

**INQUIRY INTO KOORAGANG ISLAND ORICA
CHEMICAL LEAK**

Organisation: NSW Ministry of Health

Date received: 7/11/2011

NSW Ministry of Health Submission to

Legislative Council Select Committee on the Kooragang Island Orica chemical leak

This submission details NSW Health's actions following the Orica chromium VI release and provides information relevant to items (b) i and ii and (c) of the terms of reference. **Tab A** provides a timeline of actions undertaken by both NSW Health and Hunter New England Population Health (HNEPH).

The New South Wales Government's response following the incident, including the timelines and reporting to the Department of Health

On 10 August at 11:30am Hunter New England Population Health received telephone notification by Orica of a release at their plant (likely chromium). Orica management confirmed that the Office of Environment and Heritage (OEH) had been previously notified. Orica reported that no illness had been identified in workers on the Orica site. Orica reported that they had consulted occupational health consultants for advice on assessment and care of workers.

This prompted calls by HNEPH to the Hunter New England Health Services Functional Area Controller (HNE HSFAC) and HAZMAT as per the usual protocol to determine whether there had been a notification or investigation of the incident. HNE HSFAC had not been previously notified. HAZMAT reported an anonymous call at 1:00pm Tuesday 9 August but due to OEH being on-site and reporting on-site containment they did not deploy to the site.

OEH were contacted to determine their actions and assessment. Visual inspection by OEH staff identified deposition in the Stockton area of a yet to be identified material. Emergency Departments were contacted by HNE HSFAC following notification by HNEPH. HNEPH was at that stage not aware of any reported ill health and there were no subsequent reports of presentations to emergency departments as a result of the incident.

On 10 August at 2:25pm HNEPH had a telephone discussion with Orica management. They had identified hexavalent chromium (initially reported to Health as chromate) solution from a deposit on the Orica site. There were no known health effects for workers on the Orica site. No environmental testing had been conducted in the Stockton residential area. Orica reported that they were about to deploy teams to the Stockton area to inspect for deposition and directly contact residents in the potentially affected area. They had determined the risk area based on wind direction at the time of the release. Orica planned to convey precautionary health messages to Stockton residents at that time. HNEPH provided comment on these messages and recommended that Orica distribute a written information sheet. Orica indicated that they would staff a telephone information line.

The A/Director, Health Protection HNEPH, spoke with Orica on the evening of 10 August (with a follow-up phone call on the morning on 11 August) to request answers to questions for consideration by the expert panel meeting on the morning on 11 August.

At 8:15 on 11 August, HNEPH contacted Orica. Orica estimated that approximately 21 kg of chromium VI was deposited on the Orica plant site and between 1 – 10 kg was likely to have been released beyond the Orica boundary.

At 9:30 the Chief Health Officer (CHO) expert group meet, including Professor Alison Jones, Professor Bruce Armstrong, OEH and HNEPH. To enable an accurate assessment and advice to community, further specific risk assessment details were formally requested from Orica with questions from panel, by 14:30, 11 August. The Expert Panel also recommended additional grid based environmental testing which was undertaken by OEH.

On 11 August 2011, Orica provided HNEPH with a response to a request for information on the "*Release of Chromium from the SP8 Stack in the KI Ammonia Plant*". The document was authored by Dr Rodney Williams – Orica Mining Services, Dr Bruce Niven – Nivicon Pty Ltd (Medical Doctor – formerly Orica Chief Medical Officer), John Frangos (Masters of Toxicology) – Principal Consultant from Toxikos, Garry Gately – Corporate Occupational Hygienist Orica and Russell Higgins – Advisor Major Projects, Orica (**tab B**).

The New South Wales Government's response following the incident, including the actions of NSW Health once notified

Please refer to the timeline pertaining to NSW Health's involvement in the response to the Orica chromium release of 8 August 2011 (**tab A**). The timeline covers the period 8 to 24 August 2011; following that period NSW Health continued to be actively involved with the response to Orica's chromium release (eg, the final health risk assessment was released on 2 September).

On arrival at Sydney Airport on 10 August following a return trip from Canberra the State Public Health Controller/Chief Health Officer (CHO) checked her message bank. The first message received was from Ms Lisa Corbyn, Chief Executive, Office of Environment and Heritage. The CHO returned Ms Corbyn's call at 5:38pm and was provided brief details of laboratory results and a description of the incident. The CHO then spoke to the Director of Health Protection, NSW Health, who indicated that the Director, Environmental Health Branch, had been notified of the issue by HNEPH at approximately 4:00pm that day.

The CHO then called the Director, Environmental Health Branch, and received a briefing regarding the issue. Following this the CHO retrieved a message from the Minister's office (approximately 5:54pm) which had previously been alerted to the incident. Whilst it was noted that HNEPH had been advising Orica on precautionary messages (since approximately 2:30pm that afternoon) it was considered appropriate for NSW Health/HNEPH to provide written public health advice to the impacted community, drawing on expert input. Plans were put in place for the preparation of this advice including the development of a factsheet for letter box distribution to the community.

That evening (10 August) the CHO had a series of discussions with the Director, Environmental Health Branch, who had been liaising with Dr Tony Merritt (A/Director Health Protection HNEPH) and Professor Alison Jones (clinical toxicologist) in order to assess the public health implications and determine appropriate public health actions.

In addition, the CHO provided a number of verbal updates to the Minister's office as information became available.

At 7:31pm the CHO received an email from Ms Corbyn with information on advice being provided by Orica staff to residents and a copy of the materials safety data sheet. The CHO, in turn, forwarded the email and attachments to the Minister's office and the Director, Environmental Health Branch at 7:37pm.

In discussions with the Director, Environmental Health Branch, it was determined that the current risk of individuals in the community being exposed to chromium VI was very low.

This was because the acute event had occurred on 8 August at approximately 6:00pm and it was considered, based on a rapid situational analysis, that the risk to the community would have been greatest at this time, if residents were outside during the period when the plume passed over Stockton. There were no known acute health affects reported amongst either workers or the community as of two days following the event.

The normal steps of hazard identification, initial acute risk assessment and final risk assessment were followed. On the night of 10 August, the response remained in the hazard identification and initial acute risk assessment phases; this continued based on the decision of the expert panel on Thursday morning (11 August) that additional information was required to properly assess the potential hazard.

The environmental scan, including laboratory test results, conducted by OEH showed very low levels of chromium VI concentration (eg sparse and patchy potential contamination).

Given the above and:

- that the most likely route of any possible ongoing exposure was through ingestion following hand to mouth contact with contaminated surfaces and soil ingestion whilst outdoors (and it was thought that only very young children would be likely to engage in this behaviour and given that it was a cold winter night they were unlikely to be playing outside even in the early morning)
- that based on current advice the risk of adverse health outcomes in those residing near the plant was very low,

it was not considered appropriate to issue precautionary warnings on the night of 10 August but to assess the situation in light of all the evidence the next morning and then communicate the recommendations.

Any risk that might have existed was considered very low, but it was considered important to rapidly undertake further investigations to formulate appropriate public health action. Information continued to be gathered overnight, including toxicology exposure pathways and any risk to human health, and a teleconference was scheduled for the morning (11 August).

The CHO requested that:

- an expert panel be convened for 8:30am on 11 August (this was later changed to 9:30am due to non-availability of a key member)
- work commence on preparation of a fact sheet for distribution to residents as part of the communications strategy
- the public health unit plan for staff to distribute the information
- further information be sought from Orica (noting comments that they had consulted on health issues in the 7:31pm email from Ms Corbyn – **(tab C)**).

At 9:40pm the CHO received an email containing an overview of the issue prepared by HNE media unit noting that the population health unit was preparing a detailed brief in relation to the matter. The overview email was forwarded to the Minister's office. During the evening of 10 August, the CHO provided a number of verbal updates to the Minister's office as additional information became available.

At 9:42pm the CHO requested that the Director, DOH Media Branch, attend the expert panel meeting the next morning (9:30am) to assist with the development of the public communication of the incident and preparation of appropriate public health advice. He subsequently confirmed his availability by email.

On 11 August the CHO forwarded an in-brief for the Minister to the DOH media office, which was subsequently forwarded to the Minister's office. NSW Health media releases and

information on communications and activities provided to residents were regularly forwarded to the Minister's office. Media conferences were held on 11 August, 12 August, 13 August and 2 September.

NSW Health provided the affected communities with numerous factsheets and other documents from 11 August 2011. HNEPH Environmental Health Officers (EHOs) were present in the area to answer questions from concerned residents and a helpline was set up for provision of advice. HNEPH EHOs wearing high visibility NSW Health tabards were available in the area to provide advice in the community on 11, 12, 13, 14, 15, 16, 17 and 18 August.

HNEPH contacted GP Access to alert them to release and potential presentations to general practice services on 11 August. In addition:

- GP Access was provided with updated information and advice to GPs for fax alert on 15 August (**tab D**).
- GP Access was provided with updated information and advice on outcome of investigations to GPs for fax alert on 2 September (**tab E**).

NSW Health was advised of the results of the first batch of samples at 23:26 on 12 August. These results were used by Professor Jones to complete a rapid risk assessment, the conclusions of which - that immediate health effects were unlikely to occur as a result of the release of chromium VI from the Orica plant - were presented to the public on the morning of 13 August (**tab F**).

NSW Health released its final health risk assessment on 2 September. This used the results of environmental samples and modelled concentrations of chromium VI in the air to estimate the maximum possible exposure of any individual in Stockton. Its results supported the findings of the rapid risk assessment. In addition, it found that it is very unlikely that anyone in Stockton will develop of cancer as a result of this the release of chromium VI from the Orica plant (**tab G**).

The following information was provided to the affected communities:

- Specific precautionary advice was provided to the child care centre in Stockton
- *Chromium VI release from Orica at Kooragang Island* – fact sheet issued to residents and the SEOC on 11 August (**tab H**).
 - Letterbox dropped to 100 properties on evening of Thursday 11 August.
 - Letterbox dropped to a further 66 residents in adjacent area south of Flint Street on Friday 12 August.
 - 20 fact sheets were delivered to the Tackle Shop for distribution to customers and 30 were given to the local childcare centre.
 - Fact sheet also emailed to staff within OEH, Newcastle City Council (Parks & Gardens), Port Waratah Coal Services and Abigroup on Sunday 14 August and to Newcastle Port Corporation on Monday 15 August.
 - Posted to NSW Health/HNE LHD websites
- *Stockton chromium results confirm no health risk to residents* – fact sheet issued to residents and the SOEC on 14 August (**tab I**).
 - Letterbox dropped to approximately 170 properties on Sunday 14 August.
 - 20 fact sheets were delivered to the Tackle Shop for distribution to customers
 - Fact sheet also emailed to Newcastle City Council (Compliance Services and Parks & Gardens), Port Waratah Coal Services and Abigroup on

- Sunday 14 August. Also emailed to Newcastle Port Corporation on Monday 15 August.
 - Posted to NSW Health/HNE LHD websites
- *Stockton chromium results confirm no health risk to residents* – fact sheet issued to residents and the SEOC on 16 August (**tab J**).
 - Letterbox dropped to approximately 400 Stockton properties on Tuesday 16 August with all Stockton residents being letterbox dropped by end of morning on Wednesday 17 August (representing approximately 1700 properties in total)
 - Fact sheet also emailed to Newcastle City Council (Compliance Services and Parks & Gardens), Port Waratah Coal Services, Abigroup, Newcastle Port Corporation, Stockton Centre, Ausgrid and Patricks on Monday 15 August.
 - Posted to NSW Health/HNE LHD websites
- *A Rapid Risk Assessment Following the Release of Chromium VI From the Orica Plant, Kooragang Island, 8th August 2011* (**tab F**)
 - Posted to NSW Health/HNE LHD websites
- *Release of Chromium VI from the Orica chemical plant, Kooragang Island, Stockton, 8th August 2011 Final Health Risk Assessment Report, 2nd September 2011* (**tab G**).
 - Link to report emailed to Newcastle City Council (Compliance Services and Parks & Gardens), Port Waratah Coal Services, Abigroup, Newcastle Port Corporation, Stockton Centre, Ausgrid and Patricks on Friday 2 September.
 - Posted to NSW Health/HNE LHD websites
- Department of Health media releases (**tab K**) including:
 - *Orica identifies chemical release in the Hunter* -11 August
 - *Reassuring results from Stockton chromium testing* - 13 August
 - *Stockton chromium results confirm no health risk to residents* - 14 August
 - *Stockton chromium results confirm no health risk to residents* - 16 August
 - *Independent assessment confirms no additional cancers expected from Orica lead* – 2 September
 - Posted to NSW Health website
 - Senior public health clinicians and a clinical toxicologist undertook numerous media interviews from 11 August onwards.
- NSW Health participated in a Stockton community meeting on 23 August.

The Office of the Chief Health Officer provided updated information to the State Emergency Operations Centre (SEOC) and the Office of Environment and Heritage (OEH). This included copies of the above-mentioned communication, most of which was also available on the NSW Health and Hunter New England Local Health District websites.

Five Incident Action Plans (IAPs) were submitted to the SEOC by NSW Health (**tab L**).

- IAP 1 – 12/8/11
- IAP 2 – 12/8/11
- IAP 3 – 13/8/11
- IAP 4 – 13/8/11 (jointly authored/endorsed by OEH and Workcover Authority of NSW)
- IAP 5 – 14/8/11 (jointly authored/endorsed by OEH and Workcover)

On 15 August, the OEH assumed responsibility for updating and submission of IAPs, although NSW Health continued to contribute to the contents.

Advice provided to multiple other agencies is detailed in the timeline (to 24 August). Additional teleconferences held since 24 August included:

- 24 August – NSW Health, OEH
- 25 August - Chief Health Officer Expert Panel (NSW Health, OEH, Professor Bruce Armstrong and Professor Alison Jones)
- 26 August – CHO Expert Panel
- 29 August – CHO Expert Panel
- 30 August – NSW Health, OEH, air modelling consultant
- 31 August – CHO Expert Panel

A formal NSW Health debrief was held in Newcastle at the Hunter New England Population Health Unit on Friday 9 September. The NSW Health debrief identified a number of recommendations which will enhance our ability to provide effective public health responses to future incidents (**tab M**). NSW Health is progressing these recommendations.

HNEPH is actively involved in the multi-agency Orica Start Up Committee and pre-recommencement desktop exercises, supporting the Office of Environment and Heritage to ensure safe resumption of operations at the Kooragang Orica Ammonia plant.

The final report of the inquiry into the chemical leak at the Orica site being conducted by Brendan O'Reilly

The O'Reilly Report supported the actions taken by NSW Health in response to this incident and acknowledged that NSW Health fulfilled its responsibilities as specified in the NSW Hazardous Materials/CBR Sub Plan. In particular, the review supports NSW Health's approach to public communication.

The review made a number of recommendations. NSW Health is currently working with the Office of Environment and Heritage and other agencies to implement these recommendations.

Attachments: Tabs A to M

NSW Health Orica chromium incident draft timeline, August 2011. Timeline will be updated and additional actions confirmed. **A**

Day	Time	Event / notes
Monday 8 August	18:00 – 18:30	Release of hexavalent chromium from Orica plant, Kooragang
Tuesday 9 August	10:30	Notification to Office of Environment and Heritage(OEH) by Orica
	Afternoon	First OEH swabs collected in Stockton (x3) from external surfaces with visible deposition (letter box and boat).
Wednesday 10 August	11:30	Notification of Hunter New England Population Health (HNEPH) by Orica of a likely chromium release at their plant. Management confirmed notification to OEH. No illness identified in workers on Orica site. They had consulted occupational health consultants for advice on assessment and care of workers.
	12:45 approx	HNEPH contacted HSFAC and HAZMAT to determine whether there had been a notification or investigation of the incident. HSFAC had not been previously notified. HAZMAT reported an anonymous call at 13:00 Tuesday 9 August. Due to OEH being on site and reported containment they did not deploy to the site.
	13:00 approx	Consulted OEH to determine their actions and assessment. Visual inspection by OEH staff identified deposition in Stockton area of yet to be identified material. Not aware of any reported ill health.
	14:25	Discussion with Orica management. They had identified chromate solution from a deposit on the Orica site. There were no known health effects for workers on the Orica site. No environmental testing had been conducted in the Stockton residential area. Orica were about to deploy teams to Stockton area to inspect for deposition and directly contact residents in potentially affected area. They had determined the mostly risk area based on wind direction at the time of the release. Orica to convey precautionary health messages to Stockton residents at that time. HNEPH asked to comment on these messages. Orica to identify and use contractors to clean visibly contaminated surfaces. HNEPH recommended Orica distribute a written information sheet. Orica indicated that they would staff a telephone information line.
	16:00 approx	NSW Health Environmental Health Branch notified by OEH (central office). EHB contacted HNEPH.
	17:15	OEH report chromium VI detection in 2 swabs collected in Stockton on 9 August to HNEPH. OEH staff identify visual deposition confined to 6 residential blocks.
	17:50	NSW Health media unit notified by OEH media unit, and Health Minister's office advised

	18:00	HNEPH discuss results with Alison Jones. Further risk assessment required
	18:15	HNEPH discuss results with Wayne Smith, EHB. HNEPH to prepare brief.
	18:30-21:00 (approx)	Collation of toxicological background information; teleconference organised for Thursday morning.
	19:00	HNEPH contacted Orica to review their investigation results. Over 25 properties inspected by Orica. Deposition identified on 2 cars and several letter boxes. No calls to their information telephone line. Orica advised that their toxicology consultants considered the risk to human health in Stockton to be very low
	20:00	Request to Orica for toxicological information for consideration by panel in the morning
Thursday 11 August		Further OEH swabs collected in the Stockton community (x36), with a focus on likely affected area.
	07:30	Preliminary work begun by EHB on chromium VI fact sheet for the community
	08:15	HNEPH contacted by Orica. Orica estimated approximately 21 kg of chromium VI deposited on Orica plant site and between 1 – 10 kg likely to have been released beyond Orica boundary. Subsequent email confirmed they would target the same 6 block area identified by OEH as potentially exposed.
	09:30	Chief Health Officer (CHO) expert group meet. Alison Jones, Bruce Armstrong, OEH, HNEPH. To enable accurate assessment and advice to community, further specific risk assessment details formally requested from Orica with questions from panel. Required by 14:30, 11 August. OEH to conduct further sampling in Stockton to confirm potentially exposed area.
	11:00 approx	Factsheet One for community continued development.
	11:20	WorkCover contacted. They were aware of incident.
	12:50 approx	Review aerial photos for evidence of tanks and pools in 6 block area
	14:10	HNEPH contact NSW Food Authority Shellfish Program. Oyster lease in nearby Hunter River closed since 26 August 2010. Possible re-opening dependent on clearance testing. Can add chromium to current tests.
	14:42	NSW Health alerted media alerted to upcoming media conference
	15:15	HNEPH staff deployed to field to identify high risk premises including child care centres, and to inspect for presence of water tanks

	15:30	Media conference (CHO, OEH, North Sydney), focus on process to date and future actions.
	15:40	HNEPH staff conduct rapid assessment of area in Stockton between Cardigan Street and Meredith Avenue, Stockton. Early Learning Centre identified as only institution in zone of concern. To be sampled by OEH.
	15:50	CHO expert panel reconvenes. Available data reassuring, public health risk assessed as likely to be low. Precautionary advice to continue pending further test results. Content of factsheet and advice to childcare centre decided. SEO Controller present at teleconference.
	15:55	HNEPH staff deployed to Early Learning Centre to conduct risk assessment, provide precautionary advice and OEH collect environmental samples.
	16:00 approx	Early learning centre management decide to close centre on Friday for cleaning.
	16:05	HNEPH staff promote precautionary actions to residents in the potentially exposed area.
	19:10 - 21:15	HNEPH staff redeployed to Stockton for delivery of factsheet one. 100 fact sheets delivered to residents within the area bounded by Fullerton Street, southern side of Griffith Avenue, Barrie Crescent, and both sides of Flint Street. One water tank identified for sampling on Friday.
	19:50	HNEPH discussion with OEH. No visible deposition at childcare centre. Assessment concludes of potentially exposed area unchanged. No water tanks identified.
Friday 12 August		Further OEH swabs collected within Stockton community, including expanded area to north and south
	07:40	HNEPH staff deployed to Stockton with additional fact sheets (Factsheet One). Factsheets delivered to 8 letterboxes in Dunbar Street within targeted 6 block zone. 20 fact sheets provided to a local business in 6 block area.
	08:45	HNEPH contact WorkCover. Adjacent industries not notified by WorkCover.
	08:55	HNEPH contact Orica. Adjacent industries not notified by Orica. They were assessed at no risk of exposure. Air monitoring for chromium at Orica site below OHS standard.
	10:20	HNEPH contacted NSW Food Authority Shellfish Program. No oysters in Hunter lease. Will likely not reopen. They will test for chromium in wild oysters in approximately 2 weeks.
	11:55	HNEPH staff redeployed to Stockton to deliver 58 fact sheets to households within the area bounded by Flint Street, Mitchell Street, northern side of Pembroke Street and both sides of Dunbar Street, which was downwind of the 6 block area.

