

	REPORT No: EN.1591.61.PR037	Rev: 0
GROUNDWATER CLEANUP PLAN PROGRESS REPORT NO. 26		

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GROUNDWATER CLEANUP PLAN PROGRESS REPORT No. 26

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REVISION 0

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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
BAF	Biological Aerated Filter
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)
BGL	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
CHHRA	Consolidated Human Health Risk Assessment
cis-1,2-DCE	cis-1,2-dichloroethene
CoBB	City of Botany Bay
COPC	Chemical of potential concern
CPRC	Community Participation and Review Committee
CTC	Carbon tetrachloride (tetrachloromethane)
CLC	Community Liaison Committee
DEC	Department of Environment and Conservation, incorporates the EPA and is now DECCW
DECC	Department of Environment and Climate Change, formerly DEC, incorporates the EPA and is now DECCW
DECCW	Department of Environment, Climate Change and Water, formerly DECC, incorporates the EPA and NSW Office of Water (whose function was formerly part of DNR)
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 and DWE, now the relevant section is incorporated in the NSW Office of Water, which is part of DECCW)
DWE	Department of Water and Energy
DoD	Department of Defence
DoP	Department of Planning (formerly part of DIPNR)
EDC	Ethylene dichloride (1,2-dichloroethane)
EDO	Environmental Defender's Office
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	Granular activated carbon

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ACRONYM	DEFINITION
GCP	Groundwater Cleanup Plan
GEEA	Groundwater Extraction Exclusion Area
GIR	Groundwater Injection and Recovery
GTA	General Terms of Approval
GTP	Groundwater Treatment Plant
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HHRA	Human Health Risk Assessment
IMC	Independent Monitoring Committee
ISCO	In Situ Chemical Oxidation
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
PRP	Pollution Reduction Program
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
TOC	Total Organic Carbon
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)

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ACRONYM	DEFINITION
VMP	Voluntary Management Proposal
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, 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 sixth report submitted in accordance with NCUA Condition 4G. The following is a summary of activities in the period 1 January 2010 to 31 March 2010.

NCUA Condition 3B(e) requires Orica to implement a comprehensive monitoring program. Results in this quarter indicated the following:

Hydraulic Monitoring

- The inferred contours and patterns of shallow and deep groundwater flow infer that hydraulic containment was achieved at BIP and PCA during the monitoring period;
- With the exception of water levels in the intermediate aquifer at the eastern end of the SCA, hydraulic containment was successfully achieved during the monitoring period. Detailed monitoring of the changes to water levels following cleaning (pigging) of pipe lines in May 2010 is required to ensure that target levels are achieved at the western end of the containment line;
- Elevated groundwater levels were observed at the SCA in intermediate monitoring wells east of MWF01. The increased levels are the result of fouling in the deep extraction wells. Detailed analysis of the causes (biological/geochemical) of the fouling has been commenced and a drilling contractor will commence cleaning activities in early June 2010. It is anticipated that cleaning of extraction wells will be included as part of the ongoing preventative maintenance program; and
- Water levels at regional monitoring locations show no discernible water level impact due to hydraulic containment thus indicating a limited potential to affect infrastructure and licensed groundwater users.

Chemical Monitoring

- Historical maximum concentrations for a number of volatile chlorinated hydrocarbons were reported in the Central Plume area at the 8 m port of BP60 and at the 20 m port of BP77. Similarly, historical maximum concentrations in the Southern Plumes area were also reported at MWF15S, MWF15I and at BP58, located in the Northern Plumes area. The reported historical maximum concentrations, with the exception of concentrations at BP01, are not considered significant as they are similar to concentrations reported previously for the respective sample locations. Slight changes in concentrations may be a function of changes in plume distribution induced by hydraulic containment.

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- The March 2010 groundwater data from Penrhyn Estuary is consistent with data from the previous monitoring rounds, with the concentrations of the chemicals of concern generally decreasing towards the discharge interface.
- The concentrations of the key contaminants reported in the March 2010 monitoring round are less than the ANZECC (2000) Trigger values for all samples collected at the discharge interface (0.1 m port).

