



**HAZARD AUDIT REPORT FOR  
EVOLUTION MINING PTY LIMITED,  
COWAL GOLD OPERATIONS, NSW**

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***5 June 2016***

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## **Hazard Audit Report for Evolution Mining, Cowal Gold Project**

### **Acknowledgment**

The author would like to thank the Evolution Mining (Cowal) Pty Limited staff who were involved with the hazard audit for their willingness to participate.

### **Disclaimer**

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<b>Rev</b>	<b>Date</b>	<b>Description</b>	<b>Reviewed By</b>
A	20/5/16	Draft for Comment	Evolution
B	5/6/16	Final Issue	Evolution

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# **EXECUTIVE SUMMARY**

This report constitutes the fourth hazard audit that has been undertaken for the Evolution Mining Cowal Gold Project, NSW. The report is written in accordance with the Department of Planning's Hazard Audit Guidelines.

The scope of the audit covers a critical examination of the systems and procedures, which exist in order to operate and maintain the facility for the purpose for which it was designed. This required a review of the Evolution documentation systems at the mine site and records of the mine's operational history since the previous hazard audit.

The following points summarise the results of this hazard audit:

- As with previous hazard audits, the personnel interviewed during this audit showed an adequate appreciation of the hazards associated with the operations and knowledge of the control measures used to reduce the risk of a potential hazardous event;
- Personnel from all levels of management, operation and maintenance displayed a strong, committed approach to safety and environmental protection;
- Procedures and documents have, generally, been kept up-to-date as well, e.g. the emergency response plan;
- There is a strong culture of incident reporting and performing work area inspections at the site;
- The processing plant has significant corrosion to structural steelwork including platforms. This is being addressed by an on-going maintenance programme and will require future significant effort to maintain the steelwork's integrity;
- There were leaks associated with the copper sulphate, xanthate and sodium metabisulphite reagents dosing systems observed during the Hazard Audit. These need to be stopped to prevent personnel being exposed to these hazardous materials; and
- The recommendations made throughout this hazard audit report are largely designed to further enhance the existing safety management system.

The hazards associated with the facility have been previously identified and are included in various forms of the Evolution safety management system. Being a mining and processing site with explosive, corrosive, oxidising, radioactive, toxic, combustible and flammable materials, large machinery and large civil structures, e.g. tailings dams, there are a number of hazardous events associated with potential losses of containment or control leading to impact to

people, the environment, property and/or the business. The hazards associated with the materials and processes were found to be well known and understood by the Evolution staff involved in the audit.

It is noted that the recommendations made throughout this report are included in an implementation program to monitor improvement progress. This implementation program will require regular review and updating (of actions that have been completed). Also, it will need to be regularly issued to the Department of Planning until all recommendations are adequately addressed.

The following recommendations were discussed during the audit close-out meeting and are summarised from the report:

- Recommendation No. 1      Reaudit the structural steelwork, platforms and stairs throughout the processing plant and rectify any areas of significant corrosion. This activity will need to be performed on a routine basis.
  
- Recommendation No. 2      The lanyards for the apron feeder and conveyor CV201 need to be through all the pigtail eyelets to ensure they are free to operate.
  
- Recommendation No. 3      Stop the oil leak on the primary crusher drive motor.
  
- Recommendation No. 4      Confirm that the conveyor CV201 fire sprays are routinely operated to ensure there are no blockages from the dust.
  
- Recommendation No. 5      The covers for the inspection hatches to the rotating parts and belts for the apron feeder and CV201 sump pump, respectively, need to be left in the closed position (not left open as observed during the audit).
  
- Recommendation No. 6      The cable to the sulphuric acid truck unloading pump should be checked as it does not appear to meet the Evolution standard requirements for shielding.
  
- Recommendation No. 7      Remove the redundant LPG truck earth strap and repair the insulation at the tank-side of the new earth strap.
  
- Recommendation No. 8      Include in the preventative maintenance system a replacement strategy for the hydrochloric acid tank given it is fibreglass-reinforced plastic and hence it will have a limited life.
  
- Recommendation No. 9      Confirm that the tank inspections performed for the chemical storage tanks meet the requirements of the relevant standards.

- Recommendation No. 10 Fix the bund surface protection in the sulphuric acid and hydrochloric acid bunds to prevent damage to the bund floor.
- Recommendation No. 11 The temporary PAX transfer hose is leaking at both connections. These leaks need to be stopped immediately.
- Recommendation No. 12 There are leaks in the copper sulphate, PAX and SMBS reagents storage and dosing bunds. These leaks need to be stopped immediately and the areas cleaned.
- Recommendation No. 13 Include in the procedure for performing Formal Risk Assessments (FRAs) guidance on how to identify hazards. For example, hazards checklists or guide words could be used.
- Recommendation No. 14 Review the controls used for any work-over-water, e.g. the leach tanks, for rescuing a person should they fall in. For example, are life buoys at the ready for work of this type?
- Recommendation No. 15 Ensure all pressure safety and relief valves are included in the preventative maintenance procedures. For example, it is not believed that the hydrogen peroxide pump discharge pressure relief valves are routinely tested.
- Recommendation No. 16 Perform a review of all modifications made in the years 2014 to 2016 to ensure all have been closed out acceptably (including all relevant documentation updates).
- Recommendation No. 17 Provide means to track and audit overrides to ensure these are removed as soon as possible and signed-off in the register.
- Recommendation No. 18 Confirm that all emergency stop buttons have been tested to ensure the design intent is achieved and develop a formal preventative maintenance programme to ensure all emergency stop buttons are routinely tested.
- Recommendation No. 19 Determine suitable means to control sources of ignition within the defined Hazardous Areas on the site (for example, the radios used at site are not intrinsically safe, flanged LPG line, reagent mixing off gases and oxygen lines).

