Community Liaison Committee Briefing Paper

December 2007

1 INTRODUCTION

This briefing paper is for the Community Liaison Committee (CLC) for Orica's Botany Groundwater Cleanup Project (BGC Project). It provides a summary of the combined monitoring and progress report (Groundwater Cleanup Plan Progress Report No. 16), which was submitted to the Department of Environment and Climate Change (DECC) on 30 November 2007.

Progress Report No.16 reports progress against the requirements of the Notice of Clean Up Action (NCUA) and Orica's Groundwater Cleanup Plan (GCP). This briefing paper also includes updates on other groundwater matters of interest to the CLC that do not fall under the NCUA. Complete copies of Progress Report No. 16 (including appendices) are provided to:

- The Department of Water and Energy (DWE);
- The DECC;
- NSW Health (South East Sydney and Illawarra Public Health Unit [SESIAHS] and Environmental Health Branch);
- City of Botany Bay Council (CoBB);
- CLC members who have requested a copy;
- Members of the Independent Monitoring Committee (IMC); and
- The Independent Compliance Auditor.

Copies of the report are available on request to all members of the CLC, are provided to CoBB and Randwick city libraries, and will be made available on Orica's Botany Groundwater website (www.oricabotanygroundwater.com).

2 ADMINISTRATIVE AND COMPLIANCE STATUS

During this reporting period there have been no variations to the NCUA and no key NCUA milestones. Orica continues work and investigations in order to comply with the requirements of the NCUA as outlined throughout this briefing paper.

3 GROUNDWATER AND SURFACE WATER MONITORING

A quarterly monitoring event was completed by URS in September 2007 in accordance with the revised 2007 Groundwater Treatment Plant (GTP) monitoring plan. The conclusions are summarised below:

Hydraulic Containment

- Hydraulic containment at Botany Industrial Park (BIP) was generally achieved during periods of extraction. However, elevated water levels in the shallow aquifer at the far southern end of the Second Street containment line exceeded target levels and hydraulic containment may not have been achieved at that location. Similarly, target levels were not achieved due to inconsistent pump operation at the far northern end of the First Street containment line in the shallow and deep aquifer and it is considered unlikely that hydraulic containment was achieved during the three-month period assessed. Containment at the BIP line is not a requirement of the NCUA. However, as the capacity and reliability of the GTP increases, the BIP line will operate more consistently.
- Hydraulic containment of the deep aquifer was generally achieved in the Primary Containment Area (PCA) in Orica Southlands. However, containment is unlikely to have been achieved in the vicinity of a monitoring well located on the eastern end of the PCA containment line, outside of the highest contamination in the Central Plume, due to the poor performance of the pump located adjacent to it. In contrast to this, improved pumping at an extraction well located in the mid-western area of the PCA has resulted in increased drawdown compared to the June 2007 monitoring period. Observations of drawdown in the core of the Central Plume at the PCA infer that significant dissolved-phase mass removal occurred during the monitoring period.
- Hydraulic containment of the deep aquifer at the Secondary Containment Area (SCA) along Foreshore Road was generally achieved for the September 2007 monitoring period. However, hydraulic containment was not achieved for the eastern end area of the SCA containment line in July 2007. This is considered to be primarily due to the inconsistent operation of three extraction wells associated with pipe replacement works on Foreshore Road. Improved pumping commenced in August 2007, resulting in hydraulic containment being achieved throughout the majority of August and September 2007.

Chemical Monitoring

Southern Plumes

The distribution of volatile CHCs within the Southern Plumes during the September 2007 event is generally consistent with that reported in the previous annual monitoring round in September 2006. The concentrations of carbon tetrachloride (CTC), chloroform (CFM), tetrachloroethene (PCE), trichloroethene (TCE) and 1,2-dichloroethane (EDC) in the shallow aquifer at the majority of sampled locations within the Southern Plumes during September 2007 reflect a generally stable or decreasing trend against historical data.

Semi-volatile CHC concentrations in the Southern Plumes are generally similar to those recorded in the September 2006 monitoring round (when they were last analysed). However, several increases were detected in some locations at Southlands and the rail corridor, which may be related to their proximity to previously inferred DNAPL source areas. The dominant semi-volatile CHCs detected, in terms of distribution and concentration, included hexachlorobutadiene (HCBD) and hexachloroethane (HCE).

