



March 2017

INTERNATIONAL CYANIDE MANAGEMENT CODE TRANSPORT RECERTIFICATION AUDIT

ICMC Transport Recertification Audit of the Lihir Gold Limited Papua New Guinea Supply Chain – Summary Audit Report

Submitted to:

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REPORT



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APPENDIX A

Important Information



1.0 INTRODUCTION

1.1 Operational Information

Name of Transportation Facility:	Lihir Gold Operation
Name of Facility Owner:	Newcrest Mining Limited
Name of Facility Operator:	Lihir Gold Limited
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1.2 Newcrest Mining Limited

Newcrest is Australia's largest gold producer and one of the world's top ten gold mining companies by production, reserves and market capitalisation. Headquartered in Melbourne, Australia, the Company has around 5100 employees and long-term contractors.

The origins of Newcrest date back to 1966, when Newmont Mining Limited established an Australian subsidiary, Newmont Australia Limited. In 1990, Newmont Australia Limited acquired Australmin Holdings Ltd, and subsequently merged with BHP Gold Limited in late 1990, changing its name to Newcrest Mining Limited. The Company has been listed on the ASX since 1987 – initially as Newmont Australia Limited.


Newcrest owns and operates seven mines. Five of these are located in Australia; Cadia Valley (Hill and Ridgeway), New South Wales; and Telfer in the Pilbara region of Western Australia. Newcrest also has the Lihir and Hidden Valley Gold Operations in Papua New Guinea as well as the Bonikro operation in Côte d'Ivoire.

1.3 Lihir Gold Operation

In 2010, Lihir Gold Operation (LGO) became part of Newcrest when Newcrest acquired Lihir Gold Limited (LGL). LGO is located on Niolam Island, 900 km north of Port Moresby in the New Ireland Province of Papua New Guinea. As Niolam Island is the principal island of the Lihir Group, it is generally referred to as Lihir Island.

Lihir Island is a volcanic sea mount that rises steeply from sea level to approximately 600 metres (m) above sea level. At its widest points, the island measures 22 km from north to south and 14.5 km from east to west. The Luise Caldera, in which all of the known ore deposits are located, is on the east coast of the island.

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1.4 LGL PNG Supply Chain Transportation

1.4.1 Summary

The LGO coordinates the transport of cyanide manufactured by Tongsoh Petrochemical Corporation (Tongsoh) from the Port of Busan in in South Korea to the NCA2 Storage yard at its mine site on Lihir Island in PNG.

The cyanide product is manufactured and packed by Tongsoh in Ulsan. The product is packed firstly into wooden intermediate bulk containers (IBC's) and then into shipping containers for transport to Tongsoh customers in PNG.

The shipping containers are transported by SAM IK Logistics, to the Port of Busan's Korail Interim Storage Facility and stored in a dedicated Dangerous Goods storage facility on the port pending shipment to Put Wharf by Kyowa Limited.

The shipping route is from the Port of Ulsan to the Port of Luise. International freight delivered to Port of Luise is unloaded at Put Wharf and then loaded on trucks that transport the cyanide to LGO's NCA2 Storage Yard. The cyanide is trucked between Put Wharf and NCA2 Storage Yard by Noram Port Services, a subcontractor of LGL.

The LGL PNG Supply Chain covers:

- Port of Busan, South Korea.
- Shipping between the Port of Busan and the Put Put Port in Luise Harbour, PNG by Kyowa Limited.
- Put Put Wharf (owned and operated by LGL).
- Road transportation of cyanide (500 m) between Put Put Wharf and NCA2 Storage Yard at LGO.

The NCA2 Storage yard is part of the process plant and is not included within this Supply Chain.

1.4.2 Marine transportation

1.4.2.1 Port of Busan


The Port of Busan is located at the mouth of the Nakdong River at the south-eastern tip of the Korean peninsula, facing the Sea of Japan. It is approximately 50 km south-west of the Port of Ulsan.

The Port of Busan is Korea's main port and is the largest transshipment port in north-east Asia and the fifth busiest container port in the world. The Port of Busan handles approximately 40% of Korea's overseas cargo and 80% of its container cargo. The Port of Busan currently handles approximately 14 million 20-foot equivalent units (TEUs) of containerised cargo per annum. The Busan Port Authority (BPA) is responsible for developing, managing and operating the Port of Busan.

The Port of Busan is made up of five components:

- South Port
- North Port
- Central Port
- Gamcheon Port
- Busan New Port.

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During periods of transit at the Port of Busan containers of hazardous materials, including solid sodium cyanide, are stored at the Korail Interim Storage Facility in a dedicated dangerous goods area.

1.4.2.2 Put Put Wharf

The Put Put Wharf, located within Luise harbour, is owned and managed by LGL to service LGO. The bonded Port is capable of handling medium ships and landing craft transporters. Containers are unloaded directly from the landing craft onto the trucks. The Port is approximately 500 metres (m) from the process plant storage yard (NCA2 Storage Yard). Storage facilities are available at the Wharf, but it is only used in case of emergencies.

Put Put Wharf is managed by LGO's Purchasing Department using contract labour (Noram Port Services).

1.4.2.3 Kyowa Shipping Lines

Based in Tokyo, Kyowa was founded in 1974 and is engaged in international shipping services with nine multi-purpose ships throughout the Asia-Pacific region. In 1995 Kyowa launched a regular service to Papua New Guinea under the banner of Paradise Service.

Kyowa is an ocean transportation service provider in the South Pacific region, with two of its ships used to transport cyanide to Put Put Wharf at Lihir. All of Kyowa's vessels are managed according to ISM Code (International Safety Management Standards) in order to ensure the safe and sure transport of valuable cargo.

1.4.3 Road transportation


1.4.3.1 Noram Port Services

Noram Ltd (Noram) is a landowner company backed by the traditional owners of the mine site and surrounding areas. Noram provides labour for the operation of the port under LGO supervision, specifically:

- Stevedore/Riggers
- Ships Crane operators
- Road Transport drivers
- Logistics Clerks
- Forklift operators
- Field Mechanics
- Auto electricians
- Administration
- Supervisors
- Mobile Crane operators.

Noram contractors are managed by LGO as direct employees. They are provided training in accordance with company policies and procedures.

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1.5 Auditor’s findings and attestation

The LGL PNG Supply Chain is:

in full compliance with

in substantial compliance with

not in compliance with

**The International
Cyanide Management
Code**

The Operation has been determined to be in substantial compliance as the Operation has partially implemented the requirements for Standards of Practice 1.2, 3.1, 3.2, 3.3 and 3.5. The Operation has not had any significant cyanide incidents during the three-year audit cycle.