	12:50	HNEPH staff deployed to Early Learning Centre to assess progress with precautionary clean up. Confirmed closure of centre.
	13:30	CHO briefs Dr Andrew McDonald, Shadow Minister for Health
	13:40	HNEPH staff on foot patrol in Stockton to promote precautionary actions in Factsheet One and discuss community concerns.
	13:50	HNEPH staff attended units in Dunbar Street to sample two rainwater tanks.
	14:30	Media Conference with Minister Parker and NSW Health (Wallsend campus)
	15:30 approx	Incident Action Plan Number 1 submitted to SEOC
	16:00	CHO expert panel. OEH report no evidence of deposition outside targeted 6 block zone. Further results expected tonight. Decided that no restriction on fishing or prawning in Hunter river was required.
	19:30 approx	Incident Action Plan Number 2 submitted to SEOC
	23:40	CHO expert panel reviewed results from samples collected 11 August. Three low positives, 33 non-detectable levels. Childcare samples x5 all undetectable for chromium.
Saturday 13 August	07:50	Childcare centre contacted re no detectable chromium in samples
	09:00	Minister Parker reports results to media.
	10:30 approx	Incident Action Plan Number 3 submitted to SEOC
	11:30 approx	Media release (from OEH and NSW Health combined)
	13:00	Media conference (Minister Parker and NSW Health), Stockton Wharf
	13:00 - 17:30	HNEPH staff in Stockton on bicycles. Reinforced precautionary actions within 6 block zone.
	17:30	CHO expert panel. Results for all samples collected by OEH available. Total 71 samples from Stockton. 11 with chromium VI detected at low levels. Panel / Alison Jones conclude no health risk to Stockton residents. Chromium detected at sample sites just south of the 6 block area. Deposition consistent with prevailing wind at the time of release. Panel advised that there was no need for precautionary measures in these areas as levels posed no risk to human health and multiple other samples in that area had not detected chromium.
	23:55	Incident Action Plan Number 4 submitted to SEOC
Sunday 14 August	09:00 approx	Media release. Media handled by HNEPH

	09:30	HNEPH staff members in Stockton community. Sites with water detections visited. Rainwater tank emptied. Bird bath emptied with neighbour.
	09:30 - 11:55	High visibility HNEPH staff circulation through community.
	12: 55 - 15:00	HNEPH staff and OEH Staff delivered Factsheet Two to properties bounded by Fullerton Street, southern side of Griffith Avenue, Barrie Crescent, Mitchell Street (to Cardigan Street, both sides of Dunbar Street (from Cardigan Street through to Flint Street) and both sides of Flint Street. Completed delivery of 152 Factsheet Two to residents. 20 Factsheet Two's provided to a local business.
	17:00	CHO teleconference. WorkCover report no ill health on Orica site.
	20:30	Incident Action Plan Number 5 submitted to SEOC
Monday 15 August	08:00	HNEPH staff at childcare centre
	9:00 – 16:00	HNEPH managed local media, calls from local residents and advice to medical practitioners. EHB respond to Sydney media
	16:00	CHO expert panel meeting. Developed Factsheet Three with result details and map of sample locations for distribution Tuesday. Key messages identified. OEH assume responsibility for IAP and assessing need for further teleconferences
Tuesday 16 August	09:00 – 21:00	HNEPH managed local media, calls from local residents and advice to medical practitioners.
	15:45	Rainwater tank samples collected by HNEPH in 6 block area: had no detectable chromium.
	17:00 – 19:00	HNEPH staff delivered detailed report of all results with map and interpretation (Factsheet Three) to Stockton area north of Pembroke Street.
	19:00 approx	Media release with results
Wednesday 17 August	08:00 – 13:00	HNEPH staff deployed to Stockton to deliver Factsheet Three to remaining residents in Stockton and respond to community questions and concerns. Assisted by OEH and Newcastle City Council staff.
	10:00 approx	HNEPH staff provide water sample results to 2 owners in 6 block area.
	09:00 – 21:00	HNEPH managed local media, calls from local residents and advice to medical practitioners.
Thursday 18 August	12:35	Orica provide first Stockton results of sampling done by them during the clean up. No chromium detected in 71 swabs.
	16:30	CHO teleconference between NSW Health and OEH.

	Evening	Orica hold community meeting in Stockton
Friday 19 August	12:50	Orica verbally notified HNEPH of a single chromium detection in further environmental sampling in Stockton
	16:30	CHO teleconference between NSW Health and OEH. Kerry Chant to speak to GM of Orica to request results of air modelling and risk assessment. OEH will assist in review of these documents. Orica's release of effluent containing arsenic is also discussed.
	19:25	Media statement issued to SMH regarding the timing of notification of the CHO and of her initial actions.
	21:10	Orica provided written report on all Stockton samples. There was one detection from 110 samples.
	21:30	Wayne Smith has phone conversation with Dr Rod Wilson from Orica about the urgent need for air quality monitoring data and health risk assessment documents being prepared by Orica's consultants.
	22:45	Teleconference between Kerry Chant, Wayne Smith and David Durrheim communicating need for GM Orica to expedite access to requested modelling and assessment data. Kerry Chant calls GM Orica during teleconference to highlight the urgent need for access to the preliminary reports
Saturday 20 August	12:30	Teleconference between NSW Health, OEH and PAE Holmes (who have undertaken air modelling for Orica).
	21:40	Media statement issued to SMH regarding OEH notification of CHO on 10 th August.
Sunday 21 August	14:45	Orica provides the draft of Toxicos' risk assessment to NSW Health. OEH review methods and assumptions. NSW Health reviews overall assessment. Cancer risk from inhalation is negligible.
	16:30	CHO teleconference between NSW Health and OEH. Summary document of cancer risk assessment to be produced and circulated for endorsement by experts. Final version of Alison Jones' risk assessment to be uploaded to the NSW Health website ASAP.
Monday 22 August	13:10	NSW Health receives an enquiry from the Daily Telegraph regarding attendance at a community meeting planned for 23 rd August.
	18:40	NSW Health receives a letter from Orica regarding the unit risk values to be used in their assessment of cancer risk.
Tuesday 23 August	11:00 approx	EHB discusses unit risk for chromium VI with John Frangos, risk assessor, Toxicos.
	12:00 approx	NSW Health receives a parliamentary question regarding blood and urine testing for chromium
	14:00	CHO teleconference. Chris Wordsworth in attendance.

	16:00	Position on biological testing for chromium discussed. It was also agreed that EHB would send a letter to Orica clarifying the unit risk values to be used in their assessment of cancer risk.
	17:30	NSW Health sends a letter of clarification to Orica regarding the unit risk values to be used in their assessment of cancer risk
	19:30	Alison Jones' risk assessment published on the NSW Health website
		Community meeting at Stockton RSL attended by a representative of the Premier, the Leader of the Opposition, the local MP, a Greens MP and the Mayor of Newcastle. NSW Health was represented by officers of HNEPH. OEH was represented by Greg Sullivan
Wednesday 24 August	12:30	Minister briefed on last night's community meeting and NSW Health's position on use of bore water and tank water.

- NSW Health contact line has been available since Thursday 11th August 24 hours a day. After hours calls are all diverted to Public Health Unit personnel and are answered in real time.
- As of 10am, 23rd August, HNEPH have received 89 calls. Four were in the last 24hrs.

B

Release of Chromium from the SP8 Stack in the KI Ammonia Plant
Response to Hunter New England Local Health District Request for Information
11/8/11

Dr Rodney Williams – Orica Mining Services
Dr Bruce Niven – Nivicon Pty Ltd (Medical Doctor – formerly Orica Chief Medical Officer)
John Frangos (Masters of Toxicology) – Principal Consultant from Toxikos
Garry Gately – Corporate Occupational Hygienist Orica
Russell Higgins Advisor Major Projects, Orica

Summary

On 11 August 2011, Tony Merritt from Hunter New England Local Health District requested the information set out in Appendix A, from Orica, in relation to an incident at the Orica site on 8 August 2011. Orica has endeavoured to compile a full and comprehensive response to this request for information in the time available. The response is set out in this document. Should further information become available that adds to the information in this document, or results in changes to any findings or assumptions made, Orica will advise Hunter New England Local Health District accordingly.

An incident during start-up of the KI ammonia plant at approximately 6pm on the evening of Monday 8 August resulted in the release of a solution containing chromium (VI). Solution released from the tower fell predominately on the KI site, downwind of the release point. The potential for release of small quantities of emission outside of the KI facility (as an aerosol) has been recognised and anecdotal evidence of deposition of very small quantities of chromium (VI) containing material in Stockton has been received.

Calculation of the quantum of release from the KI site suggests that a maximum of 10kg of chromium (VI) was released from the KI site. This is based on estimation of chromium fallout on the KI site. Details of this calculation are shown below. Based upon the short duration of the event and the very limited quantity of material emitted from the site, it is believed that the impact of this offsite emission to the health and safety of people in the Stockton area is negligible. Further exemplifying this point, there has been no report of any people on the KI site exposed to emissions from the incident suffering any acute symptoms from the emission (e.g. no occurrence of skin sensitisation or respiratory impact). The limited duration of the event also makes chronic effects related to this event extremely unlikely.

Geographic Layout

Figure 1 below shows the location of the KI site and the emission point in comparison to Stockton. Approximate wind direction at the time of the incident is shown also on the diagram.





Figure 1: Overview of the KI Site – Google Earth

Meteorological Data

Table 1 below shows the wind speed and direction data collected at the monitoring station at Orica Kooragang Island around the time of the incident. The wind direction was very consistent during this period being approximately from the NW direction (averaging 304 degrees from N). Wind speed varied between 3.5km/h and 28km/h, averaging 12 km/h.

Table 1: Meteorological Data from KI at the time of the incident

Timestamp	Wind speed km/h	Wind Direction Deg
8/08/2011 18:00	8.505518913	302.6951294
8/08/2011 18:01	9.574334145	302.2271423
8/08/2011 18:02	7.41420269	302.8014526
8/08/2011 18:03	8.854290009	301.8974304
8/08/2011 18:04	3.48771286	302.6764832
8/08/2011 18:05	7.41420269	303.6015625
8/08/2011 18:06	8.122995377	304.3980103
8/08/2011 18:07	12.48826218	303.506012
8/08/2011 18:08	6.356637955	304.0184937
8/08/2011 18:09	10.99192047	303.2189636
8/08/2011 18:10	9.911854744	303.9144592
8/08/2011 18:11	9.225563049	304.2242737
8/08/2011 18:12	5.254070759	303.7906189
8/08/2011 18:13	9.574334145	304.3583984
8/08/2011 18:14	6.70540905	303.6000671
8/08/2011 18:15	11.76821804	303.4250793
8/08/2011 18:16	12.48826218	303.8787537
8/08/2011 18:17	9.574334145	305.0489807
8/08/2011 18:18	12.11698914	304.743988
8/08/2011 18:19	14.27712154	304.1291809
8/08/2011 18:20	11.76821804	304.4489441
8/08/2011 18:21	9.225563049	302.7151489
8/08/2011 18:22	10.99192047	302.5473938
8/08/2011 18:23	8.854290009	303.6788025
8/08/2011 18:24	8.505518913	303.3787231
8/08/2011 18:25	13.54582691	303.3140564
8/08/2011 18:26	10.63189888	303.9959412
8/08/2011 18:27	11.40819645	303.6020203
8/08/2011 18:28	14.27712154	303.4537048
8/08/2011 18:29	13.54582691	304.1955566
8/08/2011 18:30	12.11698914	304.0462952
8/08/2011 18:31	10.63189888	304.2895203
8/08/2011 18:32	10.99192047	304.4479065
8/08/2011 18:33	7.762973785	303.5284424
8/08/2011 18:34	17.14604568	303.6957397
8/08/2011 18:35	9.574334145	305.8059387
8/08/2011 18:36	11.40819645	305.0054932
8/08/2011 18:37	11.41944695	306.0198364
8/08/2011 18:38	11.35194302	306.0373535
8/08/2011 18:39	11.30694008	306.1988525
8/08/2011 18:40	19.26117516	306.3973083
8/08/2011 18:41	9.383072853	307.5617981
8/08/2011 18:42	26.43911362	307.6016235
8/08/2011 18:43	22.13010025	307.000885
8/08/2011 18:44	21.78133011	307.8211365
8/08/2011 18:45	15.34593678	307.1494446
8/08/2011 18:46	17.50606918	307.4560547
8/08/2011 18:47	15.68345737	307.0155334
8/08/2011 18:48	14.63714314	306.868927
8/08/2011 18:49	14.27712154	305.4749451
8/08/2011 18:50	10.63189888	304.3062134
8/08/2011 18:51	13.17455387	304.1399231
8/08/2011 18:52	10.63189888	303.9309387
8/08/2011 18:53	27.8567009	301.7636414
8/08/2011 18:54	24.26773071	301.409668
8/08/2011 18:55	13.17455387	301.6741333
8/08/2011 18:56	13.54582691	302.5033264
8/08/2011 18:57	8.505518913	302.5433655
8/08/2011 18:58	7.41420269	302.9262085
8/08/2011 18:59	19.6324482	302.2128601
8/08/2011 19:00	9.574334145	301.5963135

Brief Description of the Incident

The ammonia plant at Kooragang Island was in the process of being recommissioned following an extensive outage for a scheduled maintenance turnaround. The steam reforming process was started and the synthesis gas generated from the reformer (containing steam) was directed to the HT shift catalyst bed for catalyst conditioning. Under normal start up circumstances, the gas exit from the HT shift catalyst bed is directed to an emission stack downstream from the HT shift catalyst. At the time of the incident, a portion of the steam condensed in the catalyst bed, forming liquid

water. The water then commenced dissolution of the soluble component of the catalyst bed. Further synthesis gas flow resulted in ejection of the condensed liquid from the top of the downstream emission stack. This resulted in flow of liquid down the exterior of the stack and aerosol (ie very small droplets) on the down wind section of the plant. It was noted that the aerosol had a yellow coloration. A yellow deposit was noted on equipment downstream of the emission point.

Immediate Impacts

A number of people on site were directly exposed to the aerosol. These people immediately changed and showered to limit exposure to the emitted liquid. There have been no reports of any impacts of this exposure, including no reports of symptoms such as skin sensitivity, dermatitis or respiratory issues.

Identification of the Emitted Chemical

Table 2 below shows the composition of the HT shift catalyst. The Chromium (VI) containing component of the catalyst is CrO_3 and is present in the catalyst at < 1% on a mass basis. Other components of the catalyst have limited solubility compared to the CrO_3 . Total mass of HT shift catalyst in the plant was approximately 35 tonnes. The yellow colouration observed in the emitted solution is consistent with the presence of chromate species formed via the hydrolysis of CrO_3 . Stability of this species under ambient conditions was confirmed through inspection of the chromium Pourbaix diagram. Analysis of a sample of solution collected on the plant is shown in Table 3. The major species identified were sodium ion and chromium ion, consistent with the emitted species being sodium chromate. This conclusion is also consistent with the coloration observed in the emitted solution.

Table 2: HT Shift Catalyst Composition

Components	CAS No.	Symbol(s)	R- Phrase(s)	Concentration
Iron(III) Oxide	1309-37-1			80-95%
Copper Oxide	1317-38-0	Xn	R22	1-5%
Chromium (III) Oxide	1308-38-9			5-10%
Graphite (Synthetic)	7782-42-5			1-5%
Chromium (VI) Oxide	1333-82-0	O,T,C,N	R49,R25,R35, R43,R50/53	<1

Table 3: Analysis of collected sample of emitted solution

Element	Conc. (ppm)
Ni	0.01
Cd	0.00
Cr	57.80
Pb	0.00
Zn	0.55
Cu	0.07
Co	0.01
Mn	0.07
Fe	2.61
Mg	8.88
Na	60.00
Ph	6.35

Quantification of Potential Offsite Emissions

A full mass balance of chromium (VI) both remaining within the catalyst bed and collected from the site would enable quantitative determination of chromium release. In this instance, the ability to access the catalyst bed to sample remaining catalyst is extremely limited. Accordingly estimation is based upon mass accounting of the initial catalyst Cr(VI) composition, the quantities of chromium containing solution captured on the site and a conservative estimation of the amount of chromium(VI) contained in the aerosol on the site. Key points are shown below:

Initial Cr(VI) in catalyst bed. Mass of catalyst = 35 tonnes. Maximum quantity of CrO_3 = 1% suggesting CrO_3 quantity is 350kg. % Cr in CrO_3 is 52%. Accordingly, mass of Cr(VI) initially in the catalyst bed = 182kg.

Solution recovered from the catalyst bed and captured in 9 x 1m3 IBC containers.

IBC Analysis

	Cr(IV) ppm
	2870
	7470
	2880
	3380
	998
	3180
	4130
	658
	3730
Av	3255

Total mass of Cr capture in the IBC's was 29kg as per the calculation below

IBC's	Vol (m ³)	9
	Cr (mg/l)	3255
	Total Cr (kg)	29.295

Other solutions captured include the Demin pond, diversion pond and clarifier. Solution volumes, chromium concentration and calculated content are shown below.