Central Plumes

The distribution of volatile CHCs recorded within the Central Plume during the September 2007 event is similar to that reported in the previous annual monitoring round held in September 2006. Continued migration of the front of the plume core (where concentrations exceed 1,000 mg/L) further downgradient of McPherson Street was noted. The plume core is now inferred to be in the vicinity of Botany Road.

Concentrations of EDC generally decreased at locations sampled within the Central Plume on Block 2 Southlands. However, based on concentrations recorded at a bundle piezometer located near the centre of Block 2, it is considered there are still likely to be zones in the aquifer exceeding 1,000 mg/L.

The September 2007 monitoring data shows that concentrations of EDC, PCE and TCE in the shallow groundwater within the Central Plume are generally stable or decreasing.

Semi-volatile CHCs concentrations within the Central Plume were reported at locations close to BIP and Block 2 Southlands, which may be related to their proximity to inferred source areas. They are noted to be similar to concentrations recorded in the September 2006 monitoring round.

Northern Plumes

The inferred distribution of volatile CHCs reported in shallow groundwater during the September 2007 monitoring event, especially EDC and CTC, which represent the majority of the contaminant mass, are stable or decreasing and the distribution is similar to that presented in the previous monitoring round (including the previous annual monitoring round in September 2006).

Semi-volatile CHC concentrations were reported at locations in the SRA/Nant Street Tank Farm area and are similar to concentrations observed in the September 2006 monitoring round. HCBD was the most commonly detected semi-volatile CHC.

Penrhyn Estuary

In general, volatile CHC concentrations measured in pore water[1] within Penrhyn Estuary are significantly less than historical concentrations, although they are similar to data from recent quarterly monitoring rounds. Concentrations of volatile CHCs in the shallowest ports in Penrhyn Estuary are significantly less than historical concentrations and are less than the ANZECC (2000) Trigger Values with the single exception of Vinyl Chloride (VC) at a bundle piezometer located in the centre of the inner estuary.

Semi-volatile CHCs were not detected in pore water samples in Penrhyn Estuary. Nor were they detected in the previous two annual monitoring rounds (September 2005 and 2006).

Surface Water

Surface water concentrations of volatile CHCs in Penrhyn Estuary, Floodvale Drain and Springvale Drain were generally lower than historical average concentrations, and those reported for the previous year. The concentrations of all volatile CHCs were less than the respective ANZECC (2000) Trigger Values, except the concentration of VC recorded at the Springvale Drain outlet at low tide.

The proportion of EDC relative to total volatile CHCs was lower than in previous monitoring rounds in Springvale Drain and Penrhyn Estuary, which is probably attributable to vastly reduced groundwater

[1] Water that fills a pore, or space, between solid particles in soil.

ingress to Springvale Drain on and around the PCA, and a greater contribution from Southern Plumes' groundwater discharge to Springvale Drain downgradient of McPherson Street.

Semi-volatile CHCs were not detected in surface water samples from Penrhyn Estuary, Floodvale Drain and Springvale Drain in September 2007, nor in the September 2005 and September 2006 monitoring rounds.

Implications for Human Health Risk Assessment (HHRA)

Overall, the data presented in the September 2007 quarterly monitoring report is not considered to alter the conclusions of the HHRA with respect to the western margin of the Northern Plumes, Botany Golf Course, commercial/industrial workers in areas above the main plumes, and Penrhyn Estuary.

4 SPRINGVALE DRAIN AIR MONITORING

Recent monitoring has suggested the operation of the containment lines does have significant impact on reducing the discharge of shallow groundwater into Springvale Drain and hence has some mitigating effect on the risk profiles for adjacent lands. However, this cannot be maintained immediately after rainfall events, which result in higher concentrations of volatile CHCs entering the drain.

Orica is currently working with the DECC and NSW Health on a remedial plan to maintain human health risks at acceptable levels regardless of rainfall events. The remedial option would most likely be the construction of a spear point extraction system along certain sections of Springvale Drain. The system will actively lower groundwater in the immediate vicinity of the drain and prevent ingress of contaminated shallow groundwater. The system will utilise the GTP to treat the extracted groundwater.

