



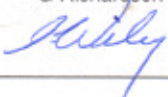
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GROUNDWATER CLEANUP PLAN PROGRESS REPORT NO. 17		

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GROUNDWATER CLEANUP PLAN PROGRESS REPORT No. 17
REPORT NO. EN.1591.61.PR023
REVISION 0

This document is based upon material available at the time of preparation and is current and accurate only to that date. Material prepared by consultant third parties was prepared on instructions by Orica for specific purposes and should not be relied upon by other parties for any purposes.

REVISION HISTORY

REV	STATUS	DATE	PREPARED	CHECKED	AUTHORISED
0	Issued to DECC	29 Feb 08	S Corish 	J Stening 	G Richardson 

DISTRIBUTION

1. Stephanie Yu, Contaminated Sites Section, DECC (hard copy with 2 copies of Attachments A and B).
2. George Gates, DWE (hard copy)
3. Santo Cannata, SESPHU (hard copy without Attachment B)
4. Geoff Richards, NSW Health (hard copy without Attachment B)
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14. Dr Mark Hibberd, IMC (hard copy without Attachments A and B)
15. Chris Clunies-Ross, IMC (hard copy without Attachments A and B)
16. Ken Holmes, BGC Project Independent Environmental Auditor (CD version)
17. Nancy Hillier, Botany Environment Watch (hard copy)
18. Pat Williams, BEREPA (hard copy)
19. Gary Blaschke, Botany Bay and Catchment Alliance (hard copy)
20. John Tourrier, Save Botany Beach (CD version)
21. John Burgess, NSW Recreational Fishing Association (hard copy)
22. Mariann Lloyd-Smith, National Toxics Network (CD version)
23. Botany Central Library, Westfield Eastgardens (two CD versions, with one to be forwarded to Mascot Library, 2 Hatfield Street Mascot)
24. Matraville Branch Library, Anzac Parade, Matraville (hard copy)
25. Ross Anthony, Randwick City Council for Randwick Branch Library, Royal Randwick Shopping Centre (CD version)
26. Bowen Library, Anzac Parade, Maroubra (hard copy)
27. Greg Dasey, JBS (CD version)
28. Andrei Woinarski, URS Australia (CD Version)
29. Orica Botany Community Relations Team (hard copy and CD version for website)

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LIST OF ACRONYMS

ACRONYM	DEFINITION
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment and Conservation Council
BEW	Botany Environment Watch
BEREPA	Botany and Eastern Region Environment Protection Agency
BGC Project	Botany Groundwater Cleanup Project (hydraulic containment and treatment project as described in the EIS)
BLG	Below ground level
BGP	Botany Groundwater Project (entire set of activities pertaining to Orica's contamination of the BIP and environs)
BIP	Botany Industrial Park
BP	Bundle piezometer
CFM	Chloroform (trichloromethane)
CHC	Chlorinated hydrocarbon
cis-1,2-DCE	cis-1,2-dichloroethene
CoBB	City of Botany Bay
COPC	Chemical of potential concern
CTC	Carbon tetrachloride (tetrachloromethane)
CLC	Community Liaison Committee
DEC	Department of Environment and Conservation, incorporates the EPA and is now DECC
DECC	Department of Environment and Climate Change, formerly DEC
DIPNR	Department of Infrastructure, Planning and Natural Resources (former NSW Government department, separated into DoP and DNR)
DNAPL	Dense non-aqueous phase liquid
DNR	Department of Natural Resources (formerly part of DIPNR, now part of DWE)
DWE	Department of Water and Energy
DoD	Department of Defence
DoP	Department of Planning (formerly part of DIPNR)
EDC	Ethylene dichloride (1,2-dichloroethane)
EIAD	Environmental Impact Assessment Document
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environmental Protection Licence
EP&A Act	Environment Planning and Assessment Act
GAC	Granulated activated carbon
GCP	Groundwater Cleanup Plan
GEA	Groundwater Embargo Area
GEEA	Groundwater Extraction Exclusion Area
GTA	General Terms of Approval
GTP	Groundwater Treatment Plant
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HHRA	Human Health Risk Assessment
IMC	Independent Monitoring Committee

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ACRONYM	DEFINITION
JBS	JBS Environmental Pty Ltd, an environmental consultancy
KBR	Kellogg, Brown and Root Pty Ltd, Engineering Contractor for many sub-projects of the BGP
KMH	KMH Consulting Pty Ltd, independent compliance auditor for the BGP
MoU	Memorandum of Understanding
NCUA	Notice of Clean Up Action
NHMRC	National Health and Medical Research Council
NSW	New South Wales
OEMP	Operational Environmental Management Plan
PCA	Primary Containment Area
PCE	Perchloroethylene (tetrachloroethene)
PFM	Planning Focus Meeting
PHA	Preliminary Hazard Analysis
PVDF	Poly vinylidene fluoride
QRA	Qualitative Risk Assessment
RAP	Remedial Action Plan
REF	Review of Environmental Factors
RO	Reverse osmosis
RTA	Roads and Traffic Authority
RWG	Regulatory Working Group
SCA	Secondary Containment Area
SCW	Scheduled Chemical Waste
SEPP	State Environmental Planning Policy
SESPHU	South East Sydney Public Health Unit
SPC	Sydney Ports Corporation
SSU	Steam Stripping Unit
SWC	Sydney Water Corporation
TBA	To be advised
1,1,2,2-TeCA	1,1,2,2-Tetrachloroethane
1,1,2-TCA	1,1,2-Trichloroethane
1,2,4-TCB	1,2,4-Trichlorobenzene
1,2,4,5-TeCB	1,2,4,5-Tetrachlorobenzene
TCE	Trichloroethene
TO	Thermal oxidiser
TWA TLV	Time Weighted Average Threshold Limit Value
TWSA	Trade Waste Service Agreement
URS	URS Australia Pty Ltd, Orica's principal environmental consultant on BGP
VC	Vinyl chloride (chloroethene)
VOC	Volatile organic compound
VSD	Variable speed drive

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EXECUTIVE SUMMARY

The NSW Environment Protection Authority (EPA), now part of the Department of Environment and Climate Change (DECC), 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 seventeenth report submitted in accordance to NCUA Condition 4G. The reporting interval for this report is 1 October 2007 to 31 December 2007, however if more recent and relevant information is available it is also included.

Orica engaged URS to complete a quarterly monitoring event in December 2007 in accordance with the agreed monitoring plan. Results and discussions are provided below.

