EPA Community Forum
Hillsdale Community Centre
236 Bunnerong Road, Hillsdale

Answers to community questions raised at the meeting of 22 November 2012

Technology

1. What permeability criteria will be required for the cut off wall?

It will be essential for the cut off wall to have uniform low permeability (i.e. 10^{-8} m/sec or lower) to mitigate the movement of contamination.

2. What is the lifespan of the containment system?

A typical design life would be about 50 years. Irrespective of the design life, however, the long-term integrity of the system needs to be ensured and that will require monitoring for system degradation and ensuring appropriate repairs and replacement as needed.

3. How durable/reliable is the containment system?

The typical design life of the containment system is about 50 years although the durability/reliability of the containment system depends on appropriate construction. The EPA will require construction quality assurance and construction quality control data to demonstrate, for instance, that the design permeability is being achieved. Performance monitoring will be required to identify any reduction in the system's performance. If a reduction in performance is identified, corrective measures (e.g. repairs/replacements) will be required.

4. What clean up is proposed for the mercury-contaminated areas outside of Block G?

Remediation plans for blocks A and M have been submitted by Orica for EPA review. The EPA is still considering the plans.

5. What are the criteria for the decision of whether an area is subject to the alternative clean up (i.e. remediation) or cap and seal (as was the case for Block G)?

The criteria used to make that decision relate to the severity of contamination (i.e. how heavily contaminated is the area?), the potential harm caused by the contamination (e.g. threat to groundwater), and the suitability (e.g. due to technical constraints) of alternative remediation options. Block G is the most heavily contaminated area in which contamination is also present below the groundwater table. This results in an increased potential for harm, particularly in relation to the potential for ongoing contamination of groundwater. Also, the deeper contamination is more difficult to remediate and the outcome of such remediation would be uncertain. Therefore, in addition to remediating soils to a depth of at least 1.5 metres, Block G requires a cut off wall and a cap to protect groundwater quality.

6. How can the EPA guarantee the containment system will maintain its integrity?

The EPA will require ongoing performance monitoring to ensure the long-term effectiveness of the containment system. The EPA has also indicated to Orica that a financial assurance will be required to ensure that there are funds available in the event that further remediation is required.

7. What consideration has there been of other remediation options?

As required by the EPA, a detailed analysis of remedial options has been carried out. This has been reported in Orica's options appraisal report which has been reviewed and endorsed by an independent expert. The EPA has reviewed the report and requested further assessment which has recently been provided and which we are now reviewing.

8. Does the cap and seal approach meet international best practice for mercury disposal/storage and emissions management?

The remediation goes beyond 'cap and contain' because Orica is also required to remove the most highly contaminated soil accessible, an approach considered to meet international best practice.

9. Will the EPA meet the UN requirements for mercury remediation? If so, how?

The EPA's requirements are consistent with the *United Nations Environment Programme Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury* (2011) which recognise that the remediation of soils contaminated with mercury is dependent on a variety of factors (i.e. there is no one approach that would suit all circumstances) and highlight that the priority is to isolate the contamination, as far as possible, in order to minimise further exposure to people and the environment.

10. What are the thermal treatment options for mercury remediation?

There are a range of technologies which are discussed in Orica's remedial options appraisal report. The EPA has requested a further assessment from Orica of the most promising thermal technology (indirect heated vacuum thermal desorption); the results of which have recently been provided to the EPA. The EPA is currently reviewing this information but has also requested further information from Orica.

Monitoring

11. Will independent monitoring be undertaken?

The type, locations and extent of further monitoring for mercury will be an important component of the EPA's Independent Review that will be undertaken by the EPA and was announced on 25 January 2013.

12. What mercury monitoring equipment is being, and will be, used?

The following mercury air monitoring equipment is currently in use:

An inline mercury vapour monitor to continuously monitor the Emission Control System (ECS) to ensure it is operating effectively. The monitoring location has been chosen to ensure the granulated activated carbon can be replaced before mercury can break through and be discharged through the stack. The inline monitor at Emission Points 37 and 38 is a Mercury Vapour Monitor VM-3000.

Equipment associated with Test Method 12 (TM-12) for mercury sampling and analysis. This equipment is used to monitor emissions discharged from the ECS stacks on a monthly basis in accordance with the EPA document *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*. TM-12 incorporates USEPA Method 29 'Determination of Metal Emissions from Stationary Sources'. Sampling and analysis are carried out by NATA-accredited companies.