Orica has engaged consultants KBR to design and construct the spear point system. KBR will be supported by consultants URS and by Greg Dasey from JBS Environmental, as the project hydrogeologist.

5 TEMPORARY AQUIFER STORAGE AND RECOVERY (TASR)

The use of the Steam Stripping Unit (SSU) as a backup to the operation of the GTP was noted in the Botany Groundwater Cleanup Project EIS and the Joint Determining Authority Report. However, the SSU was not originally designed to treat contaminated groundwater and towards completion of the GTP construction, the SSU was showing evidence of severe corrosion requiring constant maintenance and repairs. Additionally, the plant is substantially older than the GTP and does not meet current environmental best practices. Hence, a series of options were examined and TASR was identified as the most suitable alternative.

In the event of a significant GTP failure TASR would be employed to collect contaminated groundwater from critical locations (such as the SCA and the Springvale Drain spear points) and re-inject the water upgradient of the BIP containment line. This would allow Orica to maintain containment in critical areas while repairs were performed on the GTP. Once the GTP was operational again, the water would be re-collected at the downgradient containment line.

Orica is currently preparing a Review of Environmental Factors (REF) for submission in late December 2007.

6 GROUNDWATER TREATMENT PLANT AND ASSOCIATED INFRASTRUCTURE

SCA Header Pipes and Leakages

Progress Report No. 14 reported that several leakages had been detected at the SCA in the pipes that join the pump discharge from the extraction well to the transfer header pipe. As the well pits are located on the edge of the median strip, it was considered unsafe to locate the leaks and repair them immediately. Consequently, barricades were reinstated along the entire length of the containment line.

The leaking pipes were repaired temporarily in order to maximise SCA containment until further investigations into the cause could be made.

Orica then decided to replace the existing pump discharge pipes with stainless steel to minimise the effects of corrosion. This work has been completed.

SCA Mono Pump Trials

Mono pumps are capable of pumping sludges without hindrance. Trials continue in the shallow wells on Foreshore Road to determine whether their long-term suitability for dealing with biological fouling issues is better than the existing multistage centrifugal pumps.

Stripped Water Treatment Plant

In this reporting period, changes were made to the pH and bicarbonate alkalinity in the Actiflo units to improve iron and aluminium removal and give greater pH stability. This has resulted in substantially greater run times – up to nine weeks – on the primary reverse osmosis (RO) units. The system continued to treat water on average well over 5 ML/day throughout the reporting period.

Orica has recently completed the design and is about to commence trials on the conversion of some of the Granular Activated Carbon filters to operate as biologically aerated filters. It is hoped that this will reduce the total organic carbon content of the feed water to the RO units and hence allow a reduction in the use of chloramine. It is also expected that the organic content of the RO permeate[2] will be lower, improving the suitability of the water for some re-use applications. Both these changes will be of benefit to the quality of the treated water and the environment.

Chloramine in the Permeate

As has been previously reported, chloramines have been used to control biological fouling in the Stripped Water Treatment Plant. As the treated water is yet to be fully utilised, a significant proportion of it is still being discharged to a stormwater canal at Perry Street, which then flows into Bunnerong Canal and then into Brotherson Dock.

Since 2 July 2007, DECC has placed a limit of 0.1 mg/L of Total Residual Chlorine (which includes chloramine) on excess discharge water. Orica has installed a system to dose sodium metabisulphite to chemically remove chloramine. As this generates ammonia, the DECC has raised the ammonia limit on discharge water. The DECC simultaneously altered the Environmental Protection Licence to require Orica to devise and implement an ammonia pollution reduction program.

Orica submitted a report in accordance with this requirement to the DECC on 30 August 2007. DECC wrote back on 31 October 2007, requiring further information with respect to dilution of the discharge water. Orica agreed to provide further details in January 2008 as discussions with surrounding industrial neighbours was required.

Thermal Oxidiser Low Temperature Trials

As reported during the previous CLC meeting, Orica completed lower temperature trials on the thermal oxidiser (TO) successfully in late August. The Environmental Protection Licence (No. 2148) has recently been amended to reflect the new lower temperature limit of 875^{o}C.