Hydraulic Containment

- Hydraulic containment was generally achieved at the BIP containment line (with the exception of during the November/December 2007 GTP shutdown), although hydraulic containment of shallow aquifer may not have been achieved at the far southern end of the Second Street containment line and the far northern end of the First Street containment line. During the scheduled GTP maintenance shutdown, groundwater heads in the deep aquifer increased above the target levels to between 4.0 and 4.5 mAHD. Subsequent pumping may have recaptured groundwater that passed the containment lines following the shutdown. However, it is important to note that containment is not required under the notice and the BIP line is operated as capacity allows.
- Hydraulic containment in the deep aquifer was generally achieved at the PCA, with the exception of during the GTP shutdown in November/December 2007. Hydraulic heads were typically similar to or up to 0.5 m below the target levels, with the exception of MWB02 where higher groundwater elevations were recorded in October and November 2007. During the scheduled GTP maintenance shutdown, hydraulic heads in the deeper aquifer at the PCA increased above the target levels to between 1.5 and 2.5 mAHD. Subsequent pumping may have recaptured groundwater that passed the containment lines following the shutdown.
- Hydraulic containment was generally achieved in the deep aquifer at the SCA for the entire December 2007 monitoring period with the exception of the GTP shutdown in November/December 2007. Consistent pumping following the shutdown resulted in drawdown of the deep aquifer to below target levels in all monitoring wells (except MWF10) throughout the remainder of December 2007 (and continuing into 2008). Following the shutdown, pumping rates were set to maximise (to the extent practicable) the recovery of groundwater that may have passed the line during the shutdown. Hydraulic heads also exceeded targets at several monitoring locations (MWF13 and MWF12) at the eastern end of the SCA during October 2007 due to the poor performance of EWF28D (and EWF26D to a lesser extent). Once EWF28D was repaired, the increased pumping resulted in hydraulic heads below the target level.

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Chemical Monitoring

- The inferred distribution of volatile CHCs in the shallow groundwater within Southern Plumes during the December 2007 presented a generally stable or decreasing trend against historical data and is generally consistent with that reported in previous monitoring rounds.
- Although there was variability, with increases and decreases in concentrations depending on location and depth, concentrations of volatile CHCs within the Central Plumes are generally stable or decreasing and are consistent to that reported in previous rounds.
- The inferred distribution of volatile CHCs recorded within the Northern Plumes in shallow groundwater during December 2007, and particularly EDC and CTC, which represent the majority of the contaminant mass, are stable and decreasing and are consistent with historical data.
- In general, volatile CHC concentrations measured in pore water within Penrhyn Estuary are similar or lower than historical concentrations.
- The proportion of EDC relative to total volatile CHCs was lower than historically observed in samples collected from Springvale Drain and Penrhyn Estuary.

Implications for Human Health Risk Assessment (HHRA)

With respect to the western margin of the Northern Plumes, none of the data presented in the December 2007 quarterly monitoring report affects the conclusions of the Consolidated HHRA (URS, 2005e) and Addendum (URS, 2006b).

Based on the data collected to December 2007 (and considering the additional review of data presented in the June 2007 monitoring report (URS, 2007e)), the conclusions presented within the HHRA associated with exposures within the 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. However, the assessment has identified worst-case exposure scenarios (particularly within the inner estuary) where the calculated risks exceed the target values, however the assessment was based on higher concentrations of contaminants than observed in this monitoring event.

Shutdown

The GTP annual shutdown occurred between 15 November 2007 and 7 December 2007. The shutdown extended for longer than was initially planned due to a fault that occurred with a key valve that was only revealed once the plant was almost online, and a delay to the startup to allow completion of transformer oil treatment that was indicated during preventative maintenance checks. Over 350 jobs were executed without any environmental or safety incidents

Operational Performance

An average of 4.0 ML/day of contaminated groundwater have been extracted and treated by the GTP during this reporting period. This figure includes downtime when

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the plant wasn't operating – most notably due to the November/December GTP shutdown – hence the plant often treated significantly more than 4.0 ML/day when on-line.

Several issues are still challenging the GTP team and progress is being made with respect to increasing the capacity and efficiency of the pumping system and the GTP.

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1 INTRODUCTION

The NSW Environment Protection Authority (EPA), now part of the Department of Environment and Climate Change (DECC), 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. Since then the DECC has issued three variation notices as follows:

Notice under Protection of the Environment Act 1997	Date Issued
Notice of Cleanup Action (NCUA) No. 1030236	26 September 2003
<i>Variation NCUA No. 1033107</i>	17 February 2004
<i>Variation NCUA No. 1042957</i>	7 December 2004
<i>Variation NCUA No. 1052882</i>	2 February 2006

Condition 3 of the NCUA requires Orica to submit a Groundwater Cleanup Plan (GCP) by 31 October 2004 for consideration by the EPA. Condition 3 defines the issues to be addressed in the GCP within timeframes defined in Condition 4. Condition 3(e) defines requirements for a comprehensive monitoring plan, the results of which were to be reported to the EPA (under Condition 4G) on a quarterly basis.

This document is the seventeenth report submitted in accordance to NCUA Condition 4G. The reporting interval for this report is 1 October 2007 to 31 December 2007, however if more recent and relevant information is available it is also included.

Progress Report No	Date	Comment
1	Wednesday 25 February 2004	Submitted on schedule
2	Monday 17 May 2004	Submitted on schedule
3	Friday 20 August, 2004	Submitted on schedule
4	Thursday 18 November 2004	Submitted on schedule
5	Wednesday 16 February 2005	Submitted on schedule
6	Tuesday 17 May 2005	Submitted on schedule
7	Monday 15 August 2005	Submitted on schedule
8	Wednesday 30 November 2005	Submitted on schedule
9	Tuesday 28 February 2006	Submitted on schedule
10	Wednesday 31 May 2006	Submitted on schedule
11	Thursday 31 August 2006	Submitted on schedule
12	Thursday 30 November 2006	Submitted on schedule
13	Wednesday 28 February 2007	Submitted on schedule
14	Thursday 31 May 2007	Submitted on schedule
15	Friday 31 August 2007	Submitted on schedule
16	Friday 30 November 2007	Submitted on schedule
17	Friday 29 February 2008	Current Report

Previous reports are available at the relevant section of the new website oricabotanytransformation.com and a distribution list is provided at the beginning of this document.