A Lumex-RA 915+ Mercury Analyzer to monitor one day per week continuously for 24 hours the ambient air between the Temporary Emission Control Enclosure (TECE) and the Botany Industrial Park boundary along Denison Road. Monitoring at this location demonstrates that the TECE and ECS are operating effectively (preventing the escape of mercury vapour from the TECE).

A Jerome J405 Mercury Vapour Analyzer for daily monitoring in the TECE. Monitoring ambient air within the TECE ensures the effective implementation and operation of mercury mitigation measures.

The mercury controls have been designed to minimise mercury emissions from the site as much as practicable. The TECE built over the site of Block G of the former chlor alkali plant (FCAP) is specifically designed to manage mercury vapours from remediation works. The TECE components include a ventilation system and an ECS which filters ventilated air prior to its discharge to the atmosphere. The ECS consists of two treatment trains each containing granulated activated carbon beds specifically designed to capture mercury emissions.

Mercury monitoring for the 'containment system' project will be required to demonstrate emission controls are operating effectively and mercury emissions are being minimised as much as practicable. This is consistent with current monitoring requirements.

13. Will there be an Air Quality Management Plan for the containment system? What monitoring will be required?

Orica will be required to prepare and implement a detailed air quality management plan (AQMP) for the containment system project.

The AQMP will:

1. be prepared in consultation with the EPA
2. describe best practice measures that will be implemented by Orica to ensure mercury emissions are minimised to the maximum extent achievable
3. include details of an air quality monitoring program to be used to demonstrate emission controls are operating effectively.

Specific monitoring to be undertaken during construction of the containment system is likely to include the four methods specified in Question 12.

Following construction, the EPA will require that Orica employ fit-for-purpose monitoring methods that will demonstrate mercury emissions are being minimised as much as practicable.

Air quality monitoring results will be available to the community. Currently FCAP monthly stack test monitoring data and weekly boundary monitoring data is published on the web. This is consistent with the requirements of the POEO Act – and *The Requirements for Publishing Pollution Monitoring Data* (EPA, March 2012).

Air quality monitoring associated with future remediation works will be published by Orica on its website in accordance with the Act.

14. Is it possible to conduct real-time air mercury monitoring? If so, will the EPA require this?

The EPA has strict air monitoring standards on-site that provide sufficient information to monitor for any potential mercury emissions. It is as near to real-time as possible taking into account technology limitations that require a small processing speed delay ranging from minutes to hours. This data is regularly reviewed to ensure licence limits are met. On-site monitoring includes:

The EPA requires near real-time air mercury monitoring of emissions within the Emission Control System (ECS). Emissions are continuously monitored to ensure the ECS is operating effectively at all times. ECS mercury vapour monitoring is performed using an inline mercury vapour monitor (Mercury Vapour Monitor VM-3000).

The EPA requires near real-time air mercury monitoring of emissions within the TECE. Emissions are monitored daily to ensure mercury mitigation measures are implemented and operated effectively. TECE indoor monitoring is performed using a Jerome J405 Mercury Vapour Analyser.

The EPA also requires near real-time air mercury monitoring of ambient air close to the boundary of the site. Emissions are monitored one day per week continuously for 24 hours to ensure the TECE and ECS are operating effectively. Monitoring is performed using a Lumex-RA 915+. The Lumex monitor is not designed for permanent outdoor use or to provide remote access to data.

The EPA will continue to require Orica to conduct mercury vapour monitoring at a frequency that adequately demonstrates mercury emissions are controlled to the maximum extent achievable to protect human health and the environment.

15. Will EPA require Orica to perform Halo testing (soil testing on adjacent land)?

The independent review will involve a thorough analysis of available data to determine if any further information is needed to assess residual health risks, to the adjacent community, associated with the mercury emissions from the former plant. This analysis will also be used to direct any subsequent sampling and testing programs.

16. Can the community have independent testing performed to provide reassurance of the levels of contamination?

Although the scope of works to be undertaken by the independent review has not been developed, at this stage, it is envisaged that sampling for mercury will be required to support the independent review.