Diversion Pond	Vol (m ³)	320
	Cr (mg/l)	3
	Total Cr (kg)	0.96
Clarifier	Vol (m ³)	375
	Cr (mg/l)	38
	Total Cr (kg)	14.25
Demin Pond	Vol (m ³)	200
	Cr (mg/l)	0.6
	Total Cr (kg)	0.12

The quantity of chromium fallout on the site was estimated by calculating the affected area (2850m²) and assuming the fallout contained Cr at a concentration consistent with the highest observed in the IBC samples (7470ppm). A depth of fallout of 1mm was also assumed. It is believed that both of these latter assumptions are very conservative with actual values believed to be less than this. Based upon this estimate, a mass of Cr in the fallout was estimated to be 21kg as per below.

Fallout	Area (m ²)	2850
	Cr (mg/l)	7470
	Liquid Depth (mm)	1
	Total Cr (kg)	21.29

Summing each of these chromium contributions together resulted in a total captured/emitted Cr of 66kg. This is consistent with an initial upper estimate of Cr(VI) mass in the catalyst of 182kg.

Based upon the estimated fallout of Cr across the site of 21 kg (upper estimate), it is logical to conclude that the amount of Cr that left the facility to be somewhat less than this value, likely in the order of 1-10kg. The amount of Cr deposited external to the site would then decrease significantly with distance from the point of emission. The distance of Stöckton residence from the point of emission is in the order of 1km.

Therefore it is also logical to conclude that very low levels of Cr reached residences in Stockton, consistent with observations made by Orica personnel in the field in Stockton locations.

Potential Personnel and Community Health Impacts Assessment

Generally the health effects of Cr VI can be subdivided into those that occur following short term exposure and those that occur following repeated and prolonged exposure.

Any possible exposure from the incident at Orica would be considered a short term exposure.

It is generally accepted that the short term effects following single or short term exposure via inhalation or skin contact to CrVI comprise irritation of the eyes, skin, respiratory system or gastrointestinal tract depending upon the route of exposure. Whilst sensitisation may arise from any exposure the risk increases with increased levels of exposure (concentration, duration, frequency).

The levels required to cause irritation are higher than those necessary to cause health effects attributed to long term exposure.

No adverse health effects or symptoms were reported by site based personnel who had the highest potential for exposure.

There is no evidence to support the development of health effects arising from repeated or prolonged exposure in persons who have experienced a single exposure.

Although a model is being generated to characterise airborne emission and inferred fallout at a distance of approximately 800 metres downwind it is expected that due to the small mass emission, large transmission distance and the observed fallout near the plant (indicating most of the emission landed within the buffer zones of the plant) that the exposure would be extremely small and unlikely to translate to a measurable exposure and hence health effects are negligible.

Although Cr VI is a genotoxic carcinogen given the nature of the potential exposure (one off short term) any additional cancer risk is expected to be at background levels.

Appendix A – Request for Information

Questions for Orica

1. What was the exact chemical composition of the emissions from ORICA (Cr VI – how much, what other chemicals and how much)?
2. What's the worst case total release from the plant and from the premises?
3. What are the likely levels released from the plant and from the premises?
4. For how long did the release continue?
5. What are the assumptions used, and the basis of the estimates for Q2, Q3 and Q4?
6. Geographic representation of the samples taken – what was sampled where, and what levels were detected at what locations both on and offsite?
7. Air dispersion modeling – how was this done, and did it take into account precipitation and other factors apart from wind direction?
8. What is the community area identified as being potentially exposed? What assumptions were used in this calculation?
9. Have dispersion models been estimated, including assumptions of different levels of release (ie 1kg, 10kg, 20kg, 180kg)
10. What do you believe is the potential impact upon the adjacent community? On what assumptions and by what methods did Toxikos reach their assessment of the hazard or otherwise presented to the community by the exposure?
11. Is the advice from Toxikos about exposure levels based on occupational standards, or do they include general public (including vulnerable populations such as children) standards?
12. Has Orica taken samples within the community to validate your models or assumptions on likely exposure to Cr or other releases?
13. What is Orica's plans in relation to further community sampling
14. What advice is Orica giving or has Orica given to the community generally or to specific members of the community about action they should or should not take in relation to visible or assumed contamination of their property by material from the release?

Tab C

Copy of email from Ms Lisa Corbyn forwarded to NSW Health CHO and Minister's office
10 August 2011

From: CHANT, Kerry
Sent: Wednesday, 10 August 2011 7:37 PM
To: [redacted]
Subject: FW: Information

FYI – note email below
kerry

Dr Kerry Chant

Chief Health Officer and Deputy Director-General | **Population Health**
Level 11 73 Miller Street North Sydney 2060

www.health.nsw.gov.au



Health

From: Corbyn Lisa
Sent: Wednesday, 10 August 2011 7:31 PM
To: Sullivan Greg; CHANT, Kerry
Cc: Cooke Adam
Subject: FW: Information

For information. This is the material that Orica has and note in their info to their staff they say they have consulted on health issues...

For Action: Kerry and I have agreed tonight that we would have staff ready to go out to the Stockton area to survey the area first thing tomorrow.
We will have a joint meeting tomorrow morning at 9:30 to discuss data and course of joint action and media statement we might issue jointly.
Lisa C.

From: Cooke Adam
Sent: Wednesday, 10 August 2011 7:16 PM
Subject: FW: Information

Lisa, kelly
Draft script from orica. This is fyi.
Adam.

sent from my Telstra NEXTG™ handset

From: [redacted]
Sent: Wednesday, 10 August 2011 6:58 PM

progress to date.

Regards

Sherree

Sherree Woodroffe | Sustainability Manager - Kooragang Island

Please consider the environment before printing this e-mail.

This message is intended solely for the individual(s) and entity(s) addressed. It is confidential and may contain legally privileged information. The use, copying or distribution of this message or any information it contains, by anyone other than the addressee, is prohibited. If you have received this message in error, please notify postmaster@orica.com. The mailbox address from which this message has been sent is for business mail only. Mail sent to it may be subject to security scanning and delivery on non-business messages sent to this address may not occur.
Thank you.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the Office of Environment and Heritage, NSW Department of Premier and Cabinet.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

This email has been scanned for the NSW Department of Health by the Websense Hosted Email Security System.
The Department regularly monitors emails and attachments to ensure compliance with its Electronic Messaging Policy.

SAFETY DATA SHEET
SHIFTMAX 120



SAFETY DATA SHEET
SHIFTMAX 120

Effective date: 01-10-2004
Version: 2

1. Identification of the Substance/Preparation and the Company/Undertaking

Commercial Product Name	SHIFTMAX 120
Company	Sud-Chemie-India Pvt Ltd, Binanipuram-683502, Kerala, India
Telephone	+91-484-2540481, 2540487
Telefax	+91-484-2540020
e-mail	cochin@sud-chemie-india.com
Emergency telephone number	+91-484-2544746

2. Composition/ information on ingredient

Chemical nature: Mixture of Iron oxide, copper oxide, chromium oxides, graphite

Components	CAS No.	Symbol(s)	R- Phrase(s)	Concentration
Iron(III) Oxide	1309-37-1			80-95%
Copper Oxide	1317-38-0	Xn	R22	1-5%
Chromium (III) Oxide	1308-38-9			5-10%
Graphite (Synthetic)	7782-42-5			1-5%
Chromium (VI) Oxide	1333-82-0	O,T,C,N	R49,R25,R35, R43,R50/53	<1

3. Hazards Identification

R49: May cause cancer by inhalation.
R43: May cause sensitization by contact.

SAFETY DATA SHEET
SHIFTMAX 120

4. First aid measures

General advice	none
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Skin contact	Wash off with soap and plenty of water
Inhalation	If large amount have been inhaled, seek medical advice.
Ingestion	If large amount have been ingested, give emetics to cause vomiting. Call physician immediately. Rinse mouth.

Note to Physician:

Treatment none

5. Fire fighting measures

Specific hazards during fire fighting:	In case of fire , irrespirable dust containing chromium(VI) compounds can be formed.
Special protective equipment for fire-fighters:	In the event of fire, wear self-contained breathing apparatus.
Suitable extinguishing media	The product itself does not burn. Use extinguishing measures appropriate to the environment.
Extinguishing media which must not be used for safety reasons	High volume water jet.

6. Accidental release measures

Personal precautions	In case of dust or aerosol formation use respirator with filter model P3 (according to DIN 3181,1980)
Environmental precautions	Do not wash spills into water ways or public treatment systems
Methods for cleaning up	Collect uncontaminated material and pass on for further processing. Collect contaminated material by mechanical means, load into clean containers, and dispose o in accordance with legal regulations.
Additional advice	Avoid dust formation

SAFETY DATA SHEET
SHIFTMAX 120

7. Handling and storage

Safe handling advice: Avoid formation of dust and aerosols. Handle with care to avoid abrasion or breakage.

Advice on protection against fire and explosion: Risk of receptacle bursting. Keep containers and surroundings cool with water spray.

Storage: Keep container tightly closed and dry.

Advice on common storage: Keep away from combustible material.

8. Exposure Controls/Personal protection

Additional technical information on the plant: Local exhaust.

Components with workplace control parameters

Components	CAS-No	Value	Remarks
Graphite (synthetic)	7782-42-5	6 mg/m3	TRGS 900 TRK inhalable dust 02 2000
Chromium (VI) compounds , with the exception of barium chromate	1333-82-0	0.05 mg/m3	TRGS 900 TRK inhalable dust 1999
Iron Oxide	1309-37-1	5mg/m3	ACGIH/TLV
Copper Oxide	1317-38-0	1 mg/m3	ACGIH/TLV

*As copper in total dust

Personal protective equipments.

Respiratory protection :effective dusk mask- filter P3

Hand protection : protective gloves

Eye protection :safety glasses

Skin protection :lightweight protective clothing

Hygiene measures :wash off with warm water and soap.

Protective measures :Follow the usual precautions required when handling chemicals.

SAFETY DATA SHEET
SHIFTMAX 120

9. Physical and chemical properties

Appearance

Form	Tablets
Color	Dark brown
Odour	None
State	Solid

Other Data

Melting point	>1300°C
Boiling point	Not applicable
Flash point	Not applicable
Ignition temperature	Not applicable
Auto ignition temperature	None
Upper explosion limit	Not applicable
Lower explosion limit	Not applicable
Vapour pressure	Not applicable
Density	Not available
Bulk density	1.0-1.3 kg/l
Water solubility	Traces Cr(VI) can be leached out
pH	Not available

10. Stability and reactivity

The product is stable under normal handling and storage condition.

Hazardous reaction	Negligible explosion hazard when exposed to heat or flame by reaction with incompatible substances.
Hazardous reactions (Materials to avoid)	Combustible liquids, reducing agents, organic materials.
Information about decomposition	No decomposition if stored and applied as directed.

11. Toxicological information

Acute Toxicity

Acute oral toxicity	: LD 50 rat Dose: 80mg/kg (Chromium(VI) compounds , with the exception of Barium Chromate)
---------------------	--

SAFETY DATA SHEET
SHIFTMAX 120

Irritation, Sensitation, Other data toxicology

Eye irritation:	Result: no data available
Sensitization:	Result: no data available
Repeated dose toxicity	No data available
Further information	Chromium(VI) compounds are listed carcinogenic substances category 1 in annex I of directive 67/548/EEC
Human Experience:	Under normal conditions of industrial hygiene no negative effects are known so far. Due to dust raising, light irritation of eyes and/or mucous membranes is possible

12. Ecological information

Decomposition	The solid matter content can be separated mechanically in a sewage plant. Catalyst is a nearly insoluble, inorganic product.
Distribution to environmental compartments.	Heavy metals should not be released into the environment.
Ecotoxicity effects	
Further information: ecotoxicity	No data available.
Additional information about ecology	Decontamination of Cr(VI) by addition of exact dosed reducing agents (as NaHSO ₃ or Na ₂ S ₂ O ₄). Insoluble Cr(III) is formed and can be separated by filtration or sedimentation.

13 Disposal Considerations

Product	Used catalyst may have different hazards or properties than the original product. This SDS does not apply to used catalyst. Refer to manufacturer/supplier for information on recovery/recycling. Can be disposed of as solid waste or burned in a suitable installation subject to the Environmental Protection regulations.
Contaminated Packing	Dispose of as unused product.

SAFETY DATA SHEET
SHIFTMAX 120

14. Transport information

Land transport:	Not classified as dangerous in the meaning of transport regulations
Sea transport:	Not classified as dangerous in the meaning of transport regulations.
Air Transport	Not classified as dangerous in the meaning of transport regulations.

15. Regulatory information

General Advice:	The product is classified in accordance with EC directive or respective national laws.	
Symbol(s):	T	Toxic
R-Phrase	R49	May cause cancer by inhalation
	R43	May cause sensitization by skin contact.
S-phrase(s)	S53	Avoid exposure-obtain special instructions before use.
	S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
	S22	Do not breathe dust.

16. Other Information

The information presented herein is believed to be accurate, but is not warranted.

It does not represent any assurance of properties of product.

The specifications are to be drawn from the corresponding leaflet.

Script for Orica employees when speaking to residents

This is a general guide. Please do not stick to the script if the resident asks questions. Try to answer as many of them as possible (see accompanying Q&A document). If you can't answer a question, take their contact details, make a note of the question and promise to follow up with them within 48 hours.

Good morning/afternoon

My name is [name]. I work for Orica at Kooragang Island.

On Monday night, we had an incident at the plant at around 6pm which resulted in the brief release (< 30 minutes) of aerosol containing sodium chromate.

We think there is a possibility that a very small quantity of sodium chromate may have left the Orica site and we would like to confirm that this through discussion with you and your neighbours. While we don't believe there is any cause for concern, as part of our investigations, we would like to determine how far the sodium chromate might have travelled. It looks like small spots of yellow salt, which might have appeared perhaps on your car or rubbish bins. Have you seen anything around your property that might look like this since Monday night? (photo to show if possible)

Would you like to have a quick walk around together to see if we can find any evidence of it here?

(i) If find evidence

This appears to be sodium chromate. Please do not be too concerned. We have consulted with our internal medical and occupational hygiene professionals and they have advised that there is little to no risk from this substance however, we would like to clean this up for you. We will be organising for an independent third party to come back to your property and clean this area. While we make these arrangements, we suggest that you do not disturb the substance and keep children and pets away from it.

(ii) If don't find any evidence

[Thank them for their assistance in the investigation.]

As I mentioned, we are in the process of investigating the possibility of sodium chromate having left the Orica site. If we find that this is the case, we will be back in contact with you about any further actions.

In the meantime, Orica has a standard number we use for contact with the site. The number is 02 4908 9300. You can call this number if you have any concerns in the future (leave behind calendar or fridge magnet if possible).

Thanks for your time.



Tab D
Email from HNEPH Director to GP Alert
Re: text for fax to GPs
15 August 2011

-----Original Message-----

From: David Durrheim
Sent: Monday, 15 August 2011 1:18 PM
To: 'Gould, Simon'
Subject: for website/GP fax

Dear Simon

Please provide link below to GPs.

It would be worthwhile also including the following sentence.

"Given the measured levels of environmental release from the Orica plant on Kooragang Island and the very low levels of hexavalent chromium measured in environmental samples in Stockton, there is no indication for testing residents of the area. Human blood or urine testing for hexavalent chromium does not provide a prediction of human health impact."

Warm regards

Dave

<http://www.health.nsw.gov.au/whatsnew/stockton.asp>



Tab E
Email from HNEPH Director to GP Alert re: text for fax to GPs
2 September

From: David Durrheim
Sent: Friday, 2 September 2011 10:58 AM
To: David Durrheim; Gould, Simon
Subject: Friday fax Orica incident

Dear Simon

Thanks as always for your support.

Independent assessment confirms
No additional cancers expected from Orica leak

NSW Health today released an independent Final Health Risk Assessment Report into the release of chromium VI from the Orica chemical plant near Stockton at about 6:00pm on Monday 8 August 2011.

An independent expert – cancer epidemiologist Professor Bruce Armstrong – has concluded that there should not be a single extra case of cancer in Stockton residents due to the chromium VI release.

The independent Final Health Risk Assessment Report is available at <http://www.health.nsw.gov.au>

Warm regards

Dave

F

A Rapid Risk Assessment Following the Release of Chromium VI from the Orica Chemical Plant, Kooragang Island, 8th August 2011

Professor Alison Jones

13th August 2011

Clinical toxicology report and rapid risk assessment based on all information to date, and taking into account the environmental toxicology sample results circulated by the NSW Chief Health Officer at 23:26 on 12th August 2011.

Preamble:

- Stockton residents were potentially exposed to chromium VI following a one-off release from the Orica plant on Monday 8th August.
- This rapid risk assessment focuses on the immediate health risks associated with the incident and is based on sample results received at 23:26 on 12th August 2011. It considers the risk from ingestion of chromium VI.
- Further comprehensive risk assessment will incorporate the results of additional testing and will consider other routes of exposure and cancer risk.

The environmental toxicology results have been provided from the laboratory with some sampling information such as address from where they were taken and type of sample attached to each result. The analysis has been carried out in a NATA accredited laboratory with the limits of detection known and appropriate.

1. Key point one – the vast majority of all environmental samples are below the detection limit of the assay i.e. there is no evidence of widespread contamination at Stockton. This is notably so in the childcare centre, and on sandy soils.
2. The hypothesis of the plume modeling indicating the areas in which deposition of Chromium VI could have occurred is supported by the finding of detectable concentrations nearest to the Orica factory site i.e. the leaves of trees on Fullerton Street, in the predicted wind distribution pattern on Monday night
3. The release of chromium VI was a single acute event – with the Orica report demonstrating that 1-10Kg could have been released in total to the Stockton area defined in the boundary area marked.
4. Chromium VI (toxic) degrades into Chromium III in the environment by interaction with soil etc. It is expected to last no more than 10 days maximum in the soil. Sources ATSDR (American Toxic Substances Disease Registry) monograph on chromium, NIOSH monographs on chromium.
5. Active washing with water has taken place in the area (deliberate human activity and natural rainfall), so levels today will be lower than those represented in the environmental sample results from the lab.
6. There was no contemporaneous multisite air sampling in operation at the time of release of chromium in Stockton to reveal the peak air concentrations achieved. At this stage air exposure is considered a minimal route.

7. Dermal absorption of chromium VI is approx 1%. Sensitization in susceptible individuals often requires repeat exposures but can occur at low doses.
8. A worst case risk calculation is required to determine consumption quantities at this stage from inadvertent or deliberate ingestion of dust or plant materials.

Worst case scenario modeling for ingestion as an exposure route

The following calculation has been provided as an illustration of how much product a human would have to eat to have health effects. It assumes (the impossible case scenario of) eating daily amounts of the concentrations of Chromium VI found in the highest location in the leaves of the trees of Fullerton Road. It also assumes that air phase contamination is very low to zero at this stage; 4 days post release and after rain occurred. Note no air quantification data is provided.

