by Orica to contribute to the project to determine the maximum sustainable groundwater extraction rate. He will be providing feedback to the CLC following the completion of the modelling and geotechnical works (refer to Action June 09 #11).

6.1 IMC Task 24

Prof Brian Priestly has provided a response to Task 24 regarding concerns and treatment of the DEAC. This response has been distributed to the CLC for discussion at the September CLC meeting. (see Action June 09 #4).

6.2 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, which will expire in early 2010. An agenda item is scheduled for the upcoming September 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.

7 COMMUNITY COMMUNICATION UPDATE

7.1 Community Workshops

As reported previously, Orica is working with Prof Bernie Kueper to provide a webcast of his presentation given at the BGC Project Remediation Strategy Review workshop held on 31 March 2009. A final draft video has been produced and is expected to be finalised in late 2009. Orica will be showing a preview of the final draft video at the upcoming September meeting to seek feedback

from the CLC. Once complete the webcast will be loaded onto Orica's website. A workshop report will be distributed to the CLC and workshop attendees once Prof Kueper has completed his review of the document.

7.2 Newspaper Columns

Three 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 June 2009. The columns incorporate information on a range of Orica projects. Reporting on the BGC Project was as follows:

- *Column 91: 30 June 2009:* Update on the review of the regulatory framework for the BGC project by the DECCW.
- *Column 92: 28 July 2009:* Update on CLC.
- *Column 93: 25 August 2009:* Community Participation and Review Committee update (no BGC Project matters mentioned).

7.3 Website

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

- Groundwater Cleanup Plan Progress Reports No. 22 & 23;
- Recent newspaper columns;
- The June 2009 CLC newsletter;
- The Briefing Paper, and all presentations from the CLC June 2009 meeting; and
- Follow-up documents by DECCW and Orica related to Dr John McCracken's feedback on IMC Task 21.

There were 2,200 visits to the Botany Transformation Projects website from 20 May to 20 August 2009, of which 1,029 visits were to BGC Project pages and 125 visits to Treated Water Recycling Program pages.

7.4 1800 Number

Calls during this reporting period related to the BGC Project included a query regarding the use of bore water for gardening purposes within the GEEA. Enquiries placed through the 1800 line are generally responded to within 24 hours.

7.5 Email Feedback

Several e-mails were received in this reporting period from browsers of the Botany Transformation Projects website. Feedback related to the BGC Project included a request for the report from the Groundwater Remediation Strategy Review Community Workshop in March 2009 and the presentation made at that workshop by Prof Bernie Kueper. As noted above, these documents are being prepared and will be uploaded as soon as they are available. There were no emails received via the CLC feedback facility in this reporting period.

ATTACHMENTS

1. Delineation of mercury groundwater contamination (shallow, intermediate and deep aquifer)
2. Updated GTP Regulation Flow Chart (Rev. 2) as per Action Jun 09 #2