

Community Liaison Committee
Botany Groundwater Cleanup Project
Briefing Paper for Meeting on 8 December 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 1 July until late November 2009.

The structure of this briefing paper is slightly different from previous papers as the CLC meeting has been brought forward by a week and the latest information on the BGC project as reported in the quarterly Progress Report to the Department of Environment, Climate Change and Water (DECCW) has only just become available. The executive summary of Groundwater Cleanup Plan Progress Report No. 24 is provided as Attachment 1.

This paper includes the following sections:

2. Voluntary Management Proposal for the BGC Project;
3. Groundwater Treatment Plant Update
4. Groundwater Injection & Recovery System Update;
5. Bioaugmentation Field Trials;
6. Maximising Hydraulic Containment;
7. 2008-2009 Environment Protection Licence 2148 Annual Return;
8. Former ChlorAlkali Plant Mercury Investigations;
9. Community Communication Update; and
10. Other CLC Matters.

2 VOLUNTARY MANAGEMENT PROPOSAL FOR BGC PROJECT

As the CLC is aware, DECCW has made a decision to replace the Notice of Clean Up Action with a Voluntary Management Proposal (VMP) to regulate the BGC Project. Orica submitted a draft VMP, including a Groundwater Remediation and Management Plan, to DECCW on 30 October 2009 for review.

3 GROUNDWATER TREATMENT PLANT UPDATE

3.1 Capacity Constraints

Since commencement of operations in 2006, there have been a number of issues on the plant that have limited its design capacity. This is common on groundwater treatment plants. Over the past three years, these have been dealt with by modifications to the plant or ongoing maintenance.

The Groundwater Treatment Plant (GTP) is currently treating sufficient volumes of water to a) effect containment at the Primary Containment Area (PCA) and the Secondary Containment Area (SCA) as required by the regulators, b) contain major source areas on Botany Industrial Park (BIP), and c) reduce influx of contaminated groundwater into Springvale Drain thus improving the surface water quality of Penrhyn Estuary. At this stage, further increases in capacity are not required to meet the project's current environmental objectives. However, increases in capacity will occur over time as operational efficiencies improve.

3.2 Pipe-work Maintenance

Due to the biological and chemical nature of the groundwater, ongoing maintenance of groundwater transfer pipelines is required. Maintenance activities could include cleaning of the inside of the pipes (a process called 'pigging') and in some instances, replacement with more

robust materials. In 2010, Orica will begin a maintenance program that will involve replacing much of the pipe work in Southlands in order to ensure it remains functional into the future.

3.3 Extraction Wells Maintenance

As reported previously, growth of biological agents in some of the pumping wells, particularly on Foreshore Road, has resulted in the requirement for regular routine maintenance. This has continued for much of this year and will do so for much of 2010 as well. Orica is looking for ways to improve the accessibility to pumps on Foreshore Road.

3.4 GTP Annual Shutdown

As the CLC is aware, the annual GTP shutdown is underway at the time of writing.

4 GROUNDWATER INJECTION & RECOVERY SYSTEM UPDATE

The Groundwater Injection and Recovery (GIR) System is designed to reinject extracted groundwater into the aquifer upgradient of the containment lines on BIP if the GTP is unable to treat groundwater for an extended period of time.

Orica received a variation to Environment Protection Licence (EPL) 2148 from DECCW, and a trial injection licence from the NSW Office of Water.

At the time of writing the initial stages of the Trial Injection for GIR have been completed. A brief summary of key findings is provided below:

- The trial injection well was highly efficient and injection rates averaging approximately 150 m³/day were maintained throughout the trial;
- Based on the observed monitoring well water levels, the trial has demonstrated that the proposed full-scale GIR System is worth pursuing; however,
- The rates and duration of injection were limited due to clogging of the pre-injection filter and reducing capacity within the well over time. The clogging is believed to be biological in nature.

In order to maximise effectiveness, Orica will need to minimise the clogging so as to extend the rates and duration of the injection. Orica proposes an extension of the trial prior to the implementation of the full-scale system. The trial will focus on the use of anti-fouling agents and injection well maintenance techniques.

Orica is currently discussing the trial outcomes and the next stage of work with DECCW.