Health

17. What are the current health impacts on people and the environment?

Based on the current health risk assessment, ambient air monitoring, relevant remediation projects and sampling completed around the site, the EPA believes that there are no health risks to residents. This issue will be considered in further detail as part of the EPA's Independent Review.

18. Who issues health warnings/notices?

NSW Health

19. What health testing is required?

This issue will be considered in further detail as part of the EPA's Independent Review. However there are currently no health testing requirements around the site or within the community as the health risk is considered to be extremely low. This is based upon health risk assessments, ambient air monitoring, relevant remediation projects and historical sampling completed.

20. Can a review of mercury health studies be undertaken? What are the health implications for the local community?

This issue will be considered in further detail as part of the EPA's Independent Review.

Historical site contamination

21. Can the EPA supply old copies of Environment Protection Licences? Was Orica permitted to discharge mercury in the past?

There are numerous historical files, data, reports and other information on the old ICI plant that go back many years. In order to obtain old copies of the Environment Protection Licences and details on mercury discharges, a search of these files is being conducted. Further information, including old copies of licences, will be made available once located. Information available shows that some of the discharges allowed were for example:

Air
Orica was permitted to emit mercury through the vent stacks at an emission rate of 0.3 mg/m^3 through vent absorbers controlled with carbon filters in accordance with the Clean Air (Plant and Equipment) Regulation 1997.

Waste
Brine waste filter solids were stabilised and cast into concrete blocks suitable for landfill disposal. The blocks were regularly tested to the US EPA Toxicity Characteristic Leaching Procedure. The mercury content leachate limit was 0.2 milligrams per litre. Spent carbon filters contaminated with mercury were also stored on site and sent to landfill.

22. What was the total quantity of mercury discharged?

Orica has provided the following answer to this question:

Based on limited data from the final years of the operation of the Orica Botany plant, and data from similar mercury cell plants, it is probable that the total losses from the Botany plant were ~ 3 g Hg/tonne of chlorine capacity or ~ 240 kg of mercury equivalent per annum. There is a high degree of uncertainty in the estimates but this represents a reasonable estimate.

Available information is below.

1. Orica data for the last few years of the plant life is recorded in the National Pollutant Inventory and this is summarised below:

National Pollution Inventory: Year	Units of measure (data in kilograms)
1998/99	240
1999/00	202
2000/01	128
2001/02	141
2002/03	240
2003/04	340

However there is widely reported data from similar mercury cell plants. The Botany chlorine plant was rated at 80,000 tonne per annum capacity and the above data equates to 3 g Hg/tonne of chlorine capacity.

2. The total mercury emission to air, water and products from chlor alkali plants in western Europe was 9.5 tonnes in 1998, ranging from 0.2-3.0 g Hg/tonne of chlorine capacity at the individual plants (ICC (2004))

3. The UNEP estimated that in 2005 the chlor alkali industry demand for mercury was 500 tonnes for an estimated 9 million tonnes of mercury cell production capacity world wide. Assuming that the demand was required to replace mercury losses, this equates to 0.6 g Hg/tonne chlorine capacity.
(http://www.zoinet.org/web/sites/default/files/publications/Mercury-Poster-Chlor-Alkali.pdf)

4. Emissions of mercury to the atmosphere from the BIP chlor alkali plant were quoted to be 120 and 140 kg per year in 2001 and 2002 (or ~1.8 g Hg/tonne of chlorine capacity), which were the last years of operation of the plant. (Nelson PF, H Nguyen, AL Morrison, H Malfroy, ME Cope, MF Hibberd, S Lee, JL McGregor and M Meyer (2009). *Mercury Sources, Transportation and Fate in Australia*. Final Report to the Department of Environment, Water, Heritage & the Arts RFT 100/0607).

5. EuroChlor reports that the mercury waste streams in European mercury cell plants averaged ~ 3 gm Hg/ tonne chlorine capacity in 2002.
(http://www.eurochlor.org/media/9074/3-4-1-unep_global_mercury_programme_-_the_chlor-alkali_sector_partnership.pdf)

23. What quantity of mercury remains in the contamination?

It is estimated that approximately 12 tonnes of mercury remain within the identified remediation area.

24. Does the EPA know the extent of the mercury contamination?

The extent of the mercury-contaminated soil that is currently subject to a Management Order under the *Contaminated Land Management Act 1997* was determined through onsite investigation and sampling.