# GLOSSARY

AN	Ammonium Nitrate
AS	Australian Standard
BLEVE	Boiling Liquid Expanding Vapour Explosion
CHESS	Community Health and Environmental Surveillance System
DoP	Department of Planning
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ERP	Emergency Response Plan
ESH	Environmental, Safety and Health
FHA	Final Hazard Analysis
FSS	Fire Safety Study
GMESH	General Manager Environment, Safety and Health
HAZOP	Hazard and Operability Study
HIPAP	Hazardous Industry Planning Advisory Paper
IBC	Intermediate Bulk Container
ICMI	International Cyanide Management Institute
ISO	International Standards Organisation
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
LPG	Liquefied Petroleum Gas
MCC	Motor Control Centre
NSWFB	New South Wales Fire Brigade
PAX	Potassium Amyl Xanthate
PHA	Preliminary Hazard Analysis
P&ID	Piping and Instrumentation Drawing
PPE	Personnel Protective Equipment
PPM	Parts Per Million
PSV	Pressure Safety Valve
PVI	Pressure Vessel Inspection
RIMS	Responsibility Information Management Systems
SDS	Material Safety Data Sheet
SMBS	Sodium Metabisulphite



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UPS	Uninterruptible Power Supply
VESDA	Very Early Smoke Detection Apparatus

# REPORT

## 1 INTRODUCTION AND SCOPE OF AUDIT

### 1.1 OBJECTIVES, REQUIREMENTS AND SCOPE

#### 1.1.1 Audit Objectives

This report constitutes the fourth hazard audit that has been undertaken for Evolution Mining (Evolution) for the Cowal Gold Project.

Condition 5.4(e) of the Cowal Gold Project Development Consent specifies the following requirements for the hazard audit.

*Twelve months after the commencement of operations of the proposed development or within such further period as the Director-General may agree, the Applicant shall carry out a comprehensive hazard audit of the proposed development and submit a report of the audit to the Director-General.*

*The audit shall be carried out at the Applicant's expense by a duly qualified independent person or team approved by the Director-General prior to commencement of the audit. Further audits shall be carried out every three years or as determined by the Director-General and a report of each audit shall within a month of the audit be submitted to the Director-General. Hazard audits should be carried out in accordance with the Department's Hazardous Industry Planning Advisory Paper (HIPAP) No. 5, "Hazard Audit Guidelines".*

This report details the results of the hazard audit and is written to meet the requirements of HIPAP No. 5 guidelines (Ref 1).

The facility, operations and safety systems were included in this hazard audit.

The fundamental objectives of the hazard audit were:

- To review the significant changes made at the site since the third Hazard Audit (Ref 2);
- To identify areas where improvements to operational and organisational safeguards are required with respect to safety, health and the environment; and
- To recommend appropriate measures to improve safety, health and environmental deficiencies in the areas identified.

The audit was conducted by Dean Shewring from Pinnacle Risk Management. The correspondence granting lead auditor approval is included in Appendix 1. The audit was conducted over three days (May 16 to 18, 2016).

### **1.1.2 Requirements of the Audit**

The audit of the facility included both the hardware and safety management systems. The term “hardware” covers facility and equipment, instrumentation and control systems, protection systems etc. The term “safety management systems” is used to denote people systems and people factors and covers the following items:

- Organisation (formal, emergency, tasks and roles);
- Methods and procedures;
- Knowledge and skills (operator and maintenance employee training, ability to recognise faults and take corrective action); and
- Attitudes towards tasks (reflecting whether the software systems are functioning effectively).

It is essential that the hardware and safety management systems complement each other. For example, elaborate control and protection systems may be built into the installation based on rigorous hazard analysis, but without regular inspection and testing, their performance would deteriorate so that they would be ineffective when a demand is placed upon them. The performance of the management system of safety controls is a key element in effective risk management.

### **1.1.3 Scope of the Audit**

The scope of the audit covers a critical examination of the systems and procedures, which exist in order to operate and maintain the facility for the purpose for which it was designed. This requires a review of the documentation systems at the plant and records of the facility’s operational history since the previous Hazard Audit. In particular, it requires a review of the degree and frequency with which operating conditions vary from the design intent.

The scope of the audit includes the following topics:

- Plant and process systems;
- Process control;
- Review of operating procedures;
- Process operator training;
- Maintenance procedures;
- Safety training of employees;

- Plant modification control;
- Testing of protection systems;
- Electrical equipment handling;
- Unusual incident reporting;
- Injury/accident reporting;
- Fire protection and training;
- Emergency procedures;
- Safety management systems;
- Security of premises, and;
- Environmental protection.

## **1.2 METHODOLOGY**

### **1.2.1 Basic Approach**

This hazard audit has been conducted in compliance with the Department of Planning's HIPAP No. 5 (Ref 1).

The remit of the audit was discussed with Evolution personnel prior to the audit. An outline of the scope of the audit was presented prior to the site based audit work. This allowed the requirements of the audit to be canvassed within Evolution which in turn allowed planning for the appropriate people to be available during the audit.

The majority of documents obtained or sighted have been listed in Appendix 2.

In broad terms, the methodology used was that of conducting detailed discussions with key operations, safety, engineering and maintenance personnel. Several site tours were conducted. Personnel within a "vertical cross-section" of the operation were interviewed.

