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INTERNATIONAL CYANIDE MANAGEMENT CODE
CYANIDE PRODUCTION CERTIFICATION AUDIT

ORICA AUSTRALIA PTY LTD

**YARWUN SODIUM CYANIDE PRODUCTION
FACILITY**

SUMMARY AUDIT REPORT

Submitted to:



**International Cyanide Management
Institute (ICMI)**
1200 G Street, NW, Suite 800
Washington, DC 20005
UNITED STATES OF AMERICA



Orica Australia Pty Ltd
Reid Road via Gladstone
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Gladstone, Queensland 4680
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- 1 Copy - Orica Australia Pty Ltd
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November 2006

06641334-R02



**SUMMARY AUDIT REPORT
FOR CYANIDE PRODUCTION OPERATIONS**

Name of Cyanide Production Facility: Yarwun Sodium Cyanide Production Facility
Name of Facility Owner: Orica Australia Pty Ltd
Name of Facility Operator: Orica Australia Pty Ltd
Name of Responsible Manager: Robert Mossop, Yarwun Site Manager
Address: Reid Road via Gladstone, Gladstone
State/Province: Queensland
Country: Australia
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Location detail and description of operation:


Orica Australia's Yarwun facility located at Gladstone, Queensland, commenced operations in 1989 and is engaged in the manufacture of Sodium Cyanide (solid and liquid), Ammonium Nitrate, Nitric Acid, Chlorine, Sodium Hydroxide, Sodium Hypochlorite, Hydrochloric Acid and Expanded Polystyrene balls. The site employs approximately 160 personnel full time across all plants.

Sodium Cyanide is manufactured at Yarwun site using the Andrussow process. In this process, methane, ammonia and oxygen are reacted over a platinum catalyst to form hydrogen cyanide gas (HCN). The HCN gas is then absorbed into caustic soda to form liquid sodium cyanide. The sodium cyanide liquor can then be crystallised, dried and compacted into solid sodium cyanide. Orica Yarwun site provides sodium cyanide in liquid and solid form to the mining industry.

The Plant has been designed, constructed and is operated using environmentally sound practices. The Plant facilities are located within concrete containment and the plant has been constructed to operate with fail safe systems to minimise the potential for operation spills or releases during emergencies. Loading of solid and liquid product is also undertaken within sealed contained areas.

Sodium Cyanide manufactured at Yarwun Site is used in gold mining operations within Australia, Asia, Africa and South America.

Yarwun Production Facility
Name of Facility


Signature of Lead Auditor

16 November 2006
Date

Auditor's Finding

This Operation is in full compliance with
 in substantial compliance with **The International Cyanide**
 not in compliance with **Management Code**

Audit Company: Golder Associates
Audit Team Leader: Edward Clerk, CEnvP
Email: eclerk@golder.com.au
Name and signatures of other auditors:



Mark Latham
Name of Auditor

Signature of Auditor

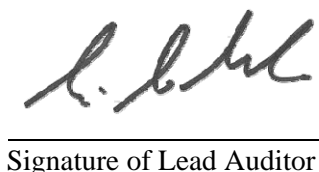
30 October 2006
Date

Dates of Audit: 31 July 2006 to 4 August 2006 and 2 October 2006.

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the International Cyanide Management Institute for Code Verification Auditors.

I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the International Cyanide Management Code Verification Protocol for Cyanide Production Operations and using standard and accepted practices for health, safety and environmental audits.