MRL = minimum risk level – i.e. the level at which NO ADVERSE effects are expected to occur (this does not include the risk of cancer). The data comes from ATSDR 2008 as a source and pools all available risk data to date on exposures to animals and humans in non and occupational settings. Please note – the MRL level already has some large inbuilt safety margins to account for interspecies differences in interpreting data, and inter-individual human differences.

There is not enough scientific data to calculate a MRL value for exposures to Chromium VI of 1-15 days (termed acute). However, there is good data providing an intermediate duration MRL i.e. for exposures lasting 15-364 days and chronic (365 days plus). Intermediate MRL values have thus been taken for our modeling.

- Intermediate MRL for oral ingestion is 0.005mg Cr VI/ kg body weight / day. That is 5 microgram Cr VI/ kg body weight/ day – for exposures lasting 15-364 days

- This means that a 100 kg man or woman would be able to ingest 500 microgram/ day Chromium VI without adverse health effects
- This means that a 75 Kg man or woman would be able to ingest 375 microgram/day Chromium without adverse health effects
- This mean that a 10 Kg child would be able to ingest 50 microgram /day without adverse health effects

[The Chronic MRL figure for exposure lasting >365 days is 0.001 mg Chromium VI/ Kg body weight/ day but because of degradation of chromium VI to Chromium III in the environment, the Chromium VI is not expected to persist beyond 10 days in soil for example]

The results from the environmental toxicology lab are all below the detection level for chromium VI with 3 exceptions – all samples are from Fullerton Street – nearest to the Orica plant.

One sample of the (non edible) tree leaves nearest the Orica plant demonstrate 0.6 mg/Kg (600 microgram/Kg) of Chromium VI and another 0.8 mg/Kg (800 microgram/ Kg) of Chromium VI respectively. Assuming that across the whole area marked by the boundary that all plants could be ingested i.e. were edible, none were washed prior to eating, there had been no washing by rain, that decay of Chromium VI to Chromium III had not occurred on or around the plant then,

Taking a worst case scenario:

- An adult of 100Kg could eat $500/800 = 0.63$ Kg every day of this material without health effect
- An adult of 75Kg could eat $375/ 800 = 0.47$ Kg every day without health effect
- A child of 10 Kg could eat $50/800 = 0.06$ Kg i.e. 60 grams every day without effect

The risk that anyone could exceed the MRL is considered extremely unlikely for adults, and unlikely for children. Taking into accounts all the data above, what we know about Chromium VI degradation in the environment and the fact that evenly detected concentration of 0.8 microgram/ Kg are not been seen across the boundary area the overall risk, even to children is considered negligible.

This view is also supported by the lowest observable adverse effect level reported for Chromium VI (LOAEL) by ATSDR. The lowest reported oral adverse effect level (based on mice data) is 0.77mg/kg/d Chromium VI

- i.e – for a 100 Kg man or woman that is 770 microgram/ day Chromium VI i.e 1Kg/ day of 0.8mg/kg tree material everyday

- for a 75 Kg man or woman that is 578 microgram/ day Chromium VI i.e 0.72 kg /day of 0.8mg/kg tree material everyday
- for a 10kg child that is 77 microgram/day Chromium VI i.e 100g/day of 0.8 mg/kg tree material

The risk that anyone could exceed the lowest observable adverse effect level from eating vegetation is considered extremely unlikely for adults, and unlikely for children. Taking into accounts all the data above, what we know about Chromium VI degradation in the environment and the fact that evenly detected concentration of 0.8 microgram/ Kg are not been seen across the boundary area the overall risk, even to children is considered negligible.

One window frame sample (swabbed) also from Fullerton Street yielded a Cr VI concentration of 1.1 microgram/cm² surface area on a hard surface. Assuming a worst case scenario of evenly distributed CrVI at this level across the whole boundary area, a 10Kg child would have to lick and consume 70 cm² of window frame each day to develop adverse effect, a 75 kg man 525 cm², and a 100 kg man 700 cm² to have an adverse effect (LOAEL data). The equivalent MRL values for this scenario are 34cm², 255 cm² and 341cm² respectively for a 10 kg child, a 75 kg man and a 100kg man respectively. This is considered extremely unlikely.

In summary

Our knowledge of the scenario of release of Chromium VI from the Orica factory (supplied by the factory and from their Toxicos report), the environmental fate of chromium VI, and initial environmental toxicology data from the boundary area are reassuring.

All but 3 samples within the boundary area in Stockton fell below the detection limit for the NATA accredited lab.

Areas where children would be playing e.g. childcare centre have all been below the detection limit for Chromium VI in the lab.

The 3 samples that were detectable for Chromium VI were found in the street closest to the Orica factory i.e. Fullerton street. In making a risk assessment a very worst case scenario risk assessment for ingestion as a route of exposure has been worked through and indicate that for a child to get adverse effects is very unlikely and would require an implausible chain of events – and for an adult it is also implausible.

I would be happy to remodel data at any time in the light of any new information arising.

Professor Alison Jones BSc(Hons), MD, FRCPE, FRCP, FIBIOL, FRACP

Clinical Toxicologist
Dean, Graduate School of Medicine

Post script

Some simple errors in the mathematics were identified and corrected on 18th August. These did not affect the conclusions of the assessment. The preamble was added to outline the scope and context of the assessment.

Release of Chromium VI from the Orica chemical plant, Kooragang Island, Stockton, 8th August 2011

Final Health Risk Assessment Report, 2nd September 2011

Key Points

- This assessment confirms the conclusion of Professor Alison Jones' initial rapid risk assessment. That is, immediate health effects were not expected to occur as a result of the chromium VI release from the Orica plant.
- On the basis of this risk assessment, it is very unlikely that anyone in Stockton will develop cancer as a result of this incident. We would not expect to see a single extra case of cancer in the population of Stockton as a result of this chromium VI exposure.
- This risk assessment uses two scenarios to estimate the risk of ill health for a person in Stockton exposed to chromium VI as a result of the Orica incident. Scenario 1 produces a worst case estimate of risk. Scenario 2 produces a risk estimate using the maximum reasonable calculation of exposure. The reasons for this are explained in the report.
- Exposure to chromium VI is likely to have occurred only in the part of Stockton that was directly downwind of the Orica plant at the time of the release and where chromium VI was detected in samples collected by the Office of Environment and Heritage (see map on page 2).
- Any risk of ill health from this incident would largely result from breathing chromium VI, which was present in the outside air downwind of the Orica plant for less than 1 hour shortly after 6pm on 8th August 2011. People who were indoors at this time or not in the affected area of Stockton (see map on page 2) will not have been exposed to this risk.
- Children who attended the child care centre at Barrie Crescent are very unlikely to have been exposed to chromium VI at the centre. No chromium VI was detected in any environmental samples collected from the childcare centre by the Office of Environment and Heritage following the incident.

Introduction

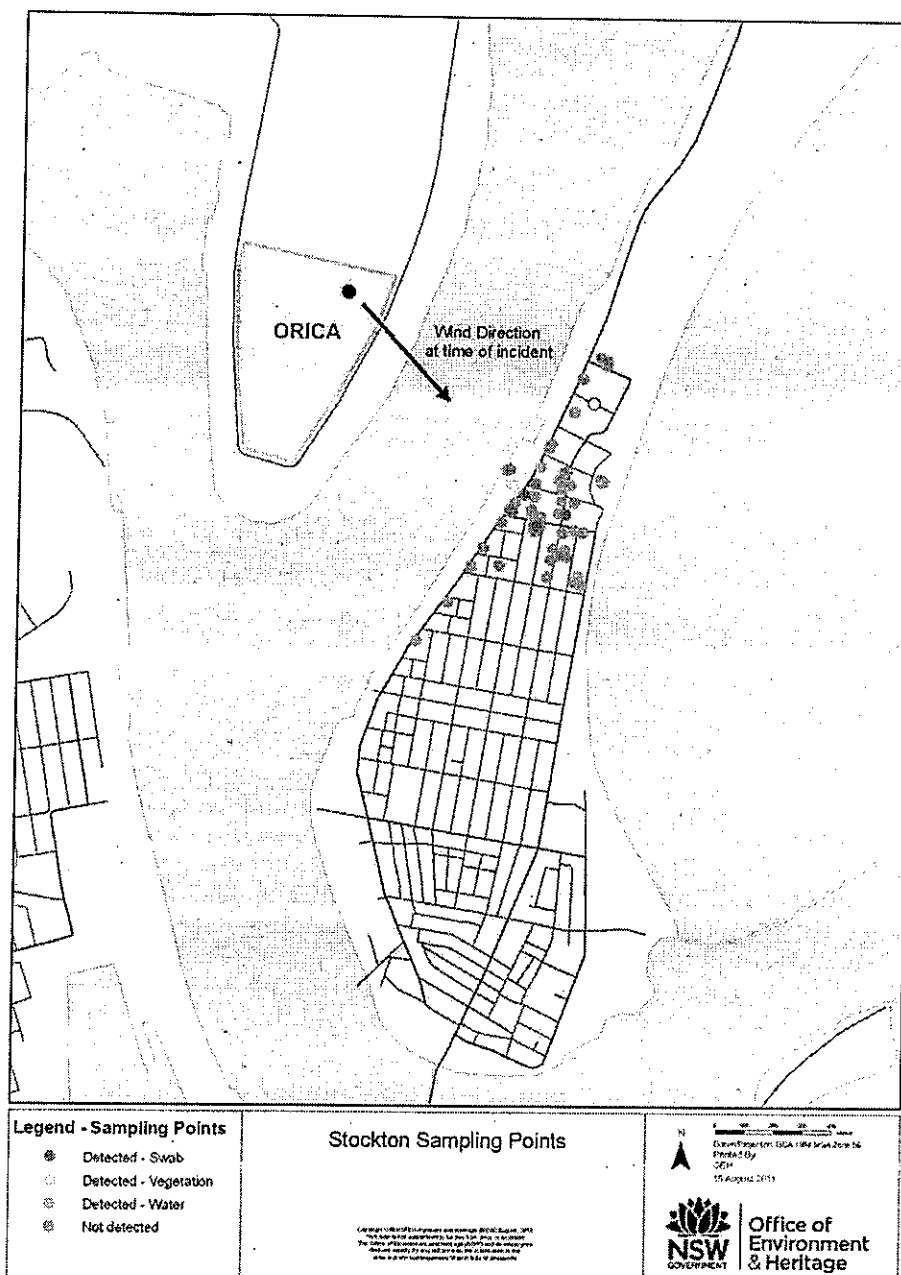
This report considers all available data to produce a final assessment of risk to health arising from the Orica incident on 8th August 2011.

At approximately 6pm a failure at the Orica plant resulted in the release of a quantity of catalyst that contained chromium VI, a chemical that is known to cause cancer. The release lasted approximately 20 minutes and, while much of the chromium VI was deposited on the Orica site, some landed on Stockton.

In the days following the incident, extensive environmental sampling was undertaken by the NSW Office of Environment and Heritage. This confirmed that contamination in Stockton was limited to a small area directly downwind of the Orica plant.

Computer modelling of the incident suggests that between 10 and 20kg of chromium VI left the Orica plant site boundary. It is estimated that at most 1.5kg of chromium VI was deposited on the area of Stockton in which environmental sampling identified measurable amounts of Chromium VI.

This map shows the locations where environmental sampling took place and the locations where chromium VI was detected.



Overview

To assess the health risk for residents of Stockton, NSW Health has developed two scenarios based on all the information available. Scenario 1 produces a worst-case estimate of the risk of ill health. Scenario 2 produces a more reasonable estimate. The scenarios allow us to estimate the maximum amount of chromium VI that any resident of Stockton might have been exposed to. Each scenario makes assumptions about *human factors* (such as the location of a person at the time of the release and the quantity of home grown vegetables that person eats) and *environmental factors* (such as the levels of chromium in the air and the amounts that might have been on surfaces or soil in the area of Stockton directly downwind of the Orica plant at the time of the incident). A brief description of these factors is provided in this report.

This health risk assessment considers three age groups: infants, children and adults. Children are known to be more susceptible than adults to health effects from environmental hazards. For their size and weight, they eat more and drink more than adults. Their hand-to-mouth behaviour means that they are more likely to consume soil, sand and dust. There is also evidence that children may be particularly sensitive to the effects of cancer causing agents (carcinogens). These important issues are considered in this report.

Human factors

Both scenarios allow us to estimate the health risk for an infant, a child and an adult who:

- Lived in the area of Stockton over which chromium VI passed
- Were standing outside and directly downwind of the Orica plant (see map on page 2) throughout the 1 hour period that chromium VI is considered to have been in the air over Stockton following the release
- For the next ten days, repeatedly touched the most contaminated surface identified by the Office of Environment and Heritage's sampling and then placed their hands in their mouths
- Ate soil and home-grown vegetables from the area of Stockton directly downwind of the Orica plant at the time of the incident (although no chromium VI was detected in any sample collected from fruit, vegetables or soil).

These characteristics are those that would have led to the highest exposure to chromium VI from being resident in Stockton.

It is highly unlikely that anyone in Stockton had all the Scenario 1 characteristics. However, it is standard practice when assessing the risk of ill health from an environmental contaminant to estimate the risk for a person with the highest imaginable amount of exposure to that contaminant. While Scenario 2 characteristics are a little more reasonable, it is still unlikely that anyone would have all of them.

Environmental Factors

The estimated risk of ill health produced by both scenarios is likely to be higher than the actual risk.

The air modelling evidence indicates that the droplets containing Chromium VI that would have reached Stockton were too large to enter the lungs. The environmental sampling that took place in Stockton was more likely to find chromium VI, owing to the fact that samplers generally targeted areas with visible contamination. Even so most samples had no chromium VI detected. This suggests that chromium VI was not widely distributed over the community.

Each scenario made the following important assumptions:

Scenario 1 – The Worst Case Scenario

- The maximum estimated level of chromium VI in the air over Stockton as a result of the release. This level is from air modelling based primarily on a single surface sample collected by the Office of Environment and Heritage that was substantially higher than all others collected.
- All vegetables, soil and most surfaces in the contaminated area were evenly contaminated with the highest measured levels of chromium VI.

From the Office of Environment and Heritage's environmental sampling, these assumptions are highly unlikely to be true. However, NSW Health has used this scenario to produce an estimate of risk of ill health in the **worst possible case**. It is highly unlikely that any infant, child or adult living in Stockton was exposed to the sorts of levels of chromium VI used in this scenario.

Scenario 2 – The Reasonable Maximum Exposure Scenario

- The maximum reasonable level of chromium VI present in the air following the release based on air modelling.
- Average levels of chromium VI present in vegetables, fruit, soil, sand, dust and on surfaces were based on environmental sampling carried out by the Office of Environment and Heritage.

Data used for this health risk assessment

This risk assessment draws upon three main sources of data:

- Computer modelling to estimate the concentration of chromium VI in the air over Stockton after the release, conducted by PAE Holmes and paid for by Orica
- Measurements of chromium VI in the environment done in the laboratories of, and using samples collected by, the NSW Office of Environment and Heritage
- Standard exposure factors used in health risk assessments.

NSW Health also reviewed the Toxikos Health Risk Assessment report commissioned by Orica while preparing this report.

What is chromium VI?

Chromium VI is a reactive form of the element chromium. Chromium occurs in three main forms, chromium 0, chromium III and chromium VI. Chromium III is present in small quantities in food and water and thought to be essential for good health. Chromium VI is much less common, but sometimes found in the environment. For example, chromium VI is present in cigarette smoke, some paints and some products used to preserve wood. Chromium VI is more reactive than chromium III and has been shown to cause adverse health effects if high enough exposures take place.

Short term exposure to chromium VI can cause effects such as nose, throat and eye irritation. Chromium VI has been shown to cause cancer in people exposed through their work to high levels in the air (occupational exposure). Chromium VI in water has also been shown to cause cancer in rodents.

Dose-response relationship

Non-cancer health effects

Most people will only experience immediate health effects, like nose and throat irritation, when exposed to chromium VI above a certain threshold level. A small number of people who are allergic or sensitive to chromium VI may experience these symptoms below this threshold level. This level has been used to derive exposure limits. Two such limits used in this risk assessment are the US Department of Energy's *Temporary Emergency Exposure Limits* (TEELs) and the US Centers for Disease Control and Prevention's Agency for Toxic Substances and Disease Registry *Minimal Risk Levels* (MRLs). The NSW Health risk assessment uses these levels to identify whether immediate health effects were likely to result from this incident. TEELs are used to assess the risk of immediate effects due to chromium VI in the air. An MRL is used to assess the risk of immediate health effects from oral exposure to chromium VI.

TEELs

There are no Australian guidelines for acute inhalation exposure to chromium VI. In the absence of Australian guidance, acute air exposures may be compared against US Protective Action Criteria (PAC). PAC are designed to be used where air sampling is available. In this case, air sampling was not available. Thus, this is a theoretical back calculation of the potential risk for a resident based on modelled air concentrations at the time of the release. It should be noted that there is a time difference between what the PAC values are set for, and the potential exposure time. However, it is still considered that these values are the most relevant for the current situation.

PAC values include TEELs, which have been used in this assessment (Table 1).

Table 1

Level	Value (mg/m ³)	Explanation
TEEL-0	0.00962	This is the threshold concentration below which most people will experience no adverse health effects.
TEEL-1	0.00962	This is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation or certain asymptomatic non-sensory effects. However, these effects are not disabling and are transient and reversible upon cessation of exposure
TEEL-2	0.01	This is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape.
TEEL-3	28.8	This is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience life-threatening adverse health effects or death.

MRL

An oral MRL of 0.005 mg chromium VI /kg/day has been derived for intermediate (15 - 364 days) exposure to chromium VI compounds. Exposure for 10 days to a level below this intermediate MRL are very unlikely to result in adverse health effects.

Cancer

Ingestion

The evidence that ingestion of chromium VI can cause cancer comes from studies in rodents. These studies have been used by the US Environmental Protection Agency (US EPA) and the California Office of Environmental Health Hazard Assessment (OEHHA) to estimate the risk of cancer in humans who ingest chromium VI. Using well established techniques, these agencies have determined that the *cancer potency factor* (CPF) for oral exposure to chromium VI is 0.5 per mg/kg of body weight/day [(mg/kg-day)⁻¹] of exposure.

Inhalation

The evidence that inhalation of chromium VI can cause cancer comes from studies of occupationally exposed workers. Generally, the participants in these studies were exposed to high levels of chromium VI for a prolonged period of time. These studies have been used to determine an *inhalational unit risk* (IUR) for chromium VI. The IUR for chromium VI is the increase in risk of cancer that is associated with a lifetime's exposure to a 1µg/m³ (this is one microgram in one cubic metre of air) increase in the concentration of chromium VI in the air.