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2 COMPLIANCE SUMMARY

2.1 Notice of Cleanup Action (NCUA)

A summary of the compliance status against current NCUA (including variation notices) condition requirements is provided below:

Cond.	Summary of Requirement	Status	Reference Documents / Comments
3A	Commence preparation of GCP by 30/09/2003	Achieved.	Commenced on 26/09/2003
3B	Prepare and submit GCP by 31/10/2003 covering matters listed	Achieved.	GCP submitted 31/10/2003. EPA authorisation of GCP on 17/02/2004 by Variation Notice No.1033107.
4A	Commence implementation of GCP by 16/03/2004	Achieved.	Work commenced immediately after submission of GCP, in anticipation of its approval.
4B	Commence containment works within primary containment area within 14 days of receipt of all approvals and complete such work within 90 days.	Achieved.	Extraction commenced 28/10/2004. Orica letter of 29/10/2004, DECC letter 10/11/2004.
4BA	At least once every 3 months during GCP implementation report on effectiveness of hydraulic containment works.	Ongoing compliance.	Most recent data provided in Section 3.1 of this report.
4C	Complete identification of the locations of the DNAPL sources by 31 May 2004.	Ongoing compliance.	No further work in this reporting period.
4D	Complete containment of DNAPL sources by 30/11/2004.	Achieved	Orica submission regarding compliance submitted 30/11/2004. DEC letter of 06/01/2005 has stated in-principle acceptance and requested further information. Orica submitted requested information on 27/01/2005. DEC provided letter of compliance on 07/09/2005.
4D	Remove DNAPL sources to the maximum extent practicable by 31 October 2005.	Achieved	Progress included in Section 4.3 of this report.
4E	Reduce the concentrations within the primary containment area to the maximum extent practicable by 31/10/2005, with an 80% target on July 2002 levels.	Achieved	Letter of compliance (to maximum extent practicable requirements of the Condition) received on 1 February 2006.
4F	Establish a secondary containment area by 31/10/2004.	Achieved.	Commenced extraction 29/10/2004. Orica letter of 29/10/2004, DEC letter of 10/11/2004 (confirmed in DEC letter of 06/01/2005).
4G	Implement monitoring program and report at the end of February, May, August and November of each year.	Ongoing compliance.	Summary of monitoring program results for this reporting period provided in Section 3 of this report. Details are provided in Attachment A.
5	Remedial measures to ensure groundwater and surface water flows into Botany Bay and Penrhyn Estuary achieve ANZECC Guidelines for	Work in progress.	Discussion on latest findings provided in Section 3.2 and Attachment A of this report.

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Cond.	Summary of Requirement	Status	Reference Documents / Comments
	slightly to moderately disturbed ecosystems.		
6	Emission controls from works and measures required by the NCUA strictly controlled through adoption of best practice. Works and operations to be carried out in a controlled and competent manner.	Ongoing monitoring being performed.	A discussion on GTP emission compliance provided in Section 5 of this report.
7	Orica to make all reasonable attempts to obtain consent for work on premises not occupied by Orica and related companies. Notify EPA within 7 days if refusal to grant access.	Ongoing compliance.	Ongoing access to third party premises sought as required.
7A	Updating of GCP to take account of developments.	Ongoing compliance.	The GCP remains relevant in terms of the overall groundwater containment and remedial strategy. The Groundwater and Surface Water Monitoring Plan was agreed for 2006 and a revised Plan was submitted and agreed with former DEC (now DECC) for 2007. Discussion of the current plan and its implementation is provided in Section 3 of this report. Orica, in conjunction with its consultants, is preparing a proposed plan for monitoring for 2008 for review with DECC.
7B	Orica to monitor groundwater in any other area likely to have been, or to be, impacted by the contaminants.	Ongoing compliance.	Discussion of residential bore monitoring provided in Section 4.1 of this report.
7C	7B monitoring is to: a) Determine the spatial distribution of the contaminants; and b) Monitor changes in the spatial contamination and distribution of the contaminants.	Ongoing compliance.	Refer to comments on 7B.
7D	Monitoring results to be provided to the EPA as soon as possible after results become available to Orica.	Ongoing compliance.	Important results are provided to DECC as soon as possible. The quarterly progress reports are the primary mode of reporting monitoring data.
7E	Orica must consider best practice technology in the remediation of DNAPL and groundwater containing dissolved phase contamination.	Ongoing compliance.	DNAPL overseas mission completed in April 2005. Orica representatives have attended Battelle conference on "Remediation of Chlorinated and Recalcitrant Compounds" in Monterey, California (May 2006) and will attend the equivalent conference in 2008.
7F	Orica must provide an annual written report to DECC on actions required by 7E. First report to be provided no later than 28 February 2006.	Ongoing compliance.	Annual detailed update provided in Attachment B of Progress Report 13.
7G	Orica must review the need to revise the HHRA in light of relevant	Ongoing compliance.	See 7H

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Cond.	Summary of Requirement	Status	Reference Documents / Comments
	monitoring data.		
7H	All reports submitted to DECC must include an assessment of the potential risk to human health.	Ongoing compliance.	All reports now submitted to DECC include relevant appraisal of potential risk to human health and hence identify any requirement to update the HHRA.
7I	By 30 April 2006, Orica must prepare and submit to DEC, a monitoring plan for all necessary input parameters to the HHRA.	Achieved.	Plan submitted on 30 April 2006.
7J	Orica must provide copies of reports issued under 7F and 7H to DWE, SESPHU, NSW Health, and CoBB within 7 days of submission to DECC.	Ongoing compliance.	Ongoing compliance
7K	Orica must inform the community of developments by: a) A community forum agreed to by the DECC. b) Provision of a quarterly newsletter to people residing within a 1 km radius of BIP. c) Maintenance of a website in which copies of relevant reports are posted.	Ongoing compliance.	a) The CLC meets quarterly (see Section 6.1 of this report) b) See Section 6.3 c) www.oricabotanygroundwater.com has been updated and replaced with oricabotanytransformation.com
8	Works and measures under voluntary agreement must not compromise the efficacy of measures under the notice.	Ongoing compliance.	Orica has since discontinued bioremediation trials because sufficient data had been obtained to assess the efficacy of bioremediation, and the PCA interim hydraulic containment was interfering with the flow of groundwater through the trials area. Orica proposed and DEC agreed to defer installation of a zero valent iron permeable reactive barrier wall.
8A	Provide additional information as detailed to DEC by 16/03/2004.	Achieved.	Issued by Orica 16/03/2004, received by DEC 17/03/2004 due to courier error. Additional information on PCA extraction design progressively provided in accordance with Orica's response of 16/03/2004.

