



SUSTAINABILITY
FUTURE GROWTH

**ORICA AUSTRALIA PTY LTD: Yarwun Cyanide
Production Facility**

Re-Certification Audit: International Cyanide Management Code
- Production Verification Protocol

Summary Audit Findings Report

13-15 March 2013





TABLE OF CONTENTS

| | |
|--|----|
| SUMMARY AUDIT REPORT | 1 |
| LOCATION DETAIL AND DESCRIPTION OF OPERATION | 1 |
| AUDITOR'S FINDING | 2 |
| Audit Company | 3 |
| Audit Team Leader | 3 |
| Names and Signatures of Other Auditors | 3 |
| Date(s) of Audit | 3 |
| PRINCIPLE 1 – OPERATIONS | 5 |
| Production Practice 1.1 | 5 |
| Production Practice 1.2 | 6 |
| Production Practice 1.3 | 7 |
| PRINCIPLE 2 – WORKER SAFETY | 9 |
| Production Practice 2.1 | 9 |
| Production Practice 2.2 | 10 |
| PRINCIPLE 3 – MONITORING | 12 |
| Production Practice 3.1 | 12 |
| PRINCIPLE 4 – TRAINING | 14 |
| Production Practice 4.1 | 14 |
| Production Practice 4.2 | 14 |
| PRINCIPLE 5 – EMERGENCY RESPONSE | 16 |
| Production Practice 5.1 | 16 |
| Production Practice 5.2 | 16 |
| Production Practice 5.3 | 17 |
| Production Practice 5.4 | 18 |
| Production Practice 5.5 | 18 |
| Production Practice 5.6 | 19 |

INTERNATIONAL CYANIDE MANAGEMENT CODE

SUMMARY AUDIT REPORT

Facility: Yarwun Production Facility

Facility Owner and Operator: Orica Australia Pty Ltd

Responsible Manager: Rod Waldron Compliance Projects Manager
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LOCATION DETAIL AND DESCRIPTION OF OPERATION


Orica Australia Pty Ltd (Orica) operates the Yarwun production facility which is located 9 km north-west of Gladstone, Queensland. The facility has been in operation for 23 years and Orica operates the following plants at the site:

- Three Nitric Acid plants
- Two Ammonium Nitrate plants
- An Ammonium Nitrate Emulsion Phase plant
- An Expanded Polystyrene plant
- A Chlorine and derivatives plant
- A Sodium Cyanide plant

The facility also operates two raw material import facilities at the Fisherman's landing port, located approximately 5km north of the main site. The facilities incorporate ammonia and caustic soda unloading and storage facilities that are connected to the site through an underground pipe network. The site employs approximately 220 personnel along with up to 100 contractors. At any one time the maximum number of persons likely to be on-site is between 150-200 personnel.

The Plant utilises four main raw materials to produce sodium cyanide liquor and cyanoids (briquettes of sodium cyanide). These common materials are ammonia, rich methane gas (RMG), process air and caustic soda.

Orica Yarwun Production Facility
Name of Facility



Signature of Lead Auditor

20 September 2013
Date

The process commences with the mixing of the three gases: ammonia, RMG and pre heated process air. These gases are reacted in the converter to produce hydrogen cyanide gas. The HCN gas produced is cooled passing through the waste heat boiler and the process gas economiser then transferred to the selective absorber where the HCN gas is absorbed into caustic soda to form sodium cyanide liquor. The absorber has a large recirculating stream to remove the heat of reaction. From this stream, NaCN liquor is taken off to feed the evaporator, with any surplus going to the evaporator feed tank. Any impurities which build up in the NaCN liquor are purged to the sales liquor tank.

The complex contains two production plants which operate two different processes to form the final product which is then transported off site.

During 2012, Orica's Yarwun site at Reid Road, Gladstone, transitioned to a licensed Major Hazard Facility (MHF).

AUDITOR'S FINDING


This operation is:

- ☒ in full compliance
- ☐ in substantial compliance
- ☐ not in compliance

with the International Cyanide Management Code Production Facility Verification Protocol.

This operation has experienced compliance problems during the previous three-year audit cycle which are discussed in this report under Standard of Production Practice 3.1.

Orica Yarwun Production Facility
Name of Facility



Signature of Lead Auditor

20 September 2013
Date



SUSTAINABILITY
FUTURE GROWTH

Audit Company

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Names and Signatures of Other Auditors

Bill Danaher
20 September 2013

Date(s) of Audit

Inclusive of the period from 13-15 March 2013.