5 BIOAUGMENTATION FIELD TRIALS

As the CLC might recall, bioremediation field trials were conducted at Southlands in 2004 and 2005. The trials successfully evaluated the effectiveness of injecting nutrients into the aquifer to enhance the ability of the naturally occurring microorganisms to destroy elevated concentrations of contaminants. At the conclusion of the previous trials some of the biomass was recovered from the treatment zone. The biomass was sent to the Centre for Marine Bio-Innovation, based at the University of NSW, to isolate and build up a biological culture comprising the microorganisms that actively degraded the target contaminants. Orica is now planning to conduct a follow-up field trial in Southlands evaluating whether injecting this biological culture can achieve even greater stimulation of bioremediation than with nutrients alone. This approach is called bioaugmentation.

Southlands has been selected as the location for the bioaugmentation trial given that much of the original bioremediation trial infrastructure is still in place. However, trials such as these could be performed in any number of locations in future.

The culture will be injected into the aquifer in the north-east corner of the western block (Block 2) of Southlands¹ and monitoring will be conducted to measure the rate of reduction in groundwater contaminant concentrations.

¹ The proposed Southlands Remediation and Development Project allows for ongoing bioremediation investigations by the provision of easements for groundwater wells.

As the CLC is aware, whilst bioremediation is not an appropriate stand-alone solution for remediation of the Orica groundwater plumes at this time, Orica continues to direct resources into research and development work in this field given the potential for future application at Botany and other Orica sites.

6 MAXIMISING HYDRAULIC CONTAINMENT

In Progress Report No. 21 it was explained that Orica had commenced an assessment to determine the maximum sustainable volume of groundwater the aquifer could provide to the GTP from the existing groundwater extraction network. One component of the assessment was an investigation of the effects of additional extraction, beyond containment requirements, on the built environment (i.e. buildings and structures).

In October 2009, the assessment was completed by Pell Sullivan Meynink. The report concluded the following:

- Extraction up to approximately 7 ML/day of groundwater from the existing network will not present any significant risks of settlement.
- Extraction beyond 7 ML/day could present a risk of subsidence, particularly on the BIP. Further detailed investigations would be required to establish the feasibility of extracting at rates exceeding this value.

As a result of information presented in the subsidence report, Orica will continue to only extract what is required for containment alone, and does not currently aim to treat more than 7ML/day.

Should Orica decide in future to extract more than 7 ML/day, further assessment of the subsidence risks and possible environmental impacts would be necessary.

In addition to the subsidence assessment, some groundwater modelling was also undertaken. Orica consulted with Ian Acworth (Independent Monitoring Committee [IMC] member) and Noel Merrick with respect to the approach and scope of that work. A significant recalibration of the model was completed using data collected since the last model was created. This model will be a very useful tool for future works onsite. One application could include the optimisation of the containment lines.

Orica will debrief Ian Acworth, Noel Merrick and the NSW Office of Water.

7 2008-2009 EPL2148 ANNUAL RETURN

The CLC has requested that Orica present results of the 2008-2009 Annual Return for EPL2148 that are relevant to the BGC Project. The Annual Return was submitted to the DECCW on 16 September 2009. Seven minor non-compliances were reported in relation to the BGC project, with no significant environmental impacts. With the exception of these non-compliances, all other discharges to air and water from the GTP met the stipulated licence conditions for the duration of the 2008-2009 EPL2148 reporting period. Orica will provide a brief presentation of this information at the upcoming meeting.

8 FORMER CHLORALKALI PLANT MERCURY PROJECT UPDATE

As previously reported, Orica has conducted investigations of mercury in soil at the site of the demolished former ChlorAlkali Plant (FCAP) at the BIP, and groundwater investigations both on and off the site.

Orica plans to remove the mercury contamination source by using a soil washing technology and aims to render the site suitable for future industrial/commercial use.

DECCW has determined that the mercury contamination is "Significant Enough to Warrant Regulation" and Orica submitted a remediation works scope to the Department in mid September. The works scope will become the foundation of a VMP for the FCAP mercury cleanup project. The remediation works scope includes remediation of soil, which acts as a source of the groundwater contamination, and establishment of a groundwater monitoring program on and off-site.

