WATER RECYCLING WORKSHOP REPORT

24 OCTOBER 2006

This report is being distributed to all those who attended the Water Recycling Workshop at Orica on 24 October 2006.

What does this report consist of?
The report:

- provides brief summaries of the areas covered in each of the presentations
- identifies the issues raised at the workshop
- identifies questions and answers provided at the workshop and additional information for answers where required
- highlights the issues that will be further addressed at a further workshop
- lists the attendees.

Each of the presenters at the workshop have had the opportunity to contribute to the material presented in this report. The presentations from the workshop will be made available on a new website for Orica Botany Transformation Projects. This website is currently under development. In the interim, please contact us if you would like a copy of the presentations.

When is the next water recycling workshop?
It was suggested at the workshop that a further workshop be held in six months to measure progress on some of the issues raised. It was also suggested that this workshop be held on a date when Parliament is not sitting so that local Members of Parliament can attend. Orica is planing for an open public workshop to be held in May 2007 and will invite everyone who attended this first workshop. The next workshop will also be advertised in local papers.

Feedback Welcomed
Orica welcomes community feedback on our projects. If you have any thoughts or questions about our water recycling plans, or feel that any discussion from the first workshop is not adequately captured in this report, we welcome you to contact us via:

- community contact line on 1800 025 138
- postal address: Community Matters, 16-20 Beauchamp Road, Matraville 2036
- email address: info@oricabotanygroundwater.com

1. WORKSHOP BACKGROUND

The primary objective of Orica's Botany Groundwater Cleanup Project is the remediation of groundwater contaminated by it's past industrial activity. In addition to groundwater remediation, Orica's Environment Protection licence requires it to maximise the reuse of water treated as part of the remediation process. As such, Orica is proposing to recycle water from its Groundwater Treatment Plant (GTP) for reuse by neighbouring businesses. This treated water is suitable for various industrial and other uses because when the GTP was designed, Orica added a reverse osmosis water purification system to ensure that the contaminated water was treated to a high standard.

The treated groundwater can be reused for industrial purposes on the Botany Industrial Park (BIP) and nearby. This is known as Stage 1 of Orica's water recycling plans.

Orica is also investigating two further stages of water recycling that are in addition to its remediation requirements:

- Stage 2: treatment of process effluent (trade wastewater) from the BIP and provision of this water to customers located within a few kilometres of the BIP; and
- Stage 3: the possibility of sewer mining and treatment and distribution of the treated water to customers remote from the BIP.

On 24 October 2006, Orica held a workshop in response to community requests for an open forum with local and state government representatives to discuss plans for Orica's water recycling initiative, set into the context of governments' wider water management strategies.

To assist in planning the workshop, Orica met with several community members two weeks prior to the workshop. That meeting provided an excellent opportunity for Orica to understand the aspects of water recycling and other Orica issues that the community was keen to see addressed at the workshop. Orica recorded the questions and issues raised at the preparation meeting and provided them to each of the presenters so they could respond to those matters in their presentations.

2. WORKSHOP STRUCTURE AND CONTENT

The half-day workshop included four presentations covering various initiatives for government and private water management, as summarised below.

Presentation 1 - Metropolitan Water Plan by Matthew Sherb, NSW Cabinet Office

The first presentation covered the NSW Government's Metropolitan Water Plan for Sydney, including initiatives to:

- research climate change and defend against prolonged periods of drought
- increase supply and reduce demand on water resources
- improve recycling capacity
- improve catchment and river health.

The Plan includes such initiatives as sewer mining, using grey water at home, harvesting stormwater, investing $400 million over four years to better maintain water infrastructure, household rebates for water saving and recycling initiatives, and expanding water infrastructure. The Plan aims to recycle up to 70 billion litres per year and to reduce the demand for water by 145 billion litres per year by 2015.

Presentation 2 - Management and Use of the Groundwater Resource by Brian Graham, Department of Natural Resources (DNR)

The second presentation provided an overview of the framework for groundwater management in NSW, also covering such issues as ownership of the groundwater resource. It was explained that there were two pieces of legislation covering the management of groundwater:

- the Water Act (1912), which covers the licensing of water
- the Water Management Act (2000) which covers more recent issues such as the sharing of groundwater.

A groundwater management plan is currently being prepared for the Botany Sands Aquifer and there are another 40 groundwater sharing plans across NSW. All works that affect groundwater are required to be licensed by DNR, which assesses the potential impact on the aquifer from the licence application.