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 Production Facilities and using standard and accepted practices for health, safety and environmental audits.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



SUSTAINABILITY

FUTURE GROWTH

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

11 June 2013
Date

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



PRINCIPLE 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.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 1.1

☐ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:

Orica is in FULL COMPLIANCE with Production Practice 1.1, requiring the operation to design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

The facility has continued to retain quality assurance and quality control records, through sites SAP operating system, that demonstrate the application of sound and accepted engineering practices from the initial facility construction and for plant expansions and modifications that have occurred since. Management of change processes and Orica Hazard Studies for production and storage upgrades include requirements to meet engineering standards that are defined by Orica and the application of prescribed standards is verified and reviewed by independent qualified engineers in accordance with Orica's Quality Control processes. Records and certificates of engineering verification are retained.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date

Multiple systems are in place at the Yarwun production facility to prevent cyanide storage vessels from overfilling that are specified within Orica's Cyanide Safety Basis of Design document. The Basis of Design includes system interlocks and shutdown mechanisms that are used during power outages and equipment failures and these are tested on a regular basis. The Yarwun production facility design basis requires that cyanide process and transfer equipment be constructed of stainless steel to ensure compatibility with the process reagents. The Yarwun production facility has comprehensive drainage system that includes secondary and tertiary containment and spill prevention measures for all cyanide facilities, including pipelines, which is sufficient to prevent release of cyanide to the environment in the event of equipment failures, shutdowns, operational errors or extreme rainfall events. The cyanide production and storage facilities at Yarwun are constructed on suitably constructed and treated concrete surfaces that are designed to minimise the potential for seepage to subsurface and the tertiary stormwater containment pond is an impervious concrete structure.

Production Practice 1.2

Develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 1.2

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 1.2, requiring the operation to develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.



Orica Yarwun Production Facility

Name of Facility

Signature of Lead Auditor

20 September 2013

Date



Each section of the production plant, including the packaging and warehouse areas, has specific operating procedures, including a detailed Stormwater Management Plan which prescribe the operational parameters required to maintain safety and environmental standards and to prevent uncontrolled release of cyanide to the environment. These procedures are set out in a systematic manner, are regularly reviewed and include a suite of documents related to all aspects of the operation. A range of these documents were viewed during the audit and regular internal audits of these procedures and the associated permit to work system are undertaken. A management of change process at the facility is effectively used as evidenced through upgrades to the facility's stormwater management and effluent treatment systems. Preventative maintenance programmes are in place and are managed through the plant maintenance and management system, SAP. The preventative management system includes the systematic calibration of equipment used to monitor the operational parameters of the production facility

A range of abnormal operating instructions exist to guide the facility's response to unplanned or emergency situations, which include extreme rainfall events, pipe blockages and power outage. The site also implements a comprehensive Emergency Response Plan and procedures for the disposal of cyanide and cyanide contaminated materials through retreatment within the production facility or disposal to a suitable licensed waste facility.

The facility includes a well ventilated and secure cyanide storage warehouse which is designed to prevent the build-up of hazardous gasses and to prevent contact with water. Sodium cyanide is packaged for customers throughout Australia and internationally, and is labelled in accordance with the relevant jurisdictional requirements of the destination country and the delivery route.

Production Practice 1.3

Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 1.3

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 1.3, requiring the operation to inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date

Regular inspections, including daily visual checks, are undertaken of cyanide production and storage facilities at the Yarwun production facility. Tanks are currently subject to scheduled maintenance inspections and most major storage tanks have been fully replaced in the last three years. Secondary containment and surfaces within the process and storage areas are subject to daily inspections and have recently been substantially upgraded over the period of certification. The daily production operator inspections include recorded visual checks of the secondary containment and stormwater treatment drains and valves at Yarwun. Cyanide facility maintenance inspections are undertaken at various frequencies which have been determined on the basis of risk assessment. All inspections are documented and where deficiencies have been identified, work permits or corrective actions are raised. Evidence and documents of verification that corrective actions have been completed are maintained.

Orica Yarwun Production Facility

Name of Facility



Signature of Lead Auditor

20 September 2013

Date

PRINCIPLE 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.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 2.1

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 2.1, requiring the operation to develop and implement procedures to protect plant personnel from exposure to cyanide.