2.2 Environmental Protection Licence No. 2148 (EPL2148)

Orica reports compliance against EPL2148 requirements via the submission of the annual return in September each year. For the past two years, Orica has also been subject to an independent audit by KMH Consulting. The audit reports are available on the relevant section of the new website oricabotanytransformation.com. A summary of Groundwater Treatment Plant (GTP) relevant licence modifications and compliance milestones in this reporting period is provided below:

- Condition L3.3 Point 11 was modified to change the allowable temperature range for treated water from 15-25°C to 10-30°C.

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The lower operating temperature limit for the thermal oxidiser unit (Condition L3.7 Point 10) was lowered to 875°C.

2.3 Other Licences and Statutory Approvals

A summary of compliance status against other approvals relevant to the project is provided in the table below.

Licence / Statutory Approval	Comments
Conditions under Part V of the Water Act	<ul style="list-style-type: none"> Groundwater and surface water monitoring conducted during this reporting period was undertaken in accordance with the program developed in response to condition E12.2.3 of EPL2148. A summary of the results is provided in Section 3 of this report.
Conditions from Sydney Water Corporation	<ul style="list-style-type: none"> These conditions require that Orica maintain a register of accidents, incidents and potential incidents with actual or potential significant off-site impacts on people, property, or the biophysical environment. Orica maintains an incident register for the GTP in the internal Safety Health and Environment Incident Management database. Orica obtained the Subdivider/Developer Compliance Certificate under Division 9 Section 73 of the <i>Sydney Water Act 1994</i> for the BGC Project on 19 January 2006.
Conditions from Sydney Ports Corporation	<ul style="list-style-type: none"> The licence with Sydney Ports Corporation (SPC) for the discharge of excess treated water to the Bunnerong Stormwater Channel was finalised in January 2006 and subsequently executed by Sydney Ports and provided to Orica on 25 August 2006. Ultimately this discharge will be a backup only as Orica intends to maximise the reuse of treated water.

3 QUARTERLY MONITORING EVENT

NCUA condition 3B(e) requires Orica to implement a comprehensive monitoring program within the defined area (formerly named as the Groundwater Protection Zone 1 by the then DIPNR (subsequently DNR and now part of DWE), and now referred to as the Groundwater Exclusion Extraction Area [GEEA]) to:

- monitor changes in concentrations of the substances in the contaminant plumes;
- monitor changes in the spatial distribution of contaminant plumes in the sub-surface;
- gauge groundwater levels to assess effectiveness of hydraulic containment; and
- monitor concentrations in groundwater and surface water discharges to Botany Bay and Penrhyn Estuary for comparison against the Australian and New Zealand Guidelines for Marine and Fresh Water (2000) trigger values for protection of slightly to moderately disturbed ecosystems.

Orica and DEC (now DECC) subsequently agreed the content and scope of the *GTP Groundwater and Surface Water Monitoring Plan* (URS 2005a). On an annual basis DECC and Orica meet to discuss the effectiveness of the monitoring program and revise monitoring requirements as appropriate. Orica will shortly submit a revised program for DECC review with the intent of implementing it in the June 2008 monitoring event.

Orica engaged URS to complete a quarterly monitoring event in December 2007 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, December 2008* (URS 2008a). This report is bound separately as Attachment A. The remainder of this section has effectively been transcribed from the URS report.

3.1 Hydraulic Containment

Botany Industrial Park (BIP) Containment Area

Hydraulic containment was generally achieved at the BIP containment line (with the exception of during the November/December 2007 GTP shutdown), although hydraulic containment of shallow aquifer may not have been achieved at the far southern end of the Second Street containment line and the far northern end of the First Street containment line. During the scheduled GTP maintenance shutdown, groundwater heads in the deep aquifer increased above the target levels to between 4.0 and 4.5 mAHD. Subsequent pumping may have recaptured groundwater that passed the containment lines following the shutdown. However, it is important to note that containment is not required under the notice and the BIP line is operated as capacity allows.

Primary Containment Area (PCA)

Hydraulic containment in the deep aquifer was generally achieved at the PCA, with the exception of during the GTP shutdown in November/December 2007. Hydraulic heads were typically similar to or up to 0.5 m below the target levels, with the exception of MWB02 where higher groundwater elevations were recorded in October and November 2007. During the scheduled GTP maintenance shutdown, hydraulic

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heads in the deeper aquifer at the PCA increased above the target levels to between 1.5 and 2.5 mAHD. Subsequent pumping may have recaptured groundwater that passed the containment lines following the shutdown.

Secondary Containment Area (SCA)

Hydraulic containment was generally achieved in the deep aquifer at the SCA for the entire December 2007 monitoring period with the exception of:

- During the GTP shutdown in November/December 2007 hydraulic heads increased to above the target levels to between 0.5 and 1.0 mAHD, and it is likely that hydraulic containment during the GTP shutdown period was not achieved. Consistent pumping following the shutdown resulted in drawdown of the deep aquifer to below target levels in all monitoring wells (except MWF10) throughout the remainder of December 2007 (and continuing into 2008). Following the shutdown, pumping rates were set to maximise (to the extent practicable) the recovery of groundwater that may have passed the line during the shutdown.
- Hydraulic heads exceeded targets at several monitoring locations (MWF13 and MWF12) at the eastern end of the SCA during October 2007 due to the poor performance of EWF28D (and EWF26D to a lesser extent). Once EWF28D was repaired, the increased pumping resulted in hydraulic heads below the target level.
- Hydraulic heads at the western-most end of the SCA (MWF10) were above the target levels throughout the monitoring period in the deep aquifer and above the target levels in the shallow aquifer in October 2007. It is important to note that CHC concentrations in groundwater west of MWF08 are low and generally at or below relevant water quality guidelines (ANZECC 95% Low Reliability Trigger Value).

Comparison of Model-Predicted and Observed Groundwater Flow Regime

A preliminary comparison between modelled scenarios and current observed extraction rates for the GTP system required to achieve hydraulic containment and meet design constraints were conducted. The comparison shows that the current GTP system groundwater yield, which has largely attained hydraulic containment at the BIP, PCA and SCA, is within the range predicted by the hydraulic model (Laase, 2005). Model-predicted hydraulic heads under Scenario C and Scenario F are in reasonable agreement with observed hydraulic heads.