Presentation 3 - NSW Government Water Savings Plans by Adrian Langdon, Department of Energy, Utilities and Sustainability (DEUS)

The third presentation covered the water savings fund established by DEUS, incorporating a number of water savings initiatives, set up under the Water and Energy Savings Act (2005). The Act incorporates two funds that cover:

- saving energy across NSW
- saving water across Sydney.

Under this Act, DEUS is seeking viable projects that will enable significant and immediate potable water savings in Sydney. It was explained that organisations need to be able to demonstrate an ability to deliver the project and to communicate the results of their initiatives to the public. The level of funding depends on the potential for funding from other sources and is limited to the minimum amount required for the project to be viable. To date, there has been a total of 68 projects funded by the scheme, with a total value of $33 million. Water savings from these projects total more than 6.5 billion litres of water per annum.

Presentation 4 - Orica's Water Recycling Plans by Ross Fraser, Orica

The fourth presentation provided information on Orica's plan to recycle water and sell it to neighbouring businesses for industrial use. It covered:

- sources of water
- expected demand for the recycled water
- ability and capacity to treat water
- means of transporting the water within and off the site
- an explanation of how Orica's reverse osmosis plant operates

The presentation also covered issues raised at past community meetings regarding uses and charges for the water.

3. QUESTIONS AND ANSWERS

Following is a list of questions asked at the workshop as well as answers. In some cases, where more information about issues was available than that presented at the workshop, a more comprehensive response than that given at the workshop has been provided below. Answers were largely provided by the government and Orica representatives who made the presentations.

QUESTION	***RESPONSE***
Metropolitan Water Plan – NSW Cabinet Office	
Would Warragamba Dam cease releasing water into the river if the Western Sydney Recycled Water Initiative proceeded?	The Initiative aims to replace the releases from Warragamba Dam with highly treated recycled water. This will enable water to remain in the Dam to be used for drinking purposes.
How would the water in the Western Sydney Recycled Water Initiative be recycled?	The water would be recycled using a reverse osmosis process whereby the water passes through a very fine filter to only allow clean water to pass through it.
From where does the water that is to be recycled in the Western Sydney Recycled Water Initiative originate?	The water comes from the Penrith, St Marys and Quakers Hill sewage treatment plants, which currently treat wastewater to a very high quality.
What about Kurnell? Are there any recycling projects there?	The NSW Government's desalination plant, proposed for Kurnell, has been put on hold. However, it is proposed to sewer mine treated effluent from the Cronulla Sewage Treatment Plant and distribute recycled water to local businesses Caltex and Continental Carbon.
What is Sydney's water usage each year?	Sydney's water usage is about 550 billion litres per annum.
Will the water in the Hawkesbury-Nepean River be safe if recycled water is discharged into the river?	Yes. The discharged water will be cleaner than the water currently flowing in the river.
Will wildlife adapt to the changed water?	Yes.
Is Mangrove Mountain dam under the Metropolitan Water Plan?	No. The Metropolitan Water Plan only covers areas serviced by Sydney Water.
Management and use of Groundwater Resource - DNR	
Are you saying that all the contaminants are from Orica?	DNR has established four groundwater management zones for the Botany Sands aquifer. Zone 1, known as the Groundwater Extraction Exclusion Area (GEEA), was established as a result of Orica's groundwater contamination. The chlorinated hydrocarbon groundwater plumes originating from the Botany Industrial Park are migrating southwest towards Botany Bay. Three containment lines have been installed to prevent the high concentration contaminated groundwater from reaching Botany Bay. Zones 2, 3 and 4 are based on legacies of other, non-Orica, industrial activity.