Human Health Risk Assessment

- There are no additional data presented in the March 2010 monitoring round that affect the conclusions of the Consolidated Human Health Risk Assessment (HHRA) (URS, 2005c) or its Addendum (URS, 2006).
- The Consolidated HHRA will be revised in September 2010. It will be reviewed by Independent Monitoring Committee (IMC) member Professor Brian Priestly at the request of the Community Liaison Committee (CLC).

Project Regulation and Administration

Following consultation with the CLC and Orica, DECCW determined that the project is best managed by a Voluntary Management Proposal (VMP) under the Contaminated Land Management Act 1997.

Orica submitted the final VMP to DECCW in May 2010. This report will be the last provided against NCUA No. 1030236 and its variation notices. Reports summarising progress against the VMP will instead be provided starting in August 2010 (assuming the VMP is ratified).

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1 INTRODUCTION

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. Since then the DECCW 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 twenty sixth report submitted in accordance with NCUA Condition 4G. The reporting interval for this report is 1 January 2010 to 31 March 2010, however if more recent and relevant information is available it is also included.

Previous reports are available at the relevant section of the website www.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 Clean Up Action (NCUA)

A summary of the compliance status against current NCUA (including variation notices) condition requirements is provided below. The regulation of the Botany Groundwater Cleanup (BGC) has been reviewed by DECCW to take into account cleanup progress and recent developments and the NCUA is to be replaced with a Voluntary Management Plan (VMP). Orica has prepared a draft and final (responding to DECCW comments) VMP for agreement with DECCW (refer Section 2.4).

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, DECCW 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	Significant DNAPL investigations completed to date and discussed in previous GCP Progress reports. 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,	Ongoing compliance	Summary of monitoring program results for this reporting period

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Cond.	Summary of Requirement	Status	Reference Documents / Comments
	August and November of each year.		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 slightly to moderately disturbed ecosystems.	Work in progress	Discussion on latest findings provided in Section 3 and Attachment A of this report.
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	All emission points are licensed under EPL 2148
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	Access to third party premises sought as required.
7A	Updating of GCP to take account of developments.	Ongoing compliance	A revised Groundwater Remediation and Management Plan (GRAMP) has been submitted as an attachment to the Voluntary Management Proposal (see Section 2.4) When ratified, the GRAMP will replace the current GCP.
7B	Orica to monitor groundwater in any other area likely to have been, or to be, impacted by the contaminants.	Ongoing compliance	The most recent residential bore monitoring round took place in early May 2010, results will be provided in the next Progress 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 DECCW 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	Orica held a workshop at Botany in December 2007 to discuss remediation strategy with a range of respected overseas and local experts. A submission and presentation were made to the DECCW and the Botany Groundwater Community Liaison Committee (CLC) in September 2008. A community workshop was held on 31 March 2009. The revised remediation strategy has been included in the VMP and supporting documents.

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Cond.	Summary of Requirement	Status	Reference Documents / Comments
			At the time of writing, two Orica representatives were attending the 2010 Battelle conference in Monterey, California.
7F	Orica must provide an annual written report to DECCW on actions required by 7E. First report to be provided no later than 28 February 2006.	Ongoing compliance	The 2010 Annual Report was provided in GCP Progress Report No. 25.
7G	Orica must review the need to revise the HHRA in light of relevant monitoring data.	Ongoing compliance	See 7H
7H	All reports submitted to DECCW must include an assessment of the potential risk to human health.	Ongoing compliance	All reports now submitted to DECCW include relevant appraisal of potential risk to human health and hence identify any requirement to update the Consolidated 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 City of Botany Bay (CoBB) Council within 7 days of submission to DECCW.	Ongoing compliance	Ongoing compliance
7K	Orica must inform the community of developments by: a) A community forum agreed to by the DECCW. 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 b) See Section 6.1. c) www.oricabotanytransformation.com
8	Works and measures under voluntary agreement must not compromise the efficacy of measures under the notice.	Ongoing compliance	Orica discontinued the enhanced bioremediation trials in 2004 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 DECCW 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.

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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 to DECCW. The following matters are noted in relation to the licence conditions for the Groundwater Treatment Plant (GTP) for the reporting period:

- The EPL was modified on 29 January 2010 (E8.8) to allow for the implementation of the bioaugmentation trials in Southlands that are being conducted in conjunction with the Centre for Marine BioInnovation (UNSW).