The WHO, US EPA and OEHHA have each used a different method to derive an IUR for inhalational exposure to chromium VI. The different methods produce the different results summarized here:

Table 2

Agency	Inhalational Unit Risk
US EPA (1998)	$1.2 \times 10^{-2} (\mu\text{g}/\text{m}^3)^{-1}$
WHO (2000)	$4.2 \times 10^{-2} (\mu\text{g}/\text{m}^3)^{-1}$
OEHHA (2011)	$1.5 \times 10^{-1} (\mu\text{g}/\text{m}^3)^{-1}$

NSW Health has used the WHO's IUR for its primary analysis of cancer risk from inhalation of chromium VI. This is in line with normal Australian practice as set out in the *Guidelines for assessing human health risks from environmental hazards* (Commonwealth of Australia, 2002).

NSW Health has also undertaken a sensitivity (secondary) analysis using the OEHHA's CPF of 510 (mg/kg-day)⁻¹ (which is derived in a standard way from the OEHHA's IUR).

Age sensitivity

Chromium VI is thought to cause cancer by direct damage to DNA; that is, it is a *genotoxic carcinogen*. There is evidence that people in the early stages of life (infants and children) are more sensitive than older people to the effects of genotoxic carcinogens. Because of this, NSW Health has used the following age sensitivity factors to calculate the risk for infants (aged less than two years), children (aged two to 16 years) and adults (aged older than 16 years). This approach is in line with the guidance laid out in the US EPA's 2005 document *Supplemental Guidance for Assessing Early-Life Susceptibility to Carcinogens*.

Table 3

Age group	Age Sensitivity Factor
Infants (0 – 2)	10
Children (2 – 16)	3
Adults (>16)	1

Exposure assessment

NSW Health considers that there are five possible pathways through which residents of Stockton may have been exposed to chromium VI. This is in line with the Toxikos risk assessment.

1. Inhalation of chromium VI suspended in the air during or soon after the initial release
2. Ingestion of chromium VI deposited on home-grown vegetables and fruit
3. Ingestion of chromium VI by eating contaminated sand, soil or dust (this is mainly an issue for children)
4. Ingestion of chromium VI following contact with contaminated surfaces
5. Inhalation of resuspended dust from surfaces contaminated with chromium VI.

Some key assumptions

- The estimate of exposure from inhalation of chromium VI is for a person standing outside, directly downwind from the Orica site for a 1 hour period immediately following the release. A person who was indoors at the time of the incident or was not present in the affected area of Stockton will not have received this exposure.
- The modelling undertaken by PAE Holmes and the samples collected by the Office of Environment and Heritage show that chromium VI released from the Orica site was contained within water droplets of between 50µm and 100µm in diameter. Particles of this size are too large to enter the lungs when inhaled, although they may have an impact on the

nasal passages and throat. However, NSW Health has included inhalational exposure in its risk assessment and pragmatically used a standard factor of 0.375 referenced in *Guidelines for assessing human health risks from environmental hazards* (Commonwealth of Australia, 2002).

- In the worst case scenario, all vegetables were contaminated with $0.8\mu\text{g/kg}$ chromium VI. This was the highest level measured in Stockton and was the level measured in leaves collected from a tree on the foreshore. Several samples were collected from fruit and vegetables in other parts of Stockton and no chromium VI was detected in any of these samples.
- The modelled levels of chromium VI were based on samples collected by NSW Office of Environment and Heritage. Because the samples mostly came from visible sources of contamination and were therefore more likely to detect chromium VI, it is considered that the modelled levels are higher than the true level.

Risk characterisation

Non-cancer risk

Risk from inhalation at time of the incident

Under scenario 2 (our maximum reasonable exposure) no TEEL levels were exceeded, and thus no acute health effects should occur, beyond mild irritation. There were no incident related presentations to local hospitals.

Using scenario 1 (the worst case) the modelled air concentration of 0.012 mg/m^3 chromium VI slightly exceeds TEEL -1 and TEEL -2. However, acute health effects are considered unlikely, given the conservatism of the air concentration modelling and the relatively large size of the droplets making them very unlikely to enter the lungs.

Risk from ingestion of contaminated vegetables and soil and from contact with contaminated surfaces

These results confirm the conclusions of Professor Alison Jones' rapid risk assessment. Even under the worst case scenario, we do not expect any person to exceed 51% of the Minimal Risk Level set by the ATSDR. We do not expect any person to develop acute health effects as a result of ingestion, even taking into account background levels.

Primary analyses of daily oral dose compared to MRL

Infant (aged 0 to 2 years)

Table 4

Scenario	Daily dose from each pathway (mg/kg/day)			Total dose (mg/kg/day)	MRL (mg/kg/day)	Percentage of MRL
	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces			
Scenario 1 Worst Case	1.8×10^{-3}	3.0×10^{-6}	7.1×10^{-4}	2.5×10^{-3}	5.0×10^{-3}	50.2%
Scenario 2 Maximum Reasonable Exposure	2.3×10^{-4}	3.0×10^{-6}	3.9×10^{-5}	2.7×10^{-4}	5.0×10^{-3}	5.4%

Child (aged 2 years to 16 years)

Table 5

Scenario	Daily dose from each pathway (mg/kg/day)			Total dose (mg/kg/day)	MRL (mg/kg/day)	Percentage of MRL
	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces			
Scenario 1 Worst Case	6.9×10^{-4}	3.8×10^{-7}	3.0×10^{-4}	9.9×10^{-4}	5.0×10^{-3}	19.8%
Scenario 2 Maximum Reasonable Exposure	8.6×10^{-5}	3.8×10^{-7}	1.7×10^{-5}	1.0×10^{-4}	5.0×10^{-3}	2.1%

Adult (aged over 16 years)

Table 6

Scenario	Daily dose from each pathway (mg/kg/day)			Total dose (mg/kg/day)	MRL (mg/kg/day)	Percentage of MRL
	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces			
Scenario 1 Worst Case	7.1×10^{-4}	1.0×10^{-7}	1.4×10^{-4}	8.5×10^{-4}	5×10^{-3}	17.0%
Scenario 2 Maximum Reasonable Exposure	8.9×10^{-5}	1.0×10^{-7}	7.7×10^{-6}	9.7×10^{-5}	5×10^{-3}	2.0%

Cancer risk

Based on this risk assessment, it is very unlikely that anyone in Stockton will develop cancer as a result of this incident. Detailed assessment of the risk of cancer from each exposure pathway and for infants, children and adults is provided in the tables below. The first set of tables provides NSW Health's primary analysis that uses the WHO inhalational unit risk factor to calculate risk. The second set of tables provides a sensitivity analysis that uses the OEHHA's cancer potency factor to calculate the risk for inhalational exposure.

Primary analyses using the WHO inhalational unit risk factor and the US EPA/OEHHA cancer potency factor for oral exposure

Infants (aged 0 to 2 years)

Table 7

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	3.3×10^{-5}	3.5×10^{-6}	5.9×10^{-9}	1.4×10^{-6}	2.1×10^{-9}	8.2×10^{-6}
Scenario 2 Maximum Reasonable Exposure	1.6×10^{-5}	1.3×10^{-7}	5.9×10^{-9}	7.6×10^{-8}	5.8×10^{-10}	1.8×10^{-6}

Children (aged 3 years to 16 years)

Table 8

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	9.9×10^{-7}	4.0×10^{-7}	2.2×10^{-10}	1.8×10^{-7}	6.3×10^{-10}	1.6×10^{-6}
Scenario 2 Maximum Reasonable Exposure	4.8×10^{-7}	1.5×10^{-8}	2.2×10^{-10}	9.7×10^{-9}	1.7×10^{-10}	5.1×10^{-7}

Adults (aged older than 16 years)

Table 9

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	3.3×10^{-7}	1.4×10^{-7}	2.0×10^{-11}	8.2×10^{-9}	2.1×10^{-10}	4.8×10^{-7}
Scenario 2 Maximum Reasonable Exposure	1.6×10^{-7}	5.2×10^{-9}	2.0×10^{-11}	1.4×10^{-9}	5.8×10^{-11}	1.7×10^{-7}

Sensitivity analyses using OEHHA cancer potency factor for inhalational exposure and US EPA/OEHHA cancer potency factor for oral exposure

Infants (aged 0 to 2 years)

Table 10

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	3.2×10^{-5}	3.5×10^{-6}	5.9×10^{-9}	1.4×10^{-6}	1.9×10^{-8}	3.7×10^{-5}
Scenario 2 Maximum Reasonable Exposure	1.6×10^{-5}	1.3×10^{-7}	5.9×10^{-9}	7.6×10^{-8}	5.1×10^{-9}	1.6×10^{-5}

Children (aged 3 years to 16 years)

Table 11

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	4.5×10^{-6}	4.0×10^{-7}	2.2×10^{-10}	1.8×10^{-7}	2.8×10^{-9}	5.1×10^{-6}
Scenario 2 Maximum Reasonable Exposure	2.3×10^{-6}	1.5×10^{-8}	2.2×10^{-10}	9.7×10^{-9}	1.6×10^{-10}	2.3×10^{-6}

Adults (aged older than 16 years)

Table 12

Scenario	Risk attributable to each pathway					Total Risk
	Inhalation at time of incident	Ingestion of contaminated fruit and vegetables	Ingestion of contaminated soil	Ingestion after contact with contaminated surfaces	Inhalation of resuspended dust from contaminated surfaces	
Scenario 1 Worst Case	1.2×10^{-6}	1.4×10^{-7}	2.0×10^{-11}	8.2×10^{-9}	7.4×10^{-10}	1.3×10^{-6}
Scenario 2 Maximum Reasonable Exposure	5.9×10^{-7}	5.2×10^{-9}	2.0×10^{-11}	1.4×10^{-9}	2.0×10^{-10}	6.0×10^{-7}

What does this risk assessment mean to me and my family?

- This assessment confirms the conclusion of Professor Alison Jones' initial rapid risk assessment. That is, immediate health effects were not expected to occur as a result of this incident.
- Even under the modelled worst case scenario, we would not expect to see a single extra case of cancer in people who were residents of Stockton at the time of the chromium VI release from the Orica plant.
- The majority of the estimated risk of cancer for infants, children and adults is due to inhalation of chromium VI in the outside air at the time of the incident. Anyone who was inside between 6pm and 7pm on 8th August would not have been exposed to this risk. Anyone outside at the time of the release, but not in the part of Stockton directly downwind of the Orica plant (see map on page 2) would not have been exposed to this risk.
- If home-grown fruit and vegetables were not eaten, or these were washed thoroughly before eating, then their contribution to the estimated risk would not apply.
- Children who attended the child care centre at Barrie Crescent are very unlikely to have been exposed to chromium VI at the centre. No chromium VI was detected in any environmental samples collected from the childcare centre by the Office of Environment and Heritage following the incident.

Chromium (VI) release from Orica at Kooragang Island

- *To date, no health effects have been identified as a result of this incident.*
- *Current information indicates a low health risk to the community.*
- *The NSW Government is working to verify this risk.*
- *This factsheet suggests ways you and your family can reduce your exposure in the interim.*
- *Outdoor items should be washed with tap water onto grassy areas to reduce contamination*
- *Chromium (VI) degrades to a safer form within 10 days on contact with soil.*

What is the current situation?

A failure at the Kooragang Orica Site on 8 August 2011 has resulted in the release of sodium chromate, which contains chromium (VI). This release resulted in droplets being deposited within the Orica site and a section of the nearby suburb of Stockton. These droplets are yellowy brown in colour. The plant has now been shut down until NSW Government completes its investigation. The Office of Environment and Heritage (OEH), NSW Health, NSW WorkCover and the Hunter New England Population Health Unit are working closely to determine the extent and the nature of risk from this exposure. There have been no health effects identified because of this incident to date. Current available evidence suggests a low risk.

What areas are likely to be affected?

The current area believed to be potentially affected by the release of chromium (VI) from Orica includes the land bounded by Fullerton Street to the west, Griffith Avenue to the north, Barrie Crescent to the east and Flint Street to the south.

What is chromium?

Chromium is a naturally occurring element found in soil and rocks. It is released into the environment by natural and man-made processes. Most people are exposed to small amounts of chromium from the air, food and water.

Chromium exists in three forms: chromium (0), chromium (III) and chromium (VI). Chromium (VI) is the most toxic of these forms but will quickly transform to chromium III (in about 10 days) in the natural environment. Chromium (III) is important in certain biological processes. Therefore, it is generally considered that intake of a small amount is necessary for good health.

Can chromium (VI) affect my health?

Depending on the level and the length of time you are exposed to chromium (VI) certain health effects can result. Exposure low levels for short periods is unlikely to result in health effects.

Chromium (VI) can cause cancer. Lung cancers have been associated with workers exposed to high levels of chromium (VI) over long periods of time and gastrointestinal and stomach cancers with those exposed to high levels in drinking water.

Acute health effects may include lung, nose and skin irritation; abdominal pain; and skin redness and swelling.

What is the NSW Government doing?

The NSW Government is seeking independent advice from health experts regarding information provided by Orica. Further, the Government is undertaking testing to verify that levels of chromium VI in the environment. We will keep the local residents updated with new information as it becomes available.

What can I do to reduce exposure to chromium (VI)?

Some simple steps can be taken to reduce possible exposure to any chromium (VI):

- Wash any yellowish brown droplets on cars, outdoor objects or surfaces with tap water. These should be washed on the lawn or near the drain.
- Don't drink water from rain water tanks. These tanks should be emptied onto the lawn or down the drain.
- Don't eat home grown leafy vegetables or fruits.
- Wash all home grown root vegetables.
- Wash your hands before eating or smoking after being outside.
- Prevent your children from playing in the garden unless the lawn is washed by strong rain or tap water.

How can I find more about the current situation?

Should you require specific advice on any of the following issues please contact the appropriate agency as listed below:

Health issues:

Hunter New England Population Health - (02) 4924 6477

Regulatory support:

Office of Environment and Heritage - 131 555

Stockton chromium results confirm no health risk to residents

Update for Stockton residents

All samples collected in the Stockton area have now been tested for chromium. A total of 71 samples have been analysed. Samples include swabs of outside surfaces such as windows, soil and sand, vegetation and water in tanks and pools.

No chromium was detected in 60 samples. In 11 samples, low levels of chromium were detected. All results have now been considered in detail by an expert panel which included Professor Alison Jones, an independent expert clinical toxicologist.

Professor Jones has advised that the levels of hexavalent chromium found in Stockton are very low and that the results now confirm that there is no health risk to the residents of Stockton from the release of hexavalent chromium last Monday.

Low levels of chromium were detected in the areas closest to the Orica plant. This area had been identified as most at risk of exposure to chromium following the incident at Orica. Residents in the six blocks bounded by Fullerton Street, Griffith Avenue, Barrie Crescent and Flint Street have been advised to take precautionary measures. These measures should continue until next Friday and can then be discontinued. By that time any hexavalent chromium present will have converted to a much safer form of chromium.

Residents in this area are advised to continue with the following precautions:

- Wash any yellowish brown droplets on cars, outdoor objects or surfaces with tap water. These should be washed on the lawn or near the drain.
- Don't drink water from rain water tanks. These tanks should be emptied onto the lawn or down the drain.
- Don't eat home grown leafy vegetables or fruits.
- Wash all home grown root vegetables (this is a good lifetime habit).
- Wash hands before eating or smoking after being outside (this is also a good lifetime habit).
- Ensure outdoor playing areas at home have been washed down by strong rain or tap water.

Even though the sample results reveal no threat to health, we recommend residents continue to take these simple steps to protect children by minimising exposure to any dust that may contain chromium.

Low levels of chromium have also been detected in two water samples collected immediately south of this six-block area. The samples were collected from a private water tank and a birdbath. The levels do not pose a risk to health. Multiple other tests of soil, vegetation and surface swabs in this area detected no chromium. Residents in this area do not need to take any additional precautionary measures. Tap drinking water from Hunter Water is unaffected, and extensive sampling has not detected chromium in any other areas of Stockton.

We would like to thank local residents for their cooperation with the precautions suggested.

For further information please contact:

Health Issues: Hunter New England Population Health on 4924 6477 Option 9

Regulatory Support: Office of Environment and Heritage on 131555

Stockton chromium results confirm no health risk to residents

16 August 2011

This factsheet provides details of the samples collected in the Stockton community between 9 and 12 August 2011 to test for the presence of hexavalent chromium (chromium VI) following an incident at the Orica plant on Kooragang Island on 8 August. A total of 71 samples were analysed. Chromium VI could not be detected in 60 samples and low levels of chromium VI were detected in 11 samples.

Key messages

1. Chromium VI was not detectable in the vast majority of samples. No chromium was detected in the 5 samples from the child care centre in Barrie Crescent.
2. When detected, chromium VI was at low levels that do not represent a risk to the health of Stockton residents.
3. Chromium VI was only detected in the area identified as most likely to be exposed when the initial risk to residents was assessed considering the prevailing wind.
4. The concentrations of chromium VI detected are consistent with expectations based on the amount of chromium VI estimated to have been released outside the plant.
5. Chromium VI converts to a much safer, naturally occurring form of chromium (III) within 10 days of contact with the environment.
6. Residents of Stockton within the area bounded by Fullerton Street, Griffith Avenue, Barrie Crescent and Flint Street (six block area) should follow the simple precautionary measures previously advised until Friday 19 August. No precautionary measures are required after this date.
7. The Office of Environment and Heritage has defined an outer area larger than the confirmed affected area in the Clean Up Notice issued to Orica. This is a precautionary approach to not limit Orica's area of responsibility in relation to any cleanup activities that may be required.

Detailed sample results

Seventy-one samples were analysed; 35 surface swabs, 16 soil samples, 12 vegetation samples, 1 bird sample and 7 water samples. The levels of chromium VI for the 11 samples with chromium detected are summarised below:

Type of sample	Sample details	Chromium VI concentration
Surface swab	7 samples from external surfaces: sign, mailbox, boat, fence, window, door, switchboard	0.003 µg/cm ² , 0.007 µg/cm ² , 0.019 µg/cm ² , 0.028 µg/cm ² , 0.35 µg/cm ² , 0.58 µg/cm ² , 1.1 µg/cm ²
Vegetation	2 samples of tree leaves	0.6 mg/kg, 0.8 mg/kg
Water	1 rainwater tank sample 1 bird bath sample	0.012 mg/L (total chromium 0.013 mg/L) 0.049 mg/L (total chromium 0.059 mg/L)

The chromium concentration is expressed in different units for each type of sample. The Australian Drinking Water Guidelines set the acceptable level of chromium VI in drinking water at 0.05 mg/L. Both water samples were below this guideline level and neither water sample was

from a source intended for human consumption. Skin contact with chromium at these concentrations does not pose a risk to health.

The two water samples with chromium detected were collected immediately south of the six-block area. Multiple other tests of soil, vegetation and surface swabs outside the six block area detected no chromium. Residents in these areas do not need to take any additional precautionary measures. Tap drinking water from Hunter Water is unaffected. Extensive sampling has not detected chromium in any other areas of Stockton.

Results are available at the Office of Environment and Heritage website:
<http://www.environment.nsw.gov.au/>

Sample locations

This map shows the location for each sample collected.