Audit Company: Golder Associates

Audit Team Leader: Edward Clerk, CEnvP (112), Exemplar Global (020778)

Email: eclerk@golder.com.au

1.6 Name and signatures of other auditors

Name	Position	Signature	Date
Edward Clerk	Lead Auditor and Technical Specialist		8 March 2017

1.7 Dates of audit

The field component of the LGL Certification Audit was undertaken between 30 August and 1 September 2016.

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 Transportation Operations* and using standard and accepted practices for health, safety and environmental audits.

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2.0 CONSIGNOR SUMMARY

2.1 Principle 1 – Transport

Transport Cyanide in a manner that minimises the potential for accidents and releases.

2.1.1 Transport Practice 1.1

Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 1.1

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

Lihir Gold Operations

LGO has developed procedures to guide the selection of the transport route to minimise the potential for accidents and releases, or the potential impacts of accidents and releases. The Cyanide Transportation procedure provides information on the transport route and route selection process. It addresses the requirements that are relevant based on the selected transport route.

The route selected between the Put Put Wharf and the NCA2 Storage yard is the most direct route. The route for the entire supply chain has not changed since the last Certification Audit.

The road transportation is limited in distance and within the operations site and the transportation is coordinated by LGO for its own requirements. LGO is not transporting cyanide commercially for third party customers along numerous routes.

LGO implements a procedure to evaluate risks of selected cyanide transport routes and take the measures necessary to manage these risks.

LGO conducted a detailed hazard identification and risk assessment process for the route. The hazards were assessed using a bow tie risk assessment process and the outcomes of the assessment were used to guide the selection of the current Supply Chain route and development of the relevant procedures. The Coordinator Bulk Materials has advised that all elements of the supply chain remain unchanged and consequently the formal risk assessment has not been updated.

LGO has implemented a process to periodically re-evaluate routes used for cyanide deliveries and get feedback from transport operators. The Supply Department conducts a morning toolbox where road conditions and other topics/hazards related to cyanide transportation are discussed.

LGO produces ZAP (Zero Accident Potential) sheets when required, which communicate to all employees and contractors information on works that are occurring on roads at LGO.

LGO has documented the measures taken to address transportation risks within its key procedures and due diligence assessments. A risk assessment has been completed that was used to develop the key procedures and plans.

Road transportation of cyanide within the scope of this audit is restricted to 500 m of road within the LGO processing plant operations area. Access to this area is through a manned security gate and it is limited to authorised LGO and subcontractor personnel. Noram contractors are managed by LGO as direct employees. Although the community are LGO stakeholders they are not situated along the cyanide transport route and are not consulted in the selection of routes and development of risk management measures.

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The Supply Chain does not present special security or safety concerns that require the need for convoys, escorts or other additional safety or security measures.

There is no requirement to advise external responders, medical facilities and communities of their role during an emergency response. LGO is not reliant on external responders, external medical facilities and communities during an emergency. In the event of an emergency involving cyanide, the operation would utilise its own emergency response team and on-site Medical Clinic. Although the community are not involved in cyanide emergency response, LGO has developed community notification procedures.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

Put Put Wharf

The Put Put Wharf was designed by LGO for the operation's requirements. The Wharf was not designed for interim storage of cyanide which is reflected in the process for unloading cyanide containers. Cyanide containers are not unloaded during rough conditions. Once unloaded, containers are placed onto the hardstand temporarily before being loaded directly onto trucks for transportation to the NCA2 Storage Yard. Cyanide containers are not left on the hardstand or within the Wharf area for more than 24 hours although it is typically less than 30 minutes.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. The potential for accidents and releases is minimised through the design of the facility, the ship unloading procedures, priority removal of cyanide product and the training of LGO employees and Noram contractors (who are managed by LGO as direct employees).

In addition to the security provided for the LGO processing operations area, access to the Put Put Wharf is further restricted to authorised persons (e.g. Noram and LGO Supply Department personnel). Access is controlled via access cards through a manned security boom gate.

Kyowa Shipping


LGO does not have control of the routes taken by the shipping lines contracted to transport sodium cyanide. In selecting a route, shipping lines must take into account factors such as tides, currents, winds, storms and load compatibilities.

Golder conducted a due diligence review of Kyowa Shipping on 2 December 2016. The review was conducted as a desktop process using information and experience obtained from previous assessments, review of applicable documentation, and interviews with other consigners.

The Review found that Kyowa has systems in place to ensure compliance with all the requirements of the IMDG Code and other relevant parts of the International Convention for the Safety of Life at Sea (SOLAS Convention), particularly placarding, stowage, segregation, packaging, packing of containers and documentation.

The Kyowa route (Kyowa Shipping Service Paradise route) includes the Ports of Busan, Chofu, Kobe, Nagoya, Yokohama, Lihir, Rabaul, Lae, Port Moresby, Townsville, Keelung, Shanghai and then back to Busan. The route was chosen as the most direct, shortest and most economically viable (Kyowa selected the clockwise rotation voyage from Busan to Lihir via Yokohama, which provides the shortest transit time (10 days). All relevant port facilities are well equipped to handle dangerous goods class 6.1 and there is no reconstitution of cargo at any of the Japanese ports.

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Kyowa vessel operators provide the correct manifest documentation to the destination port which provides them with a list of the cargo types and in the case of sodium cyanide and any other hazardous cargo the number and reference of the containers.

The due diligence review was found to sufficiently evaluate the shipping operations, and additional management measures by the consigner were not considered necessary.

Kyowa Shipping and the route between the Port of Busan and Put Put Wharf is reviewed every three years by LGO through the due diligence process.

Port of Busan

Golder conducted a due diligence review of the Port of Busan on 2 December 2016. The review was conducted as a desktop process using information and experience obtained from previous assessments, review of applicable documentation. This review of Port of Busan facilities against the ICMC requirements concluded that its operations were in compliance with the ICMC and additional management measures by the consigner were not considered necessary.

The international sales and exports of sodium cyanide take into consideration the ports available to service the intended target area. The Port of Busan is located in relative close proximity to cyanide manufacturers, is connected to a well-developed intermodal transportation system consisting of railways, highways, waterways and pipelines, and is serviced by shipping companies that have routes through the Asia-Pacific region.

The Due Diligence review also noted that Pier 2 of North Port Busan does not have interim storage facilities for dangerous goods and consequently cyanide is loaded from Pier 2 of North Port Busan directly onto the ship.

2.1.2 Transport Practice 1.2

Ensure that personnel operating cyanide handling and transport equipment can perform their jobs with minimum risk to communities and the environment.

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

Summarise the basis for this Finding/Deficiencies Identified:


The LGL PNG Supply Chain is in SUBSTANTIAL COMPLIANCE with Standard of Practice 1.2 requiring personnel operating cyanide handling and transport equipment can perform their jobs with minimum risk to communities and the environment.