QUESTION	RESPONSE
Is there any vinyl chloride and what other contaminants are in zones 2, 3 and 4?	A wide range of contaminants has been detected in groundwater in particular locations in management zones 2, 3 and 4. The contaminants are derived from a broad range of industrial activities that were conducted in the area. The contaminants that have been detected include chlorinated hydrocarbons and other solvents, petroleum hydrocarbons (such as petrol and diesel), some heavy metals such as chromium, nickel, lead and arsenic. Vinyl chloride has been detected in groundwater in the vicinity of a site located in zone 2. The site is currently being regulated by the Department of Environment and Conservation (DEC) under the *Contaminated Land Management Act 1997* (CLM Act). The vinyl chloride contamination at this site is probably a degradation product of other contaminants and is not associated with the chlorinated hydrocarbon plumes migrating southwest from the Botany Industrial Park. DEC also regulates several other contaminated sites within zones 2, 3 and 4. Details relating to these sites (including the contaminants detected at each site) can be obtained from the contaminated land public record, which is available on line at: www.environment.nsw.gov.au/clm/searchregister.aspx
If vinyl chloride is found in zones 2, 3 or 4, does that mean that it has come from Orica?	The results of groundwater monitoring conducted in zone 1 (the GEEA) indicate that the vinyl chloride contamination in groundwater, resulting from past Orica operations, does not extend beyond the boundaries of zone 1 into zones 2, 3 or 4. The source of vinyl chloride, if detected in groundwater in management zones 2, 3 or 4, could be one of many industrial or commercial activities that have previously been conducted in these zones. Vinyl chloride can be formed by the natural breakdown of certain chlorinated hydrocarbon compounds (eg tetrachloroethene and trichloroethene) that are used in a wide range of industrial and commercial activities including dry cleaning and metal polishing.
Why do the Botany Aquifer management zones stop at the northern end of Botany Bay if the aquifer extends south of the Cooks River?	Contamination studies have concentrated on the lands zoned industrial, both currently and historically, in the northern sands (i.e. to the north of the Cooks River and Botany Bay). The information to hand (from DEC) made this area a priority for the DNR restriction on domestic extraction as a precaution in protecting community health.
When will this area to the south (i.e. along the western side of Botany Bay) be considered?	The area has already been considered and, based on DNR and DEC's current understanding of contaminated sites, there are no plans to extend the management zones to the south. If specific issues need to be addressed, the overall strategy provides for them to be managed on a case-by-case basis. What this means is that if specific contamination were identified, the use of water from any affected bores would be banned and, if necessary, the management zone boundaries would be reviewed.

QUESTION	*RESPONSE*
How far do the management zones extend into Matraville?	The domestic exclusion area (zone 4) at Matraville lies to the west of Bunnerong Road and south of Australia Avenue. In this area, no use of domestic bores is permitted. It should be noted that an embargo on groundwater licences (across a wider area extending south from Waterloo) came into effect in 2003, meaning that no new bore licence applications may be received west of Bunnerong Road at Matraville.
Is Zone 4 contaminated?	There are eight known contaminated sites in the Botany area being managed by DEC under the *Contaminated Land Management Act 1997*. The banning of domestic groundwater use is a precautionary measure to protect public health. It is important to note that the mapped restriction zones indicate where domestic groundwater use is banned. The maps do not necessarily depict areas of groundwater contamination.
Why did Orica contaminate the groundwater in the first place?	The contamination of soil and groundwater at the Botany Industrial Park occurred at a time when industrial management practices and regulatory controls on industrial processes were not as rigorous as they are now. Orica regrets the groundwater contamination and is committed to cleaning it up.
Why is bore water permitted for use by industrial users but not residential users?	There is an obligation on industry to ensure that groundwater is fit for the intended purpose. This is a matter between the user and the NSW WorkCover Authority. DNR also requires industry to test water quality and supply this information to both DNR and DEC. This is an economic matter for the industries concerned. If they make considerable investment in water testing and/or water treatment and the water is fit for purpose there is no reason why it should not be used.
Is it true that industry bore water testing could test positive for contamination one time and be OK the next?	The concentration and distribution of contaminants in groundwater will vary over time due to the complex behaviour of groundwater and the nature of the contamination. As a result, any contaminants present in groundwater at very low concentrations may be detected in groundwater sampled from an industrial bore during one sampling event and not be detected during the next event.
Why are domestic bore water users not given the opportunity to use water in Zones 2, 3 and 4 even if they undertake testing?	The ban placed on residential bore water use in zones 2, 3 and 4 was established as a precautionary measure to protect human health. The approach is based on our current knowledge of groundwater contamination in the area and the broad industrial history of the area. Following the precautionary approach, it is not appropriate to allow residents to use groundwater based on the results of one test given the potential for groundwater within zones 2, 3 and 4 to be contaminated.
How often is industry required to test the groundwater?	At least annually.
How is it that it's annually when you just said that the quality could change from day to day?	Annual testing is currently the minimum requirement. It may be necessary to revise this depending on the results of testing.