The approach to the audit is best summarised as follows (Ref 1):

*"Generally, checklists or scoring schemes should not be used. They are inflexible and do not facilitate evaluation. They do not question the validity of existing systems and tend to ignore interactions between various parts of the facility. They are least satisfactory when the design is new and many hazards have not been encountered before....."*

*In general, a more investigative approach is required. The specific method used to audit the site is left to the discretion of the*

*auditor or audit team leader. The auditor may carry out the audit in different ways to evaluate different aspects of the facility's operations. The various elements of the audit may be performed at different levels of detail, depending on the reason for the audit, the nature of hazards at the facility and the scale of the development."*

This approach is adopted by Pinnacle Risk Management in conducting hazard audits. Depending on the facility and the associated hazards, the depth of auditing of the required areas of operation is determined by the lead auditor both prior to and during the audit. Whilst the guidelines issued by the Department are used in determining the audit scope, the guidelines themselves are not used as a complete checklist. In particular, as this is the fourth hazard audit, the focus of the reviews was on the changes made to the hardware and safety management systems over the last three years.

### **1.2.2 Personnel Interviewed**

The following personnel were interviewed during the hazard audit:

Garry Pearson	Environment and Social Responsibility Manager
Andrew Harland	Senior Electrical Engineer
Bejisa Boamah	Senior Project Engineer
Andrew McRae	Mine Engineering Services Superintendent
Ashley Curran	Metallurgist
Ivo Bonekamp	Processing Superintendent
Wendy Hodgetts	OH&S Manager
Ken Green	Leach Circuit Operator
Chais Morris	Primary Crusher Operator
Ronnie Pettit	Acting Fixed Plant Electrical Supervisor

### **1.2.3 Summary and Conclusions**

The following points summarise the results of this hazard audit:

- As with previous hazard audits, the personnel interviewed during this audit showed an adequate appreciation of the hazards associated with the operations and knowledge of the control measures used to reduce the risk of a potential hazardous event;

- Personnel from all levels of management, operation and maintenance displayed a strong, committed approach to safety and environmental protection;
- Procedures and documents have, generally, been kept up-to-date as well, e.g. the emergency response plan;
- There is a strong culture of incident reporting and performing work area inspections at the site;
- The processing plant has significant corrosion to structural steelwork including platforms. This is being addressed by an on-going maintenance programme and will require future significant effort to maintain the steelwork's integrity;
- There were leaks associated with the copper sulphate, xanthate and sodium metabisulphite reagents dosing systems observed during the Hazard Audit. These need to be stopped to prevent personnel being exposed to these hazardous materials; and
- The recommendations made throughout this hazard audit report are largely designed to further enhance the existing safety management system.

The hazards associated with the facility have been previously identified and are included in various forms of the Evolution safety management system. Being a mining and processing site with explosive, corrosive, oxidising, radioactive, toxic, combustible and flammable materials, large machinery and large civil structures, e.g. tailings dams, there are a number of hazardous events associated with potential losses of containment or control leading to impact to people, the environment, property and/or the business. The hazards associated with the materials and processes were found to be well known and understood by the Evolution staff involved in the audit.

All safety management systems need to be dynamic in nature, i.e. they need constant review and modification if necessary. One of the aims of this audit is to provide assistance in progressing improvements to the existing safety management system. The recommendations made throughout this report are included in a separate implementation program to monitor improvement progress (a copy is included in Appendix 3). This implementation program will require regular review and updating (of actions that have been completed).

## **2 SITE OVERVIEW**

### **2.1 SITE LOCATION, SURROUNDING LAND USES AND LAYOUT**

Descriptions of the site location, surrounding land uses and layout are given in the Final Hazard Analysis (FHA, Ref 3) and the Environmental Impact Statement (Ref 4). These descriptions are not reproduced in this report.

The site location is shown in Figure 1. The site layout is shown in Figure 2 and Figure 3.

Given the distance to the nearest residence (approximately 4 km), it is unlikely that the consequential impacts from a fire, explosion or toxic release are likely to have significant effect (as concluded in the FHA, Ref 3). Also from the FHA, the risk associated with external events, e.g. earthquakes, is low.