2.3 Other Licences and Statutory Approvals

A summary of recent compliance activity regarding other approvals relevant to the project is provided below.

- Orica submitted production bore applications to the Department of Water and Energy (DWE; now the NSW Office of Water, part of DECCW) in mid 2008 and awaits a response.
- An application for a combined Network Operator and Retail Supplier licence under the Water Industry Competition Act, 2006 is to be submitted to the Independent Pricing and Regulatory Tribunal of NSW by 8 August 2010.

2.4 Ongoing Regulation

Following consultation with the Community Liaison Committee (CLC) and Orica, DECCW determined that the project is best managed by a Voluntary Management Proposal (VMP) under the Contaminated Land Management Act 1997.

Orica submitted the final VMP to DECCW in May 2010. The purpose of the VMP is to establish a clear set of undertakings relating to each part of the project including:

- Maintenance and optimisation of hydraulic containment;
- Chemical and hydraulic monitoring programs for groundwater, surface water, air and other relevant environmental media;
- Assessment of risk to human health and the environment;
- Source area management;
- Contingencies for the GTP; and
- Community consultation.

Orica notes that the existing NCUA is referenced in Schedule 1 to State Environmental Planning Policy (SEPP) 55 – Remediation of Land. The Department of Planning (DoP) and DECCW have discussed the need for an amendment to this SEPP following implementation of the approved VMP to provide the ongoing

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statutory approvals framework under SEPP55 for work conducted in accordance with the approved VMP. In the meantime, the NCUA will need to remain “active” until such time that an amendment to SEPP55 can be made.

Orica has requested, that once the VMP is enacted that DECCW modify the NCUA to remove or modify conflicting or duplicated requirements until such time that SEPP55 is amended and the NCUA can be revoked in full.

If the VMP is approved and the changes are made to the NCUA in time, this report will be the last provided against NCUA No. 1030236 and its variation notices. Reports summarising progress against the VMP will instead be provided starting in August 2010.

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 (now the NSW Office of Water), 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 (ANZECC, 2000) trigger values for protection of slightly to moderately disturbed ecosystems.

Orica and DEC (now DECCW) subsequently agreed the content and scope of the *GTP Groundwater and Surface Water Monitoring Plan* (URS, 2005b). On an annual basis DECCW and Orica meet to discuss the effectiveness of the monitoring program and revise monitoring requirements as appropriate. In June 2008 Orica submitted its proposal for monitoring from late 2008 to 2010 (URS, 2008).

Orica engaged Golder Associates (GA) to complete a quarterly monitoring event in March 2010 in accordance with the agreed monitoring plan. Results and discussions were provided in the GA report *Groundwater Treatment Plant (GTP) Quarterly Groundwater and Surface Water Monitoring Report, March 2010*. This report is bound separately as Attachment A. The remainder of this section has effectively been transcribed from the GA report to summarise the monitoring events findings.

3.1 Hydraulic Monitoring

Botany Industrial Park (BIP) Containment Area

Groundwater extraction flow rates and the consistency of pump operation at the BIP have improved significantly compared to previous monitoring rounds. This improvement is reflected in the current water level monitoring data that shows water levels have decreased to approximately 3 mAHD (metres Australian Height Datum) at the containment line monitoring wells. These water levels are lower than those required for hydraulic containment at the BIP containment line (Laase, 2005). Based on this data and the interpreted groundwater flow at the BIP, hydraulic containment during the monitoring period was achieved for the monitoring period.

Primary Containment Area (PCA)

Pumping was consistent following the annual shutdown for extraction wells along McPherson Street although levels at EWB10D and EWB11D were not as low as adjacent PCA extraction wells. However, the water levels at EWB10D/EBW11D were maintained at levels close to, or below the target level of 1 mAHD, and levels at

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the adjacent monitoring wells (MWB03 to MWB05) indicated that containment was effected.