The Yarwun production facility has continued to implement operating procedures that address worker safety aspects for all cyanide production operations, product packaging and storage, effluent treatment and disposal, for abnormal and emergency situations, and for the maintenance activities. The Yarwun facility implements a permit to work system for maintenance activities on cyanide production and packaging facilities to ensure appropriate procedures, which include safety procedures, are identified, communicated and followed. These procedures are implemented and workers trained in their use. Operating procedures are subject to periodic review or are reviewed in response to operational changes through the management of change process. Operational personnel provide input to the worker safety aspects of operational procedures through regular toolbox meetings and formal safety committees.

The facility has determined areas where workers may be exposed to cyanide and has ensured that cyanide gas and dust monitors are in place, and regularly calibrated, to alarm workers of potential harmful exposures. Specialised personal protective equipment, use of cyanide personnel monitors, communication equipment and clothing change requirements are mandatory and are rigorously enforced for workers who are operating in identified cyanide exposure risk areas. Worker health and hygiene programs are in place and implemented to ensure that workers are suitably fit to undertake cyanide related tasks. The facility prohibits smoking, eating and open flames in cyanide production and packaging areas which are clearly demarcated and communicated through signs, inductions and procedures.



Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



Workers in the cyanide production and packaging plants are provided with radios and fixed phones are also provided to ensure that workers can communicate with other personnel for assistance. Audible and visual alarms are provided throughout the plant and a Tag-Board system is used to record persons present on the Plant premises at any time.

Production Practice 2.2

Develop and implement plans and procedure for rapid and effective response to cyanide exposure.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 2.2

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 2.2, requiring the operation to develop and implement plans and procedure for rapid and effective response to cyanide exposure.

The facility has continued to implement a detailed Site Emergency Plan which details how the facility responds to cyanide emergency scenarios which have been identified through systematic major hazard assessment processes. First aid equipment is located throughout the facility and the local medical responders/providers have been alerted and trained in the response to cyanide incidents. All first aid equipment is subject to scheduled and documented inspections.

Multiple emergency showers, eye-wash stations, resuscitators and oxygen are provided across all levels of the cyanide plant and are subject to regular scheduled and documented inspections. In addition there are resuscitators and oxygen retained within the Control Room and the site Medical Centre. Plant communication is documented in the Emergency Response Plan and through the site Plant Communication procedures. Material Safety Data Sheets and First Aid procedures are available throughout all areas of potential cyanide exposure. Cyanide tanks and pipes are labelled throughout the plant and the permit to work system at Yarwun is used to ensure all maintenance activities on cyanide facilities are authorised such that hazards are communicated and PPE is used. The facility has decontamination procedures in place for worker clothing and PPE for all personnel who enter the defined cyanide risk areas of the plant; and also emergency decontamination of personnel if suspected of being splashed with cyanide solutions or solids.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



The facility has developed detailed emergency procedures, through the emergency response plan, for workers exposed to cyanide which include application of first aid, blood testing to verify potential exposure and transport of potentially affected workers to nearby medical facilities in Gladstone with appropriate capability and equipment. Orica provides periodic training to local emergency medical facilities for the treatment of cyanide exposure and involves these facilities in emergency mock drills and training exercises. Cyanide antidote is available onsite but will not be administered by site personnel, but is sent with an affected person to the Gladstone hospital as per emergency response plan instructions. The Yarwun facility maintains full time medical staff and suitably trained first aiders for all operational shifts to respond to cyanide exposure incidents.

Mock emergency drills are conducted at least annually to test the emergency plans and procedures included in the Yarwun Site Emergency Plan. These emergency scenarios include fire, cyanide gas release, worker exposure and liquid cyanide spills. The emergency drills are evaluated through debrief reports to identify any changes required to plans, procedures, equipment or training. Orica has reviewed its emergency response procedures following emergency events, including extreme rainfall events, to ensure that its response measures are effective.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date

PRINCIPLE 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.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 3.1

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 3.1, requiring the operation to conduct environmental monitoring to confirm that planned or unplanned releases of cyanide do not result in adverse impacts.

The facility maintains a treatment and collection system that is designed to collect and treat waste effluent and first-flush stormwater run-off from process areas that may be contaminated. Water from the site is captured in a retention system which holds the water until monitoring indicates that concentration of cyanide is within defined licence discharge limits and then discharged to surface water.