A preliminary comparison of the model-predicted potentiometric surface for Scenario F and the current observed potentiometric surface (December 2007) shows similar groundwater elevations, although greater observed drawdowns are apparent at the BIP and PCA. While differences in the flow regime can be observed, the overall flow and drawdown attributes are similar and of the same order.

3.2 Chemical Monitoring

Southern Plumes

The inferred distribution of volatile CHCs in the shallow groundwater within Southern Plumes during the December 2007 presented a generally stable or decreasing trend against historical data and is generally consistent with that reported in previous monitoring rounds. However, significant increases (against to the short term and long term historical data) were detected in some locations, particularly related to VC concentrations:

- BP114 (6 m): CFM and VC
- BP114 (10 m): VC
- MWF15I: CTC, CFM, PCE, EDC, VC and TCE
- BP01 (6 m): TCE
- WG154S: VC and EDC
- BP01 (2 and 6 m): VC and EDC
- BP115 (5.25): VC and EDC
- BP115 (6.5 m): VC
- BP61 (4 m): VC
- BP62 (8 m): VC

Significant decreases were detected at:

- BP01 (0.75): EDC and VC
- BP01 (1.25 m): CFM, VC, TCE and EDC
- BP01 (10 m): CFM and PCE
- WG75I: EDC, CFM and TCE
- BP61 (4 m): PCE
- BP61 (8 m): PCE, TCE and EDC
- BP62 (4 m): VC
- BP114 (4 m): VC
- MWF15S: VC
- MWF15D: EDC

Central Plumes

Although there was variability, with increases and decreases in concentrations depending on location and depth, concentrations of volatile CHCs within the Central Plumes are generally stable or decreasing and are consistent to that reported in previous rounds. However, significant increases were detected at:

- BP41 (4 m): EDC, TCE and VC
- BP41 (6 m): EDC, PCE, TCE and VC
- BP60 (6 m): EDC and VC
- BP60 (10 m): VC
- BP59 (12 m): PCE and VC
- BP73 (10 m): VC
- BP76 (4 and 10 m): VC
- BP77 (10 m): VC

Significant decreases were detected at:

- BP59 (4 m): EDC and TCE
- BP59 (8 m): EDC, PCE, TCE and VC
- BP73 (10 m): TCE
- BP76 (4 m): EDC
- BP76 (6 and 10 m): EDC and TCE
- BP77 (4 m): EDC and VC
- BP77 (10 m): TCE

Northern Plumes

The inferred distribution of volatile CHCs recorded within the Northern Plumes in shallow groundwater during December 2007, and particularly EDC and CTC, which represent the majority of the contaminant mass, are stable and decreasing and are consistent with historical data. However, significant increases against the historical average for the key volatile CHCs were recorded at BP04_12m (EDC and VC), BP57_12 m (EDC), BP58_6 m (EDC and VC) and BP58_9 m (EDC and VC).

Significant decreases in EDC concentrations were detected at BP78 (9 and 12 m), BP52 (6 m) and BP113 (6 m). Significant decreases in EDC, PCE, CFM, VC and TCE were recorded at WG41S. Significant decreases in VC concentrations were also detected at BP113 (3 and 6 m).

Penrhyn Estuary

In general, volatile CHC concentrations measured in pore water within Penrhyn Estuary are similar or lower than historical concentrations. 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 exception of:

- TCE: BP44 (0.1 m) and BP66 (0.1 and 0.5 m) at low tide.
- EDC: BP44 (0.1 m), BP66 (0.1m) at low tide and BP71A.
- VC: BP44 (0.5 m) at high tide.

The concentrations of the volatile CHCs in the shallowest ports of all sampled bundled piezometers were less than the respective ANZECC (2000) Trigger Values.

Surface Water

Surface water concentrations of total volatile CHCs in December 2007 (Floodvale and Springvale Drain outlets, Penrhyn Estuary at low tide) and January 2008 (Penrhyn Estuary at low and high tide) were generally less than the respective ANZECC (2000) Trigger Values, except in the sample collected from SW031 at low tide, which had a VC concentration of 0.14 mg/L.

The proportion of EDC relative to total volatile CHCs was lower than historically observed in samples collected from Springvale Drain and Penrhyn Estuary.

Implications for Human Health Risk Assessment (HHRA)

With respect to the western margin of the Northern Plumes, none of the data presented in the December 2007 quarterly monitoring report affects the conclusions of the Consolidated HHRA (URS, 2005e) and Addendum (URS, 2006b).

Based on the data collected to December 2007 (and considering the additional review of data presented in the June 2007 monitoring report (URS, 2007e)), the conclusions presented within the HHRA associated with exposures within the 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. However, the assessment has identified worst-case exposure scenarios (particularly within the inner estuary) where the calculated risks exceed the target values, however the assessment was based on higher concentrations of contaminants than observed in this monitoring event.

Recommendations

On the basis of the results of the December 2007 program, the following recommendations were made:

- Ongoing detailed review of hydraulic containment of the shallow aquifer at the BIP containment line is required to minimise the potential for loss of containment. However, it is important to note that containment is not required under the notice and the BIP line is operated as capacity allows. In addition, due to the relatively low concentrations of CHCs in shallow groundwater in this area, and the presence of PCA downgradient of BIP, immediate action to ensure drawdown in the shallow aquifer is not required.
- Checking and repair (as required) of several transducers where practicable which appear to be faulty.
- Checking and repair of two pumps which appear to be performing poorly. It must be noted that several pumps and transducers are in areas that cannot be easily accessed (SCA) and repairs occur at the first practical opportunity.
- Continual refining of pumping rates/levels at the SCA is required to maximise containment within the design constraints. Quarterly GTP monitoring rounds are showing limited changes in volatile CHCs concentrations in groundwater in many areas. On this basis, the GTP monitoring program should be reviewed and perhaps the scope reduced, whilst still ensuring data critical to environmental and human health are collected.
- Ongoing monitoring of surface water quality in Penrhyn Estuary and Floodvale and Springvale Drains is recommended to assess impacts / improvements in surface water quality in response to pumping at the hydraulic containment lines.

4 OTHER ENVIRONMENTAL ACTIVITIES

Other groundwater and surface water monitoring and data acquisition activities that have been undertaken in this reporting period pursuant to, or that have relevance to the agreed monitoring plan and conditions of the NCUA, are detailed below.