Figure 1 – Site Location

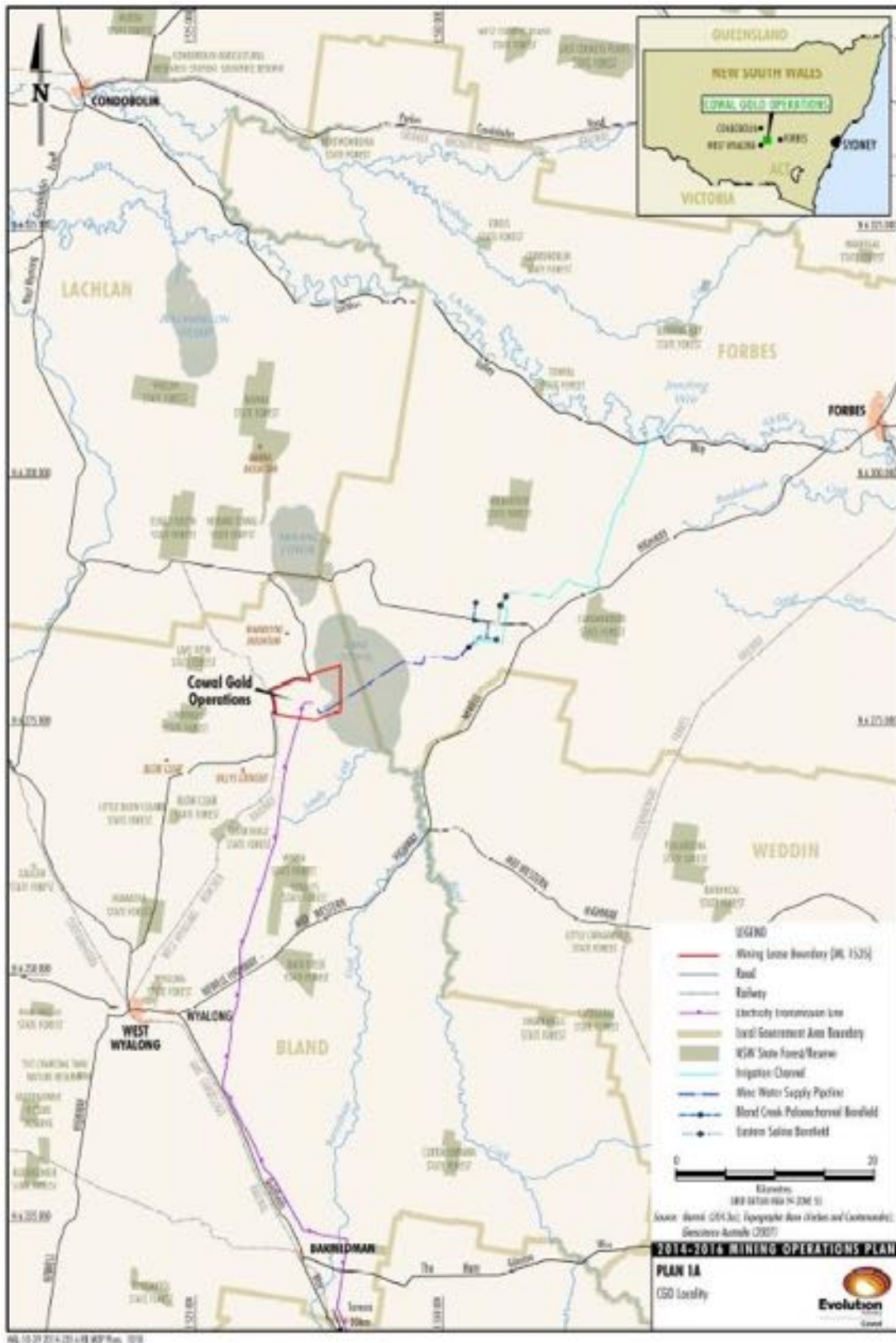




Figure 2 – Site Layout

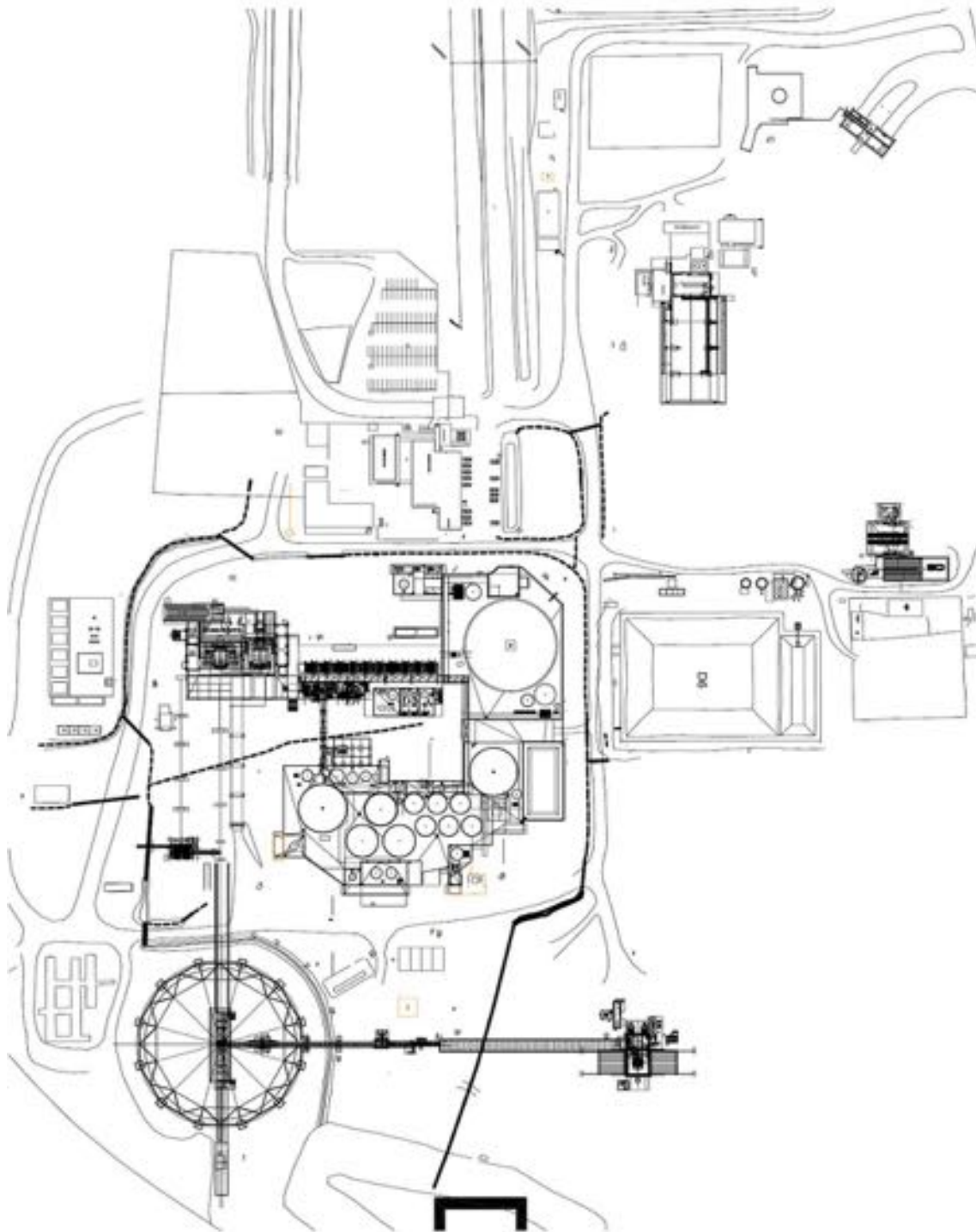
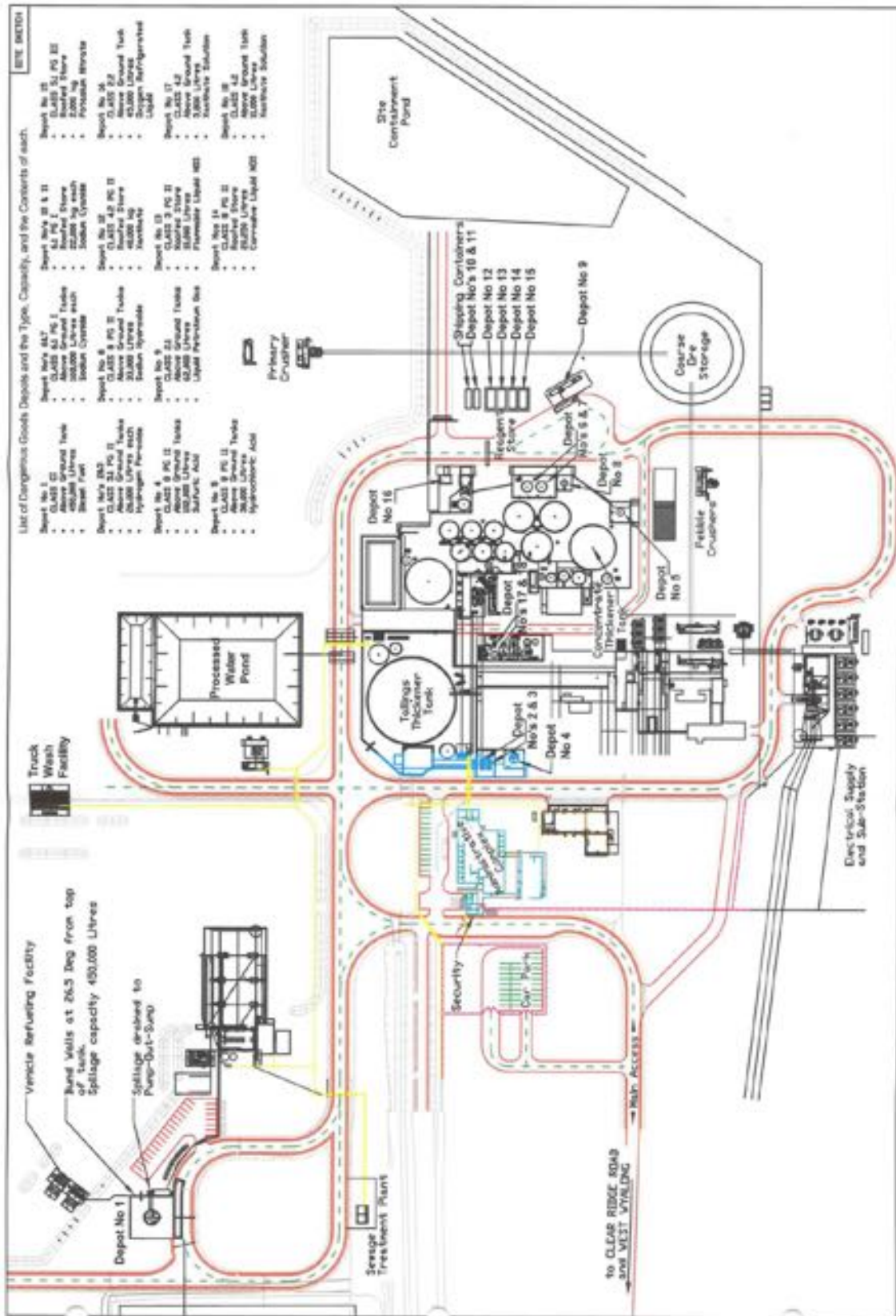


Figure 3 – Processing Plant Layout



There have been no major changes to the processing plant since the previous Hazard Audit although some relatively minor modifications have been performed. The largest of the physical changes at the site is the waste rock stockpiling, i.e. these stockpiles will grow as the mine continues to operate, as well as lifting of the tailings storage facility walls.

During the audit, the facility layout, building design and construction, site security and utilities were reviewed and inspected. Whilst some of these site areas are discussed in more detail later in this report, no major shortcomings were found in these areas.

There is one main control room for the processing plant. The operators monitor and remotely control the process from this location. As the control room is located at an elevated position near vibrating equipment, some vibrations are transferred to the control room. To date, this has not been a cause for any significant impact.