GTP Summary

Throughout the construction and commissioning program, Orica has employed an aggressive accelerated implementation schedule to get the GTP operating in the shortest time possible. Following construction, several hurdles have presented themselves. As they are identified, they are worked through and a program is implemented to set about resolving them in a methodical fashion. Orica will continue this approach until the containment system and the GTP are operating optimally.

7 REUSE OF TREATED WATER

Treated water is currently being used by Orica and Qenos in cooling tower applications and Solvay Interox is working towards using treated water in their cooling systems. Unfortunately, as reported at the previous CLC meeting, treated water is not currently being used in the demineralisation plants at ChlorAlkali and Solvay as the low level of organics in the water has caused some operational issues. As discussed in Section 6, Orica has begun trials and capital works to address this issue and enable increased usage.

8 DNAPL SOURCE AREA DEPLETION PROJECTS

In this reporting period the following progress has been made on the DNAPL removal projects:

- DNAPL direct pumping trials have been designed and a trial is planned for late 2007. Consent to access the Qenos site where the pumping trials will take place was received mid-October.
- Bench scale trials of In Situ Chemical Oxidation (ISCO) are continuing. Lab trials are physically complete. Orica has received a report of the trials and is reviewing the results. A funding proposal request has been raised to take the project to the point of field trial design completion.

[2] The treated water product from the RO units.

- A funding proposal request has also been raised to complete the design of the field trial of Steam Enhanced Extraction/Thermal Conductive Heating at the former Solvents Plant. Laboratory treatability trials and detailed source area characterisation are essential elements of the design process and are planned to commence in early 2008.
- A draft report on desktop evaluation of hydraulic displacement in the Central EDC Plume source area has been reviewed. Field trials are not proposed at this stage.

9 MERCURY IN GROUNDWATER

As previously reported, mercury has been detected in groundwater and soil at the site of the now demolished former ChlorAlkali Plant at the BIP. Orica has been conducting groundwater investigations both on and off the BIP site and also soil investigations on the BIP site. These investigations have detected mercury in groundwater at off-site monitoring wells. All of the 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.

A Human Health and Environmental Risk Assessment (HHERA) is being prepared by URS. It was noted at the September CLC meeting that URS would present the findings of this assessment at the December meeting. Orica has since been advised, by URS, that additional groundwater sampling will be required to reduce uncertainties and to create a more robust assessment. The HHERA is now expected to be completed in early 2008. The DECC has been informed of the delay.

In the interim, Orica is considering a proposal to conduct small scale soil washing trials to assess whether this remediation technology is feasible to remediate mercury (elemental) contaminated soil at the Botany site. Soil washing literally involves washing and screening mercury contaminated soil with water. The 'treated' soil is tested to ensure that is suitable for site reuse and the water is treated and tested to ensure it is suitable for disposal. If the trials are successful, a small percentage of the soil will require disposal in an approved landfill and some elemental mercury will be recovered for recycling. At the time of writing, Orica anticipates the trials to commence in March 2008. If the trials are successful, the remediation of the contaminated soil of the area will proceed, subject to completion of the HHERA, preparation of a Remediation Action Plan (RAP) and any planning or other approvals that may be required. Further details will be presented at the upcoming December CLC meeting.

10 2007 SUSTAINABILITY REPORT

Orica released its first annual Sustainability Report on the orica.com website on 20 November 2007, which replaced the annual SH&E Report. It describes Orica's approach to sustainability and its challenges with various sustainability case studies, including the reuse of treated water from the GTP. Hard copies can be provided upon request.

11 COMMUNITY CONSULTATION

Community Liaison Committee (CLC)

A quarterly CLC meeting was held on 18 September 2007. Presentations were made by the DECC and Orica on the progress of the Cleanup Project and by URS Australia on the Penrhyn Estuary Ecological Monitoring study. The following table summarises key matters raised by members of the CLC at the meeting and action taken or planned as a result. Please note that this information has been summarised from draft minutes not yet endorsed by the CLC.

