**Community Liaison Committee**
**Botany Groundwater Cleanup Project**

# Briefing Paper for 16 September 2008 Meeting

## 1. INTRODUCTION

This briefing paper is prepared for the Community Liaison Committee (CLC), a community forum established for Orica's Botany Groundwater Cleanup (BGC) Project. It aims to update the CLC on the progress of the BGC Project; actions required of Orica and recorded at previous CLC meetings, as well as other matters of interest to the CLC. It covers the period from June 2008 until early September 2008. At the September CLC meeting Orica will present details about the key issues arising this quarter. Orica welcomes discussion on any of the matters in this briefing paper or the Groundwater Cleanup Plan Progress Report No. 19 at the meeting.

## 2. PROGRESS OF BGC PROJECT

Each quarter Orica provides a Groundwater Cleanup Plan Progress Report to the Department of Environment and Climate Change (DECC). The most recent report, No.19, was submitted on 29 August 2008. The reporting period for Progress Report No.19 is from 1 April 2008 to 30 June 2008. However, more recent information is included in the report. The report is distributed to stakeholders and regulators as requested. Section 2 of the CLC briefing paper attempts to summarise key points from the quarterly report.

### 2.1. Notice of Clean Up Action (NCUA)

Orica has achieved compliance with all ten conditions of the NCUA that had specific completion deadlines, and has also achieved ongoing compliance with 15 more conditions of the NCUA that typically relate to recurring or routine timeframes (e.g., progress reports). Two further conditions are works in progress:

- Condition 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. Progress against this condition is discussed in Section 2.4 below.
- Condition 6: Emissions from the works and measures required by the NCUA must be strictly controlled through adoption of best practice. Works and operations to be carried out in a controlled and competent manner. Ongoing monitoring is being performed (see Section 2.5 for further discussion).

### 2.2 Environmental Protection Licence (EPL)

Orica reports to the DECC against its EPL requirements via an annual return due each September. The EPL includes requirements for the BGC Project and other legacy projects at Botany.

- A meeting was held with the DECC in July to discuss further changes to the EPL in order to remove redundant clauses or clarify conditions that conflict with the NCUA. Following this meeting a licence variation request was submitted to DECC
- Ken Holmes from KMH Environmental Pty Ltd has recently undertaken the third independent validation audit of the BGC Project (as required under condition E5.1 of the EPL). Orica has requested a licence variation to allow this report to be submitted after submission of the Annual Return.
- DECC has recently issued a licence variation that requires the 2007/08 audit report to be submitted by 14 November 2008. Ken Holmes will report his findings to the CLC in December 2008. The current licence variation also includes the following changes:
    - Clarification of start-up and shutdown definitions.
    - Removal of the requirement to report moisture in the stack gas (due to modification of the sampling system).

In addition, the following changes were made to the EPL in the last few months:

- Changes were made to reflect reporting on the Ammonia Concentration Pollution Reduction Program.
- Dioxin testing frequency has been changed to six monthly.
- Administrative changes, including the requirement for the third (current) audit, completion of the Ambient Environmental Monitoring and Load Based Licensing.

## 2.3 Hydraulic Containment

In containing the groundwater contamination plumes, Orica must consider the relationship between both the deep and shallow aquifers and rainfall events when pumping the groundwater. As mentioned in the June briefing paper, Orica requested URS to review this relationship at the *Primary Containment Area (PCA)*. Orica will present an update on investigations at the CLC meeting.

Although a pump on Southlands Block 2 (along McPherson Street) temporarily had problems, the PCA successfully achieved hydraulic containment and removal of high concentration dissolved phase contamination in the deep aquifer from the Central Plume. Hydraulic containment of the deep aquifer along the majority of the PCA was achieved.

At the *Secondary Containment Area* (SCA), overall hydraulic containment was achieved in both the shallow and the deep aquifer during the June 2008 monitoring period, which in turn means the SCA was successful in preventing the migration of contaminated groundwater into Botany Bay.