No events were identified whose risk would be unacceptable with respect to propagation to the control room although it is possible that some events could impact these areas if they occur, e.g. low likelihood events such as a LPG BLEVE (boiling liquid expanding vapour explosion).

Security for the site comprises the following measures:

- The site is fenced (some of which is typical farm fencing). Processing plant areas, e.g. sodium cyanide, and the ammonia nitrate and explosives storage compounds are fully fenced and sign-posted;
- Staffed entrance gate and/or security patrols;
- Closed circuit television cameras at selected locations;
- Regular operational staff inspections;
- Operator vigilance (the site is permanently manned by operational staff);
- Area lighting for night surveillance;
- Electric fences are installed along the north, east and south sides of the mine lease;
- Increased security for the gold room (primarily for prevention of gold theft); and
- Radios are carried by all operational staff and are fitted in vehicles.

There are approximately 300 to 380 people during normal business hours and 30 to 50 people outside of normal hours on the site at any one time.

The security system for the site was observed and found to be operating as intended.

The facility normally operates 7 days per week, 24 hours per day. All personnel gain access via the main gate (either via their security codes or by signing in as a visitor). As this gate is located away from the plant areas it can be expected to be safe to use for people / vehicle control for most plant emergencies.

During the audit, the reliability of utilities was reviewed. The main utility is power. In the event of a power failure, the process is designed to fail safe. Loss of other utilities, e.g. instrument air or hydraulics, will also result in a predetermined, safe shutdown.

Given the types of hazards on the site with the training programmes implemented and the protective equipment provided, e.g. fire protection response vehicles and medical assistance, there are sufficient people available to either handle most minor to moderate potential hazardous situations. However, large scale events will require assistance from the NSW emergency services as per the emergency response plan.

## **2.2 PROCESS DESCRIPTION**

A detailed description of the process was given in the Final Hazard Analysis (Ref 3). To avoid unnecessary duplication, further information regarding the facility's process description can be found in this Reference and it is not reproduced in this report.

However, as detailed in the FHA, there are two main modes of plant operation. The initial mode is termed "oxide ore"; the second mode is termed "primary ore". The difference is the result of ore changes. The facility is operating in primary ore mode.

## **2.3 PROPERTIES OF MATERIALS BEING HANDLED / PROCESSED**

From the Evolution emergency response plan, Table 1 lists the hazardous materials handled, stored and/or processed at the facility.

**Table 1 – Summary of Materials**

<b>Material</b>	<b>HAZCHEM Code</b>	<b>UN No.</b>	<b>Average Quantity Stored On-Site (tonnes)</b>
Interfroth	3 (Y)	1993	20
SIBX (sodium isobutyl-xanthate)	1 (Y)	3342	60
Sodium Cyanide	2 (X)	1689	200
Quicklime (calcium oxide)	4W	1910	500
Carbon	No Allocation	No Allocation	10
Oxygen	2 PE	1073	45

<b>Material</b>	<b>HAZCHEM Code</b>	<b>UN No.</b>	<b>Average Quantity Stored On-Site (tonnes)</b>
Hydrochloric Acid	2 R	1789	37
Sulfamic Acid	2 Z	2967	30
Borax	No Allocation	No Allocation	1
Silica Flour	No Allocation	No Allocation	0.3
Soda Ash	No Allocation	No Allocation	0.3
Caustic Soda	2 R	1824	16
Flocculants (Magnafloc 155)	No Allocation	No Allocation	27.5
LPG	2 WE	1075	27
A 238 Aeropromotor	2 R	1719	40
Hydrogen Peroxide	2 PE	2015	62
Sulphuric Acid	2 P	1830	187
Diesel	No Allocation	No Allocation	500,000 Litres
Ammonium Nitrate	1 (Y)	1942	150
Detonators / Primers	E	0360	20
Explosives, i.e. Powergel and Energan	E	0042	0.5
PAX (potassium amyl nitrate)	1 (Y)	3342	40

In addition to those materials listed in Table 1, there are nucleonic instruments, e.g. density meters, within the process.

Given the materials listed in Table 1, there are a number of potential hazardous events that could lead to fires, explosions and/or toxic or radioactive impact. These events were examined in the Final Hazard Analysis (Ref 3) as part of Development Consent and found to be acceptable based on risk.

Material inventory and usage is monitored via the computer control system. The plant metallurgist reviews the usage for plant optimisation reasons.

Further discussion of the properties of the materials can be found in Reference 3.

### **3 HAZARD AUDIT OF PLANT OPERATIONS**

#### **3.1 PLANT AND EQUIPMENT**

The mine operations are conducted as per the requirements of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 and the Work Health and Safety Act 2011.

Several trips into the processing plant and mining areas were made over the three days on site.

This included inspecting the:

- Mining operations (pit, explosives storage and handling and ore transfer);
- Ore crushing and milling;
- Lake Cowal and the mobile drilling rig;
- Processing plant and chemical storage and handling;
- Tailings storage dams; and
- Water storage ponds.

There are no significant changes to the process / equipment since the previous hazard audit.

Checks on major equipment, including pipes, vessels and instruments, indicated appropriate identification by labels and signs. The facility is well laid out. It is noted that the facility was reviewed by the HAZOP technique when built.

As there are a significant number of people at site at any one time then there exists adequate numbers on-site to effectively deal with credible small to moderate emergencies (note that this includes liaison with emergency workers). Potentially larger hazardous events will require assistance from the emergency services as per the site's Emergency Response Plan.