There are no statutory ground water limits established for the Yarwun facility and no identified beneficial users of groundwater in the vicinity of the operation. Monitoring data from the facility's monitoring bore network indicates no material adverse cyanide related impacts to groundwater beyond the boundary of the facility.

Orica Yarwun Production Facility

Name of Facility



Signature of Lead Auditor

20 September 2013

Date



The Yarwun production plant also monitors the batch discharge of process effluent to a trade waste facility operated by an external provider to ensure compliance with Queensland Department of Environment and Heritage Protection (DEHP) development permit requirements for discharge of effluent to the trade waste facility not to exceed 1 mg/l Total CN. Orica had exceeded the discharge limit for effluent to the trade waste facility on occasions during the period Feb 2010 to Feb 2012 and reported these incidents to the relevant authorities. Enforcement action was taken against Orica by the DEHP in March 2012. Orica pleaded guilty to four charges relating to breach of a development condition in a development approval. There was no charge or assertion of environmental harm relating to these incidents. Orica made substantial investment to improve the site's segregation, catchment, monitoring, treatment and storage of waste waters. Since implementation the site has been fully compliant with Total Cyanide discharge limits to the waste facility.

Orica has substantially upgraded its cyanide monitoring capability for effluent discharge since mid-2012. Prior to this period, the analytical methods were insufficient to ensure discharge within the development permit conditions of 1mg/L Total CN for the waste discharge facility. Although the discharge represents a breach of development approval conditions established for the Yarwun facility, the breach does not, in itself, represent non-compliance with the requirements of the Cyanide Code as it is not a direct discharge to the environment, but to a third party operated trade waste facility. Investigations undertaken by the DEHP into water quality in Gladstone Harbour in the vicinity of the trade waste facility outfall discharge confirm that there was no measurable environmental impact from the discharge with water quality samples <0.004 mg/L Total Cyanide and sediment samples of 0.005 and 0.019 mg/L Total Cyanide.

A review of the "Free Cyanide" analysis method used by Orica before mid-2012 identified that the method used was akin to "WAD" Cyanide as per ICMC sample & analysis definitions.

Until mid-2012, Orica used "Free CN" to report stormwater discharge results as it did not have the technical capability to analyse Total CN within the required reporting time frame, thereby requiring external NATA testing which delayed final reporting of the accurate levels of "Total CN"

Statutory limits apply to air emissions from the facilities that are based on protection of health and the environment. Daily measurements are undertaken which verify compliance with limits.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



PRINCIPLE 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.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 4.1

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 4.1, requiring the operation to train employees to operate the plant in a manner that minimises the potential for cyanide exposures and releases.

The facility maintains a site training matrix which outlines training requirements for staff across operational areas. The training and induction material provides awareness of cyanide hazards, minimum PPE requirements, cyanide management controls, response to spills and emergencies, and basic first aid requirements. This training is conducted prior to staff starting to work with cyanide. Orica's Cyanide Basis of Safety training has a validity of 3 years before refresher training is required to be completed. Personnel who undertake work on the plant are required to re-sit the General Site Induction every 2 years, for employees, and every year for contractors. Training programs include substantial emphasis on hazard identification in the workplace; safe operating procedures and spill prevention. Trainee operational personnel are mentored by suitable experienced employees and records of competency achievements are maintained. Training effectiveness is systematically evaluated through post training competency evaluations. The training materials in place at the Yarwun facility reflect key competency requirements for each position and identify priority elements in regards to health and safety provisions.

Production Practice 4.2

Train employees to respond to cyanide exposures and releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 4.2

Orica Yarwun Production Facility

Name of Facility

Signature of Lead Auditor

20 September 2013

Date



☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 4.2, requiring the operation to train employees to respond to cyanide exposures and releases.

The Emergency Response plan implemented by Orica includes training requirements related to cyanide exposure and release for all workers who may be exposed to cyanide in the production, storage and packaging areas. The training matrix identifies specific emergency response training for workers in various areas of the facility and the site induction contains emergency response information for visitors to the site. Response to emergency scenarios is tested through mock drills and evaluated following emergency incidents; whereby the effectiveness of emergency response training is reviewed and amended as necessary. Emergency response training is provided by suitably qualified and experienced personnel and training records are retained for evidence.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date



PRINCIPLE 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.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.1

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 5.1, requiring the operation to prepare detailed emergency response plans for potential cyanide releases.