4.1 Residential Bores Monitoring

As part of a twice-yearly sampling program, Orica engaged URS to collect samples from 13 residential bores between Monday 5 November and Wednesday 7 November 2007. Residential bores sampled were within the Groundwater Extraction Exclusion Area (GEEA).

Volatile CHCs were detected in groundwater collected from 10 of the 13 residential bores sampled during this round. The concentrations¹ and type of volatiles CHCs detected in groundwater in each bore are summarised below:

The most pervasive contaminants present in the sampled bores were trichloroethene (TCE) and tetrachloroethene (PCE). These compounds are used as industrial solvents for the cleaning of dirt, grease, resins and glues. One of the typical degradation products of both PCE and TCE is cis-1,2-dichloroethene (cis-1,2-DCE), which was detected with TCE in groundwater from some Collins Street and Spring Street bores.

Trends in concentrations of TCE and PCE in bores from Collins and Spring Streets indicate that these contaminants appear to be migrating to the south-west (following the general groundwater flow direction) based on the increasing concentrations measured in the vicinity of Spring Street. These contaminants appear to be sourced from a site hydraulically upgradient of Collins Street.

Ethylene dichloride (EDC) was detected in one Dent Street bore, one Collins Street bore and two Spring Street bores. EDC is occasionally detected in groundwater in Collins Street at concentrations usually less than, and occasionally marginally above, Australian Drinking Water Guidelines. EDC is an intermediate product in the production of vinyl chloride (VC) and polyvinyl chloride (PVC) plastic and is often associated with groundwater contamination from the Botany Industrial Park.

The concentrations of volatile CHCs at one Dent Street bore, one Collins Street bore and two Spring Street bores could pose an unacceptable exposure to residents if groundwater was extracted and used. However, since these properties are located within the GEEA, and consequently groundwater should not be extracted and used, the potential risks to residents are considered likely to be acceptable. It is noted that assessment of exposures through soil vapour emissions has not been conducted for the properties at Collins and Spring Streets.

4.2 Air Monitoring and Human Health Risk Assessment

It was reported in Progress Report No.6 that the draft *Consolidated Human Health Risk Assessment 2005* (URS, 2005b) was prepared by URS and submitted to the

¹ For bores where field duplicate samples were collected, the highest concentration measured in either primary, inter-, or intra-laboratory duplicate has been used for this assessment.

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DEC on 31 March 2005 with copies provided also to NSW Health and Prof. Brian Priestly (Monash University) from the Australian Centre for Human Health Risk Assessment for independent review. Following a request from the DEC, the draft report was released publicly.

Prof. Priestly completed the independent review and provided comments in a letter to the DEC on 11 May 2005. Generally the comments were overwhelmingly positive and strongly supported the findings of the risk assessment.

Regular air monitoring programs are scheduled, and the results are compared with the data assessed in the Consolidated Human Health Risk Assessment. A summary of the current air emission programs is provided below. Some of these are a requirement of the aforementioned monitoring plan, whilst others have been undertaken in response to recent groundwater and surface water analytical results.

Springvale Drain Air Monitoring

It was reported in Progress Report No.10 that, following the detection of EDC in ambient air at concentrations exceeding those considered in the consolidated human health risk assessment, further sampling was being performed in order to:

- a) better quantify the variability of the air emissions results (if possible); and
- b) assess any potential risk to workers in the vicinity of the drain.

A sampling program was devised in consultation with DECC, NSW Health and WorkCover. The program's objectives were as follows:

- to determine whether the current risk profile for Southlands and businesses adjacent to the drain are within acceptable guidelines for workers; and
- to determine whether the GTP is capable of reducing the groundwater levels to render and maintain risk profiles at acceptable levels for businesses adjacent to the drain.

To achieve the objectives, the following scope was developed:

- develop a water level monitoring network adjacent to Springvale Drain suitable for detailed assessment of the interaction of groundwater and Springvale Drain. The monitoring network will be designed to assess the influence of recharge events as well as GTP operation on shallow groundwater discharge to the drain;
- assess risks to workers along Springvale Drain based on ambient air data collected during a six-month program to assess the effectiveness of the GTP operation in reducing shallow groundwater discharge to the drain and associated inhalation exposures;
- review the relationship between surface water concentrations and ambient air data to refine the volatilisation model. The volatilisation model, once refined, will be utilised to calculate target surface water concentrations that are considered to result in acceptable levels of risk associated with inhalation exposures in workplaces adjacent to the drain; and
- assess potential acute or short-term exposures that may occur in the event that the GTP is not operating resulting in increased discharge of shallow groundwater to the drain and increased concentrations of volatile CHCs in air. This

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assessment will aim to identify a maximum short-term exposure period which may be considered acceptable on the basis of acute or short-term risks to workers.

In summary, the operation of the containment lines (and consequent drawdown of the water table) does have significant impact on reducing the discharge of shallow groundwater into Springvale Drain (with observed very beneficial effects on surface water condition in Penrhyn Estuary), and hence has some mitigating effect on the risk profiles for adjacent lands. However, this cannot be maintained immediately after rainfall events, which results in higher concentrations of volatile CHCs entering the drain.

Consequently, Orica has committed to constructing 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 KBR to design and construct the spear point system. KBR will be supported by URS and by Greg Dasey from JBS as project hydrogeologist. A Review of Environmental Factors (REF) will be submitted to the DECC at the end of March 2008.

At the time of writing, a summary of the results and proposed corrective actions had been provided to the effected landowners.

4.3 DNAPL Source Area Depletion Projects

A detailed update on the DNAPL removal projects is provided as a separate report, *DNAPL and Groundwater Technology Annual Review No. 2*, in Attachment B.

5 GROUNDWATER TREATMENT PLANT OPERATION

The GTP has been operating since January 2006. In this time, several operating challenges have been presented to Orica. The following is an update of Orica's progress in overcoming and addressing these challenges in order to improve the GTP on-line time and throughput. The report *DNAPL and Groundwater Technology Annual Review No. 2* (Attachment B) also provides an update on the evaluation and implementation of improvements to unit processes in the GTP over the past twelve months.

5.1 Air Strippers

It has been reported in previous GCP Progress Reports that the air stripping system was suffering from biological fouling caused by the growth of a filamentous fungus within the stripping cabinets. Under the GTP's original operating regime, the groundwater entering the air strippers was acidified to prevent the build-up of inorganic precipitants such as aluminium and iron. However, laboratory experiments showed that these acidic conditions encouraged opportunistic growth of the filamentous fungus.