Lihir Gold Operations

LGO does not directly operate equipment for the transportation and handling of cyanide along its PNG Supply Chain as this is undertaken by its contractor Noram. LGO does, however, manage the training of all port personnel involved in the unloading and delivery of cyanide.

All truck drivers within PNG are required by law to have a valid Class 4 (heavy goods) or Class 7 (machinery) licence issued by the government of PNG. Licences are tracked by the Port Services Admin Clerk. In addition to Government issued licences, all equipment operators including truck drivers are also required to be recognised as competent for the class of vehicle being used and the area in which it is operated through the issuing of site licences.

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All personnel operating cyanide handling and transport equipment have been partially trained to perform their jobs in a manner that minimises the potential for cyanide releases and exposures.

LGO has developed a Training Needs Analysis that identifies and tracks job training requirements for specific roles in the Supply Department including Noram. The Training Needs Analysis identifies expected training for stevedore activities and site training requirements.

It was emphasised by the Port Services Coordinator and Port Admin Clerk that personnel do not perform tasks on the port until they have been trained.

The Cyanide Transportation procedure requires drivers to be trained in Dangerous Goods Handling and Cyanide Awareness Training. At the time of the audit. Drivers had been trained in Cyanide Awareness but not all drivers had been trained in Dangerous Goods Handling.

LGL is considered to be Substantially Compliant with this Standard of Practice as the operation had not complied with its minimum training requirements specified in its Cyanide Transportation procedure. In making this determination it was noted that:

- LGL had shown a good faith effort to comply by training all staff in Cyanide Awareness prior to working with cyanide. This training course covers dangerous goods aspects associated with cyanide.
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as all staff are trained in cyanide awareness prior to working with cyanide. This training covers elements of dangerous goods management.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

2.1.3 Transport Practice 1.3

Ensure that transport equipment is suitable for the cyanide shipment.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 1.3

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:


The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 1.3 requiring that transport equipment is suitable for the cyanide shipment.

Lihir Gold Operations

LGO only uses equipment designed and maintained to operate within the cyanide loads it will be handling at the Put Put Wharf and along the road transport route to the NCA2 Storage Yard.

All equipment used by LGO to offload the ships, load and unload trucks and transport the cyanide have design ratings appropriate to handle a fully loaded cyanide container. Movement (loading) of cyanide containers is restricted to top lifters rather than forklifts with tynes to prevent spearing containers.

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Inspections are completed by operators and equipment maintenance is managed through SAP. Preventative maintenance is conducted on all mobile equipment used in the unloading and transport of cyanide at LGO. Maintenance is conducted on site in accordance with equipment requirements.

The adequacy of equipment is verified through the daily prestart checks and scheduled service preventative programmes. These include the structural integrity of the equipment to identify signs of stress or overloading.

LGO does have a procedure to prevent overloading of the transport vehicle being used for handling cyanide at the Put Put Wharf and along the road transport route. The Loading and Unloading Cyanide procedure requires all equipment used in the loading and unloading of cyanide be operated within their design limits.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

2.1.4 Transport Practice 1.4

Develop and implement a safety program for transport of cyanide.

The operation is in full compliance with **Transport Practice 1.4**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 1.4 requiring an implemented safety program for transport of cyanide.

Lihir Gold Operations


LGO has procedures to ensure that the cyanide is transported in a manner that maintains the integrity of the producer's packaging.

The Loading and Unloading Cyanide procedure requires sea containers to be checked for damage prior to unloading. If a container is suspected of damage, the Port Services Coordinator is contacted and the damage is assessed. Twist locks are used to secure the containers to the trucks for the short journey to the NCA2 Storage Yard. Cyanide containers are unloaded using the ship's cranes. In high swell conditions resulting in excessive ship movement, unloading is prevented.

Consignments of cyanide transported by LGO are manufactured by Tongsu. As an ICMC certified cyanide producer, Tongsu has systems in place to ensure their containers are labelled in accordance with the IMDG Code and as required by local regulations or international standards. Currently there are no regulations or regulatory authority within PNG for the transport of dangerous and hazardous goods and no placarding of trucks or containers is required.

The Loading and Unloading Cyanide procedure states that the Port Supervisor has the responsibility of ensuring the correct Hazchem signage is attached to the front of each truck prior to delivery to the NCA2 Storage Yard.

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LGO takes custody of the Tongsoh containers once they clear customs at the Port of Busan. The containers are not opened nor have their signage augmented until they arrive at the final destination.

LGO implements a safety programme for cyanide transport that includes the following:

- a) Vehicle inspections prior to each departure/shipment through the implementation of pre-start checks.
- b) Implementation of a preventative maintenance program on all mobile equipment.
- c) Limitations on operator or drivers' hours through restricting load transport during daylight hours. The short trip (500 m) also restricts driver hours.
- d) Procedures to prevent loads from shifting. The containers are not unloaded at the Put Put Wharf during rough conditions and they are secured using twist locks when being transported by road to the NCA2 Storage Yard.
- e) Procedures by which transportation can be modified or suspended if conditions such as severe weather or civil unrest are encountered. The Loading and Unloading Cyanide procedure states that in very poor conditions all operations are to cease until the conditions improve.
- f) Implementation of LGO's *Drug and Alcohol Policy*.
- g) Retention of records documenting that the all the above has been completed.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

2.1.5 Transport Practice 1.5

Follow international standards for transportation of cyanide by sea and air.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 1.5

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 1.5 requiring the operation follow international standards for transportation of cyanide by sea and air.


Lihir Gold Operations

LGO does transport consignments of cyanide by sea within the scope of this audit. This occurs from the Port of Busan in South Korea to the Port of Luise, by Kyowa Shipping.

All containers transported by LGL are placarded at the Tongsoh Petrochemical Corporation in South Korea in accordance with the requirements of the IMDG Code, with UN numbers, the Class 6 dangerous goods class label and the severe marine pollutant label.

The operation does not transport consignments of cyanide by air within the scope of this audit.

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Put Put Wharf

The Put Put Wharf is owned by LGL and managed using LGO processes and procedures. The CTV Protocol was used by the Auditors to assess activities at the Put Put Wharf rather than a specific due diligence and comments on cyanide manage systems implemented at the Wharf are detailed under each specific question, where relevant.