The EPA has reviewed the information supplied and is aware of the extent of the contamination. This issue will be considered in further detail as part of the EPA's Independent Review.

25. What is the extent of the contaminated area (on and offsite)? How is this known? Where are the contaminated areas?

The extent of the mercury-contaminated soil that is currently subject to a Management Order under the *Contaminated Land Management Act 1997* was determined through onsite investigation and sampling.

The EPA has reviewed the information supplied and is aware of the extent of the contamination. This issue will be considered in further detail as part of the EPA's Independent Review.

26. Can Orica account for all the mercury wastes produced?

Orica has provided the following answer to this question:

No, Orica has no record to account for all the mercury wastes produced. Orica's critical records retention guidelines require waste monitoring records and waste disposal records to be retained for seven years. The former chlor alkali plant closed in 2002/03, so waste records pre-dating that period would not have been retained.

27. What remediation will be required after the containment system is built (on and offsite)?

This issue will be considered in further detail as part of the EPA's Independent Review.

Risk management

28. What are the emergency management arrangements for Orica?

In accordance with Section 5.7A of the *Protection of the Environment Operations Act 1997*, Orica Botany has prepared Pollution Incident Response Management Plans (PIRMPs). The PIRMPs outline the processes to prevent and minimise the risk of pollution incidents and ensure comprehensive and timely information is provided to relevant authorities and stakeholders.

Orica's Pollution Incident Response Management Plan is available at:

http://www.oricabotanytransformation.com/?page=166

Regulation

29. What is the monetary value of financial assurance proposed for the project? Will it be adequate to remediate the site if Orica goes out of business? Is the financial assurance available if Orica goes out of business?

Final monetary value is to be determined. The intent is to have the financial assurance available regardless of the status of Orica.

30. What powers does the EPA have to regulate the project and Orica?

Under the *Protection of the Environment Operations Act 1997* (POEO Act) and the *Contaminated Land Management Act 1997* (CLM Act) the EPA has robust regulatory powers to ensure that it is able to perform effectively. Some of these include:

- requiring immediate notification of a pollution incident to all relevant authorities
- doubling to $2 million the maximum penalty for failure to notify a pollution incident in accordance with the requirements of the POEO Act
- requiring licensees to prepare and implement pollution incident response management plans
- requiring licensees to publish monitoring results or otherwise make them available to the public
- new explicit powers for the EPA and Ministry of Health to require, in certain instances, payment for an analysis of the human health and environmental risks arising from an incident
- expanded powers to require a mandatory environmental audit
- expanded information to be included on the public registers of Appropriate Regulatory Authorities website.

31. What is Orica's non-compliance history?

Refer to Attachment 1.

Consultation

32. What will be the ongoing consultation process?

The EPA believes that the community's input and involvement in the clean-up process is vital to its success.

The EPA will continue to consult via the Orica Community Liaison Committee and EPA-initiated community meetings as necessary. The EPA will use the Botany Bay subscribers group website as a tool to provide further information to interested community members.

The Steering Panel for the EPA's Independent Review will include community members to enable community views to be put forward.

33. How is the EPA going to continue to consult with the community?

See answer to Question 32 above.

Other issues

34. Why did the EPA allow Orica to burn diethylaluminum chloride (DEAC) in the past?

On 22 October 2008 Orica wrote to the EPA stating that it intended to treat a 'small amount of waste residue' in the Groundwater Treatment Plant (GTP) prior to the annual shutdown in November 2008.

The EPA carefully considered the proposal and ultimately agreed to the activity with a number of conditions including community notification. The proposal was carefully considered on its technical merits and in consideration of the environmental risks associated with other treatment options. The conditions agreed by the EPA included notification to the chair of the Community Liaison Committee (CLC) (Mr Kent) and compliance with all licence conditions, including stack limit and monitoring conditions.

Orica complied with its requirement in notifying Mr Kent but began the treatment before the rest of the CLC members were apprised.

Stack testing during the process demonstrated an exceedance of the licence limit for suspended particles.

The EPA issued Orica with a Penalty Infringement Notice for non-compliance with licence condition L3.

The EPA has also amended the Environment Protection Licence with a condition that requires that no 'waste residue' can be processed through the Groundwater Treatment Plant without a full environmental impact assessment.