QUESTION	*RESPONSE*
Why are domestic bore water users not given the opportunity to continue using groundwater even if they undertake testing?	The ban placed on residential bore water use in zones 2, 3 and 4 was established as a precautionary measure to protect human health. The approach is based on current knowledge of groundwater contamination in the area and the broad industrial history of the area. Following the precautionary approach, it is not appropriate to allow residents to use groundwater based on the results of one test given the potential for groundwater within zones 2, 3 and 4 to be contaminated.
What is the plan for NSW Health for monitoring health impacts from contaminated groundwater, from places such as Hensley Athletic Field?	NSW Health only monitors at the time of a known exposure pathway. Orica has conducted a Human Health Risk Assessment, which confirmed that there are no unacceptable health risks associated with groundwater exposure at the athletic field. If you have specific health concerns you are advised to see your local doctor. Orica also suggested that members of the community are welcome to attend the next combined meeting of the Community Liaison Committee (CLC) and Independent Monitoring Committee (IMC) at Orica on 10 November to consult Professor Brian Priestly from the IMC about health concerns. Note: two meetings with the CLC and IMC are planned for 2007 and questions for IMC members can be raised at the quarterly CLC meetings.
Isn't the Orica contamination further north than shown in zone 1?	The results of recent groundwater monitoring conducted in the northern section of zone 1 indicate that the chlorinated hydrocarbon groundwater plumes originating at the Botany Industrial Park do not extend north of Zone 1 as the groundwater flows in a south westerly direction in the Botany aquifer.
Will DNR look at Orica's strategy for commercial usage of contaminated groundwater treated through the GTP?	DNR regulates extraction of contaminated groundwater for the Orica Botany Groundwater Cleanup Project by licence in consultation with DEC. DNR does not dictate where that treated water must be deposited as long as any disposal does not adversely affect natural systems (watercourses, aquifer). The on-supply of treated water is not subject to Water Act licensing. However, when the specific purpose (cleanup) is completed, the approval (licence) to extract water for that purpose will cease.
Why does the Orica rainwater tank rebate program not include north of Banksia Street and other areas?	This area is not included under the rebate program because it is not within the Groundwater Extraction Exclusion Area (GEEA), as defined by DNR, which Orica uses for its rainwater tank rebate scheme. Orica only offers its rebate to the area that has been affected by its contamination. Notwithstanding any community services offered by Orica, Sydney Water continues to offer all its customers a rebate on the installation of rainwater tanks.

QUESTION	*RESPONSE*
Why does it cost so much to test the groundwater?	The total cost of testing varies depending upon the range and type of substances being investigated and the precision of measurement required. Tests typically require a range of specialised equipment and procedures, as well as skilled technicians, to reliably measure the presence of specific chemicals and particles in a sample. Only an accredited laboratory can reliably undertake the tests, and because of the wide range of potential contaminants the tests are complex and hence expensive.
Could Orica contamination be drawn into other areas by large bore water users?	The extraction of groundwater from a high-volume bore can result in a change of the direction of groundwater flow in the vicinity of the extraction bore and thus potentially draw contaminants in the same direction (i.e. towards the bore). In the past, high levels of groundwater extraction have influenced the flow of groundwater in the Botany area. Current levels of groundwater extraction are much lower than they were back in the 1960s when groundwater flow direction was affected. The current extraction of groundwater from industrial production bores in the vicinity of the Botany Industrial Park is not significantly influencing the migration of the chlorinated hydrocarbon groundwater plumes.
Can people use their groundwater if tests come back clear?	The movement of water and contaminants in the ground is extremely complex. Modelling around some known measurements is helpful but not sufficiently precise to give adequate confidence in time or space on a property-by-property basis. As a precaution, those in the banned areas should not use their bore water even if a clear test result is achieved because the water quality can vary week by week.
How will local people cope through summer not using bore water? What provisions have been made?	The vast majority of Sydney people do not have bore water. They minimise the use of potable water, install rainwater tanks, and use captured grey water for watering where that is appropriate.
NSW Government Water Savings Plan – DEUS	
Why is dense residential development permitted if we don't have enough water (eg, Breakfast Point)?	This is a short-term point of view and the State Government is taking actions to ensure supply for the long-term with these initiatives. Water efficiencies are also much more effective in new housing developments than in the past as there is now a requirement to use 40% less water than existing houses.
Are water recycling projects being used in new unit developments?	As stated above, water efficiencies are much more effective in new housing developments. Some developments are using water recycling.
Is there a plan for changing usage of drinking water for toilet flushing?	That would require billions of dollars in investment to make these changes to thousands of kilometres of pipework, so we're looking at alternative means of capturing and saving water, such as recycling, rainwater tanks, etc. Opportunities may occur in the meantime to incorporate recycling initiatives into new infrastructure.