Kyowa Shipping

A Due Diligence Review of Kyowa Shipping was conducted for LGO by Golder in December 2016. This Due Diligence Review indicated that Kyowa Shipping transported cyanide in compliance with the IMDG Code. The Due Diligence Review noted that containers of cyanide are received at the Port of Busan are already sealed for transport. Consequently, the Due Diligence Review was limited to the ICMI Transport Practices that specifically referenced provisions of the IMDG Code, namely 1.5.1 d-i:

- Containers intended for sea transport are packed by Tongsuh who is required to certify that they have packed, placarded and marked the containers in accordance with the IMDG Code.
- Kyowa receives, through electronic data interchange, copies of the documents prepared with the information required under Chapter 5.4 of the IMDG Code for the consignor by KMII and makes up a consignment list of all dangerous goods in a shipload.
- The due diligence review noted that the container packing certificate is specifically prepared in accordance with 5.4.2 of the IMDG Code and it meets all the requirements.
- On arrival at the Port of Busan vessel operator's provide the Master with copies of the Dangerous Goods manifest (including stowage plan) and Packing Certificates for each of the hazardous cargo units loaded at the Port.
- The Due Diligence Review noted that Kyowa Shipping has emergency response information as required under Section 5.4.3.2 of the IMDG Code and SOLAS. All Kyowa Shipping employees are trained in the company's emergency response plan to ensure compliance with Section 5.4.3.2 of the IMDG Code.


Upon arrival and before departing port Kyowa vessel operators provide to the port authority copies of the relevant emergency response Information together with the dangerous goods manifest (including stowage plan) and Packing Certificates for each hazardous cargo unit to be loaded or unloaded at the port.

- The Due Diligence Review noted that Kyowa comply with the stowage and separation requirements of Part 7 of the IMDG Code.

Port of Busan

A Due Diligence Review of the Port of Busan was conducted for LGO by Golder in December 2016. The review assessed the Port of Busan facilities against the ICMC requirements and concluded that its operations were in compliance with the ICMC and additional management measures by the consigner were not considered necessary.

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2.1.6 Transport Practice 1.6

Track cyanide shipments to prevent losses during transport.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 1.6

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 1.6 requiring Tracking of cyanide shipments to prevent losses during transport.

Lihir Gold Operations

LGO has several means to communicate with the transport company, the mining operation, the cyanide producer and emergency responders.

The LGO Supply Department maintains regular contact with the cyanide supplier and shipping agent to ascertain the progress of the ship and its estimated arrival date. Shipping agents are located within the Supply Department and communications are verbal and via email.

The Port Operations are advised of the arrival date for planning purposes and the Wharf Clerk reconciles the offloaded contains against those detailed on the Magic List.

Once landed, trucks transport the cyanide to the NCA2 Storage Yard. Radios are used for communications within the operations.

LGO communication equipment is tested through continuous use to ensure it functions properly rather than a procedural requirement to check the equipment on an established frequency.

Drivers are trained to use all communication devices as part of their on the job induction training. There are no blackout areas along the 500 m route.


LGO does implement processes to track the progress of cyanide shipments. A Magic List is maintained by the LGO Supply Department that details information on each cyanide voyage. The LGO Supply Department maintains regular contact with the cyanide supplier and shipping agent to ascertain the progress of the ship and its estimated arrival date. Shipping agents are located within the Supply Department and communications are verbal and via email.

The Port Operations are advised of the arrival date for planning purposes and the Wharf Clerk reconciles the offloaded contains against those detailed on the Magic List. Cyanide is not tracked between the Put Put Wharf and NCA2 Storage Yard due to the distance involved.

LGO does implement inventory controls and custody documentation to prevent the loss of cyanide during shipment. A Magic List is maintained by the LGO Supply Department that details information on each cyanide voyage and container. The Wharf Clerk reconciles the offloaded contains against those detailed on the Magic List.

Shipping records indicating the amount of cyanide in transit and Safety Data Sheets (SDS) are available at Put Put Wharf.

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Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

Put Put Wharf

The Put Put Wharf is owned by LGL and managed using LGO processes and procedures described above.

Kyowa Shipping

A Due Diligence Review of Kyowa Shipping was conducted for LGO by Golder in December 2016. This Due Diligence Review indicated that chain of custody documentation is used by Kyowa to prevent the loss of cargo during shipment. This documentation includes the vessel manifest and Material Safety Data Sheets (MSDS), which identifies the location and content of each container on the vessel.

Furthermore, to comply with the International Maritime Solid Bulk Cargoes Code (IMSBC Code), Kyowa vessel operators are required to declare dangerous cargo to relevant port authorities by submitting a *Transport Document for Goods by Sea (Package)* form to the relevant port authority before arriving at or leaving a port. The relevant port stevedoring company then receives the Kyowa vessel's manifest which includes the containers for unloading and handling by them.


Port of Busan

The Busan Port Authority (BPA) coordinates the operation of the Port of Busan, and must be informed of all ship movements and major operations. The production schedule (ship movement plan) is maintained by the BPA in consultation with the wharf operators. The BPA coordinates ship movements, tracks pilotage operations, and supervises terminal operations via real-time CCTV monitoring. The BPA is responsible for enforcing regulations on behalf of the MOF at the Port of Busan including inspecting containers holding dangerous goods.

Vessels arriving at or departing from the Port of Busan are required to declare dangerous cargo to the BPA by submitting a *Transport Document for Goods by Sea (Package)* form. This documentation is accompanied by the vessel's manifest and Safety Data Sheets (SDS), which identifies the location and content of each container on the vessel, including containers with cyanide and other dangerous goods. The relevant port stevedoring company receives the vessels manifest which includes the containers for unloading and handling by them. This information is then captured in the stevedore's management systems which assists with the location where each container from the vessel is to be placed after unloading. Transport from the unloading berth to the interim storage facility is controlled by documentary checks detailing the container details and the containers contents.

All sodium cyanide transited through the Port of Busan remains contained within its sealed containers at all times.

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2.2 Principle 2 – Interim Storage

Design, construct and operate cyanide trans-shipping depots and interim storage sites to prevent release and exposures.

2.2.1 Transport Practice 2.1

Store cyanide in a manner that minimises the potential for accidental releases.

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

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 2.1 requiring cyanide to be stored in a manner that minimises the potential for accidental releases.

Put Put Wharf

Signs are present on the entry gate to the Wharf advising that cyanide and other dangerous goods are present in the area, that smoking, open flames, eating and drinking are not allowed, and the required personal protective equipment.

There are security measures in place to prevent unauthorised access. The Wharf is a secure gated facility that is manned by a 24 hour security presence and monitored through closed circuit television. Persons may only access the area if they have been authorised to do so through the issuing of an access card. This card is checked upon entry. The containers are also locked and sealed with placards indicating UN Numbers and Dangerous Goods Class labels.

The Put Put Wharf is used to transfer cyanide containers from ships onto trucks for transportation to the NCA2 Storage Yard. The Wharf is not used for the interim storage of cyanide therefore there is no requirement to separate incompatible materials. There is no potential to mix with water and there is no requirement for ventilation.

LGO has established an emergency response system for its operation, including the Wharf. The operation has developed a CERP that forms part of the emergency response system. The CERP regulates the response to cyanide related emergencies at LGO. The document is subordinate to the Lihir Emergency Management Plan, which is the primary document for the management of emergencies at LGO.