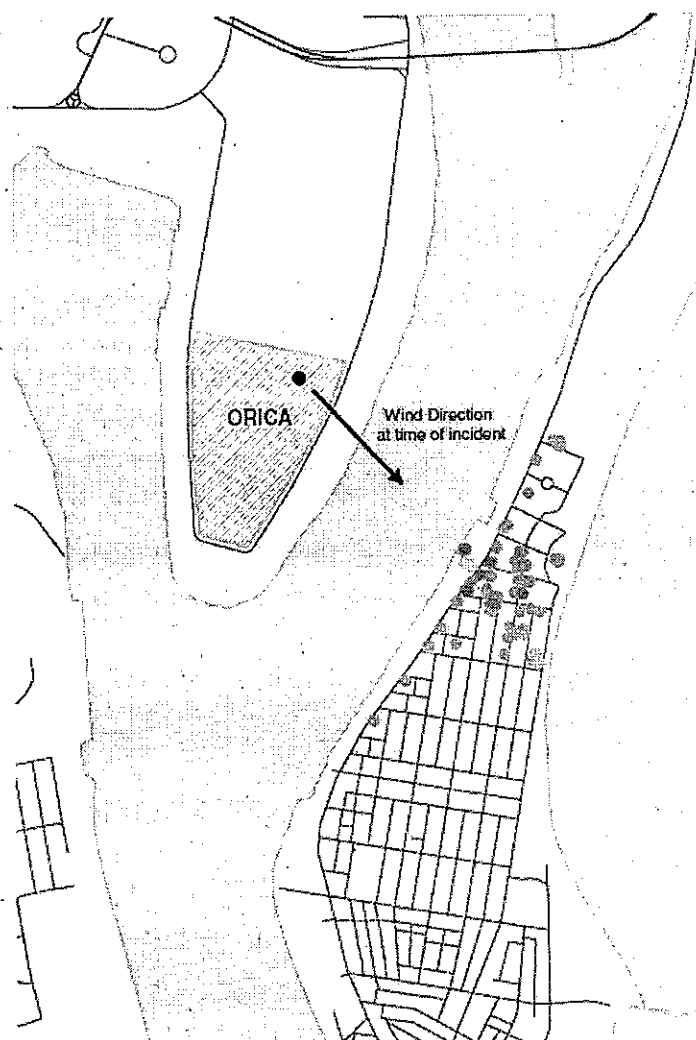
Samples with no chromium detected are marked with green dots.

Samples with chromium detected are marked with other colours:

Surface swabs with pink dots;
water samples with blue dots
and vegetation samples with orange dots.

Legend - Sampling Points

- Detected - Swab
- Detected - Vegetation
- Detected - Water
- Not detected



Conclusion

The testing results have been considered in detail by an expert panel which included Professor Alison Jones, an independent expert clinical toxicologist. Professor Jones has advised that the levels of chromium VI in these samples from Stockton are very low and that these results confirm that there is no health risk to the residents of Stockton from the release of chromium VI on Monday 8 August.

For more information see: <http://www.health.nsw.gov.au/whatsnew/orica.asp>

For further information please contact:

Health Issues: Hunter New England Population Health on 4924 6477 Option 9
Regulatory Support: Office of Environment and Heritage on 131555



Health

Media Release

11 August 2011

Orica identifies chemical release in the Hunter

NSW Health Chief Health Officer Dr Kerry Chant said today that NSW Health officials are aware of an incident at an Orica site on Kooragang Island, Newcastle that resulted in the release of a chemical substance onto houses located in the vicinity of the plant near Stockton.

The incident occurred around 6 pm on Monday evening and involved a short emission of Hexavalent Chromium from the plant during start up. The emission appears to have been largely contained within the Orica site on Kooragang Island, however some nearby houses in the area of Stockton bounded by Fullerton Street, Griffith Avenue, Barrie Crescent and Flint Street were affected.

Dr Chant said NSW Government agencies are working with Orica to ascertain the full extent of the exposure of Hexavalent Chromium to employees and residents within the vicinity. However, the initial advice from Orica's toxicologists was that the risk to human health is minor.

"NSW Health and Office of Environment and Heritage (OEH) take these issues very seriously and has today convened an expert panel of scientists and public health specialists to independently verify the advice provided so far by Orica," said Dr Chant.

"The information available at this time shows no reports of acute health effects. Orica reports that none of their staff at the site have reported acute health effects following exposure to the substance.

"The Hunter New England Local Health District has seen no related presentations to local Emergency Departments.

"However, health officials are monitoring the situation closely and are working with the Office of Environment and Heritage and with staff from Orica," said Dr Chant.

Dr Chant said that people residing in the affected area that has been potentially exposed to the chemical should follow these precautions:

- Wash down outdoor areas that children might come into contact with
- Wash hands with soap and running water for at least 10 seconds after working outside, before eating and before smoking
- Restrict outside exposures, particularly for children
- Do not consume home grown leafy vegetables
- Root vegetables should be thoroughly washed and cooked
- Do not drink water from rainwater tanks
- Drain water from water tanks and containers around the yard

Health officials are in the process of contacting all potentially exposed households.

- [Chromium factsheet](#)
- [Media conference video](#)



Health

Media Release

13 August 2011

Reassuring results from Stockton chromium testing

Environment Minister Robyn Parker said today that results from further testing conducted by the Office of Environment and Heritage (OEH) became available late last night.

"The tests were conducted on a range of locations in the suburb of Stockton. Samples were from the six block area assessed as potentially exposed to chromium and from some sites immediately outside that area," said the Minister.

The tests were expedited by OEH's independent nationally accredited laboratory. Results for a total of 36 samples became available late last night. 33 of these tests showed no detectable levels of hexavalent chromium. Three tests identified low levels of chromium.

The only sites found to have detectable levels were areas along the foreshore closest to the Orica plant. No other areas were found to have detectable levels. Five samples from the child care centre on Barrie Crescent had no chromium detected.

NSW Health Chief Health Officer Dr Kerry Chant said the results should reassure the community.

Professor Alison Jones, an independent expert clinical toxicologist from Wollongong and Newcastle Universities, has reviewed the latest results.

"The levels of hexavalent chromium from these tests in Stockton are so low that they do not pose a health risk" advised Professor Jones. "These results are very reassuring."

Dr Chant said that further samples still remain to be tested, and the results of these tests are expected by this evening.

"NSW Health and Office of Environment and Heritage (OEH) take these issues very seriously and are continuing to work with an expert panel of scientists and public health specialists to ensure appropriate health advice is provided to the community" said Dr Chant.

"Health officials are monitoring the situation closely and will continue to work with the Office of Environment and Heritage and with staff from Orica."

"Even with these good sampling results, we are not being complacent and wish to take every reasonable opportunity to protect children by minimising their exposure to any dust containing chromium - it is therefore sensible to continue to follow precautions outlined below. These measures should continue for the next week and can then be discontinued," said Dr Chant.

The precautions recommend that people residing in the area that has been potentially exposed to the chemical should:

- Wash any yellowish brown droplets on cars, outdoor objects or surfaces with tap water. These should be washed on the lawn or near the drain.
- Don't drink water from rain water tanks. These tanks should be emptied onto the lawn or down the drain.
- Don't eat home grown leafy vegetables or fruits.
- Wash all home grown root vegetables.
- Wash your hands before eating or smoking after being outside.
- Prevent your children from playing in the garden unless the lawn is washed by strong rain or tap water.

Health officials are available to answer questions from all potentially exposed households.

Media Release

14 August 2011

Stockton chromium results confirm no health risk to residents

NSW Health Chief Health Officer Dr Kerry Chant said today that all samples collected in the Stockton area have now been tested for chromium.

"A total of 71 samples have been collected by OEH in the Stockton area. Samples include swabs of outside surfaces such as windows, soil and sand, vegetation and water in tanks and pools," said Dr Chant.

"No chromium was detected in 60 samples. In 11 samples, low levels of chromium were detected."

Dr Chant said the results of all of the testing have now been considered in detail by an expert panel which included Professor Allison Jones, an independent expert clinical toxicologist.

Professor Jones advised that the levels of hexavalent chromium from these tests in Stockton are very low. "These results now confirm there is no health risk to the residents of Stockton from the release of hexavalent chromium last Monday," said Professor Jones.

Dr Chant said that low levels of chromium were detected in the areas closest to the Orica plant. These areas had been identified as those most at risk of exposure to chromium following the incident at Orica on Monday 8 August.

"Residents in the six residential blocks bounded by Fullerton Street, Griffith Avenue, Barrie Crescent and Flint Street have been advised to take precautionary measures," she said.

Low levels of chromium have also been detected in two water samples collected immediately south of this six-block area. The samples were collected from a private water tank and a birdbath. The levels do not pose a risk to health. Multiple other tests of soil, vegetation and surface swabs in this area detected no chromium.

Residents in this area do not need to take any additional precautionary measures. Tap drinking water from Hunter Water is unaffected, and extensive sampling has not detected chromium in any other areas of Stockton.

"Even though these sampling results reveal no threat to health, we recommend residents continue to take simple steps to protect children by minimising their exposure to any dust containing chromium," said Dr Chant.

"All of the hexavalent chromium will convert to a much safer form of chromium by next weekend, so it is sensible to continue to follow precautions outlined below. These measures should continue until next Friday and can then be discontinued.

"I would like to thank local residents for understanding the concerns we have all had, and appreciate their cooperation with the precautions we are suggesting," said Dr Chant.

The precautions recommend that people residing in the area that has been potentially exposed to the chemical should:

- Wash any yellowish brown droplets on cars, outdoor objects or surfaces with tap water. These should be washed on the lawn or near the drain.
- Don't drink water from rain water tanks. These tanks should be emptied onto the lawn or down the drain.
- Don't eat home grown leafy vegetables or fruits.
- Wash all home grown root vegetables (this is a good lifetime habit and should continue indefinitely).
- Wash your hands before eating or smoking after being outside (this is also a good lifetime habit and should continue indefinitely).
- Prevent your children from playing in the garden unless the lawn is washed by strong rain or tap water.

Hunter New England Public Health Unit staff are available to answer queries from the community.

Update for Stockton residents

Media Release

16 August 2011

Stockton chromium results confirm no health risk to residents

Hunter New England Public Health Unit today commenced distribution of information sheets to all residents of Stockton, confirming there is no health risk following the emission of Hexavalent Chromium from the nearby Orica site on Kooragang Island.

Staff from the local Public Health Unit will be in the Stockton area over the next two days to answer any questions or concerns from residents and the local community.

NSW Chief Health Officer, Dr Kerry Chant reiterated today that test results confirm there is no health risk to residents.

"We are taking these measures, and distributing this information sheet to inform the local community and reassure residents that the results confirm there is no risk to their health," Dr Chant said.

"The test results have been considered in detail by an expert panel which included Professor Alison Jones, an independent expert clinical toxicologist.

"Professor Jones has advised that the levels of chromium VI in these samples from Stockton are very low and that these results confirm that there is no health risk to the residents of Stockton from the release of chromium VI on Monday 8 August," Dr Chant said.

For further information please contact Hunter New England Population Health Unit on (02) 4924 6477 and select Option 9.

- [Latest factsheet](#)
- [Clinical toxicology report and rapid risk assessment](#)



Health

Media Release

02 September 2011

Independent assessment confirms no additional cancers expected from Orica leak

NSW Health today released an Independent Final Health Risk Assessment Report into the release of chromium VI from the Orica chemical plant near Stockton at about 6:00pm on Monday 8 August 2011.

An independent expert – cancer epidemiologist Professor Bruce Armstrong – has concluded that there should not be a single extra case of cancer in Stockton residents due to the chromium VI release.

NSW Chief Health Officer, Dr Kerry Chant, said the independent assessment confirmed conclusions from the original rapid risk assessment undertaken by clinical toxicologist, Professor Allison Jones.

"Our detailed examination of all available data confirms that the initial advice given to the Stockton community was correct. That is, the Orica chromium VI incident was not expected to produce acute health effects in the community," Dr Chant said.

The 'maximum reasonable exposure' assessment makes a number of worst case assumptions including that a person was outside and in the area directly downwind from the release for the hour after it. This assessment estimated an excess lifetime cancer risk of between 1.8 in a million and 1.7 in 10 million due to the release. It was calculated by NSW Health using the Australian standard for this kind of analysis – the approach used by the World Health Organisation.

NSW Health also thoroughly examined a separate risk assessment conducted by 'Toxikos' – consultants engaged by Orica – which reported that the risk of a person developing cancer as a result of the chemical release was between 2 in a million and 4 in 10 million.

Professor Jones said that comprehensive analysis of all available data confirms that it is appropriate to reassure local residents that the cancer risk from the chromium VI release was very low.

"The Final Health Risk Assessment is consistent with initial advice," Professor Allison Jones said. "Our precautionary advice and actions may have seemed alarming to some but we think it was the right mix of precaution and avoiding unnecessary public anxiety."

Professor Armstrong said that risk calculations used in the Independent assessment were based on worst-case scenarios that incorporated unlikely levels of public exposure.

"All methods were conservative and some used a value for the risk of cancer (following exposure to Chromium VI) that is at the upper limit of the plausible range. Thus, the true risks of cancer to people in Stockton are probably much lower," said Professor Armstrong.

"The risk assessment also assumed that people consumed unusually large amounts of soil and home-grown vegetables.

"We understand that droplets containing chromium VI that could have reached ground level in Stockton were much larger than can be inhaled into the airways of the lungs. Thus, none of it may have reached the parts of the lungs where it could cause lung cancer.

"When all these factors are added together, it is clear we really are using worst-case assumptions and most likely overestimating the cancer risk from this incident," said Professor Armstrong.

"I reiterate that the cancer risk from the Orica incident is very low and unlikely to result in even one extra case of cancer in Stockton residents."

The Independent Final Health Risk Assessment Report is available at [Final Health Risk Assessment Report, 2nd September 2011](#)

Ends.

If any members of the community have health concerns or questions relating to the Orica incident, they can contact Hunter New England Population Health on 4924 6477 and select 'option 9'

- [Video of media conference to announce Final Report, 2nd September 2011](#)
- [Final Health Risk Assessment Report, 2nd September 2011](#)
- [Latest factsheet](#)
- [Clinical toxicology report and rapid risk assessment](#)
- [Health risk assessment of hexavalent chromium release at Orica Kooragang Island](#)
- [Previous Media Release](#)

2nd September, 2011.

INDEPENDENT ASSESSMENT CONFIRMS NO ADDITIONAL CANCERS EXPECTED FROM ORICA LEAK

NSW Health today released an independent Final Health Risk Assessment Report into the release of chromium VI from the Orica chemical plant near Stockton at about 6:00pm on Monday 8 August 2011.

An independent expert – cancer epidemiologist Professor Bruce Armstrong – has concluded that there should not be a single extra case of cancer in Stockton residents due to the chromium VI release.

NSW Chief Health Officer, Dr Kerry Chant, said the independent assessment confirmed conclusions from the original rapid risk assessment undertaken by clinical toxicologist, Professor Alison Jones.

“Our detailed examination of all available data confirms that the initial advice given to the Stockton community was correct. That is, the Orica chromium VI incident was not expected to produce acute health effects in the community,” Dr Chant said.

The ‘maximum reasonable exposure’ assessment makes a number of worst case assumptions including that a person was outside and in the area directly downwind from the release for the hour after it. This assessment estimated an excess lifetime cancer risk of between 1.8 in a million and 1.7 in 10 million due to the release. It was calculated by NSW Health using the Australian standard for this kind of analysis – the approach used by the World Health Organisation.

NSW Health also thoroughly examined a separate risk assessment conducted by ‘Toxikos’ – consultants engaged by Orica – which reported that the risk of a person developing cancer as a result of the chemical release was between 2 in a million and 4 in 10 million.

Professor Jones said that comprehensive analysis of all available data confirms that it is appropriate to reassure local residents that the cancer risk from the chromium VI release was very low.

“The Final Health Risk Assessment is consistent with initial advice,” Professor Alison Jones said. “Our precautionary advice and actions may have seemed alarming to some but we think it was the right mix of precaution and avoiding unnecessary public anxiety.”

Professor Armstrong said that risk calculations used in the independent assessment were based on worst-case scenarios that incorporated unlikely levels of public exposure.

NSW HEALTH Media

Tel. 02 9391 9121 A/Hours. 02 9962 9890 Fax. 02 9391 9575 Web. www.health.nsw.gov.au

healthdirect AUSTRALIA – providing expert health advice 24 hours a day to NSW residents – Tel. 1800 022 222

"All methods were conservative and some used a value for the risk of cancer (following exposure to Chromium VI) that is at the upper limit of the plausible range. Thus, the true risks of cancer to people in Stockton are probably much lower," said Professor Armstrong.

"The risk assessment also assumed that people consumed unusually large amounts of soil and home-grown vegetables.

"We understand that droplets containing chromium VI that could have reached ground level in Stockton were much larger than can be inhaled into the airways of the lungs. Thus, none of it may have reached the parts of the lungs where it could cause lung cancer.

"When all these factors are added together, it is clear we really are using worst-case assumptions and most likely overestimating the cancer risk from this incident," said Professor Armstrong.

"I reiterate that the cancer risk from the Orica incident is very low and unlikely to result in even one extra case of cancer in Stockton residents."

The independent Final Health Risk Assessment Report is available at <http://www.health.nsw.gov.au>

Ends.

If any members of the community have health concerns or questions relating to the Orica incident, they can contact Hunter New England Population Health on 4924 6477 and select 'option 9'

Media enquiries: NSW Health – 02 9391 9121

PUBLIC HEALTH INCIDENT ACTION PLAN

Response: Chromium (VI) release in Stockton, Hunter region	IAP #: 1	Date: 12 August 2011
---	---------------------------	---------------------------------------

1.0 SITUATION

(Provide a summary of the current hazard/response and predicted changes in a specific future period)

CURRENT	<ul style="list-style-type: none"> An incident occurred at the Orica plant at Kooragang Island at approximately 6pm on Monday 8th August. This resulted in the release from the plant of a catalyst that contains hexavalent chromium. NSW Health was notified of the incident by Orica at 11:30am on Wednesday. Initial investigations show that some of the catalyst was deposited off-site in the neighbouring town of Stockton. This may result in exposure of the population to chromium (VI). There have been no reports of acute health effects associated with this incident. NSW Health has been in verbal communication with Orica and is advised that they have employed an independent toxicologist to assess the exposure of the population and the associated health risk. Media attention remains high.
PREDICTED [indicate timeframe]	NSW Health's investigation into any potential health effects of the release is ongoing. Provision of information and reassurance to members of the public in the exposed area remains a central feature of the response.

2.0 OBJECTIVES (or MISSION)

(What is the response trying to achieve?)