Secondary Containment Area (SCA)

Eastern Portion

- Following completion of the annual maintenance program at the GTP in December 2009 groundwater extraction was consistent at the eastern end of the containment line. With the exception of water levels in the intermediate aquifer at the eastern end of the SCA, hydraulic containment was successfully achieved during the monitoring period.
- Previous reports have discussed re-occurring issues with intermediate water levels at SCA. Groundwater levels in intermediate monitoring wells east of MWF01 consistently exceeded the target level during the monitoring period. Historically (2005) water levels in the deep and intermediate aquifer responded similarly to changes in groundwater extraction rates in the deep aquifer. However, recent monitoring (including that presented in this report) clearly indicates that this response no longer occurs and extraction now affects the intermediate aquifer less than the deep aquifer. Based on these observations (and the results of previous investigations and recent maintenance works) it is concluded that fouling of the deep extraction well screens is occurring.
- A program of microbiological and geochemical sampling is currently underway to identify the cause of the fouling and the most appropriate methodology for rehabilitation of the extraction wells.
- At the time of writing the barriers had been moved to allow access to the affected wells and samples had been collected from extraction wells EWF22S/D, EWF24S/D, EWF26S/D, EWF28S/D and monitoring wells MWF12S/I/D to MWF14S/I/D. A drilling company has been engaged to commence preparatory works for cleaning of fouled wells from early June 2010.

Western Portion

- Following completion of the annual maintenance program at the GTP on 10 December 2009 groundwater extraction at the western end of the SCA was less consistent compared to the eastern end of the containment line. The reduced performance at the western end of the containment line is the direct result of elevated pressure in the header pipe restricting pumping rates. Although the groundwater extraction rates were limited, water levels remained at or below the nominated 0.1 mAHD target from late December 2009 through to early February 2010 when significant rainfall resulted in elevated groundwater levels.
- In mid May 2010, a program to clean (pig) the header was undertaken by Orica. This resulted in an immediate reduction in pressure on the western end of SCA (approximately 50 kPa) and more uniform pressure across the line. A detailed review of the effects of the pressure change on water levels will be provided in the June 2010 report.

3.2 Chemical Monitoring

Offsite Monitoring Wells

The assessment of groundwater chemical monitoring data presented in this report focuses on historical maximum concentrations. Historical maximum concentrations were reported for several contaminants at the 0.75 m and 2 m ports of BP01. The fluctuation in concentrations reported in the December 2009 and March 2010 monitoring rounds at this location may indicate that the bundle piezometer's integrity has been compromised. As such, new drive-points will be installed at this location to serve as an additional/alternative sampling location prior to the next quarterly monitoring round. Based on the results of sampling at the discharge interface and for surface water in Penrhyn Estuary the elevated concentrations at BP01 are not currently impacting on water quality in the estuary.

Three nested monitoring wells are currently being installed between the SCA and Penrhyn Estuary to further assess contaminant concentrations and hydraulic containment at the SCA. These wells, along with the replacement sample locations at BP01, will provide additional data to aid in determining the cause of the variable concentrations at BP01.

Historical maximum concentrations in the Central Plume area were reported at the 8 m port of BP60 (EDC, PCE and TCE) and at the 20 m port of BP77 (EDC, PCE, TCE and CFM). Similarly, historical maximum concentrations in the Southern Plumes area were also reported at MWF15S (PCE), MWF15I (CFM) and at BP58 (TCE), located in the Northern Plumes area.

The reported historical maximum concentrations, with the exception of concentrations at BP01, are not considered significant as they are similar to concentrations reported previously for the respective sample locations. Slight changes in concentrations may be a function of changes in plume distribution induced by hydraulic containment.

Penrhyn Estuary

The March 2010 groundwater data from Penrhyn Estuary is consistent with data from the previous monitoring rounds, with the concentrations of the chemicals of concern generally decreasing towards the discharge interface.

The concentrations of the key contaminants reported in the March 2010 monitoring round are less than the ANZECC (2000) Trigger values for all samples collected at the discharge interface (0.1 m port). No historical maximum key contaminant concentrations were reported during the March 2010 monitoring round.

Surface Water

Key contaminant concentrations reported in the March 2010 monitoring round continued to be less than the relevant ANZECC (2000) Trigger Values.

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Implications for Human Health Risk Assessment

There are no additional data presented in the March 2010 monitoring round that affect the conclusions of the Consolidated HHRA and its Addendum in relation to the Western Margin of the Northern Plumes and with respect to existing commercial/industrial workers in areas above the main plumes.