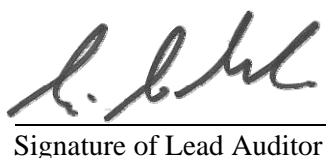
Yarwun Production Facility
Name of Facility



Signature of Lead Auditor

16 November 2006
Date

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1. OPERATIONS: *Design, construct and operate cyanide production facilities to prevent release of cyanide.*


Production Practice 1.1: *Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.*

The operation is in full compliance with **Production Practice 1.1**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The original facility was design and constructed by ICI Australia based on ICI experience, which was documented to form the foundation of quality assurance for the facility. ICI Australia adapted the basic design concepts to local conditions, applying the ICI process hazard management processes that are now widely used in hazardous process industries. Quality assurance and quality control documents are maintained at the facility as an extensive Plant Dossier. Some records of the original construction checking were destroyed under appropriate authority as their relevance had been significantly reduced due to process changes, however the configuration documents that construction checks were made against have been kept current throughout progressive extension and modification of the facility. The configuration documents show the application of construction material specifications and the extensive interlock and instrumentation system that includes level alarms and trips. Orica's health, safety and environment management system requires an annual letter of assurance from operating management together with a plan for dealing with identified deficiencies. The secondary containment of a tank installed below ground surface and of drain lines that carry sodium cyanide solution to the effluent treatment system need improving. Improvements have been made to the lining of bunds and plans are being developed for addressing other identified issues when the facility shuts down for a capacity extension in early 2007.

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Production Practice 1.2: *Develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.*

The operation is in full compliance with
 in substantial compliance with **Production Practice 1.2**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The facility has an extensive system of procedures, instructions and checklists which are accessible through an on-line Document Management System. The instructions deal comprehensively with usual and abnormal operating requirements and are structured systematically to make the information easily accessible. The facility applies strong procedures to control the modification of physical plant and operating instructions. Physical plant modifications and preventive maintenance of plant are administered through a comprehensive on-line system; however the preventive maintenance of pipelines is yet to be incorporated into this system. Preventive maintenance includes the periodic calibration of key instruments, particularly those required to initiate trips. Practices are in place to ensure cyanide is packaged as required by the political jurisdictions through which the load will pass.


Production Practice 1.3: *Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.*

The operation is in full compliance with
 in substantial compliance with **Production Practice 1.3**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

Inspection programs are allocated to plant technicians and qualified engineering professionals with relevant skills. Checksheets completed by plant technicians were examined and found to be completed effectively, with work orders raised for corrective actions where appropriate. A number of inspections carried out by professional engineers were sighted. It was apparent that improvements have been identified and acted on as a result of such inspections. There are opportunities to improve the scope of regular inspections by scheduling the inspection of tanks, pipelines and valves.

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2. WORKER SAFETY: *Protect workers' health and safety from exposure to cyanide.*

Production Practice 2.1: *Develop and implement procedures to protect plant personnel from exposure to cyanide.*

The operation is in full compliance with
 in substantial compliance with **Production Practice 2.1**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The Site has developed and implemented formal procedures for the operating Cyanide Plant from the receipt of raw materials through to finished product, packaging and shipping. All procedures follow a consistent and standardised format that incorporate safety information for normal, non-routine and maintenance activities. The Site has formal procedures to ensure that all modifications are implemented in a manner which does not present a risk to safety, health, the environment or physical security.


The facility solicits and considers worker input in developing and evaluating health and safety procedures through a number of processes such as meetings and editing functions within the document control system on-site.

The location and use of fixed and portable monitoring devices confirm controls are in place to limit worker exposure. The SH&E/QA and Statutory Manager and Shift Facilitator advised that the Cyanide Plant uses both a buddy and radio system to maintain communication channels.

The Facility has a Health Assessment Procedure and a full time Site Occupational Health Nurse. The Cyanide Plant does have a clothing change procedure for employees, contractors and visitors accessing areas with the potential for cyanide contamination of clothing.

Signs were evident throughout the facility warning workers that cyanide is present and advising them of appropriate PPE requirements. The location and content of the vast majority of signs observed appeared appropriate, however a number of signs observed within the Cyanide Plant were faded and difficult to read, as a result the facility was considered substantially compliant with this requirement.

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Production Practice 2.2: Develop and implement plans and procedures for rapid and effective response to cyanide exposure.

The operation is in full compliance with
 in substantial compliance with **Production Practice 2.2**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

Orica have developed and implemented a *Yarwun Site Emergency Plan* that covers the requirements of Production Practice 2.2. Plant Operators interviewed during the audit were familiar with the procedure for cyanide exposure and decontamination and their responsibilities under the Emergency Response Plan. The Orica cyanide decontamination procedure for employees, contractors and visitors is the same for situations involving either incidental contamination or larger scale emergency situations.