QUESTION	*RESPONSE*
Why can't we use bore water for flushing toilets?	Because it may be contaminated and because new piping in every home would be required to separate the potable supply from another water supply, such as bore water.
Orica Water Recycling - Orica	
When Orica plans to treat BIP effluent, would the chemicals from Qenos affect the quality of treated water?	Orica would need to closely consider the quality of water to be sure that the treated water quality was fit for purpose. The bulk of water that is currently sent to sewer is from the cooling towers and is quite good quality. The quality of that water is well within Sydney Water sewer discharge limits.
Where does Orica send its contaminated water?	Orica discharges effluent to sewer in accordance with the quantity and quality limitations set by Sydney Water.
Could recycled water be used to flush gutters?	We can consider that suggestion as an option and add it to our suggestions list. As with any option, the ability to transport the water to where it would be used is a key consideration.
Can Orica put recycled water back into the ground?	Theoretically, the treated groundwater could be pumped back into the ground. However, as the treated water is aerobic (contains oxygen), it could cause biological fouling at the injection point and the sheer volume of water could cause localised flooding. There would be a limit as to how much you could inject back into the available space in the ground. Orica would also question the value of doing this when there are such severe water shortages around the country.
How long will it take to decontaminate the groundwater?	The groundwater treatment plant has been designed to operate for 30 years. However, the concentration of contamination may be sufficiently reduced within the next decade to enable the adaptation of other technologies, such as bioremediation, to reduce this timeframe.
Is the Government aware of these issues affecting water, such as supply, pricing, etc?	Yes.
When can you use grey water for your garden?	Under the Metropolitan Water Plan, you are permitted to discharge grey water to your garden without approval, however, if you want to treat that water, you need approval from DNR. However, the Department of Health stipulates that grey water must not leave a property as it may contain viruses/pathogens that could have an impact on local health. If you are unsure it is best to consult with your local council.
Will Orica be testing for mercury in groundwater?	Yes. We are currently testing for mercury in areas around the former chlorine plant.

4. WORKSHOP CONCLUSION

During the presentations and at the end of the workshop, there was opportunity to ask questions and engage in discussion on key points raised by participants. The key issues raised by the community during the workshop were largely covered under the areas of:

- safety of water, in terms of its quality for use as well as ensuring protection of the environment;
- domestic and industrial use of bore water
- government regulation of water, present and future, in terms of allocation and charges.

There was also a suggestion that the relevant NSW Government departments could be more involved in discussing community issues as they related to Orica's projects and those of other commercial operations in the area.
At the conclusion of the meeting, comment was made about the progress that had been made in relation to working with the community on such initiatives and the value of having open forums with presentations by government agencies to provide information on such projects was recognised.

The suggestion was also made that another workshop should be planned for six month's time to report back on progress of Orica's water recycling plans and to provide further information to the community. The possibility of attracting local MPs to this and other such meetings was also raised and it was agreed that every attempt would be made to ensure that meetings were planned at a time when parliament was not sitting and that local MPs would continue to be invited to attend.

5. WORKSHOP ATTENDEES

Organisations	
Bob Marr	Department of Environment and Conservation
Matt Hart	Department of Environment and Conservation
Brian Graham	Department of Natural Resources
Greg Russell	Department of Natural Resources
Adrian Langdon	Department of Energy, Utilities and Sustainability
Steve Murphy	Sydney Water
Matt Sherb	Metro Water Directorate
Bruce Royds	Sydney Ports Corporation
Santo Cannata	NSW Health
Barbara Campany	Orica
Graeme Richardson	Orica
Ross Fraser	Orica
James Stening	Orica
Lucy Archer	Orica
Wendy Salkeld	Orica
Lily Roberts-Everett	Orica
Kate Shea	Orica
Ron Bean	Orica
Robert Evans	Orica
Simon Sarkar	Orica
John Lear	Orica
Chris Brunton	Orica
Richard Benson	Qenos
Maureen Short	Qenos
Rick Bevan	Solvay Interox
Reinhardt Skruntitt	Matraville Chamber of Commerce
John Tourrier	Save Botany Beach
Nancy Hillier OA	Botany Environment Watch
Julia Gennissen	Botany Environment Watch
Lynda Newnam	BB&CA
Susan Hall	Aust. Environmental School com
Alexandra van Rijn	Aust. Environmental School com
Mark Wood	City of Botany Bay Council
John Burgess	Australian National Sportsfishing Association
Anne Gardiner	Greens Candidate, Maroubra

Residents			
Dianne Bayndrian	Mrs Gulevski	Pat McKinley	Ron Salkeld
Hatshik Bayndrian	Ivan Kralj	Milan Mihawevic	Joseph Skrabut
Sammy D'Angelo	Colin Lee	Pat Norris	Ilma Street
Rhonda De Costa	Gladys Lee	Mr Edmy Ohearn	Mr Kire Temelkovski
Tony Figlatona	Ted Magen	William Peters	Diana Temelkovski
Coral Gagossian	Len Mahony	Vasil Petrovski	Fred Zehtab
Joseph Gagossian	Miso Markus	Charmaine Plaud	
Peter Gulevski	Barbara McKinley	Giovanni Romeo	