Orica received feedback from DECCW in October 2009, requesting further groundwater monitoring and an assessment of remediation options for mercury contaminated groundwater to be included

as reporting requirements and milestones in the VMP. Orica is currently preparing a VMP, which it aims to submit to the DECCW by the end of year.

Orica has engaged URS to prepare a Remediation Action Plan (RAP), and appointed Chris Jewell² as the DECCW accredited Site Auditor to review the RAP. The RAP will describe how the soil remediation works will be conducted and establish a groundwater monitoring program for the project.

The soil remediation project satisfies the planning criteria of a remediation project that does not require development consent, and therefore an Environmental Assessment is not required. The remediation works must, however, comply with detailed environmental and safety requirements outlined in State and Council planning instruments (including reporting and notification to the CoBB and DECCW). Modifications to EPL2148 could be required for the project.

Orica will continue to consult with stakeholders including BIP employees, residents of Denison Street and the railway operators as the project progresses.

8.1 Soil Remediation Plans

Orica currently plans for the soil remediation works to commence in July 2010, and to continue for approximately five months. Given the successful soil washing trial in August 2008, Orica will use the soil washing plant operated by Highlands Remediation Ltd (HRL). The plant will be shipped from Canada after its modification to meet Australian standards, and will be established on Block L at the BIP (refer to image below). Some preparatory works are required to ready the Block L site for the installation and operation of the soil washing plant.



The soil washing plant will be transported and housed in shipping containers, which will be stacked and secured together (refer to image below). Stockpiles of feed soil and treated soil might need to be stored in bunkers to manage emissions.



² Chris Jewell is also the DECCW Accredited Site Auditor on Orica's proposed Southlands Remediation and Development Project, and for the Car Park Waste Encapsulation remediation project.

Soil delineation works have recently been conducted by URS to estimate the volume of soil for treatment. The investigation has estimated that about 24,000 metric tonnes of soil is to be treated and that 12,000 metric tonnes of concrete will be excavated for disposal at a licensed landfill. Excavated treated soil will be reinstated on the FCAP site and elemental mercury will be sold for reuse. Orica has commenced discussions with SITA Australia about the potential use of its Kemps Creek landfill for disposal of mercury contaminated concrete and the mercury contaminated sludgy soil that is separated by the treatment process.

As reported previously, mercury is generally not particularly mobile in groundwater, but its mobility could be influenced by dissolved salt from the large salt mound that is a feedstock to the current ChlorAlkali Plant. Following the soil remediation works at the FCAP site, Orica plans to relocate the salt mound to a new bunded and sealed area closer to the current ChlorAlkali Plant (at Block G - refer figure above).

8.2 Further Trials and Investigations

Groundwater Plume Delineation

Orica has recently installed two new offsite groundwater monitoring wells on a strip of land it owns on the southern side of McPherson Street immediately to the west of the railway line. Data collected from these wells will be used to better delineate the mercury plume and to see whether pumping at the PCA affects movement of the mercury plume. Other geochemical analyses of the groundwater will also be conducted to better understand how the groundwater conditions could be influencing the mobility of the mercury.

These new data will be used to complete the fate and transport model (a numeric model using soil and groundwater data to evaluate how mercury will behave in the groundwater), which forms an important part of the RAP.

Air Emission Controls

During the remediation works Orica wants to prevent emissions of mercury to the atmosphere as much as possible. The following mercury emission sources will need to be managed during the planned soil remediation work:

- Fugitive emissions from the soil washing plant
- Emissions from the excavated soil stockpile
- Emissions from contaminated treated soil
- Emissions from excavated surfaces

In early 2010, Orica plans to conduct trials with custom-made covers and emission control systems in the small areas that were excavated during the concrete cutting trials in June 2009. The emission control systems will each include an activated carbon filter and a small discharge stack. This stack will be an emission point source, which will require regulation. Orica will apply to DECCW for a modification to EPL2148 prior to commencing the trials.

Air emission modelling is currently being undertaken by PAEHolmes using air quality data collected during the concrete cutting trials. The model will assist in further determining the likely emissions at the work area and estimated concentrations at the BIP boundary and this will then inform the detailed design of the remediation approach and emissions control measures.