Generally, for the equipment inspected, all items (including control functions) appeared to be operated satisfactorily.

It should be noted that operation outside of the design values for most parts of the process is not possible due to process control (including trips, e.g. low tanks levels for the outlet pumps and low speed for conveyors) and equipment specifications. Much of the process occurs at ambient conditions (typical for many mining processes).

Records of plant performance are kept within the computer control system.

Master Piping and Instrumentation Diagrams (P&IDs) are kept electronically and via hard copies.

There are pressure vessels on the site, e.g. elution column and hydraulic receivers, and these will be routinely inspected and tested as per AS 3788 Pressure Equipment – In Service Inspection and AS 3873 Pressure Equipment – Operation and Maintenance. Some PSV (pressure safety valves) test tags were reviewed during the audit and found to be adequately labelled (PSVs are replaced on a basis as determined by a Certified Boiler Inspector).

A review of the site utilities was undertaken. Power has proven to be reliable in supply. Should this service fail then the process fails safe as all drives are stopped.

There is also an emergency power generator on-site. The critical power users, e.g. the control system, have their own uninterruptible power supply.

For loss of instrument air, the automatic valves close to their predetermined positions as required during detail design and the project's HAZOP study. Loss of hydraulic power, e.g. the mills, also results in a predetermined shutdown. Given the reviews performed, no significant hazardous scenarios were determined for loss of a utility.

Emergency stop / local isolation buttons are located throughout the site. For the stop buttons inspected, they appeared to be suitably located, e.g. the stop buttons for the chemical dosing pumps. Lanyards were also located adjacent to the conveyors.

Discussions with various operations staff showed that they generally had an adequate level of understanding of the hazards involved and what to do in an emergency, and that the plant was operated safely.

During the audit, observations of the operator tasks were performed. This included mine activities (loading of trucks with ore and ore movement) and chemical transfers and handling.

To assist the operators with emergency response, gas monitors, e.g. hydrogen cyanide and sulphur dioxide, have been installed throughout the relevant plant areas.

Safety showers and eyewash stations are tested fortnightly throughout the site and prior to each chemical transfer.

The processing plant has significant corrosion to structural steelwork including platforms. This is being addressed by an on-going maintenance programme and will require future significant effort to maintain the steelwork's integrity. The cause for the corrosion is believed to be the relatively high levels of dissolved solids in the bore water used as well as inadequate protection's applied during construction (the latter can be partially attributed to the original plant design life being approximately 10 years).

Whilst there is an on-going maintenance programme for rectifying corrosion issues, during the audit significant corrosion was observed on checker plate (e.g. level 2 at the primary crusher), grid mesh (e.g. top platform for the flotation tanks), structural supports and stairs (e.g. PAX reagents stairs). Given the risks to personnel from significant corrosion, the following recommendation is made.

Recommendation No. 1 Reaudit the structural steelwork, platforms and stairs throughout the processing plant and rectify any areas of significant corrosion. This activity will need to be performed on a routine basis.

From a review of the primary crusher operations, other recommendations are:

Recommendation No. 2 The lanyards for the apron feeder and conveyor CV201 need to be through all the pigtail eyelets to ensure they are free to operate.

Recommendation No. 3 Stop the oil leak on the primary crusher drive motor.

Recommendation No. 4 Confirm that the conveyor CV201 fire sprays are routinely operated to ensure there are no blockages from the dust.

Recommendation No. 5 The covers for the inspection hatches to the rotating parts and belts for the apron feeder and CV201 sump pump, respectively, need to be left in the closed position (not left open as observed during the audit).

### **3.2 LOADING AND UNLOADING OPERATIONS**

Unloading activities occur within the mining and processing areas and are a two person activity. There are only a few loading operations, e.g. waste products and product gold, at the site and these are typical of facilities such as the Cowal Gold Mine.

In the mining area, trucks are loaded with ore following blasting. Standard mines practices are implemented in the pit and these were observed during the audit. Excavators load ore onto mining trucks for removal from the pit. Ore is loaded into the crusher via the conventional technique of reversing trucks to a predetermined position (reversing stop in-place at the dump hopper) and then raising the tray.

The materials listed in Table 1 are delivered to site in either solid or liquid form. Solids, e.g. PAX or copper sulphate in bulkabags, are moved via forklift to their storage areas.

Bulk liquid chemicals (e.g. hydrochloric acid, sodium hydroxide and LPG) are delivered to the site by road tanker. These chemicals are used within the processing plant. Diesel is used for fuelling the mining vehicle fleet. Bulk liquid



unloading operations are performed by site inducted tanker drivers. There are containment systems for the unloading areas should spills occur.

There were no obvious signs of any significant spills in the unloading areas.

There are fire extinguishers installed throughout the processing plant area if required and a safety shower / eyewash station installed (tested fortnightly) near each unloading bay.

All material unloaded / loaded is recorded in the Evolution transport records system.

Off-site transportation takes place via various transport companies. A separate transport study (Ref 5) was conducted on the transport requirements and no unacceptable risks were found.

Recommendation No. 6     The cable to the sulphuric acid truck unloading pump should be checked as it does not appear to meet the Evolution standard requirements for shielding.

Recommendation No. 7     Remove the redundant LPG truck earth strap and repair the insulation at the tank-side of the new earth strap.

### **3.3   STORAGES**

There are a number of different storage types on the facility, i.e.:

- Ore and spoil stockpiles;
- Materials listed in Table 1 in tanks and sheds; and
- Tailings storage dams.