Matter Raised by CLC	Action Taken or Planned
Next steps for IMC Task 16 regarding additional groundwater monitoring south of the Secondary Containment Line.	Orica to consider options for an investigation program to obtain further groundwater data in Penrhyn Estuary and to provide feedback to Prof. I Acworth, DECC, CoBB and the CLC.
Members requested information on any potential impacts of chloramines and volatile CHCs on Penrhyn Estuary ecosystems.	DECC is to provide information on potential impacts at the December CLC meeting.
CLC requested extended distribution of CLC newsletters to the Brighton-Le-Sands area to provide information on BGC Project progresses and activities to residents in the area.	Orica has extended its CLC newsletter distribution to Rockdale City Council area by making newsletters available at six libraries, two community centres and Rockdale City Council Office from December 2007.

Matter Raised by CLC	Action Taken or Planned
Considerable discussion was held regarding the performance of hydraulic containment east of the SCA. The CLC requested further information on hydraulic containment and chemical monitoring at the SCA.	Orica has invited hydrogeologist, Greg Dasey, to speak about hydraulic containment and chemical monitoring at the SCA at the December CLC meeting. (As G Dasey has left URS, Andrei Woinarski will attend the meeting instead)
The CLC requested a combined meeting with the Independent Monitoring Committee (IMC) to obtain feedback on BGC Project progress and performance.	A combined meeting with the IMC was held on Friday, 26 October 2007. All IMC members attended the meeting.
Two new IMC tasks were agreed as follows: • Prof Acworth to comment on the TASR proposal; and, • Prof Priestly to comment on the potential health risks associated with washing fish at Penrhyn Estuary.	The new tasks were issued and undertaken by the relevant IMC members, and subsequently presented to the CLC at the combined IMC and CLC meeting held in October 2007.
Discussions were held regarding the proposed combined workshop with Sydney Ports and the CLC agreed to ask City of Botany Bay Council (CoBB) to host and chair (CoBB General Manager) the workshop in early 2008.	CLC members are to further discuss the scope and date for the CoBB workshop at the December CLC meeting.

CLC Newsletter

CLC Newsletter No. 26 was distributed in September 2007. It included updates on GTP operations, results of May 2007 Residential Bore Monitoring Program, mercury investigations, compliance audit, and feedback from the June 2007 CLC meeting and the extraordinary CLC meeting on financial assurance in August 2007.

A draft of CLC Newsletter No. 27 was issued to the CLC for comment in the last week of November 2007. As agreed at the March 2007 CLC meeting, this newsletter was to include a report from the CLC Chairman. However, this item will be deferred. The CLC has requested that the Chairman's report be further discussed at the December CLC meeting. CLC Newsletter No.27 will be finalised and distributed prior to the December CLC meeting. As discussed above, the newsletter distribution area has expanded to include Rockdale City Council area from December 2007.

Independent Monitoring Committee

The table below lists outstanding IMC tasks. All completed IMC tasks are listed on the project website: www.oricabotanygroundwater.com.

Task #	IMC Task Description	Status
9	Prof Acworth to be asked to attend the proposed Orica/Sydney Ports workshop (Action from 12 Dec 06 CLC meeting for Sydney Ports and Orica to arrange a workshop for after March 2007. Orica and Sydney Ports to contact the CLC and the Ports Development Community Consultative Committee in advance of the workshop to request any questions).	**OUTSTANDING** Raised by CLC on 12/12/06. The workshop is now to be hosted and chaired by the CoBB.
17	Dr Clunies-Ross and Dr Hibberd are to conduct a project to research the formation of dioxin at the GTP, particularly between the quencher and the stack.	**OUTSTANDING** Raised by the CLC on 19/06/07. Interim progress was shared at the October Combined CLC/IMC meeting.
20	Professor Acworth to bring his aquifer model to the next (or the following, depending on his availability) CLC meeting in order to aid understanding of aquifer dynamics and groundwater movement.	**OUTSTANDING** Raised by the CLC on 26/10/07. Prof Acworth has been invited to the December CLC meeting.

Task #	IMC Task Description	Status
21	Orica to share the requirements of its Environment Protection Licence, Trade Waste Service Agreement and Ammonia Pollution Reduction Program for the GTP, along with recent results for each, with Dr McCracken in order to better describe the inputs and outputs from the GTP treatment process. Dr McCracken to provide feedback to the CLC following review of this information.	**OUTSTANDING** Raised by the CLC on 26/10/07. Orica has shared information with Dr McCracken.