Safety showers, eyewash stations and bottled water have been placed throughout the Cyanide Facility at all high risk areas. The showers are walk-in multiple spray showers providing complete simultaneous coverage of the entire body from all angles by individual spray heads. They are activated by stepping onto the platform. First Aid equipment and emergency response equipment is readily available for use in the plant and the inspection and testing programs are appropriate.


All site personnel have access to Orica's Chemical Data Management System via the intranet and hard copies of Material Safety Data Sheets are also maintained in the Administration Building and the Control Room.

The Company Doctor and the Site Occupational Health Nurse have frequently communicated with and visit the Gladstone Hospital to inform and educate hospital staff on the issues associated with cyanide and confirm arrangements between Orica and the Gladstone Hospital including emergency response requirements.

Emergency drills are conducted frequently (at least weekly). Orica Australia have a Procedure for capturing opportunities for improvement and for investigation and management of SH&E and/or physical security improvement actions, including actions required following SH&E incidents and audits.

The storage tanks, process tanks, containers and piping containing cyanide that were observed within the Cyanide Plant were not consistently labelled to alert workers of their contents and the direction of flow. The one exception included the recently installed Second Back End which appeared adequately labelled.

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3. MONITORING: *Ensure that process controls are protective of the environment.*

Production Practice 3.1: *Conduct environmental monitoring to confirm that planned or unplanned releases of cyanide do not result in adverse impacts.*

The operation is **in full compliance with** **Production Practice 3.1**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:


The Plant does not have a direct or indirect stormwater or process water discharge to surface waters. Orica hold an Environmental Licence to operate their facility which is issued by the Queensland Environmental Protection Agency (EPA). The licence requires groundwater monitoring, however no numerical standard for cyanide is listed within the License. The licence does require an annual assessment of Orica's groundwater quality to be undertaken and these reports are prepared by an external consultant.

Although no beneficial groundwater user has been identified and no regulatory limit established, the issue of cyanide contamination of groundwater within their boundary has been identified by Orica and remedial action taken to address the issue including the installation of recovery wells downgradient of the facility. Pumping of the recovery bores is undertaken automatically using timers and level controls. Extracted water is sent to plant effluent system for treatment.

Process emissions of hydrogen cyanide gas within the facility are limited effectively through operational and engineered controls. Personnel exposure limits in air are based on concentrations of hydrogen cyanide gas of 10 ppm instantaneously and 4.7 ppm continuously over an eight hour period. The monitoring of environmental emission limits are set by the EPA and detailed within the Environmental Licence.

The frequency of monitoring is considered appropriate to identify changes in a timely manner.

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4. TRAINING: *Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.*

Production Practice 4.1: *Train employees to operate the plant in a manner that minimises the potential for cyanide exposures and releases.*

The operation is **in full compliance with**
 in substantial compliance with **Production Practice 4.1**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation has a strong safety culture which fosters personal responsibility in each individual for their own safety and the safety of colleagues. Only individuals who are expected to fit in with this culture are employed, and corrective action is taken if necessary. The training program places a strong initial focus on ensuring that the individual understands the hazards and the basic principles of working safely with cyanide. Key information on hazards and protective strategies is delivered repeatedly through a number of individuals with the opportunity for discussion and clarification. The training process is not rushed, but is developed progressively through clearly defined steps that draw on learning acquired from earlier steps. A mentor is assigned to each individual to provide information on task requirements, demonstrate their performance and monitor the development of competence. This relationship persists until the trainee can perform the role independently and until that time the pair perform that role together. Work crews monitor the effectiveness of the mentor/trainee relationships and corrective action is taken if needed. Documentation sets out the competencies to be acquired and criteria for their attainment. The trainee only qualifies to work the role independently when a defined group of colleagues sign off that each is satisfied that the individual can take on the role to work independently as a full and responsible member of the crew.