Port of Busan

A Due Diligence Review of the Port of Busan was conducted for LGO by Golder in December 2016. This Due Diligence Review indicated that the Port of Busan has dedicated dangerous goods areas for hazardous goods awaiting loading to arriving vessels. The Port is not used for the interim storage of cyanide as it is a transshipping depot used to transfer cyanide containers from trucks to ships.

The area in which the containers are stored whilst transiting the port is suitable to effectively contain any spillage of solid sodium cyanide that may occur. This facility is well demarcated, certified to handle and store all categories of dangerous goods, including Class 6.1, and contains fire-fighting equipment.

Pier 2 at the Port of Busan is for the loading of all dangerous goods at the port. Containers from the Korail Interim Storage Facility are transported by truck to Pier 2 of North Port where it is loaded directly onto ships.

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The Due Diligence Review assessed the Port of Busan facilities, including the Korail Interim Storage Facility, against the ICMC requirements and concluded that its operations were in compliance with the ICMC and additional management measures by the consigner were not considered necessary.

2.3 Principle 3 – Emergency Response

Protect communities and the environment through the development of emergency response strategies and capabilities.

2.3.1 Transport Practice 3.1

Prepare detailed Emergency Response Plans for potential cyanide releases.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 3.1

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in SUBSTANTIAL COMPLIANCE with Standard of Practice 3.1 requiring a detailed emergency response plan for potential cyanide releases.

Lihir Gold Operations

LGO has partly established emergency response system. The operation has developed a CERP that forms part of the emergency response system. The CERP regulates the response to cyanide related emergencies at LGO. The document is subordinate to the Lihir Emergency Management Plan, which is the primary document for the management of emergencies at LGO. Supporting the CERP, LGO has two procedures:

- Hazardous materials Incidents.
- Cyanide Emergency.


The document map contained in the CERP does not appear to reflect current emergency management documents on site.

LGL is considered to be Substantially Compliant with this Standard of Practice as the CERP document is one of several emergency management documents, but the relationship or hierarchy between the documents is unclear. The emergency response procedures for cyanide emergencies also vary between specific pre-incident plans as noted in the CERP and Cyanide Procedures and generic responses as guided by SAA/SNZ HB 76: 2010, Australian/New Zealand Handbook Dangerous Goods Initial Emergency Response Guide, Safety Data Sheets and ChemaAlert systems.

In making this determination it was noted that:

- LGL had shown a good faith effort to comply by developing emergency management documentation
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as the different emergency response approaches achieve the same outcome and emergency responders are only instructed and trained in the standardised approach rather than the specific pre-incident plans outlined in the CERP.

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The plan is appropriate for the selected transport route and interim facility. The CERP details response procedures for emergencies involving cyanide at the mine (including NCA2 Storage Area), along the road transport route and at the Port. On-site transport emergencies between the Wharf (including inside the Wharf) and the NCA2 Storage Yard are specifically addressed. The Supply Chain risk assessment process was used in the development of CERP.

The CERP considers the physical and chemical form of cyanide (solid cyanide). It details the hazards and controls of both solid and liquid cyanide. The emergency response actions detailed in the CERP and Cyanide Emergency Procedure are relevant to solid cyanide and its packaging in IBCs within freight containers.

The plan considers the method of transport. The CERP is relevant to emergencies involving cyanide at the mine (including NCA2 Storage Area), along the road transport route and at the Port.

The CERP does consider all aspects of transport infrastructure. The CERP is relevant to emergencies involving cyanide at the mine (including NCA2 Storage Area), along the road transport route and at the Port.

LGO does consider the design of the transport vehicle and method of packaging of the product. The CERP is designed around the handling of sea containers, transportation using trucks and storage.

The CERP describes response actions, as appropriate for the following anticipated emergency situations:

- General response procedure (e.g. PPE and Testing for HCN, CN poisoning, uncontained and contained spills)
- Release scenarios (e.g. catastrophic HCN release, fires, uncontrolled seepage).

The Cyanide Emergency Procedure addresses a number of items including scenarios related to the facilities and related neutralisation and decontamination processes.

LGL is considered to be Substantially Compliant with this Standard of Practice as the emergency response approaches on the site vary between specific pre-incident plans as noted in the CERP and Cyanide Procedures and generic responses as guided by SAA/SNZ HB 76: 2010 Australian/New Zealand Handbook Dangerous Goods Initial Emergency Response Guide, Safety Data Sheets and Chemalert systems.

In making this determination it was noted that:


- LGL had shown a good faith effort to comply by developing emergency management documentation
- The deficiency is readily correctable within one year

The deficiency does not represent an immediate risk to personnel or the environment as the different emergency response approaches achieve the same outcome and emergency responders are only instructed and trained in the standardised approach rather than the specific pre-incident plans outlined in the CERP.

The CERP details response procedures for emergencies involving cyanide at the mine (including NCA2 Storage Area), along the road transport route and at the Wharf. As noted in 1.1.7, the route is within LGO area, and does not pass through any communities. Due to the lack of facilities and equipment on the island external to LGO, LGO has not designated any role for outside responders or communities in the event of an emergency during transport.

Although the community are not involved in cyanide emergency response, LGO has developed community notification procedures.

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Put Put Wharf

Put Put Wharf is managed by LGO’s Purchasing Department using contract labour (Noram Port Services). Noram contractors are managed by LGO as direct employees. LGO’s emergency response procedures are applicable to this facility.

Kyowa Shipping

A Due Diligence Review of Kyowa Shipping was conducted for LGO by Golder in December 2016. This review did not specifically assess Kyowa’s emergency response plan however it determined that Kyowa has emergency response capabilities in accordance with IMO DG Code and SOLAS Convention requirements.

Kyowa Shipping has emergency response procedures for all its shipping lines. Toritec Co., Ltd operates Kyowa ships, and provide procedures that include Emergency Response Regulation, Emergency Contact List and Dangerous Goods Shipping Procedures which also describes actions to be taken in case of emergencies. All Kyowa Shipping employees are trained in the company’s emergency response plan.

The due diligence review evaluated Kyowa’s shipping operations against the ICMC requirements and concluded that its operations were in compliance with the ICMC.

Port of Busan

A Due Diligence Review of the Port of Busan was conducted for LGO by Golder in December 2016. Due to access restrictions, the due diligence was conducted as a desktop process using information and experience obtained from previous due diligence assessments and review of applicable documentation. The Due Diligence Review assessed the Port of Busan facilities against the ICMC requirements and concluded that its operations were in compliance with the ICMC and additional management measures by the consigner were not considered necessary

2.3.2 Transport Practice 3.2

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

in full compliance with

The operation is

in substantial compliance with

Transport Practice 3.2

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in SUBSTANTIAL COMPLIANCE with Standard of Practice 3.2 requiring LGO designate appropriate response personnel and committed resources for emergency response.