CURRENT	<ul style="list-style-type: none"> To assess any risks to human health from the exposure To provide clear and timely public communication To work with Office of Environment and Heritage on an investigate into the release
----------------	---

3.0 EXECUTION [how the mission will be achieved]

RESPONSE STRATEGIES AND TACTICS (disease control, environmental health response, surveillance activity etc)	<ul style="list-style-type: none"> NSW Health has been in verbal communication with Orica and is advised that they have employed an independent toxicologist to assess the exposure of the population and the associated health risk. NSW Health is seeking from Orica a written report of the details of the release and the nature of the human health risk assessment that has been undertaken. NSW Health will review this report to
---	--

	<p>determine the validity of the risk assessment and whether further action, such as additional environmental sampling, is required. NSW Health has requested Orica to supply this report by 11/8/11.</p> <ul style="list-style-type: none"> • NSW Health has prepared and distributed a factsheet on the chromium (VI) release to the exposed area. • NSW Health's investigation into any potential health effect of the chromium (VI) release is ongoing.
<p>PUBLIC INFORMATION / ADVICE TO PARTNER AGENCIES</p> <p>(new resources etc)</p>	<ul style="list-style-type: none"> • NSW Health media release issued 11 August. • NSW Health fact sheet released 11 August. • Content added to front page of NSW Health website 11 August (www.health.nsw.gov.au) • Numerous media interviews conducted – ongoing.
<p>PREPARING FOR A SURGE ON PUBLIC HEALTH SERVICES</p>	<ul style="list-style-type: none"> • A surge of public enquiry phone calls to the Public Health Unit was anticipated for the evening of 11 August but did not materialise.
<p>MAINTAINING CORE PUBLIC HEALTH SERVICES</p>	<ul style="list-style-type: none"> • Core public health services at the Hunter New England Public Health Unit are being maintained.
<p>4.0 ADMINISTRATION AND LOGISTICS [support provided to the response] (relevant sections to be completed)</p>	
<p>EQUIPMENT</p> <p>(maintenance, technical support, deployments, public health cache, State Medical Stockpile, procurement)</p>	<p>Clinical toxicologist Professor Alison Jones has been consulted on the risk profile of the chromium (IV) exposure.</p>
<p>SERVICES</p> <p>(catering, transport, accommodation arrangements etc)</p>	<p>Any additional services (eg meals during extended shifts) are being arranged locally.</p>
<p>PERSONNEL</p> <p>(recruitment, rostering, orientation etc)</p>	<ul style="list-style-type: none"> • Hunter New England Public Health Unit is operating within existing staffing levels. • Hunter New England Public Health Unit operated on extended hours 11 August to support public outreach and manage enquiries. Advisors from the State Environmental Health Branch were available to assist with media interviews and public enquiries after hours.
<p>SAFETY</p>	<ul style="list-style-type: none"> • Public Health Unit staff undertaking factsheet mailbox drops after hours on 11 August operated in pairs.



(list concerns, changes to OH&S procedures etc)	<ul style="list-style-type: none">All staff have been briefed on the risk profile of the response.
5.0 CONTROL, COORDINATION & COMMUNICATION (relevant sections to be completed)	
GOVERNANCE ARRANGEMENTS (reporting structure, ICS teams, key committees etc)	The Chief Health Officer, as State Public Health Controller, is providing reports to the State Health Services Functional Area Coordinator. An ICS structure has not been activated, nor has the public health emergency operations centre been activated.
REPORTING (situation reports, verbal briefings etc)	<ul style="list-style-type: none">Regular teleconferences are scheduled between Hunter New England Public Health Unit and the Department of Health.Other HNE arrangements (eg briefings to local HSFAC?)
LINKS WITH PARTNER AGENCIES	<ul style="list-style-type: none">Regular discussion is occurring between NSW Health public health services and the Office of Environment and Heritage, which has regulatory responsibility.Links with SEMC partners is occurring through usual channels (ie via the State HSFAC).
COMMUNICATIONS (equipment, key contact points, after-hours arrangements etc)	Do you know what the weekend arrangements are?
6.0 ATTACHMENTS (list any attachments eg maps, charts, organisational charts)	

Comment [NDoH1]: Check that HNE hasn't opened an ops centre

Comment [NDoH2]: Consider the chromium attachment provided to the Minister here.

Author:	Approved by:	Contact officer and details:
---------	--------------	------------------------------

PUBLIC HEALTH INCIDENT ACTION PLAN

Response: Chromium (VI) release in Stockton, Hunter region	IAP #: 2	Date: 13 August 2011
---	---------------------------	---------------------------------------

1.0 SITUATION

(Provide a summary of the current hazard/response and predicted changes in a specific future period)

CURRENT	<ul style="list-style-type: none"> An incident occurred at the Orica plant at Kooragang Island at approximately 6pm on Monday 8th August. This resulted in the release from the plant of a catalyst that contains hexavalent chromium. NSW Health was notified of the incident by Orica at 11:30am on Wednesday. Initial investigations show that some of the catalyst was deposited off-site in the neighbouring town of Stockton. This may result in exposure of the population to chromium (VI). There have been no reports of acute health effects associated with this incident Orica assessed that the health risk to the population living in the area affected by the plume is low. NSW Health has received a written report from Orica that describes the basis of their risk assessment. NSW Health has had this report reviewed by an expert toxicologist and epidemiologist who felt that the methods used in the assessment were appropriate. The Office of Environment and Heritage, in liaison with NSW Health, has undertaken environmental sampling to assist in further assessment of any risk. The public in the affected area have been provided with written advice about how to reduce their exposure to chromium (VI). Media attention remains high.
PREDICTED [indicate timeframe]	<ul style="list-style-type: none"> NSW Health's investigation into any potential health effects of the release is ongoing. Thorough assessment of the risk and provision of appropriate information and reassurance to members of the public in the exposed area remains a central feature of the response.

2.0 OBJECTIVES (or MISSION)

(What is the response trying to achieve?)

CURRENT	<ul style="list-style-type: none"> To fully assess the risk to human health from this incident To provide clear, appropriate and timely public communication To work with Office of Environment and Heritage to investigate the release
----------------	--

3.0 EXECUTION [how the mission will be achieved]

RESPONSE STRATEGIES AND TACTICS

(disease control, environmental health response, surveillance activity etc)

- NSW Health has obtained a written report of the details of the release and the nature of the human health risk assessment that has been undertaken. NSW Health has had this report reviewed by an expert clinical toxicologist and epidemiologist. Their opinion is that the methods used in the risk assessment are appropriate.
- OEH, in liaison with NSW Health, is undertaking further environmental sampling to confirm that the health risk is low.
- NSW Health has prepared and distributed a factsheet on the chromium (VI) release to the exposed area.
- NSW Health's investigation into any potential health effect of this chromium (VI) release is ongoing.
- **36 samples from high risk areas have been assessed.**
- **The results of further samples will be available the evening of Saturday 13 August 2011.**
- **Sampling included plants, dust, dirt and sand.**
- **33 of the 36 samples did not show evidence of Chromium 6 above lowest detectable levels.**
- **Low levels of Chromium 6 were detected in 3 samples from streets along the waterfront facing the Orica plant.**
- **Levels detected were such that inconceivably large amounts of sand, plants or dirt would need to be eaten even for a child to cause either acute or chronic effects.**
- **All samples from the childcare centre did not show evidence of Chromium 6 above the lowest detectable levels.**

PUBLIC INFORMATION / ADVICE TO PARTNER AGENCIES

(new resources etc)

- NSW Health media release issued 11 August.
- NSW Health fact sheet released 11 August – this was provided to each house in
- Content added to front page of NSW Health website 11 August (www.health.nsw.gov.au)
- NSW Health and OEH undertook a joint media conference on 11 August.
- NSW Health and OEH are undertaking a joint media conference on 12 August
- Numerous media interviews conducted – ongoing.
- **NSW Health and OEH are preparing advice to the childcare centre and media releases for approval. Ongoing media interviews are expected.**

PREPARING FOR A SURGE ON PUBLIC HEALTH SERVICES

- A surge of public enquiry phone calls to the Public Health Unit was anticipated for the evening of 11 August but did not materialise.
- The Public Health Unit received 15 calls regarding the incident from the general public on 12 August.

MAINTAINING CORE PUBLIC HEALTH SERVICES

- Core public health services at the Hunter New England Public Health Unit are being maintained.

4.0 ADMINISTRATION AND LOGISTICS [support provided to the response] (relevant sections to be completed)

<p>EQUIPMENT</p> <p>(maintenance, technical support, deployments, public health cache, State Medical Stockpile, procurement)</p>	<ul style="list-style-type: none"> • Clinical toxicologist Professor Alison Jones has been consulted on the risk profile of the chromium (IV) exposure. • Professor Jones and Professor Bruce Armstrong (expert epidemiologist) have reviewed Orica's risk assessment and have provided advice on appropriate public health action.
<p>SERVICES</p> <p>(catering, transport, accommodation arrangements etc)</p>	<ul style="list-style-type: none"> • No extra services are required at this time.
<p>PERSONNEL</p> <p>(recruitment, rostering, orientation etc)</p>	<ul style="list-style-type: none"> • Hunter New England Public Health Unit is operating within existing staffing levels. • Hunter New England Public Health Unit operated on extended hours 11 August to support public outreach and manage enquiries. Advisors from the State Environmental Health Branch were available to assist with media interviews and public enquiries after hours.
<p>SAFETY</p> <p>(list concerns, changes to OH&S procedures etc)</p>	<ul style="list-style-type: none"> • Public Health Unit staff undertaking factsheet mailbox drops after hours on 11 August operated in pairs. • All staff have been briefed on the risk profile of the response.
<p>5.0 CONTROL, COORDINATION & COMMUNICATION</p> <p>(relevant sections to be completed)</p>	
<p>GOVERNANCE ARRANGEMENTS</p> <p>(reporting structure, ICS teams, key committees etc)</p>	<ul style="list-style-type: none"> • The Chief Health Officer, as State Public Health Controller, is providing reports to the State Health Services Functional Area Coordinator. • An ICS structure has not been activated, nor has the public health emergency operations centre been activated.
<p>REPORTING</p> <p>(situation reports, verbal briefings etc)</p>	<ul style="list-style-type: none"> • Regular teleconferences are scheduled between Hunter New England Public Health Unit and the Department of Health.
<p>LINKS WITH PARTNER AGENCIES</p>	<ul style="list-style-type: none"> • Regular discussion is occurring between NSW Health public health services and the Office of Environment and Heritage, which has regulatory responsibility. • Links with SEMC partners is occurring through usual channels (ie via the State HSFAC).
<p>COMMUNICATIONS</p> <p>(equipment, key contact points, after-hours arrangements etc)</p>	<ul style="list-style-type: none"> • Hunter New England Public Health Unit is coordinating communications. • Based on current demand, usual on-call arrangements will be employed for out-of-hours enquiries this weekend. • Additional communications capacity will be provided by officers of

	the NSW Health Environmental Health Branch.
--	---

6.0 Attachments

(list any attachments eg maps, charts, organisational charts)

Author: Dr Richard Broome	Approved by: Dr Kerry Chant	Contact officer and details: Richard Broome 0457 830161
-------------------------------------	---------------------------------------	--

PUBLIC HEALTH INCIDENT ACTION PLAN

Response: Chromium (VI) release in Stockton, Hunter region	IAP #: 3	Date: 13 August 2011 09:00
---	---------------------------	---

1.0 SITUATION

(Provide a summary of the current hazard/response and predicted changes in a specific future period)

CURRENT	<ul style="list-style-type: none"> An incident occurred at the Orica plant at Kooragang Island at approximately 6pm on Monday 8th August. This resulted in the release from the plant of a catalyst that contains hexavalent chromium. NSW Health was notified of the incident by Orica at 11:30am on Wednesday. Initial investigations show that some of the catalyst was deposited off-site in the neighbouring town of Stockton. This may result in exposure of the population to chromium (VI). There have been no reports of acute health effects associated with this incident Orica assessed that the health risk to the population living in the area affected by the plume is low. NSW Health has received a written report from Orica that describes the basis of their risk assessment. NSW Health has had this report reviewed by an expert toxicologist and epidemiologist who felt that the methods used in the assessment were appropriate. The Office of Environment and Heritage, in liaison with NSW Health, has undertaken environmental sampling to assist in further assessment of any risk. The public in the affected area have been provided with written advice about how to reduce their exposure to chromium (VI). Media attention remains high.
PREDICTED [indicate timeframe]	<ul style="list-style-type: none"> NSW Health's investigation into any potential health effects of the release is ongoing. Thorough assessment of the risk and provision of appropriate information and reassurance to members of the public in the exposed area remains a central feature of the response.
2.0 OBJECTIVES (or MISSION) (What is the response trying to achieve?)	
CURRENT	<ul style="list-style-type: none"> To fully assess the risk to human health from this incident To provide clear, appropriate and timely public communication To work with Office of Environment and Heritage to investigate the release

3.0 EXECUTION [how the mission will be achieved]

RESPONSE STRATEGIES AND TACTICS

(disease control, environmental health response, surveillance activity etc)

- NSW Health has obtained a written report of the details of the release and the nature of the human health risk assessment that has been undertaken. NSW Health has had this report reviewed by an expert clinical toxicologist and epidemiologist. Their opinion is that the methods used in the risk assessment are appropriate.
- OEH, in liaison with NSW Health, is undertaking further environmental sampling to confirm that the health risk is low.
- NSW Health has prepared and distributed a factsheet on the chromium (VI) release to the exposed area.
- NSW Health's investigation into any potential health effect of this chromium (VI) release is ongoing.
- 36 samples from high risk areas have been assessed.
- The results of further samples will be available the evening of Saturday 13 August 2011.
- Sampling included plants, dust, dirt and sand.
- 33 of the 36 samples did not show evidence of Chromium 6 above lowest detectable levels.
- Low levels of Chromium 6 were detected in 3 samples from streets along the waterfront facing the Orica plant.
- Levels detected were such that inconceivably large amounts of sand, plants or dirt would need to be eaten even for a child to cause either acute or chronic effects.
- All samples from the childcare centre did not show evidence of Chromium 6 above the lowest detectable levels.
- ***At 11.30 pm on 12/8/11 an expert panel met to review the first set of field test results from OEH laboratories. These tests results showed levels at no risk to public health however the results of additional field test samples are awaited.***
- ***These results should be available on Saturday evening and an expert panel will be convened to review the results.***
- ***5 samples from the child care centre all showed no detectable levels of chromium V1***
-

PUBLIC INFORMATION / ADVICE TO PARTNER AGENCIES

(new resources etc)

- NSW Health media release issued 11 August.
- NSW Health fact sheet released 11 August – this was provided to each house in
- Content added to front page of NSW Health website 11 August (www.health.nsw.gov.au)
- NSW Health and OEH undertook a joint media conference on 11 August.
- NSW Health and OEH are undertaking a joint media conference on 12 August
- Numerous media interviews conducted – ongoing.
- NSW Health and OEH are preparing advice to the childcare centre and media releases for approval. Ongoing media interviews are expected.
- ***Additional media will be undertaken today to advise of the results of the first set of tests.***
- ***The child care centre has been contacted and arrangements made for Public Health Unit staff to be present on Monday to address any parent concerns. The child care centre manager will be advised of the test results today.***

PREPARING FOR A SURGE ON PUBLIC HEALTH SERVICES	<ul style="list-style-type: none"> A surge of public enquiry phone calls to the Public Health Unit was anticipated for the evening of 11 August but did not materialise. The Public Health Unit received 15 calls regarding the incident from the general public on 12 August. Contingency plans in place to support response- the major focus of which is communicating effectively the results of the risk assessment and testing
MAINTAINING CORE PUBLIC HEALTH SERVICES	<ul style="list-style-type: none"> Core public health services at the Hunter New England Public Health Unit are being maintained.
4.0 ADMINISTRATION AND LOGISTICS [support provided to the response] (relevant sections to be completed)	
EQUIPMENT (maintenance, technical support, deployments, public health cache, State Medical Stockpile, procurement)	<ul style="list-style-type: none"> Clinical toxicologist Professor Alison Jones has been consulted on the risk profile of the chromium (IV) exposure. Professor Jones and Professor Bruce Armstrong (expert epidemiologist) have reviewed Orica's risk assessment and have provided advice on appropriate public health action.
SERVICES (catering, transport, accommodation arrangements etc)	<ul style="list-style-type: none"> No extra services are required at this time.
PERSONNEL (recruitment, rostering, orientation etc)	<ul style="list-style-type: none"> Hunter New England Public Health Unit is operating within existing staffing levels. Hunter New England Public Health Unit operated on extended hours 11 August to support public outreach and manage enquiries. Advisors from the State Environmental Health Branch were available to assist with media interviews and public enquiries after hours.
SAFETY (list concerns, changes to OH&S procedures etc)	<ul style="list-style-type: none"> Public Health Unit staff undertaking factsheet mailbox drops after hours on 11 August operated in pairs. All staff have been briefed on the risk profile of the response.
5.0 CONTROL, COORDINATION & COMMUNICATION (relevant sections to be completed)	
GOVERNANCE ARRANGEMENTS	<ul style="list-style-type: none"> The Chief Health Officer, as State Public Health Controller, is providing reports to the State Health Services Functional Area Coordinator.