Production Practice 4.2: *Train employees to respond to cyanide exposures and releases.*

The operation is **in full compliance with**
 in substantial compliance with **Production Practice 4.2**
 not in compliance with
 not subject to

Summarise the basis for this Finding/Deficiencies Identified:

Training is provided on-site to ensure all persons (including visitors and contractors) are provided with relevant information and awareness training concerning cyanide. This information is conveyed through general and specific work training. All Cyanide Plant employees are required to undergo competency based training on all aspects of the Cyanide Plant including emergency response procedures and specialist emergency response training to fulfil their duties under the Emergency Response Plan.


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Refresher training is given periodically. Records were sufficiently detailed to demonstrate conformance and employee interviews confirmed an understanding and awareness of the emergency response procedures.

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5. EMERGENCY RESPONSE: *Protect communities and the environment through the development of emergency response strategies and capabilities.*

Production Practice 5.1: *Prepare detailed emergency response plans for potential cyanide releases.*

The operation is **in full compliance with** **Production Practice 5.1**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

There are emergency response plans for the involvement of facility personnel in both site emergencies and in emergencies off-site associated with the distribution of product. Many of the scenarios suggested for consideration under the code are addressed within the inherent safety of the facility's design and the mitigation measures in place. The Emergency Response Plan is detailed and provides guidance on the use of measures designed into the facility to assist in dealing with emergencies such as trips and the arrangements for containment within the first flush system catchment.


Production Practice 5.2: *Involve site personnel and stakeholders in the planning process.*

The operation is **in full compliance with** **Production Practice 5.2**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

Site personnel are involved in emergency planning through the planning, conduct and review of emergency drills. In relation to emergency response planning, mutual aid relationships with industrial neighbours are maintained mostly through drills conducted for ammonia and chlorine incident scenarios as these are identified as more likely to involve neighbours than cyanide-related emergencies. Current versions of the cyanide plant emergency plan are maintained in the custody of the police and emergency services and a regular review is undertaken with the Gladstone Hospital to maintain its preparedness for dealing with persons who may be brought for treatment after a cyanide exposure.

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Production Practice 5.3: *Designate appropriate personnel and commit necessary equipment and resources for emergency response.*

The operation is **in full compliance with** **Production Practice 5.3**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The Emergency Response Plan for the site designates roles and responsibilities, call out procedures and contact information. The operation has lists of emergency response equipment and has designated persons to check and maintain the equipment. The roles of outside responders are also clearly described within the Plan.

Production Practice 5.4: *Develop procedures for internal and external emergency notification and reporting.*

The operation is **in full compliance with** **Production Practice 5.4**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The Emergency Response Plan identifies the procedure and contact information for notifying management, neighbours, regulatory agencies, outside response providers and medical facilities as appropriate.

Production Practice 5.5: *Incorporate into response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.*

The operation is **in full compliance with**
 in substantial compliance with **Production Practice 5.5**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The Yarwun Emergency Response Plan explicitly prohibits the use of sodium hypochlorite, ferrous sulphate and hydrogen peroxide to treat cyanide in emergencies. The Emergency Response Guide Sodium Cyanide recommends that no chemicals are added to a flowing waterway in the event of a cyanide spill as these may only exacerbate the incident with their own toxicity characteristics.

Specific arrangements are in place to enable the containment and monitoring of spills.

Production Practice 5.6: *Periodically evaluate response procedures and capabilities and revise them as needed.*


The operation is **in full compliance with**
 in substantial compliance with **Production Practice 5.6**
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The Site's Emergency Response Plan was a controlled document that undergoes periodic review every 12 months. Evidence obtained during interviews of the Cyanide Plant Shift Team revealed that emergency response training is an integral part of their job function and training program. The exercises are not conducted just to evaluate the Emergency Responses Plan although they do form a valuable part of the review process.

The Yarwun Facility has only had to respond to one major incident involving cyanide. As a result of the investigation into the incident, several modifications were made to the Emergency Response System and Plan.

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16 November 2006
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