At the *Botany Industrial Park (BIP) Containment Area,* hydraulic containment of the deep aquifer was achieved for most of the monitoring period (April to June 2008). Full containment at the BIP containment area will only be achieved once the Groundwater Treatment Plant (GTP) is operating at its full capacity. Containment at the BIP is not required under the NCUA, and the BIP line is operated as GTP capacity allows. Regardless of this, Orica considers containment at the BIP important; in order to effect low contaminant concentrations in Springvale Drain and Penrhyn Estuary.

## 2.4 Chemical Monitoring

### *Southern Plumes*

The concentrations of *CTC, CFM, PCE, TCE, VC and EDC*[1] in the majority of sampled locations within the Southern Plumes, for the June monitoring event, were generally stable or decreasing against historical averages. The June results also confirmed a suspected accidental interchange of samples collected at two locations in March.

### *Central Plume*

The distribution and concentrations of volatile chlorinated hydrocarbons (vCHCs) recorded within the Central Plume were similar to those reported in previous rounds.

### *Northern Plumes*

The overall distribution and concentrations of vCHCs recorded within the Northern Plumes area were similar to those reported in previous rounds. The concentrations of vCHCs in the Northern Plumes areas, particularly EDC and CTC, which represent the majority of the contaminant mass, were typically stable or decreasing against historical averages. CTC was not detected above the limits of reporting in any sample location or depth in the Northern Plumes.

### *Penrhyn Estuary*

On the whole, vCHC concentrations measured in pore[2] water within Penrhyn Estuary were similar to, or lower than, historical concentrations.

### *Surface Water*

[1] CTC - carbon tetrachloride (tetrachloromethane), CFM - chloroform (trichloromethane), PCE - perchlorethylene (tetrachloroethene), TCE - trichloroethene, VC - vinyl chloride (chloroethene), EDC - ethylene dichloride (1,2-dichloroethane).

[2] Pore is a space in soil not filled by solid particles, but with air or water.

Surface water concentrations of total vCHCs in Penrhyn Estuary in June 2008 were generally low and similar to the concentrations determined in previous monitoring rounds. The concentrations of vCHCs were less than the respective ANZECC (2000) Trigger Values, with only the sample collected from the Springvale Drain Realignment Channel having a recorded concentration equal to the Trigger Value for VC.

The data gathered in this monitoring period do not alter the conclusions of the Consolidated Human Health Risk Assessment (prepared by URS and dated 2005).

### 2.5 Groundwater Treatment Plant Operation Update

The following table summarises the key operating issues at the GTP that Orica worked on during this reporting period. These issues have been previously reported to the CLC and the table below provides an update on their status.

| **Key issues worked on during this reporting period** | **Progress** | **Comment** |
|---|---|---|
| Biological fouling in air stripping unit. | • A new fungicide has been identified and some laboratory work undertaken. Results will be reported to the CLC when available.<br>• Investigations into the use of chlorine dioxide as a sterilising agent are planned.<br>• A clean-in-place system is being developed to improve the environment during the cleaning process. | • Air stripping system is working satisfactorily.<br><br>All these actions will be undertaken in a staged approach to determine which one or combination is most successful. |
| Improving iron/aluminium removal at Stripped Water Treatment Plant. | • A procedure of routine flushing and soaking of the Reverse Osmosis (RO) units is giving good RO run times between cleaning cycles. | • Further improvements will need to be made in the future. |
| Biological fouling in pressure filters and reverse osmosis (RO) units. | • Five Biological Aerated Filter (BAF) units are on line and working well, removing up to 80% of readily biodegradable acetic acid.<br>• Further improvements are being sought through the use of finer filter media (zeolite). | • Careful operation has also avoided the recurrence of the sulphide problems previously observed. |
| Improvement in Treated Water Quality. | • BAF units are reducing Total Organic Carbon in RO feed.<br>• RO membranes have been replaced based on analysis of individual membrane performance. | • Improved water quality in the feed to the RO units is improving the quality of product water.<br>• After two and a half years of operation, some of the RO membranes are showing signs or reducing performance. The large amount of cleaning due to fouling issues has contributed to wear on the membranes. |