9 COMMUNITY COMMUNICATION UPDATE

CLC Newsletter

CLC Newsletter No. 34 was distributed to approximately 5,500 homes and businesses within the Botany, Banksmeadow, Hillsdale, Matraville and Pagewood areas in September 2009, after being reviewed by the CLC. Additional copies are also distributed to City of Botany Bay and Rockdale Councils, Botany and Rockdale Council Libraries and Bexley Community Centre.

CLC Newsletter No. 34 included updates on groundwater treatment and containment, a summary of the September 2009 CLC meeting, results of the May 2009 Residential Bore Monitoring Program, and an update on Groundwater Injection & Recovery.

Website

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

- Groundwater Cleanup Plan Progress Report No.23;
- CLC newsletter No. 34;
- The Briefing Paper and presentations for the September 2009 CLC meeting;
- Recent newspaper columns;
- Report by Prof Priestly on IMC Task 24; and,
- Report on March 2009 Groundwater Strategy Review Community Workshop.

There were 2,900 visits to the Botany Transformation Projects website from 20 August to 12 November 2009, of which 1,146 visits were to BGC Project pages and 126 visits to Treated Water Recycling Program pages.

E-mail Enquiry

One website email enquiry was received regarding the now complete Rainwater Tank Rebate program in this reporting period. No emails were received via the CLC feedback facility.

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 September 2009.

1800 Number

The Botany Industrial Park operates a free-call number – 1800 025 138, where enquiries to Orica are directed. From the calls received during this reporting period only one related to the BGC Project and this concerned the November residential bore testing.

10 OTHER CLC MATTERS

10.1 e-mailing CLC

As the CLC is aware, the Botany Community Relations Team uses email as a tool to communicate with the CLC as its secretariat. In the past the CLC has requested that email messages be sent via 'blind courtesy copy' or Bcc. Due to changes in the computer software and for recording purposes, Orica wishes to start sending email communication in a manner that the email addresses of the CLC members with email accounts would appear on the email message (i.e. include email addresses on To box instead of Bcc box). This matter will be raised at the upcoming meeting for discussion.

10.2 Professional photo-shoot of a meeting

To produce more interesting communication material, the Botany Community Relations Team uses photographs in its communication tools for the wider community. We would like to bring a professional photographer to one of the quarterly meetings in 2010 to update our photographic archive of the CLC (the last photo-shoot was in 2005). This matter will be raised at the upcoming meeting for discussion.

ATTACHMENTS

1. Executive Summary of Groundwater Cleanup Plan Progress Report No. 24

	REPORT No: EN.1591.61.PR034	Rev: 0
GROUNDWATER CLEANUP PLAN PROGRESS REPORT NO. 24		

EXECUTIVE SUMMARY

The NSW Environment Protection Authority (EPA), now part of the Department of Environment, Climate Change and Water (DECCW), issued Orica Australia Pty Ltd (Orica) with Notice of Clean Up Action (NCUA) No. 1030236 on 26 September 2003, under the Protection of the Environment Operations (POEO) Act 1997.

This document is the twenty-fourth report submitted in accordance to NCUA Condition 4G. The reporting interval for this report is 1 July to 30 September 2009, however if more recent and relevant information is available it is also included.

Orica engaged URS to complete a quarterly monitoring event in September 2009 in accordance with the agreed monitoring plan. Results and discussions were provided in the URS report *Groundwater Treatment Plant (GTP) Quarterly Groundwater and Surface Water Monitoring Report, September 2009*.

Hydraulic Containment

- The inferred contours and patterns of shallow and deep groundwater flow infer that hydraulic containment was achieved at SCA and PCA during the monitoring period.
- Elevated groundwater levels were observed at the SCA in intermediate monitoring wells east of MWF01. Investigations of the cause of the increased levels have been inconclusive at this stage but additional works are ongoing to more fully understand the issue. 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.
- Hydraulic containment was achieved at the central and southern portions of the BIP containment line in the shallow and deep aquifers. Containment was not regularly achieved at the northern portion of the BIP containment line during the monitoring period due to capacity constraints at the GTP. However, this section of the line has lower groundwater contaminant concentrations, and groundwater flow from this area is towards the central portion of the line and groundwater that migrates past the BIP containment line is effectively captured at the PCA.
- Water levels at regional monitoring wells show no discernible water level impact due to hydraulic containment thus indicating a limited potential to affect infrastructure and licensed groundwater users.