Lihir Gold Operations

LGO partially provides emergency response training for appropriate personnel

LGO has developed a Training Needs Analysis that identifies and tracks job training requirements for specific roles in the Supply Department including Noram. The Training Needs Analysis identifies expected training for stevedore activities and site training requirements

The CERP details the training requirements for the following dedicated emergency response personnel.

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The Emergency Response Team has developed a Training Matrix, but it does not reflect the training specifications outlined in the CERP. Rather the Training Matrix is based around the RII30709 – Certificate III in Mine Emergency Response and Rescue. This course promotes generic responses as guided by SAA/SNZ HB 76: 2010 Australian/New Zealand Handbook Dangerous Goods Initial Emergency Response Guide.

LGL is considered to be Substantially Compliant with this Standard of Practice as the training requirements specified within the CERP are not reflected in the ERT Training Matrix.

In making this determination it was noted that:

- LGL had shown a good faith effort to comply by developing emergency management documentation and is training its emergency response personnel to respond to dangerous goods through a structured training process.
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as the different emergency response approaches achieve the same outcome and emergency responders are only instructed and trained in the standardised approach rather than the specific pre-incident plans outlined in the CERP.

The CERP:

- Identifies the key roles and responsibilities in the event of an emergency during transport.
- Provides a figure showing the crisis and emergency organisation within Newcrest.
- Outlines the responsibilities for the Emergency Management Team (EMT) members and Incident Management Team (IMT).
- Describes actions to be undertaken per type of incident.

Cyanide mock drills and desktop scenarios are the responsibility of the ERT Coordinator and will be nominated within this framework as a minimum of once per calendar year.

Responsibilities and duties are also detailed within the Cyanide Emergency Response procedures.


The CERP lists the equipment that is available for cyanide emergency response. The Auditor inspected a selection of equipment and found it to be present and serviceable.

LGO partially has the necessary emergency response and health and safety equipment available during transport. Truck drivers are not first responders in emergencies, therefore are not required to carry specialist PPE.

The list of equipment has not been reviewed against the changed emergency response procedures (generic responses as guided by SAA/SNZ HB 76: 2010 Australian/New Zealand Handbook Dangerous Goods Initial Emergency Response Guide) to see if they are still appropriate.

LGL is considered to be Substantially Compliant with this Standard of Practice as the emergency response equipment requirements have not been reviewed against the changed emergency response procedures (generic responses as guided by SAA/SNZ HB 76: 2010 Australian/New Zealand Handbook Dangerous Goods Initial Emergency Response Guide) to see if they are still appropriate.

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In making this determination it was noted that:

- LGL had shown a good faith effort to comply by purchasing and maintaining emergency response equipment specified within the CERP.
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as the equipment specified within the CERP is based on detailed scenario planning and is likely to be adequate for a change in response procedures from pre-incident plans to generic responses.

Transport vehicle and equipment operators partially receive initial and periodic refresher training in emergency response procedures including implementation of the CERP.

LGO has developed a Training Needs Analysis that identifies and tracks job training requirements for specific roles in the Supply Department including Noram. The Training Needs Analysis identifies expected training for stevedore activities and site training requirements.

Cyanide Awareness has a refresher requirement of 18 months, but a review of training records indicate that refresher training was not actively being managed with the refresher extending will beyond 18 months.

LGL is considered to be Substantially Compliant with this Standard of Practice as the operation had not complied with its risk based training refresher frequency for Cyanide Awareness.

In making this determination it was noted that LGL had shown a good faith effort to comply by:

- Training all staff in Cyanide Awareness prior to working with cyanide.
- Retraining all staff who had not received their refresher training within the specified period.
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as all staff are trained in cyanide awareness prior to working with cyanide.

LGO partially has procedures to inspect emergency response equipment and assure its availability when required.


The CERP lists the equipment that is available for cyanide emergency response. The operation has developed checklists and inspects equipment against these lists.

LGL is considered to be Substantially Compliant with this Standard of Practice as review of the equipment check sheets noted LGL is not identifying and actioning deficiencies such as equipment in unsuitable condition or equipment not in sufficient quantities as defined by the CERP. The checks noting deficiencies (missing equipment or substandard equipment) are being signed off by supervisors as acceptable (i.e. no comments to indicate what action was taken to address the deficiency). Interviews confirmed that the deficiency occurred through a misunderstanding of the requirements of the checking process.

In making this determination it was noted that:

- LGL had shown a good faith effort to comply by:
 - Conducting checks on emergency response equipment.
 - Addressing identified deficiencies.
- The deficiency is readily correctable within one year.

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The deficiency does not represent an immediate risk to personnel or the environment as the checks are being conducted and identified deficiencies are being addressed but not actually documented.

Put Put Wharf is managed by LGO's Purchasing Department using Noram contract labour to operate the facility. All equipment used in the handling and transportation of cyanide at LGO is owned and maintained by LGO and operated by Noram under the direction of LGO's Supply Department.

LGO satisfies itself that Noram meets the requirements of the ICMC by managing Noram contractors as direct employees.

2.3.3 Transport Practice 3.3

Develop procedures for internal and external emergency notification and reporting.

in full compliance with

The operation is

in substantial compliance with

Transport Practice 3.3

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in SUBSTANTIAL COMPLIANCE with Standard of Practice 3.3 requiring procedures for internal and external emergency notification and reporting.

Lihir Gold Operations

LGO's emergency documentation includes procedures and contact information for notifying management, regulatory agencies, and medical facilities of the cyanide emergency during transport.

In the event of an emergency, personnel are instructed to raise the alarm via the emergency radio channel or the emergency phone number. These contact points are manned 24 hours a day by ERT members, who assess what facets of emergency response are required.

Key internal and external contact information is contained within the CERP and key internal contacts are kept by Zero Alpha Emergency Control.

Systems are partially in place to ensure that internal and external emergency notification and reporting procedures relevant to transport are kept current.

The CERP details the emergency contact list and states that documentation (including the contact list) is to be reviewed every 12 months and/or where there is a trigger event or incident that requires that to occur."


Key internal information is managed and updated on a fortnightly basis by Zero Alpha Emergency Control.

LGL is considered to be Substantially Compliant with this Standard of Practice as the operation had not updated the contacts within the CERP during the audit period. In making this determination it was noted that:

- LGL had shown a good faith effort to comply by:
 - Maintaining an alternate emergency contact list with Zero Alpha Emergency Control.
- The deficiency is readily correctable within one year

The deficiency does not represent an immediate risk to personnel or the environment as all emergency notifications are initially issued through Zero Alpha Emergency Control, which has an up-to-date list.