(reporting structure, ICS teams, key committees etc)	<ul style="list-style-type: none"> An ICS structure has not been activated, nor has the public health emergency operations centre been activated.
REPORTING (situation reports, verbal briefings etc)	<ul style="list-style-type: none"> Regular teleconferences are scheduled between Hunter New England Public Health Unit and the Department of Health.
LINKS WITH PARTNER AGENCIES	<ul style="list-style-type: none"> Regular discussion is occurring between NSW Health public health services and the Office of Environment and Heritage, which has regulatory responsibility. Links with SEMC partners is occurring through usual channels (ie via the State HSFAC).
COMMUNICATIONS (equipment, key contact points, after-hours arrangements etc)	<ul style="list-style-type: none"> Hunter New England Public Health Unit is coordinating communications. Based on current demand, usual on-call arrangements will be employed for out-of-hours enquiries this weekend. Additional communications capacity will be provided by officers of the NSW Health Environmental Health Branch.
6.0 Attachments (list any attachments eg maps, charts, organisational charts)	

Author: Dr Richard Broome	Approved by: Dr Kerry Chant	Contact officer and details: Richard Broome 0457 830161
--	--	--

PUBLIC HEALTH INCIDENT ACTION PLAN

Response: Chromium (VI) release in Stockton, Hunter region	IAP #: 4	Date: 13 August 2011 Time 2100 hrs
---	---------------------------	---

1.0 SITUATION

(Provide a summary of the current hazard/response and predicted changes in a specific future period)

CURRENT

- An incident occurred at the Orica plant at Kooragang Island at approximately 6pm on Monday 8th August. This resulted in the release from the plant of a catalyst that contains hexavalent chromium.
- Investigations show that some of the catalyst was deposited off-site in the neighboring town of Stockton. Sections of the Orica Plant were the most highly impacted.
- There have been no reports of acute health effects associated with this incident
- Approximately 20 workers were onsite when the incident occurred.
- Orica assessed that the health risk to the population living in the area affected by the plume was low.
- NSW Health has received a written report from Orica that describes the basis of their risk assessment. NSW Health has had this report reviewed by an expert toxicologist and epidemiologist who felt that the methods used in the assessment were appropriate.
- The Office of Environment and Heritage (OEH), in liaison with NSW Health, has undertaken extensive environmental sampling and testing to assist in further assessment of any risk and verify the findings of the Orica assessment in relation to off-site emissions.
- The public in the affected area were provided with written advice about how to reduce their exposure to chromium (VI) as a precaution.
- The Stockton community environmental test results indicate no threat to health
- OEH has issued two prevention notices and a clean up notice. This action prevents the restarting of the Orica plant until approval is given by OEH. The clean up notice requires Orica to clean up off site impacts within defined zones.
- WorkCover inspectors have attended the site on Thursday 11 August and Friday 12 August to investigate the chemical incident and worker safety issues. WorkCover has also been in liaison with Orica's Compliance Manager and the local OEH manager today. A full investigation has commenced to determine any breaches of Occupational Health and Safety legislation. WorkCover is obtaining documents from the plant operator relating to the plant operation at the time of the incident and a full list of all workers and persons present in the affected areas of the plant. WorkCover is awaiting the worker health surveillance results from Orica which is expected early next week and will be reviewing these results and the para-occupational samples to determine level of risk to workers

	<p>following the incident. WorkCover is currently determining the required corrective actions and system changes required to be carried out before the plant recommences</p> <ul style="list-style-type: none"> • Personnel should not enter contaminated areas that are undergoing cleanup, unless in emergency situations where they should follow the advice of NSW Fire and Rescue HAZMAT unit in regard to personal protective equipment and decontamination procedures. • The Workcover emergency hours duty officer is 0411266320 • Environmental contractors utilising PPE are currently undertaking a clean-up of the Orica site.
<p>PREDICTED [indicate timeframe]</p>	<ul style="list-style-type: none"> • For the Stockton Community given the results of the environmental testing the focus of NSW Health will be on supporting the community with accurate information and reassurance in relation to health issues and assisting transition to normal functioning. • Workcover will be focusing on ensuring compliance with the worker health surveillance program and progressing their investigation into potential breaches of workplace safety laws. • OEH will be progressing its investigation of the cause of the incident and the potential breach of environmental licenses and legislation.
<p>2.0 OBJECTIVES (or MISSION) (What is the response trying to achieve?)</p>	
<p>CURRENT</p>	<ul style="list-style-type: none"> • To fully assess the risk to human health from this incident (this now applies principally to worker impacts) • To provide clear, appropriate and timely public communication • To investigate the circumstances of the release and response from a regulatory perspective(OEH and Workcover)
<p>3.0 EXECUTION [how the mission will be achieved]</p>	
<p>RESPONSE STRATEGIES AND TACTICS (disease control, environmental health response, surveillance activity etc)</p>	<ul style="list-style-type: none"> • At 11.30 pm on 12/8/11 an expert panel met to review the field test results reported by OEH laboratories on this day. These tests results showed levels at no risk to public health however the results of additional field test samples were awaited. • At 17:30hrs on 13th August a teleconference was convened to consider tests reported on this day. • The community testing results indicate there is no threat to health. • Public Health staff were present in the Stockton Community to provide information on 13th August. The Public Health telephone line was also in place to answer community calls. 2 calls were received overnight and 5 today. • A follow-up teleconference of agencies will held on Monday 15th August
<p>PUBLIC INFORMATION / ADVICE TO PARTNER AGENCIES (new resources etc)</p>	<ul style="list-style-type: none"> • The child care centre has been contacted and arrangements made for Public Health Unit staff to be present on Monday 15 August to address any parent concerns. The child care centre manager has been advised of the test results today. The child care centre manager was provided with some health advice including test results to incorporate into an email communication to parents.

<p>PREPARING FOR A SURGE ON AGENCY SERVICES</p>	<ul style="list-style-type: none"> Contingency plans in plan to support response- the major focus of which is communicating effectively the results of the risk assessment and testing The OEH laboratory have been provided extended hours services and this will be maintained until 15th August and then reviewed.
<p>MAINTAINING CORE PUBLIC HEALTH SERVICES</p>	<ul style="list-style-type: none"> Core public health services at the Hunter New England Public Health Unit are being maintained.
<p>4.0 ADMINISTRATION AND LOGISTICS [support provided to the response] (relevant sections to be completed)</p>	
<p>EQUIPMENT (maintenance, technical support, deployments, public health cache, State Medical Stockpile, procurement)</p>	
<p>SERVICES (catering, transport, accommodation arrangements etc)</p>	<ul style="list-style-type: none"> No extra services are required at this time.
<p>PERSONNEL (recruitment, rostering, orientation etc)</p>	<ul style="list-style-type: none"> Hunter New England Public Health Unit is operating within existing staffing levels. Hunter New England Public Health Unit operated on extended hours 11 August to support public outreach and manage enquiries. Advisors from the State Environmental Health Branch were available to assist with media interviews and public enquiries after hours.
<p>SAFETY (list concerns, changes to OH&S procedures etc)</p>	<ul style="list-style-type: none"> Public Health Unit staff undertaking factsheet mailbox drops after hours on 11 August operated in pairs. All staff have been briefed on the risk profile of the response.
<p>5.0 CONTROL, COORDINATION & COMMUNICATION (relevant sections to be completed)</p>	
<p>GOVERNANCE ARRANGEMENTS (reporting structure, ICS teams, key committees etc)</p>	<ul style="list-style-type: none"> The Chief Health Officer, as State Public Health Controller, is providing reports to the State Health Services Functional Area Coordinator. An ICS structure has not been activated, nor has the public health emergency operations centre been activated.

REPORTING (situation reports, verbal briefings, etc)	
LINKS WITH PARTNER AGENCIES	<ul style="list-style-type: none"> • Regular discussion is occurring between NSW Health public health services and the Office of Environment and Heritage and Workcover. • Workcover will now attend future teleconferences • Communications with Local Government and local Fire Brigade Area Commander have been ongoing via OEH. • The Deputy SEOCON, Local Area Police Command and FRNSW were briefed at a teleconference at 18:30 on 13 August 2011.
COMMUNICATIONS (equipment, key contact points, after-hours arrangements etc)	<ul style="list-style-type: none"> • Further media is planned for Sunday 14th August to advise of the results of the community environmental samples. • The joint OEH – Health media release for 13 August 2011 addressing the initial sampling results is attached.
6.0 Attachments (list any attachments eg maps, charts, organisational charts)	

<p>Author: Peter Dunphy Director of Operations Workcover (contributed Workcover advice) 0412051359</p> <p>Greg Sullivan(DCE Environment Protection and Regulation) 0407119 235</p> <p>Dr Kerry Chant (Chief Health Officer) 0411047165</p>	<p>Approved by: Authors</p> <p>Dr Ron Manning Health Services Functional Area Co-ordinator</p>	<p>Contact officer and details: Dr Kerry Chant 0411047165</p>
--	--	--

PUBLIC HEALTH INCIDENT ACTION PLAN

Response: Chromium (VI) release in Stockton, Hunter region	IAP #: 5	Date: 14 August 2011 Time 1800 hrs
---	---------------------------	---

1.0 SITUATION

(Provide a summary of the current hazard/response and predicted changes in a specific future period)

CURRENT

- An incident occurred at the Orica plant at Kooragang Island at approximately 6pm on Monday 8th August. This resulted in the release from the plant of a catalyst that contains hexavalent chromium.
- Investigations show that some of the catalyst was deposited off-site in the neighboring town of Stockton. Sections of the Orica Plant were the most highly impacted.
- There have been no reports of acute health effects associated with this incident.
- Approximately 20 workers were onsite when the incident occurred.
- Orica assessed that the health risk to the population living in the area affected by the plume was low.
- NSW Health has received a written report from Orica that describes the basis of their risk assessment. NSW Health has had this report reviewed by an expert toxicologist and epidemiologist who felt that the methods used in the assessment were appropriate.
- The Office of Environment and Heritage (OEH), in liaison with NSW Health, has undertaken extensive environmental sampling and testing to assist in further assessment of any risk and verify the findings of the Orica assessment in relation to off-site emissions.
- The public in the affected area were provided with written advice about how to reduce their exposure to chromium (VI) as a precaution.
- The Stockton community environmental test results indicate no threat to health.
- OEH has issued two prevention notices and a clean up notice. This action prevents the restarting of the Orica plant until approval is given by OEH. The clean up notice requires Orica to clean up off site impacts within defined zones.
- A WorkCover inspector attended the Orica site today and reports that the on-site cleanup is substantially complete. Further sampling will occur to assess the adequacy of the cleanup.
- The report from Orica on health monitoring of the workers is expected this week.
- NSW Health assisted by OEH letter dropped the 6 residential blocks identified in preliminary assessments as potentially exposed and the block immediately south of Flint between Mitchell and Dunbar. A total of 152 fact sheets were delivered.
- There were 3 calls to the health line.
- A media release was issued this morning updating the community on the results of the community environmental testing and a series of radio interviews and one TV interview was conducted.

	<ul style="list-style-type: none"> • Orica have contacted NSW Health Media to indicate they may hold a public meeting on Wednesday 17 August in Stockton
PREDICTED [indicate timeframe]	<ul style="list-style-type: none"> • For the Stockton Community given the results of the environmental testing the focus of NSW Health will be on supporting the community with accurate information and reassurance in relation to health issues and assisting transition to normal functioning. • WorkCover will be focusing on ensuring compliance with the worker health surveillance program and progressing their investigation into potential breaches of workplace safety laws • OEH will be progressing its investigation of the cause of the incident and the potential breach of environmental licenses and legislation.
2.0 OBJECTIVES (or MISSION) (What is the response trying to achieve?)	
CURRENT	<ul style="list-style-type: none"> • To support the community resume usual activities and address health queries as they arise • Ascertain if impacts on worker health and ensure a safe working environment • To provide clear, appropriate and timely public communication • To investigate the circumstances of the release and response from a regulatory perspective(OEH and Workcover)
3.0 EXECUTION [how the mission will be achieved]	
RESPONSE STRATEGIES AND TACTICS (disease control, environmental health response, surveillance activity etc)	<ul style="list-style-type: none"> • NSW Health will respond to any queries from the community in relation to health impacts. • OEH and WorkCover will continue with their investigations • The need for further community information eg through local newspaper is being considered by OEH
PUBLIC INFORMATION / ADVICE TO PARTNER AGENCIES (new resources etc)	<ul style="list-style-type: none"> • The child care centre has been contacted and arrangements made for Public Health Unit staff to be present on Monday 15 August to address any parent concerns as they drop of their children. Written information will also be provided.
PREPARING FOR A SURGE ON AGENCY SERVICES	<ul style="list-style-type: none"> • Contingency plans in plan to support response- the major focus of which is communicating effectively the results of the risk assessment and testing and addressing further health concerns • The OEH laboratory have been provided extended hours services and this will be maintained until 15th August and then reviewed.
MAINTAINING CORE PUBLIC HEALTH SERVICES	<ul style="list-style-type: none"> • Core public health services at the Hunter New England Public Health Unit are being maintained.

4.0 ADMINISTRATION AND LOGISTICS [support provided to the response] (relevant sections to be completed)	
EQUIPMENT (maintenance, technical support, deployments, public health cache, State Medical Stockpile, procurement)	
SERVICES (catering, transport, accommodation arrangements etc)	<ul style="list-style-type: none"> No extra services are required at this time.
PERSONNEL (recruitment, rostering, orientation etc)	<ul style="list-style-type: none"> OEH, Workcover and NSW Health are ensuring appropriate rostering. Surge capacity exists but is not expected to be required given the phase of the operation.
SAFETY (list concerns, changes to OH&S procedures etc)	<ul style="list-style-type: none"> No specific safety concerns. Staff in the field have been well received by residents.
5.0 CONTROL, COORDINATION & COMMUNICATION (relevant sections to be completed)	
GOVERNANCE ARRANGEMENTS (reporting structure, ICS teams, key committees etc)	<ul style="list-style-type: none"> The Chief Health Officer, as State Public Health Controller, is providing reports to the State Health Services Functional Area Coordinator. An ICS structure has not been activated, nor has the public health emergency operations centre been activated.
REPORTING (situation reports, verbal briefings etc)	
LINKS WITH PARTNER AGENCIES	<ul style="list-style-type: none"> Regular discussion is occurring between NSW Health public health services and the Office of Environment and Heritage and WorkCover. WorkCover will now attend future teleconferences. An interagency teleconference will be held at 4pm on Monday 15th August. Dial in details and agenda will be circulated on Monday morning. Communications with Local Government and local Fire Brigade Area Commander have been ongoing via OEH. Plans for agency specific and interagency debriefs are being developed

<p>COMMUNICATIONS</p> <p>(equipment, key contact points, after-hours arrangements etc)</p>	<ul style="list-style-type: none"> • No specific media is planned for Monday. • Consideration is being given to whether additional communication to residents via the local paper is to be undertaken.
<p>6.0 Attachments</p> <p>(list any attachments eg maps, charts, organisational charts)</p>	

<p>Author:</p> <p>Peter Dunphy Director of Operations Workcover (contributed Workcover advice) 0412051359</p> <p>Greg Sullivan(DCE Environment Protection and Regulation) 0407119 235</p> <p>Dr Kerry Chant (Chief Health Officer) 0411047165</p>	<p>Approved by:</p> <p>Authors</p> <p>Dr Ron Manning Health Services Functional Area Co-ordinator</p>	<p>Contact officer and details:</p> <p>Dr Kerry Chant 0411047165</p>
---	---	---

NSW Health debrief of Orica chromium incident 9 September 2011

A debrief of the NSW Health response to the Orica incident was conducted on 9 September 2011 at Hunter New England Population Health, Wallsend Campus, Newcastle.

Debrief participants included:

- *NSW Health*: Dr Kerry Chant, Dr Jeremy McAnulty, Prof Wayne Smith
- *State HSFAC*: Ron Manning
- *Health Emergency Management Unit (ASNSW)*: Rosemary Hegner
- *Hunter New England Local Health District*: Karen Kelly, Scott Pearce
- *Hunter New England Population Health*: Dr John Wiggers, Prof David Durrheim, Dr Tony Merritt, Dr Craig Dalton, Philippe Porigneaux, Cindy Gliddon, Carolyn Herlihy, Nichole Ansell, Chris Williams
- *University of Wollongong*: Prof Alison Jones, Expert Advisory Group member

A structured debrief was utilised for guiding the process.

There was acknowledgement of the excellent teamwork, enormous dedication and high quality public health practice throughout the response to this incident. The contribution of the Expert Advisory Group was considered a critical component to the effective public health response.

The debrief was conducted within a learning paradigm with a particular focus on identifying areas that could be augmented to enhance future responses. Nine areas were identified for further investment.

1. Sampling protocols following acute industrial pollution events

There was value in designing generic guidelines for optimally sampling environments potentially contaminated by industrial pollution events. This would include: a selection of best evidence sampling strategies for air, water, soil, food, consumables and surfaces. The timing and most appropriate accredited laboratories for testing would be included.

Action: Environmental Health Branch to prepare processes for defining sampling protocols following acute industrial pollution events in liaison with OEH. This issue will be raised at the Strategic Liaison Group Meeting with OEH on September 16.

2. Establishing the social/psychological/historical and community context early

There is a need to explicitly and strategically establish the social, psychological, historical and community context at the outset of an incident response. A technically flawless response could be less effective if these aspects were not considered early and appropriately managed. There would be value in assessing the public health perspective with members of the affected community or other lay persons as this could assist in developing a comprehensive communication strategy to mitigate public health or mental health risks.

Action:

- **Environmental Health Branch to prepare a process to ensure that public health responses to acute industrial pollution events include:**
 - **early explicit evaluation of the specific social/psychological/historical and community context and**
 - **seeks input from leaders within the community in developing communication material to ensure it comprehensively addresses community concerns**
 - **a checklist should be developed to ensure these processes are considered in the event response**

3. Rapid quantitative health risk assessments to guide public health action

The iterative process inherent with industry funded toxicological and broader health risk assessment led to delays. The Office of Environment and Heritage should engage an independent consultant to undertake a NSW Health risk assessment where it is recommended by the CHO. In supporting this process it is essential for NSW Health to further augment its capacity to assess and conduct health risk assessments.

Actions:

- **Environmental Health Branch to discuss this issue with the Office of Environment and Heritage to identify policy or legislative changes required to ensure that comprehensive health risk assessments informed by public health-specific needs can be rapidly completed following acute industrial pollution events.**
- **Director, Environmental Health Branch, to identify strategies to augment capacity to assess and conduct health risk assessments.**
- **Director of Environmental Health to develop a template for PHUs to use for the initial assessment of risk and reporting of the event to EHB.**

4. Early field reconnaissance

Early field deployment of experienced environmental health officers enables real-time intelligence invaluable to operation planning. This should be encouraged in all future public health responses to industrial pollution incidents impacting on neighbouring communities.

Action: Hunter New England Population Health to develop specific guidelines for environmental health reconnaissance for sharing across NSW.

5. Community risk communication and risk mitigation

Risk mitigation is the act of reducing the risk of harm to a community after an event. This harm may be due to direct exposure to a chemical or due to fears (whether well-founded or not) regarding an event. In an acute incident, NSW Fire and Rescue is the combat agency for HAZMAT incidents and is tasked with decisions around evacuation, sheltering-in-place and community emergency communications. NSW Health should be consulted early in an incident to ensure broader community concerns and impacts can be appropriately mitigated.

Action: NSW Health to raise this issue at the inter-agency debrief.

6. Community risk communications

Further investment in Australia is merited in the important area of community risk communication. This should include considerations on optimal timing to ensure the balance between optimism, realism and pessimism. The centrality of consistent messaging was emphasised.

Development of generic messages for pollution/CBRN events would be beneficial. The guidance provided during high risk events by an appropriate Expert Advisory Group was considered immensely valuable.

Further exploration of the most effective mechanisms for ensuring that those people who need to know receive an accurate message that enables appropriate action is indicated. A broad range of technical expertise should be involved including public health, risk communication practitioners and media specialists.

A detailed communication framework should be established at the outset of a response. This could assist in averting community confusion about acute and long-term risks.

Actions:

- **Office of the Chief Health Officer will host a risk communications forum to provide input into training and response resources.**

- **Environmental Health Branch to prepare key message templates in preparation for CBRN events.**

7. Explore greater involvement of community expertise

There is advantage of involving local experts in the risk assessment and communication process – local experts often understand particular community concerns, the locations of vulnerable groups and recent issues that may affect community interpretation of a current event. This is more challenging during acute chemical exposures compared to longer-term pollution incidents.

Action: Hunter New England Population Health to develop guidelines for identifying and engaging community expertise in response to acute pollution events for sharing across NSW.

8. Interagency/emergency notification

Protocols for identifying issues for escalation must consider issues beyond immediate health risks (eg whilst there may be no immediate casualties from an exposure, there may be a potential for significant long-term harms). NSW Health can only advise on these types of risks when adequately briefed – hence, it is important that incidents that may lead to long term health effects are appropriately notified.

Action: State HSFAC to raise at the inter-agency debrief.

9. Optimal document control

The importance of optimal document control including email identification was highlighted. The value of detailed time logs during the current incident was noted. These elements should be emphasised in protocols, policies and training resources. The role of Popnet in facilitating comments on documents should be considered, as should the incident management system currently under consideration by the Health Emergency Management Unit.

Action: Office of the Chief Health Officer will prepare guidelines.