In this reporting period the following has occurred:

- Plans for the trials of two new fungicides are underway;
- Investigations have commenced into the use of chlorine dioxide as a sterilising agent; and
- A clean-in-place system is being developed.

The clean-in-place system will not inhibit the growth of the fungus, however it will provide a better operating environment for the cleaning process.

Additionally, a new fungicide has been identified that has proved to be successful in overseas plants. A consultant has recommended using chlorine dioxide to sterilise the feed to the strippers and provide residual biocidal performance through the strippers.

5.2 Stripped Water Treatment Plant (SWTP)

Previously it has been reported that 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 for the downstream Reverse Osmosis (RO) units. In this reporting period, sodium hypochlorite was trialled to provide a more robust oxidising environment and encourage the precipitation of iron. Mixed results have been obtained and the trials are continuing.

One of the Granular Activated Carbon (GAC) filters was converted to operate as a Biological Aerated Filter (BAF) to evaluate the use of BAFs to reduce biological fouling in downstream pressure filters and RO units. Hydraulic tests were encouraging, however inadequate data has been obtained to validate the organic removal. The trial also resulted in reducing conditions in the SWTP, and treatment rates had to be limited to prevent potential sulphide production. Regardless, the trials were considered successful, and considering it is not possible to run the BAF

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and the GAC units simultaneously, four other GAC units will be converted to BAFs and will be commissioned in March 2008.

5.3 Chloramine in the Permeate

As has been previously reported, chloramine has been used to control biological fouling in the SWTP. Contrary to the expectations of Orica's suppliers and expert consultants, laboratory results identified that the chloramine was not removed by the reverse osmosis (RO) units into the trade waste, but passed through the RO units with the treated water.

The presence of chloramine in the treated water can cause operational problems for some users of the treated water. Furthermore, a significant proportion of the treated water is still being discharged to a stormwater channel at Perry Street, which then flows into Bunnerong Canal and then into Brotherson Dock. Chloramine can be harmful to organisms in the marine environment.

The DECC has placed a limit of 0.1 mg/L of Total Residual Chlorine (which includes chloramine) on the excess discharge water. Orica has installed a system to dose sodium metabisulphite to chemically remove chloramine. As this generates ammonia, the DECC has temporarily raised the ammonia limit on discharge water. The DECC simultaneously altered the EPL 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, which included discussion on dilution of ammonia in the stormwater channel due to other contributing discharges. 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.

In this reporting period, Orica commenced discussion with Amcor to measure their rates of extraction from the Snape Park Borefield. Water pumped from Snape Park travels via Bunnerong Canal to Long Dam, where it mixes with water discharged from the GTP treated water line. Due to inclement weather (Amcor does not pump during and following rainfall events when they can use stormwater in preference to groundwater) and faulty flow meters, the dilution calculations are yet to be finalised.

Trials also commenced using catalysed activated carbon for chlorine destruction and reduced ammonia production. The results were encouraging and further trials were underway at the time of writing.

A complete summary of progress under the Pollution Reduction Program will be submitted to DECC at the end of February 2008.

5.4 Thermal Oxidiser and Dioxin Air Emissions

The thermal oxidiser (TO) has been successfully commissioned and is operating within licence specifications. One stack sample was collected and analysed in this reporting period, the result was less than the specified licence limit of 0.1 ng/m³.

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Date	Stack Emission Results (dioxin TEQ, ng/m ³)
December 2007	0.016

5.5 Operational Performance

An average of 4.0 ML/day of contaminated groundwater have been extracted and treated by the GTP during this reporting period. This figure includes downtime when the plant wasn't operating – most notably due to the November/December GTP shutdown – hence the plant often treated significantly more than 4.0 ML/day when on-line.

5.6 Operating Data Summary

A summary of the aggregate data from the SSU and GTP since the commencement of groundwater remediation on 28 October 2004 to the end of February 2008 is provided below:

Total water treated to date:	3.3 GL
Total recovered and/or destroyed CHCs:	538 tonnes

5.7 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 and trials on the use of treated water to feed the Site Utilities Demin Plant have been performed. Solvay Interlox commenced use of treated water from the GTP in June 2007.

Treated water is currently being used by Orica and Qenos in cooling tower applications. In this reporting period, Solvay Interlox has re-commenced using the treated water. Use of treated water to feed the Demin Plants is awaiting resolution of some operational issues, which should be aided by successful operation of the BAF units.

5.8 Temporary Aquifer Storage and Recovery

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 temporary aquifer storage and recovery (TASR) was identified as the most suitable alternative. In the event of a significant GTP failure (i.e., that would necessitate a GTP shutdown for more than three or four weeks) 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

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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 BIP containment line.

The groundwater cleanup works are being conducted under the NCUA (NSW EPA, 2003). State Environmental Planning Policy 55 - Remediation of Land specifies that all works in response to a Notice of Clean Up Action are permissible without development consent. As such, installation of the TASR system is to be assessed and approved under Part 5 of the *Environment, Planning and Assessment Act 1979*.

In this reporting period, Orica has prepared a draft REF for submission in early March 2008. Some delays have occurred to the project caused by lack of availability of hydrogeological modelling resources. JBS Environmental and A.D. Laase Hydrologic Consulting, Inc. (based in Colorado, USA) are performing the modelling.

5.9 Biological Fouling of Shallow Wells on Foreshore Road

Mono pumps are progressive cavity pumps and are capable of pumping sludges without hindrance. In this reporting period, efforts continued to source a high-grade stainless steel positive displacement pump fitted with a high-grade stainless steel motor. Unfortunately finding compatible pumps and housings has proved difficult as no single company produces both items, and cannot guarantee their performance when a combined unit is manufactured. Orica is in discussions with a number of companies to resolve these issues.

Orica is also examining the use of well sleeves installed inside the extraction wells to prevent the ingress of oxygenated water from the shallow aquifer as a means of limiting bacterial growth in the wells and header pipes. At the time of writing, JBS Environmental and AGE Developments Pty Ltd (Western Australia) are developing a proposal for Orica's consideration.

5.10 Annual Shutdown

The GTP annual shutdown occurred between 15 November 2007 and 7 December 2007. The shutdown extended for longer than was initially planned due to a fault that occurred with a key valve that was only revealed once the plant was almost online, and a delay to the startup to allow completion of transformer oil treatment that was indicated during preventative maintenance checks. The following is a list of significant maintenance items that were performed during the shutdown.