35. What are the mercury emission levels from Qenos and are they a health issue?

In 2010 and 2011 Qenos emitted 20kg of mercury for the year from its coal-fired boilers. Based on the emissions rate there is no health risk.

36. Why aren't there any warning signs around Botany Bay and surrounding areas regarding the risk of mercury contamination? Should EPA/NSW Health expand this to include the risk of eating fish from Botany Bay?

There are currently warnings that fish and shellfish should not be eaten from the whole of the waters of the Alexandra Canal from its source to its junction at the Cooks River and Penrhyn Estuary.

In the event of suspected environmental pollution of a recreational fishing area, the EPA and/or Fisheries NSW undertake the collection and testing of key aquatic species. The EPA and/or Fisheries NSW can ask the NSW Food Authority to provide advice on the data obtained from a food safety perspective. The advice together with the views of the EPA and Fisheries NSW (Ministry of Health can be involved also) inform risk management of the issue.

If communication to the public via signage is an agreed path, Fisheries NSW will oversee the implementation.

ATTACHMENT 1: BREAKOWN OF LICENCE NON-COMPLIANCES
ORICA ENVIRONMENT PROTECTION LICENCE NO. 2148

Reporting year (ending 20 July)	Number of licence conditions not complied with	Number of incidents / instances	Breakdown
2003	0	0	New chlorine plant commenced operation
2004	1	1	**1** non-compliance involving waste sent to an incorrect facility and subsequently recovered – no actual or potential environmental harm
2005	2	4	**3** non-compliances related to monitoring requirements **1** non-compliance with actual or potential environmental harm, involving a minor emission of chlorine during drum testing
2006	2	2	**2** non-compliances involving actual or potential environmental harm, with volatile organic compound emissions emitted above applicable licence limit 2 Penalty Infringement Notices issued for non-compliances
2007	19	44	Commissioning of Groundwater Treatment Plant (GTP) commenced as a requirement of a Clean-Up Notice to prevent contaminated groundwater impacting on Botany Bay. **3** non-compliances related to monitoring requirements **7** non-compliances linked to stack emissions from the GTP with parameters at levels above licence limits **21** non-compliances linked to treated water from the GTP with parameters at levels above licence limits **1** non-compliance due to noise emissions from the GTP above licence limit **5** non-compliances involving operational issues **2** non-compliances involving untreated groundwater spills from groundwater collection infrastructure **4** non-compliances involving administrative issues such as late submissions of a report – no actual or potential environmental harm A number of the above non-compliances had the potential for actual or potential environmental harm. Multiple Pollution Reduction Programs

Reporting year (ending 20 July)	Number of licence conditions not complied with	Number of incidents / instances	Breakdown
			(PRPs) were imposed on Orica to address issues arising with the GTP during commissioning. 1 Penalty Infringement Notice issued
2008	21	89	**61** non-compliances related to monitoring requirements, such as not monitoring wind speeds, systems issues and not conducting required monitoring **16** non-compliances linked to treated water from the GTP with parameters at levels above licence limits, with 10 linked to elevated temperatures, one for biochemical oxygen demand and five for chloramine that were caused by software issues **6** non-compliances with actual or potential environmental harm **1** non-compliance linked to a performance trial with the GTP issues – no actual or potential environmental harm **1** operational non-compliance – no actual or potential environmental harm **4** non-compliances involving administrative issues – no actual or potential environmental harm
2009	8	13	**2** non-compliances related to monitoring requirements **1** non-compliance due to solid particle emissions from GTP stack above licence limit. Penalty Infringement Notice issued **2** non-compliances involved oxidised nitrogen in treated water from the GTP at levels marginally above licence limits **2** other non-compliances involving actual or potential environmental harm **4** non-compliances linked to temperature of treated water from the GTP above licence limits. PRP developed requiring Orica to undertake rectification measures **2** non-compliances involving administrative issues – no actual or potential environmental harm

Reporting year (ending 20 July)	Number of licence conditions not complied with	Number of incidents / instances	Breakdown
2010	5	11	**8** non-compliances related to monitoring requirements **3** non-compliances linked to temperature of treated water from the GTP above licence limits. PRP to address issues completed during this reporting year
2011	1	1	**1** non-compliance related to monitoring as not monitoring wind speeds
2012	4	3	**3** non-compliances linked to temperature of treated water from the GTP above licence limits. PRP to address issues completed during this reporting year