Communication Tools

Community Street Meetings

No community street meetings were held in the reporting period.

Community Workshops

No groundwater-specific community workshops have been held in the reporting period. Orica still plans to hold another workshop on water recycling once the various recycling initiatives have been further developed.

Orica will no longer host the combined workshop with Sydney Ports to discuss the interaction of the groundwater cleanup and the Port Development. It was agreed at the September CLC meeting for CoBB to host and chair the workshop as the scope of the workshop has broadened to entail topics non-specific to the groundwater cleanup. Further discussions on planning the workshop are expected to take place at the December CLC meeting.

A second combined meeting of the CLC and IMC was held on 26 October 2007. As a very small number of community members were able to participate in the meeting, a letter summarising IMC members' feedback on specific tasks and discussions, together with agreed new actions, was sent to the CLC on 8 November 2007.

BIP Site Community Bus Tours

Since the last reporting period, a Botany site bus tour was held, involving 15 participants.

Newspaper Columns

Three newspaper columns were published in both the *Southern Courier* and *St George and Sutherland Shire Leader* since the last quarterly report. These columns incorporated information on a range of Orica projects. Reporting on the BGC Project was as follows:

- *Column 70: 25 September 2007*: GTP operations, results from latest residential bore monitoring event, feedback from September CLC meeting, invitations to the combined CLC/IMC meeting and November residential bore monitoring event and, BIP site bus tour;
- *Column 71: 30 October 2007*: GTP operations; and
- *Column 72: 27 November 2007*: GTP operations, sampling event for Community Air Monitoring Program and feedback from the combined CLC/IMC meeting held in October. It also provided information of locations in the Rockdale City Council area where future CLC newsletters will be available.

Website

The website is an important tool which provides immediate access to information about the BGC Project and supports Orica's commitment to open and transparent communication. Maintenance of the website is a requirement under Part c of Condition 7K.

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

- Groundwater Cleanup Plan Progress Report No.15 and Appendices;
- Recent newspaper columns;
- September CLC newsletter;
- Botany Site and Surrounding Area Air Emissions Sampling Program Report issued on September 2007;

- CLC Briefing Paper, September 2007;
- Presentation materials from the September 2007 CLC Meeting; and,
- IMC Task 15 – reports and feedback on evaluation of Orica's current monitoring programs under BGC Project by Dr Chris Clunies-Ross, Dr Mark Hibberd and Prof Ian Acworth.

Between 23 August 2007 and 15 November 2007, 10,174 website visits were recorded (down from 21,344 in the previous reporting period) with 80 downloads of CLC Newsletter No. 26 noted. Orica is continuing work on the Botany Transformation Projects website to provide information about the full range of cleanup projects at Botany. The website was launched on 5 December 2007 (www.oricabotanytransformation.com) and the expanded pages for the BGC Project are expected to be released in early 2008.

1800 Number

Orica continues to operate the free-call number, 1800 025 138. The majority of calls during this reporting period related to the Rainwater Tank Rebate and the residential bore monitoring event held in early November. Other calls included students requesting information about the BGC Project and several complaints unrelated to Orica activities from residents living near the railway corridor regarding soot deposit, which was subsequently found to come from locomotives.

E-mail Feedback

No e-mails were received in this reporting period from viewers of the Orica Botany Groundwater website.

Outreach Projects

As detailed in previous reports, Orica operates a number of outreach programs in the local community. The programs have been developed to respond specifically to community concerns surrounding the groundwater contamination issue. A brief update on matters occurring in this reporting period is provided for each of the Outreach Projects below.

- Residential Bore Monitoring – 13 residential bores were tested in the November 2007 monitoring event. Results will be shared with DECC and bore owners and reported in the March 2008 CLC Newsletter. The next round of residential bore testing is scheduled to take place in early May 2008.
- Rainwater Tank Rebate Program – At the time of writing, 955 tanks had either been installed or approved for installation.
- Local Air Quality Monitoring – The fifth sampling round of volatile organic compounds was conducted on 20 November 2007. The results will be reported together with the results from the next monitoring round, which is envisaged to take place in the middle of 2008.