- inspect and repair refractory material in thermal oxidiser;
- inspect main blowers, rebalance as required and upgrade lubrication system;
- undertake preventative maintenance on rotating equipment and electrical systems;
- inspect main heat exchanger E6103 and repair as required;
- perform pressure vessel inspections and service steam system; and
- install new equipment for improvement projects (e.g., new electrical system for BAF project, tie-ins for Clean-In-Place project, jet mixer for treated water tank, acid system non-return valves).

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Over 350 jobs were executed without any environmental or safety incidents.

6 COMMUNITY CONSULTATION

This section provides a consolidated update in response to Condition 7K of the NCUA, which specifies how Orica must inform the community of developments in the remediation of groundwater, and information regarding the wider consultation activities, which are undertaken by Orica to obtain community feedback regarding the BGC Project. Orica supports a two-way communication process with our local community and this section incorporates feedback received from the community during the reporting period.

6.1 Community Liaison Committee (CLC)

CLC Meetings

A quarterly CLC meeting was held on 18 December 2007. Presentations were made by the DECC and Orica on the progress of the Cleanup Project, by KMH Environmental on the independent validation audit for 2006/07 and by URS Australia on hydraulic containment and chemical monitoring at the SCA. 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
Feature to gather feedback on CLC activities and achievements to be incorporated in the Orica website.	Orica released an email feedback feature on the new Orica Botany Transformation projects website on 21 February 2008.
Members requested further details on the repair and maintenance works performed during the annual GTP shutdown in late November 2007.	Orica will provide further details and charts to better explain the annual shutdown works at the April CLC meeting.
The CLC is concerned that the BGC Project is not progressing well enough. The CLC requested figures showing plume distributions over time to illustrate progress and more commentary reporting in the briefing paper.	Orica is considering appropriate images and drafting further commentary to include in the April briefing paper.
CLC requested DECC to provide comment on: <ul style="list-style-type: none"> November 2007 Progress Report Acceptability of the level of containment achieved at eastern end of the SCA Progress with ammonia Pollution Reduction Program Reasons behind why the BIP Containment Line and hydraulic containment at the containment line is not a requirement under the NCUA Impact of chloramine and CHCs on aquatic ecosystems 	The DECC will provide comments during its presentation at the April CLC meeting. With regard to information on the impacts of chloramine and CHCs on aquatic ecosystems, the DECC will enhance its presentation notes from the December 2007 CLC meeting and distribute prior to the April CLC meeting.
The CLC asked CoBB to advise on the outcome of sampling it had conducted for CHCs discharges in Springvale Drain.	CoBB will advise on outcomes at the June CLC meeting.

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Matter Raised by CLC	Action Taken or Planned
Concerns were expressed that noise heard in Queen Street, Botany relates to the GTP. The CLC requested that the BIP noise monitoring report be made available.	Orica provided copies of the BIP noise monitoring report to those who had requested it. Orica also consulted with the concerned members on the possible sources of noise and outlined routine noise monitoring conducted at BIP and the surrounding area.

CLC Newsletter

CLC Newsletter No. 27 was distributed in December 2007 after being reviewed by the CLC. It included updates on GTP operations (including the scheduled annual maintenance shutdown and an update on maintenance works at SCA), the combined CLC and IMC Meeting in October 2007, the outcome of the Penrhyn Estuary Ecological Monitoring Program, and feedback from the September 2007 CLC meeting.

A draft of CLC Newsletter No. 28 will be issued to the CLC for comment in the first week of March 2008 and will be finalised and distributed prior to the April CLC meeting.

6.2 Independent Monitoring Committee (IMC)

The table below lists outstanding IMC tasks. All completed IMC tasks are listed on the new project website: www.oricabotanytransformation.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 outlet and the stack.	OUTSTANDING , progress report to be provided to the April CLC meeting. Raised by the CLC on 19/06/07.
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 , progress report to be provided to the April CLC meeting. Raised by the CLC on 26/10/07.

6.3 Communication Tools

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. As an interim, Orica is preparing an insert for the CLC March/April Newsletter that will provide an update on the progress of Orica's Treated Water Recycling Program.

Further planning on the combined workshop with Sydney Ports to discuss the interface of the groundwater cleanup and the Port Development is expected to take place at the April CLC meeting.

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 73: 18 December 2007:* GTP scheduled annual maintenance shutdowns, and changes to Orica Rainwater Tank Rebate Program;
- *Column 74: 29 January 2008:* GTP average treated groundwater volume and operations update; and,
- *Column 75: 26 February 2008:* notice of upcoming closure of the Rainwater Tank Rebate Program and April CLC meeting.

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 now 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.16 and Appendices;
- Recent newspaper columns;
- December CLC newsletter;
- CLC Briefing Paper, December 2007;
- Presentation materials from December 2007 CLC Meeting; and,
- Independent Validation Audit Report, September 2007.

Orica released a new webpage for the BGC Project on 26 February 2008 (www.oricabotanytransformation.com). The new website has enhanced page organisation, its content is more viewer friendly and it also creates easier access to website information on all Orica Botany Transformation projects. All documents available on the previous site have been copied to the new website and additional reports have been uploaded. Viewers accessing the old site will be automatically redirected to the new site. Changeover to the new website has meant that website visitor data is not available this quarter.

1800 Number

Orica continues to operate the free-call number, 1800 025 138. The majority of calls during this reporting period related to Orica's Rainwater Tank Rebate Program.

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Other calls included queries relating to groundwater use, bore testing, BIP issues, community events and numerous requests for a 2008 Orica Community Calendar.

E-mail Feedback

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

Provision of Reports (Part d of Condition 7K)

Part d of Condition 7K requires Orica to provide the community forum (i.e., the CLC) and the local libraries in the local government areas of Botany Bay and Randwick copies of reports provided to the EPA under the NCUA. This continues to be done.

6.4 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 monitoring event and results are discussed in Section 4.1 of this report. It will also be reported in the CLC Newsletter No. 27. The next round of residential bore testing is planned to take place in early May 2008.

Rainwater Tank Rebate Program – At the time of writing, 962 tanks had either been installed or approved for installation. The program will end on 30 June 2008, and a notice of its closure was printed on the February newspaper column.

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**ATTACHMENT B – DNAPL AND GROUNDWATER REMEDIATION
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