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2.3.4 Transport Practice 3.4

Develop procedures for remediation of releases that recognise the additional hazards of cyanide treatment.

The operation is in full compliance with **Transport Practice 3.4**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in FULL COMPLIANCE with Standard of Practice 3.4 requiring procedures for remediation of releases that recognise the additional hazards of cyanide treatment.

Lihir Gold Operations

The CERP contains procedures during transport for remediation, such as recovery or neutralisation of solutions or solids, decontamination of soils or other contaminated media and management and/or disposal of spill clean-up debris.

Such information is included related to decontamination, Solid sodium cyanide spill to water, Uncontained spills, Sodium Cyanide Salts Spill – Dry Conditions, Sodium Cyanide Pellet spill – Wet conditions, Contained spills, On-site transport emergency and Barricading cyanide affected area.

The CERP contains procedures during cyanide handling at the Wharf for remediation, such as recovery or neutralisation of solutions or solids, decontamination of soils or other contaminated media and management and/or disposal of spill clean-up debris.

The Cyanide Emergency Procedures also contains relevant information on remediation, recovery and neutralisation of solutions and solids, decontamination of soils and management and disposal of spill clean-up debris.

The CERP states

“Do not attempt to treat NaCN spills to any natural water sources”.

The CERP allows the use of sodium hypochlorite to neutralise spills to soil.

The Cyanide Emergency Procedures also prohibits the treatment of cyanide spills.

2.3.5 Transport Practice 3.5


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

The operation is in full compliance with **Transport Practice 3.5**
 in substantial compliance with
 not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The LGL PNG Supply Chain is in SUBSTANTIAL COMPLIANCE with Standard of Practice 3.5 requiring periodically evaluating response procedures and capabilities and revising them as needed.

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Lihir Gold Operations

LGO has partially established a process to periodically review and evaluate the CERP's adequacy as noted in the CERP.

The CERP includes a requirement to conduct mock drills and desktop scenarios for cyanide at a minimum of once a year.

The CERP (Responsibilities) notes that the Emergency Response Team Coordinator is responsible for scheduling of mock drills and desktop scenarios annually.

A mock drill involving HCN exposure was conducted on 27 August 2016. Non cyanide mock drills were conducted throughout the audit period. Whilst not specific to transport emergencies and cyanide, the skills practiced are relevant to both mine site and transport emergency response.


LGO has established a procedure to evaluate the CERP's performance after its implementation and revise it as needed. The document states that the CERP is to be reviewed every 12 months or after a trigger event.

To date there have been no transportation incidents requiring the activation of the CERP and its revision.

LGL is considered to be Substantially Compliant with this Standard of Practice as the CERP had not been reviewed in over three years. In making this determination it was noted that:

- LGL had shown a good faith effort to comply by developing and maintaining alternate emergency response procedures.
- The deficiency is readily correctable within one year
- The deficiency does not represent an immediate risk to personnel or the environment as the different emergency response approaches achieve the same outcome and emergency responders are only instructed and trained in the standardised approach rather than the specific pre-incident plans outlined in the CERP.

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3.0 DUE DILIGENCE

3.1 Shipping

3.1.1 Shipping – Kyowa Shipping

Golder conducted a due diligence review of Kyowa Shipping Co., Ltd. (Kyowa) on 2 December 2016 on behalf of Lihir Gold Ltd (Lihir).

The following items were specifically addressed within the assessment:

- Transport Practice 1.1
- Transport Practice 1.5
- Transport Practice 1.6
- Transport Practice 3.1.

The ICMI's *Auditor Guidance for Use of Cyanide Transportation Verification Protocol* was used to conduct the due diligence assessment. Due to access restrictions, the due diligence was conducted as a desktop process using information and experience obtained from previous assessments, review of applicable documentation, and interviews with other consigners.

3.1.1.1 Transport Practice 1.1


Lihir only operates in export markets that are serviced by major international shipping companies with the ability to offer scheduled container services from the Port of Busan to the selected destination port. Kyowa operate two ships to transport sodium cyanide to the Lihir Gold Operation; Kyowa Orchid and Kyowa Rose both whose safety systems comply with the SOLAS Convention and International Code for the Security of Ships and of Port Facilities (IPS Code).

Kyowa under its operations company Toritec Company Ltd (Company ID: IMO 1881905) (Toritec) is in compliance with all the requirements of the IMDG Code, the International Safety Management (ISM) Code and other relevant parts of the International Convention for the Safety of Life at Sea (SOLAS Convention), particularly placarding, stowage, segregation, packaging, packing of containers and documentation. Kyowa is audited by IMO approved auditors.

The Kyowa route (Kyowa Shipping Service Paradise route) includes the Ports of Busan, Chofu, Kobe, Nagoya, Yokohama, Lihir, Rabaul, Lae, Port Moresby, Townsville, Keelung, Shanghai and then back to Busan. The route was chosen as the most direct, shortest and most economically viable (Kyowa selected the clockwise rotation voyage from Busan to Lihir via Yokohama which provides the shortest transit time (10 days). The alternative route of going from Yokohama to Busan and Lihir provides the longest transit time (12 days). All relevant port facilities are well equipped to handle dangerous goods class 6.1 and there is no reconstitution of cargo at any of the Japanese ports.

Kyowa vessel operators provide the correct manifest documentation to the destination port which provides them with a list of the cargo types and in the case of sodium cyanide and any other hazardous cargo the number and reference of the containers.

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3.1.1.2 Transport Practice 1.5

Kyowa operates nine multi-purpose ships across the Asia-Pacific region; however, Kyowa Rose and Kyowa Orchid are the only two ships used to transport cyanide to the Lihir Gold Operation. Both Kyowa Orchid and Kyowa Rose's safety systems comply with the International Convention for Safety of Life at Sea 1974 (SOLAS) convention and International Code for the Security of Ships and of Port Facilities (IPS Code).

Containers intended for sea transport that are packed by the manufacturer must certify that they have been packed, placarded and marked in accordance with the IMDG Code. The certification document is prepared by Korea Maritime Dangerous Goods Inspection and Research Institute (KMII) using information provided by the manufacturer and is done so in accordance with the requirements of the IMDG Code. The certification document includes the declaration that the contents of the consignment are fully and accurately described by the Proper Shipping Name, and are classified, packaged, marked and labelled and are in all respects in proper condition for transport according to all applicable international and national government regulations.

Kyowa's operations company Toritec has systems in place to ensure that cyanide is transported only in containers that are placarded and marked as required by Chapter 5.3 of the IMO DG.

Golder's review of Kyowa's operations concluded that Kyowa meets the requirements of the ICMC and the IMO DG Code.