Chemical Monitoring Results

While there were various increasing and decreasing trends in CHC concentrations within the Northern, Southern and Central Plumes, the overall inferred CHC distributions as represented by the contours and cross sections are largely similar to those presented previously. The main overall changes in contaminant distribution in September 2009 were as follows:

- Decreasing trends in CHC concentrations within the Southern Plumes between PCA and SCA;

- Stable or increasing trends for some CHCs in deeper groundwater in the Southern Plumes at Southlands;
- Decreasing trends in CHC concentrations within the Central Plume at Southlands;
- Continuing migration of the leading edge of the Central Plume in the vicinity of Botany Road. The leading edge of the Central Plume will be captured at the SCA and will not discharge into Penrhyn Estuary or Botany Bay;
- Increasing concentrations of CHCs at the leading edge of the Northern Plumes at depth, which were in contrast to the stable or decreasing trends in shallow groundwater;
- The decreasing trends in groundwater concentrations of CHCs within the Central Plume on Southlands and at the periphery of the Southern Plumes south of the PCA, are likely to be related to migration of the plume and changing plume dynamics due to groundwater extraction – i.e. pumping at the PCA and SCA has changed groundwater flow directions so that relatively cleaner groundwater is being drawn in towards the plumes from the northwest (Block 2 PCA) and east (eastern edge of Southern Plumes).
- Many of the increases and decreases in CHC concentrations in the Northern, Southern and Central Plumes are likely related to the re-distribution of contaminants due to hydraulic containment. Groundwater flow in areas of flat hydraulic gradients is very slow which implies that contaminant concentrations are unlikely to change in the short to medium term. Variability in CHC concentrations in these areas (and others) can be expected;
- The estimated average concentration for the entire aquifer within PCA has decreased from approximately 550 mg/L in July 2002 to approximately 201 mg/L in September 2009, equivalent to a decrease of approximately 63%. This decrease is reflected in the significant decrease in the average total CHC concentration at the PCA extraction wells from 850 mg/L in June 2005 to 160 mg/L in September 2009;
- Semi-volatile CHC concentrations in groundwater were generally consistent with historical data. HCBd was detected at a low concentration at WG23S and elevated HCBd concentrations were reported at BP61 at depth.

Penrhyn Estuary and Surface Waters

- The change in concentrations of volatile CHCs at BP01, BP115 and MWF15 represent the redistribution of contaminants in groundwater that had passed Foreshore Road prior to commencement of hydraulic containment at the SCA in late-2004.
- Concentrations of the key contaminants at the pore water discharge interface were less than the ANZECC (2000) Trigger Values for all sample locations in Penryhn Estuary.

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- In general, volatile CHC concentrations measured in pore water within Penrhyn Estuary are similar to, or lower than, historical concentrations.
- The concentrations of volatile CHCs in surface waters were less than the respective ANZECC (2000) Trigger Values.
- Semi-volatile CHCs were not detected above the laboratory limit of reporting in Penrhyn Estuary pore water samples collected at low tide and surface water samples.

Implications for Human Health Risk Assessment

- With respect to the western margin of the Northern Plumes, the additional data presented in the September 2009 quarterly monitoring report does not affect the conclusions of the HHRA and Addendum.
- The additional data presented in the September 2009 Quarterly Monitoring Report does not alter the conclusions of the HHRA with respect to existing commercial/industrial workers in areas above the main plumes.
- Data collected from Springvale Drain does not suggest the requirement for more frequent monitoring of ambient air concentrations (currently included in Orica's 15 monthly air sampling program) adjacent to the drain.
- Data collected to September 2009 does not change the conclusions presented within the HHRA associated with exposures within the inner and outer Penrhyn Estuary. 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. However, the assessment has identified worst-case exposure scenarios (particularly within the inner estuary) where the calculated risks exceed the target values.