| Key issues worked on during this reporting period | Progress | Comment |
|---|---|---|
| Chloramine in GTP discharge water. | • Following the May self-reported exceedence, investigations identified three other instances where exceedences occurred.<br>• Factors contributing to exceedences are: software malfunction and sodium bisulphite dosing problems due to crystallisation in cold weather.<br>• Changes have been made to reduce the chance of these failures and to improve detection of problems within the system. | • Corrective actions include:<br>o modification of computer code.<br>o hardware modifications.<br>o review of reporting procedures.<br>o refresher training for GTP staff on compliance, reporting requirements and steps. |
| Ammonia Pollution Reduction Program. Ammonia is resulting from chemically eliminating chloramine in discharged treated water, by using sodium bisulphite. | • Improved BAF operation has allowed a reduction in the use of chloramine from 7 mg/L to less than 3 mg/L to date.<br>• A progress report was provided to the DECC at the end of June 2008. | • Reducing the chloramine concentration should lead to a reduction of the ammonia in the discharge water. |
| Biological fouling of shallow wells on Foreshore Road. | Maintenance (repair and preventative) work was undertaken in early June 2008:<br>• Mono pumps have proved very successful in maintaining shallow groundwater containment and have been installed in additional locations for an extended trial.<br>Although well-sleeving (to prevent ingress of oxygenated water from the shallow aquifer hence reduce biological fouling issues) showed promising results, it is likely that Mono pumps will be used as the primary method for controlling shallow groundwater fouling at Foreshore Road. | • Modifications have led to considerable improvement in pumping reliability.<br>• Inspections will occur in September to allow planning of a major maintenance program later in the year. |

Since commencing the BGC Project on 28 October 2004, Orica has treated over 3.5 GL of contaminated groundwater and has recovered and destroyed 584 tonnes of chlorinated hydrocarbons (CHCs), including amounts recovered from the interim operation of the Steam Stripping Unit (SSU). See Figure 1.