That is, the groundwater contamination within the Northern Plumes near the Western Margin and within the main plumes is not considered to pose an unacceptable risk to human health, assuming groundwater is not extracted and used.

Similarly, based on the data collected up to March 2010, the conclusions presented within the Consolidated HHRA and its Addendum associated with exposures within the inner and outer estuary remain unchanged. That is, given the conservative nature of the range of assumptions and the safety factors applied to toxicity values, the risks to human health for all exposure scenarios are considered to be low. However, the assessment has identified worst-case exposure scenarios (particularly within the inner estuary where calculated risks exceed the target values). It is noted that the potential for exposure within the inner estuary is effectively eliminated by access restrictions associated with the current Port Botany expansion works.

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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 Human Health Risk Assessment

It was reported in Progress Report No. 6 that the draft *Consolidated Human Health Risk Assessment* (Consolidated HHRA) (URS, 2005c) was prepared by URS Australia Pty Ltd and submitted to the DEC on 31 March 2005 with copies provided also to NSW Health and Professor 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.

The Consolidated HHRA is scheduled to be revised by the end of September 2010. It will again be reviewed on behalf of the CLC by Professor Brian Priestly.

4.2 Residential Monitoring

Monitoring of requested eligible residential bores in the Groundwater Extraction Exclusion Area (GEEA) for volatile chlorinated hydrocarbons occurred again in May 2010 and will be reported on in the August Progress Report.

4.3 DNAPL Source Area Depletion Projects

In accordance with Condition 7E of the NCUA, Orica is required to stay abreast of relevant DNAPL remedial technologies and apply them as practicable. Orica is required to submit an annual report pursuant to this condition at the end of February every year. The 2010 report was provided as an attachment in GCP Progress Report No. 25.

4.4 Groundwater Injection and Recovery

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.

As reported in Progress Report No. 24, in order to maximise effectiveness Orica will need to minimise clogging in the injection wells (which has been observed during the injection field trials conducted in November 2009) so as to extend the rates and duration of the injection. Orica has proposed 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 submitted a Stage 2 trial plan to DECCW in November 2009 for discussion. At the time of writing, DECCW had requested some clarifications and Orica had responded.

It is Orica's intention to have this project completed by the end of July 2010.

5 GROUNDWATER TREATMENT PLANT OPERATION

5.1 GTP Performance

A summary of indicative GTP operational performance figures for 1 January 2010 to 31 March 2010 is provided below:

Average volumetric rate of groundwater treated (1 January 2010 to 31 March 2010)	5.58 ML
Approximate total volume of groundwater treated since pump and treat activities commenced in 2005 (at 31 March 2010).	6,550 ML
Estimated total mass of CHCs destroyed in the thermal oxidiser (at 31 March 2009).	785 tonnes

Since commencement of operations in 2006, there have been significant improvements to the treatment process resulting in gradual increases in the daily treatment volumes.

5.2 Thermal Oxidiser and Dioxin Air Emissions

All stack testing emission results were within licence limits.

5.3 Beneficial Reuse of Treated Water

Orica continues to provide treated water from the GTP for industrial reuse at the BIP and adjacent industry.

5.4 Containment Line Infrastructure

SCA

- Pigging of the western portion of the line was completed in May 2010, resulting in more uniform pressure and improved groundwater extraction and water levels.
- Cleaning of selected extraction wells is scheduled for June 2010 to reduce the fouling effects described in Section 3.1.
- The maintenance requirements on Foreshore Road mean that there is the need for a more permanent barrier solution to protect workers and allow for immediate access to the entire line. Orica met with RTA in May 2010 to discuss possible barrier designs.

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PCA

- An extensive maintenance and pipe work replacement program is scheduled for Southlands in late 2010 and early 2011. This program will include underbore maintenance, replacement of carbon steel lines with stainless steel and construction of a protective wall to prevent tampering with the lines.

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. It provides information regarding the consultation activities undertaken by Orica to obtain community feedback regarding the BGC Project.

6.1 Community Liaison Committee

A quarterly Community Liaison Committee (CLC) meeting was held on 9 March 2010. The following table summarises key matters raised at the meeting, and actions taken or planned as a result (N.B. this information has been summarised from draft minutes not yet endorsed by the CLC).