3.1.1.3 Transport Practice 1.6

Chain of custody documentation is used by Kyowa to prevent the loss of cargo during shipment. This documentation includes the vessel manifest and Safety Data Sheets (SDS), which identifies the location and content of each container on the vessel.

Furthermore, to comply with the International Maritime Solid Bulk Cargoes Code (IMSBC Code), Kyowa vessel operators are required to declare dangerous cargo to relevant port authorities by submitting a *Transport Document for Goods by Sea (Package)* form to the relevant port authority before arriving at or leaving a port. The relevant port stevedoring company then receives the Kyowa vessel's manifest which includes the containers for unloading and handling by them.

3.1.1.4 Transport Practice 3.1

Kyowa has emergency response information as required by the IMDG Code and SOLAS. All Kyowa Shipping employees are trained in the company's emergency response plan.


Golder's due diligence review did not include an assessment of Kyowa's emergency response plan but it determined that Kyowa has emergency response capabilities in accordance with IMO DG Code requirements.

3.1.1.5 Conclusion

Golder's due diligence review found no issues of concern in regards to Kyowa's management and transportation of solid sodium cyanide product. The due diligence assessment was found to sufficiently evaluate Kyowa's shipping operations and the review concluded that Kyowa operates in compliance with requirements of the ICMC and the IMO DG Code.

The assessment is not a final acceptance of Kyowa for future work and as with all service providers to Lihir, Lihir will continue to review and monitor their performance.

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3.2 Ports

3.2.1 Port of Busan

Golder conducted a due diligence assessment of the Port of Busan, Korea on 2 December 2016 on behalf of Lihir Gold Ltd (Lihir). The assessment was conducted by Ed Clerk who meets the International Cyanide Management Institute's (ICMI) requirements for a Transport Technical Specialist.

The following items were specifically addressed within the assessment:

- Transport Practice 1.1
- Transport Practice 1.5
- Transport Practice 1.6
- Transport Practice 2.1
- Transport Practice 3.1.

The ICMI's *Auditor Guidance for Use of Cyanide Transportation Verification Protocol* was used to conduct the due diligence assessment. Due to access restrictions, the due diligence was conducted as a desktop process using information and experience obtained from previous assessments, review of applicable documentation, and interviews with other consigners.

3.2.1.1 Transport Practice 1.1

Orica takes into consideration the ports available to service the intended target area. Orica only operates in export markets that are serviced by major international shipping companies with the ability to offer scheduled container services from the Port of Busan to the selected destination port. These shipping companies also provide the correct manifest documentation to the destination port which provides them with a list of the cargo types and in the case of sodium cyanide and any other hazardous cargo the number and reference of the containers.

3.2.1.2 Transport Practice 1.5


It was not possible during the due diligence review to physically inspect the Port of Busan. The due diligence was completed based on information and experience obtained from previous assessments, review of applicable documentation and the Port of Busan's website. Pier 2 at the Port of Busan is for the loading of all dangerous goods at the port.

Golder's assessment of the Port of Busan concluded that the port meets the requirements of the ICMC and the IMO DG Code. The international standards for the shipment of cyanide by sea, as described in 1.5, are followed by the port.

3.2.1.3 Transport Practice 1.6

Port stevedores receive the vessels manifest on arrival which includes the containers for unloading and handling by them. This information is then captured in the stevedore's management systems which assists with the location where each container from the vessel is to be placed after unloading. Transport from the unloading berth to the interim storage facility is controlled by documentary checks detailing the container details and the containers contents.

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3.2.1.4 Transport Practice 2.1

The cyanide product is packed initially into wooden intermediate bulk containers and then into sealed shipping containers by the manufacturer for transport to the Port of Busan's Korail Interim Storage Facility where it is stored in a dedicated Dangerous Goods storage facility pending shipment. The area in which the containers are stored whilst transiting the port is suitable to effectively contain any spillage of solid sodium cyanide that may occur. This facility is certified to handle and store all categories of dangerous goods, including Class 6.1.

Containers from this facility are transported by truck to Pier 2 of North Port where it is loaded directly onto the ship. Pier 2 does not have interim storage facilities for dangerous goods and consequently cyanide is transported from the Korail Interim Storage facility to Pier 2 of North Port Busan and loaded directly onto the ship.

Pier 2 at the Port of Busan is for the loading of all dangerous goods at the port. The Due Diligence Review noted that the Port of Busan is authorised to handle 1000 tonne of Dangerous Goods class 6.1 which is well above any shipment to Lihir Island at any given time.

3.2.1.5 Transport Practice 3.1

Although Golder's desktop assessment did not feature a review of the BPA's specific emergency response plan the BPA has emergency response capabilities in accordance with IMO DG Code requirements.

Korea is a Category A member of the IMO Council and complies with the accordance with the IMO DG Code. Emergency response plans are in place at the Port of Busan and the BPA is responsible for all port operations including emergency response.

In addition, the Busan Maritime Search and Rescue Center is responsible for coordinating all search and rescue activities in the Port of Busan waters, the Busan Port PSB Fire Services Detachment holds the fire-fighting and fire prevention duties for both the land and water areas of the Port of Busan and the Busan Port Hospital is the primary provider of emergency medical care in the Port of Busan.


Busan Maritime Safety Bureau is the local agency of the MPA and must be contacted in all incidents of hazardous substance spills.

3.2.1.6 Conclusion

The assessment found no issues of concern in regards to the Port of Busan's management of solid sodium cyanide product. Golder's assessment of the Port of Busan, including interim storage facilities, concluded that the port operates in compliance with requirements of the ICMC and the IMO DG Code.

The assessment is not a final acceptance of the Port of Busan for future work and as with all service providers to Lihir, Lihir will continue to review and monitor their performance.

LGL PNG Supply Chain
Name of Facility



Signature of Lead Auditor


8 March 2017
Date



4.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled – “Important Information Relating to this Report”, which is included in Appendix A of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

LGL PNG Supply Chain
Name of Facility



Signature of Lead Auditor

8 March 2017
Date



Report Signature Page

GOLDER ASSOCIATES PTY LTD

A handwritten signature in black ink, appearing to read 'E. Clerk', written over a light blue horizontal line.

Ed Clerk
Associate

EWC/JEJ/hsl

A.B.N. 64 006 107 857

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APPENDIX A

Important Information



IMPORTANT INFORMATION RELATING TO THIS REPORT

The document (“Report”) to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd (“Golder”) subject to the important limitations and other qualifications set out below.

This Report constitutes or is part of services (“Services”) provided by Golder to its client (“Client”) under and subject to a contract between Golder and its Client (“Contract”). The contents of this page are not intended to and do not alter Golder’s obligations (including any limits on those obligations) to its Client under the Contract.

This Report is provided for use solely by Golder’s Client and persons acting on the Client’s behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it.

This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose.

The scope of Golder’s Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have retained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder’s affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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