Orica has developed and implemented a detailed Yarwun Site Emergency Plan for the facility which includes the relevant response planning required for potential cyanide releases associated with spills, fire gas release, poisoning and chemical splashes on workers. The emergency cyanide related scenarios have been identified based on a systematic hazard evaluation which is periodically reviewed. The Plan describes specific response actions; resource requirements, communications and first aid requirements for all identified cyanide exposure events and also describe the requirements for post incident investigations. Decontamination and remediation measures are described in the Plan.

Production Practice 5.2

Involve site personnel and stakeholders in the planning process.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.2

☐ not in compliance with

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date

Orica is in FULL COMPLIANCE with Production Practice 5.2, requiring the operation to involve site personnel and stakeholders in the emergency response planning process. The facility communicates its emergency response plans and scenarios with employees and stakeholders on a regular basis. Orica's emergency response consultation with local communities includes invitation of communities to participate in emergency response planning. A small community at Yarwun is within identified risk contours for the facility and is included in the major Hazard facility consultation process. Orica is also part of the Mutual Aid Response group for the Gladstone area. As part of this group, Orica meets with external emergency response providers on a regular basis to discuss emergency response planning as well as conducts specific training at the local hospital related to cyanide response. Orica participates in off-site exercises designed to test the effectiveness of the site emergency plan with relevant stakeholders and external responders.

Production Practice 5.3

Designate appropriate personnel and commit necessary equipment and resources for emergency response.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.3

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 5.3, requiring the operation to designate appropriate personnel and commit necessary equipment and resources for emergency response.

The Plan designates both primary and alternate emergency response controllers and identifies response teams and the capabilities of these teams. The Yarwun facility ensures that the operational workforce present at the facility at any time includes appropriately trained emergency response providers. The responders and emergency controllers are appropriately trained and drilled in accordance with detailed emergency response training plans. Contact details are provided for all Orica emergency response personnel and external emergency responders. External emergency responders are suitably familiar with the requirements of the Yarwun Site Emergency Plan and have participated in mock drills at Yarwun. A full list of the required emergency response and first aid equipment is identified in the Plan and is subject to regular weekly inspection.

Orica Yarwun Production Facility

Name of Facility



Signature of Lead Auditor

20 September 2013

Date



Production Practice 5.4

Develop procedures for internal and external emergency notification and reporting.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.4

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 5.4, requiring the operation to develop procedures for internal and external emergency notification and reporting.

Orica maintains the appropriate procedures for notification of both internal and external stakeholders in an emergency situation. These are provided in the Yarwun Site Emergency Plan and associated Orica corporate standing instructions for emergencies. External community stakeholders who may be affected by an emergency at Orica's Yarwun facility are identified in the Emergency response Plan. These include all industrial and residential stakeholders within 5 km of the facility who are included in the Plan's contact list.

Production Practice 5.5

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

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.5

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 5.5, requiring the operation to incorporate into response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

Orica Yarwun Production Facility
Name of Facility

Signature of Lead Auditor

20 September 2013
Date

The Emergency Plan describes remediation measures, decontamination of media and management or disposal of spill clean-up debris. These are included into various associated documents such as waste management plans and soil management plans which describe decontamination procedures for contaminated materials due to spills of solid or liquid cyanide. The decontamination procedures refer to retreatment of contaminated materials within the Yarwun facility where possible or disposal to a dedicated waste facility if retreatment is not possible. These plans prohibit the use of sodium hypochlorite, ferrous sulphate and hydrogen peroxide for treatment of cyanide that has been released into surface water. They also address the need for follow up monitoring of cyanide events.

Production Practice 5.6

Periodically evaluate response procedures and capabilities and revise them as needed.

☒ in full compliance with

The operation is ☐ in substantial compliance with Production Practice 5.6

☐ not in compliance with

Orica is in FULL COMPLIANCE with Production Practice 5.6, requiring the operation to periodically evaluate response procedures and capabilities and revise them as needed.

Orica undertakes scheduled revision of the Yarwun Site Emergency Plan and in response to any cyanide events. Mock emergency drills are conducted periodically to test the facility's capability and effectiveness in responding to cyanide emergency events and identify any required improvements to the plan including additional training of personnel, use of equipment or coordination with external providers. Orica has reviewed and amended emergency plans and procedures following potential emergency incidents associated with extreme flood events and potential cyanide exposures to workers.



Orica Yarwun Production Facility

Name of Facility

Signature of Lead Auditor

20 September 2013

Date