**Figure 1:BGC Project Operation Summary**

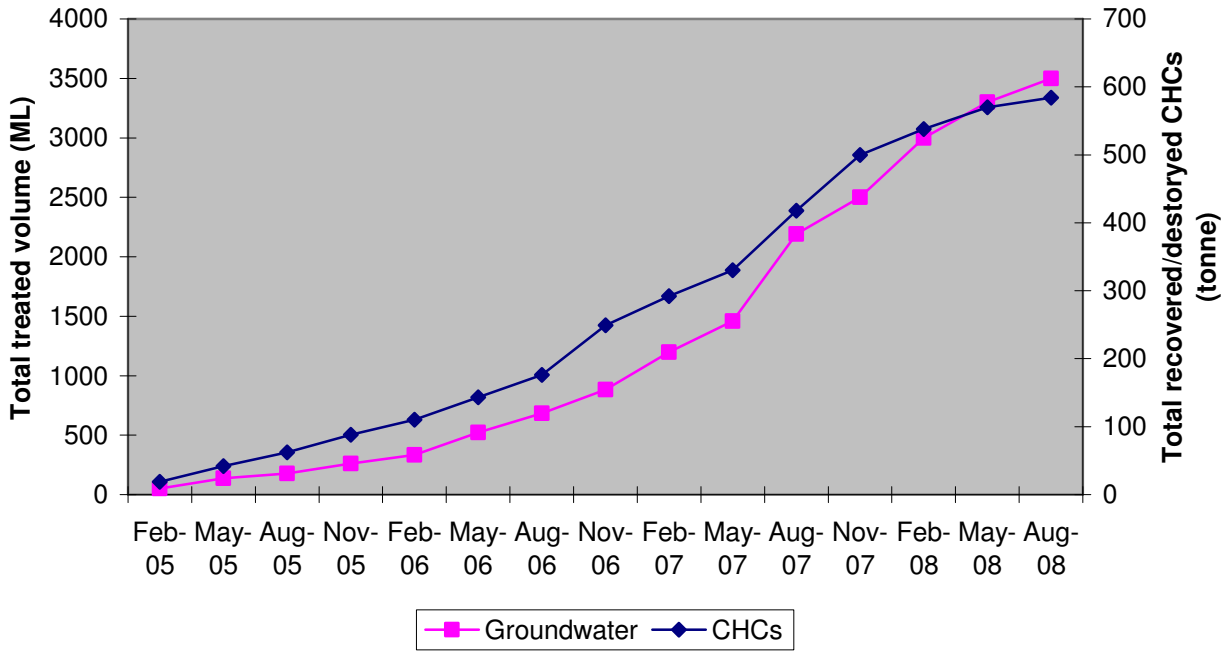
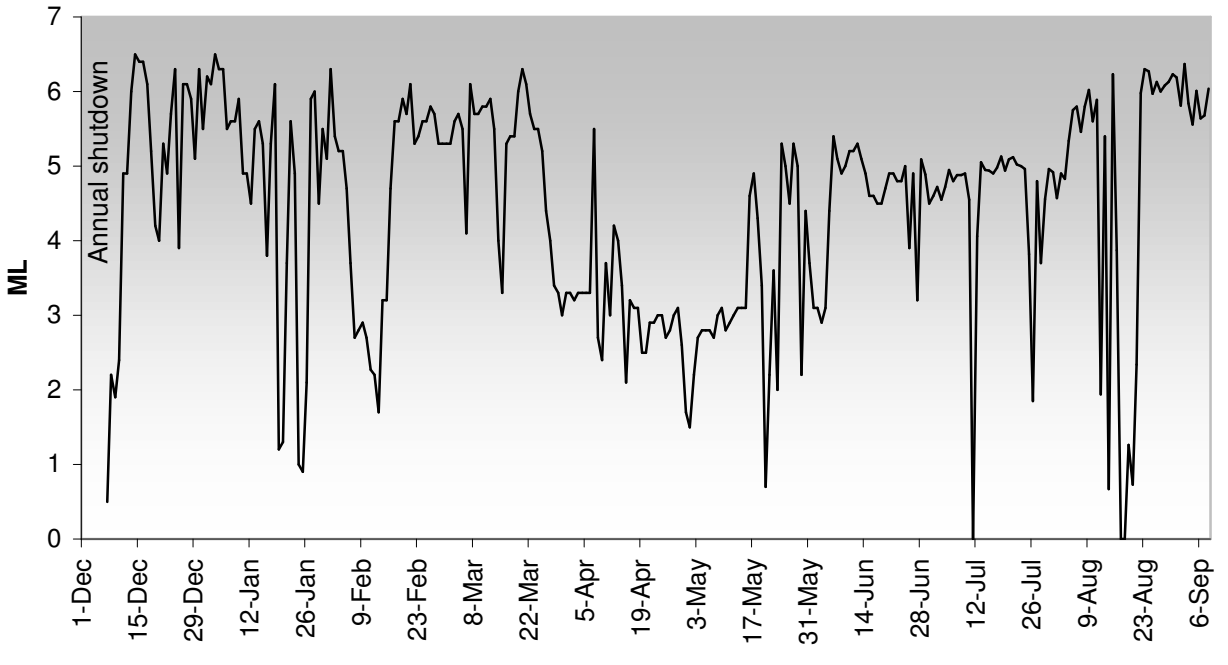



Figure 2 shows the daily volume of groundwater fed to the GTP for treatment. A reduced amount of groundwater was treated owing to the BAF commissioning and because of works to address fouling issues. During this period adequate containment was achieved.

**Figure 2: Daily Volume of Groundwater Feed to the GTP**




### *2.5.1 Thermal Oxidiser*

The thermal oxidiser continues to operate within licence specifications. All waste CHCs recovered by the SSU have been destroyed at the thermal oxidiser.

### 2.5.2 *NATA Accreditation*

Orica's GTP laboratory is still in the process of seeking accreditation with the National Analytical Testing Authority (NATA). The final assessment report has been received. Orica is now returning final documentation, and expects accreditation to be granted soon. This will mean that sample analysis of some parameters, which the EPL requires to be done by a NATA-accredited laboratory, can be undertaken on site.

### 2.5.3 *Treated Water Recycling Program*

Orica and Qenos continue to use treated water from the GTP in cooling tower applications. Solvay Interox also uses treated water in cooling tower applications depending on its availability. Orica is moving closer to achieving chloramine and Total Organic Carbon (TOC) concentrations that enable greater use of treated water. Achieving the TOC target will facilitate the use of treated water as feed for demineralised water plants. The success of the BAF units and RO membrane replacement is assisting in progressing this issue.