Matter Raised by CLC	Action Taken or Planned
The CLC issued one new task related to BGC Project for Prof Priestly of the Independent Monitoring Committee to review the revised Consolidated HHRA when it is complete	Prof Priestly has been issued with the task and will be providing a brief report to the CLC when complete.
Continued interest in reviewing the current communication approach to ensure effective community communication is maintained throughout the life of the BGC Project.	Once Jason Prior's research on community attitudes towards remediation is published, the CLC will read, review and discuss how effective ongoing communication can be maintained.

CLC Newsletter

No newsletter was issued during this reporting period as timing conflicted with more urgent publishing of another community newsletter relating to Orica Botany projects (HCB Community Participation and Review Committee (CPRC)). At the March CLC meeting, the committee agreed to combine the CLC and CPRC newsletter to create one consolidated community newsletter focussing on Orica Botany projects. However, this idea was not supported by the CPRC and the first CLC newsletter for 2010 will be issued in June.

Consultation/Communication Forum Invitations for CLC members

Orica coordinated and supported the offer for CLC members to attend recently held consultation and communication forums run by the remediation industry. Several CLC members attended the events.

6.2 Communication Tools

Website

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

- Groundwater Cleanup Plan Progress Report No. 25;
- The Briefing Paper and presentations from the March 2010 CLC meeting;
- Meeting minutes from the December 2009 CLC meeting; and,

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- Recent newspaper columns.

Of the 2,876 visits to the Botany Transformation Projects website from 19 February to 24 May, 1,260 visits were to BGC Project pages.

E-mail Enquiry

There were two website email enquiries related to the BGC Project in this reporting period from students seeking further information on the project. No emails were received via the GLC feedback facility.

Newspaper Columns

Three newspaper columns have been published in the *Southern Courier* since the last quarterly Progress Report. A column was also published in the *St George and Sutherland Shire Leader* in March 2010.

1800 Number

The Botany Industrial Park (BIP) operates a free-call number – 1800 025 138. Calls relating to Orica's remediation projects are directed to the Community Relations Team. Various calls were received from residents seeking to participate in Residential Bore Monitoring Program. There was also one call regarding the now finished Rainwater Tank Rebate Program.

BIP Community Consultative Committee

An update on the BGC Project was provided at the BIP CCC meeting held 21 April 2010.

6.3 Outreach Projects

BIP Site Tour

Orica held a site bus tour of its Botany Transformation Projects for the community on 19 April. 28 people attended, including representatives from the local community, the University of Western Sydney and DECCW.

Residential Bore Monitoring

Orica undertook residential bore monitoring at 11 locations in May 2010. Analysis is underway and results will be reported when they become available.

Botany Bay National Park

Flora survey and walking track projects at Botany Bay National Park that Orica has funded continue to progress.

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7 REFERENCES

ANZECC/ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.

Connell Wagner (2008) *Hydrological Flood Study, Southlands*

Orica Australia Pty Ltd (Orica, 2003). *Groundwater Cleanup Plan*. EN1591-00-10-001, Rev 0. October 2003.

URS (2005a) Orica Botany Environmental Survey, Stage 4 – *Remediation. Groundwater Cleanup Plan (GCP) Quarterly Groundwater and Surface Water Monitoring Report - December 2004*. Doc. No. R021_A, 15 February 2005.

URS (2005b) Orica Botany Environmental Survey, Stage 4 – Remediation. *Groundwater Treatment Plant – Groundwater and Surface Water Monitoring Plan*. Document Number R013_A. 17 May 2005.

URS (2005c) Orica Botany Environmental Projects. *Consolidated Human Health Risk Assessment 2005*. Document Number R022_D. August 2005.

URS (2006) Orica Botany Environmental Projects. *Addendum to Consolidated Human Health Risk*. Doc. No. R022_D, August 2005.

URS (2008) *Proposed Amendment to the GTP Groundwater and Surface Water Monitoring Program, 2008-2010*. WCIE 4396. 6 June 2008.

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ATTACHMENT A – QUARTERLY MONITORING REPORT – MARCH 2010.

Groundwater Treatment Plant (GTP) Quarterly Groundwater and Surface Water Monitoring Report, March 2010. Golder Associates Pty Ltd. May 2010. *Separately bound report.*