### 2.5.4 *Air Emissions Monitoring*

The most recent 15-monthly air-monitoring event (Orica Botany Environmental Survey Air Emissions Sampling Program, which includes surface flux emissions and soil gas monitoring) was completed in April 2008. The data did not change the outcomes of the Consolidated Human Health Risk Assessment. The finalised report will be submitted to the DECC later this year.

The fifth and final round of the community ambient air-monitoring program developed for the BGC Project was conducted in mid June 2008. Results for the sampling undertaken at Pagewood, Matraville and Banksmeadow Schools and Discovery Cove Business Park are being assessed and a report will be prepared that collates all the data collected for the program since its commencement in September 2005. The final report will be submitted to the DECC and made available to the community. (Note: As reported to the Community Participation and Review Committee, an extension to this community air monitoring program has been developed to coincide with operation of the HCB Waste Repackaging Plant.)

### 2. 5.4 *Temporary Aquifer Storage and Recovery (TASR)*

As previously reported, Orica is proposing to replace the SSU with TASR as a backup for the GTP in the event of a significant plant shutdown. A planning application, incorporating a Review of Environmental Factors (REF), was submitted to DECC in July 2008. A copy of the REF will be placed on the Botany Transformation Projects website.

## 3. DNAPL SOURCE AREA DEPLETION

Over the past year, Orica has regularly been in contact with overseas experts to identify remedial technologies and techniques that might be practicably applied to the BGC Project to deplete the mass of DNAPL in source areas. Orica representatives have been to various conferences and workshops and overseas experts have participated in discussions with Orica, including a technical workshop at Botany late last year. A report on the Botany workshop and discussions to date has been prepared by Orica and is to be presented to the DECC on 15 September, with the assistance of one of the USA experts Dr Mike Kavanaugh from Malcolm Pirnie Inc. Dr Kavanaugh is available to attend the September CLC meeting, to share his knowledge on DNAPL remediation technologies, and his views on DNAPL source area depletion at Botany.

## 4. FORMER CHLORALKALI PLANT MERCURY INVESTIGATIONS

As previously reported, mercury was detected in groundwater and soil at the site of the now demolished former ChlorAlkali Plant at the BIP. Orica has been conducting soil investigations on the BIP site, and groundwater investigations both on and off the site. These investigations have detected mercury in groundwater at off-site monitoring wells. All off-site wells included in these investigations are situated on industrial properties and Orica has confirmed with property occupiers that groundwater is not used at these sites.

Reports on groundwater and soil investigations, including test pitting, the hydrogeochemical conceptual model (for the fate and transport of mercury in the soil and groundwater) and the Human Health and Environmental Risk Assessment (HHERA) have been submitted to DECC.

### 4.1 *HHERA*

The HHERA assesses the potential risks associated with mercury in soil and groundwater to human health and the environment both on and off site (BIP), in areas in and around and hydraulically downgradient of the former ChlorAlkali Plant. The HHERA also derives Risk-Based Criteria for mercury in soil to assist Orica in determining the extent of remediation that might be required to address the identified risks. The HHERA report has been submitted to the DECC for review.

The report concludes that risk to human health for workers on site who undertake intrusive activities or work within the former ChlorAlkali Plant following development consistent with the industrial nature of the BIP, is considered unacceptable if no remediation measures are taken. Risks to human health off site are considered acceptable. With respect to the environmental risks, mercury-impacted groundwater has not discharged to any receiving environment; however the presence of mercury in soils and groundwater beneath the former ChlorAlkali Plant area provides an ongoing source to groundwater that requires consideration with respect to future environmental risks. When the DECC has completed its review of the report, Orica plans to meet with the DECC to discuss the assessment and risk management options.

Orica will provide more details at the September CLC meeting.

### 4.2 *Soil Washing Trials*

In August 2008, Orica commenced soil washing trials in order to assess whether this technology could be used to remediate the mercury-contaminated soil within BIP. A Canadian company has been engaged by Orica to conduct the soil washing trials, which involve screening and tumbling the contaminated soil in water to remove mercury (as droplets or attached to particles) by gravity separation and sieving. Feed material for the trials has been retrieved from test pits excavated around the former ChlorAlkali Plant as part of the soil investigations. Representatives of the DECC and the City of Botany Bay Council (CoBB) have undertaken inspections of the soil washing trials.

The trials have just concluded, and the results are encouraging. Data is still being compiled, which will be consolidated into a technology assessment report. The report will be submitted to DECC and CoBB, and made available to the community. If this technology proves to be successful, and if remediation is required, a Remediation Action Plan for full-scale soil cleanup will be prepared.

### 4.3 *Updating Stakeholders and the Community*

A letter report on groundwater sampling and the HHERA is being issued to owners/occupiers of properties where off-site groundwater sampling was undertaken. BIP workers received an update on the project in August 2008. Updates were provided in Orica's August newspaper column and in the September CLC newsletter. A new dedicated webpage is being developed for this project, as part of the www.oricabotanytransformation.com website. Information and reports will be uploaded when this webpage is complete.

## 5. INDEPENDENT MONITORING COMMITTEE (IMC)

Since the last CLC meeting, Prof Acworth and Prof Priestly have been contacted regarding the combined Sydney Ports/Orica/CoBB workshop. Logistic arrangements were discussed and the questions developed by the CLC were shared. Additional relevant background information on the Sydney Ports development provided by John Burgess was forwarded to Prof Acworth. Prof Acworth attended the Sydney Ports/Orica/CoBB workshop that was held 9 September 2008.

Prof Acworth contacted Orica to discuss an error in the presentation of groundwater monitoring data on two monitoring wells in the Progress Report No. 18 to the DECC.

## 6. COMMUNITY COMMUNICATION UPDATE

### 6.1. Community Workshops

The combined Orica/Sydney Ports/CoBB workshop to discuss the interface of the BGC Project and the Port Botany Expansion was held on Tuesday 9 September at Botany Town Hall. In advance of the workshop, Orica distributed a draft agenda for comment, final agenda and details on the workshop to the CLC.

Orica is aware that the community is keen for another workshop on Southlands to be held. Orica is waiting for the HHRA for that project to be finalised, and for the independent auditor to complete

his review of the Remediation Action Plan so that all relevant information will be available for the community workshop.

Orica still plans to hold another workshop on water recycling once the various recycling initiatives have been further developed.

### 6.2. 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 79: 24 June 2008: Groundwater treatment and the May 2008 CLC meeting;
- Column 80: 29 July 2008: Groundwater treatment and the May 2008 residential bore monitoring event; and
- Column 81: 26 August 2008: Soil washing trials for soil collected from the former ChlorAlkali Plant and the most recent Community Participation and Review Committee meeting.

With consideration of feedback received, Orica has reviewed the frequency and value of its columns in the Rockdale, Bexley and Sutherland areas and will trial printing columns in the *St George and Sutherland Shire Leader* every four months. Copies of columns are available on the website and are mailed out if requested.

### 6.3. Website

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

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

- Groundwater Cleanup Plan Progress Report No.18 and Appendices;
- Recent newspaper columns;
- June 2008 CLC newsletter;
- CLC Briefing Paper, 17 June 2008; and
- Presentation materials from 17 June CLC Meeting.

### 6.4. 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. Other calls included requests for sponsorship, information about groundwater, residential bore tests, and three requests for site tours.

### 6.5. Email Feedback

Several emails were received in this reporting period from users of the Orica Botany Transformation Projects website. There were requests for information about Southlands, other non-Botany remediation projects, Orica's rainwater tank rebate and requests for tours of the BIP site and the GTP. No emails were received through the CLC feedback email facility.

### 6.6. Outreach Projects

Orica now operates two outreach programs in the local community. The programs have been developed to respond specifically to community concerns surrounding the Orica groundwater contamination. A brief update on matters occurring in this reporting period is provided below.

***Residential Bore Monitoring*** – Reporting on the May testing round appeared in the July newspaper columns and the September 2008 CLC newsletter. The next round of residential bore testing is scheduled to take place in early November 2008.

***Rainwater Tank Rebate Program*** – At the time of writing, 985 tanks had either been installed or approved for installation. The program ended on 30 June 2008. However, Orica will continue to process applications up until 30 September 2008, where applicants have informed Orica of delays in installations, over which they have no control.