The product, gold, is refined and stored in a high security building (not inspected due to security restrictions).

Ore and mine spoil is stored as per typical mining practices. Dust is minimised as much as possible, e.g. water spraying in the Pit with saline water, use of emulsified bitumen on non-Pit light vehicle roads (eliminates water maintenance) and revegetation of earthen walls. A separate report has been commissioned by Evolution to determine the dust impact on the surrounding area and it was found that little impact was occurring outside of the mining lease.

The sodium cyanide mixing and storage area was found to be in good condition at the time of the audit. The tank has been recently replaced.

Solid flotation reagents such as PAX were inspected within the flotation reagents shed. There were no obvious signs of spills in this area at the time of

the audit. All the PAX wooden boxes inspected were in a sound condition. During rain events, it is possible that water can enter the PAX storage area (water is not compatible with PAX; there is the potential for heat generation and subsequent fires). Historically, little rain has been reported to have entered the reagents shed and when there is sufficient quantity, it is pumped out. Provided the sealed plastic bags containing the PAX remain intact then PAX degradation from any potential water ingress is unlikely.

There were leaks associated with the copper sulphate, xanthate and sodium metabisulphite (SMBS) reagents dosing systems observed during the Hazard Audit. These need to be stopped to prevent personnel being exposed to these hazardous materials (see the Recommendation below).

The explosives and detonators are stored in separate fenced compounds away from the mining and processing plant areas (as per standard mining practice). Signage is included on the fencing.

Liquid chemical storages are all bunded, including the diesel.

Tank levels are determined by instrumentation. There are high level instruments to help prevent tank overflow. There were no obvious signs of tank overflows at the time of the audit.

There is a computer based materials inventory system that details information such as the amounts of materials stored on the facility. This information is regularly backed-up.

The tank and roadway layout affords enough space for operation and access in an emergency.

Given the above observations, the following recommendation is made:

- |                       |   |
|-----------------------|---|
| Recommendation No. 8  | Include in the preventative maintenance system a replacement strategy for the hydrochloric acid tank given it is fibreglass-reinforced plastic and hence it will have a limited life. |
| Recommendation No. 9  | Confirm that the tank inspections performed for the chemical storage tanks meet the requirements of the relevant standards.   |
| Recommendation No. 10 | Fix the bund surface protection in the sulphuric acid and hydrochloric acid bunds to prevent damage to the bund floor.  |
| Recommendation No. 11 | The temporary PAX transfer hose is leaking at both connections. These leaks need to be stopped immediately.   |
| Recommendation No. 12 | There are leaks in the copper sulphate, PAX and SMBS reagents storage and dosing bunds. These   |

leaks need to be stopped immediately and the areas cleaned.

### **3.4 PROCESS CONTROL**

The operations for the crusher, the processing plant, the gold room and the tailings pumping system are monitored and controlled by a computer control system (Yokogawa Centum CS 3000). Process control is performed via clearly represented screens at the operator interface terminals in the control room. The operators at this location have overall control of setpoints, task requirements etc.

Additional operators are available for outside tasks. There are at least two people per shift who have adequate training and experience to operate the control system for the plant.

The mining operations are manually controlled as per typical mining practices, e.g. the placement of different coloured cones within the pit to indicate where entry is not permitted due to explosives use.

The processing plant and primary crusher control rooms have a number of features including the computer control system displays, camera output, emergency buttons, e.g. siren, radios and documentation (both electronic and hard copy, e.g. MSDS manual).

The computer control systems operations include setpoints (e.g. dosing chemical pumped flows), trips, interlocks, valve opening / closing, machine run / fault indications etc. A history of control operations, process alarms etc are available via trending and printouts. To supplement the computing systems, process monitoring is also performed by operator walk-arounds. All alarms are prioritised to avoid alarm flooding.

The computer control system has so far proven reliable when called upon to control operations.

For backup power supply in an emergency, there is an UPS for the computer control system. As mentioned previously, the facility also has an emergency powered generator. Manual control of the plant is also possible via the computer control system. Critical trips, e.g. the emergency stops, are hard-wired.

A specific area of the process that was reviewed during the audit was the cyanide levels in the tailings. Typically, the cyanide concentration to the tailings dams is approximately 5 ppm. As per the Development Consent requirements, cyanide in the tailings should not exceed 20 ppm for 10% of the year and should never exceed 30 ppm. The reviewed plant history shows that the plant is complying with these criteria.

Failure of any part or all of the computer control system will mean the process stops and immediate attention by the operators is given. No unsafe failure modes were identified during the audit.

### **3.5 FIRE SAFETY**

The fire prevention, detection and protection systems were previously reviewed in the Fire Safety Study (FSS) for the facility (Ref 6). The facility's fire protection equipment is detailed and assessed in this study and concluded to be adequate for the nature of fire hazards associated with the operations. Generally, the review performed during this audit indicated that the fire protection equipment has been installed and maintained as per the requirements of the original plant design intent.

The main fire or explosion hazards for this facility are a release of LPG, hydraulic oil, heating oil or diesel, oxygen enhanced combustion, general building type fires, vehicle fires, electrical fires, oxidising agent, e.g. ammonium nitrate or hydrogen peroxide, with a combustible material such as wood, activated carbon fires, PAX decomposition products, e.g. carbon disulphide, conveyor fires, transformer explosions / fires, explosives / detonators misfires and grass fires.

Fire water to the facility is from the Lachlan River Regulated Water Source, Bland Creek Paleochannel groundwater production bores or other on-site process or stormwater water dams. The fire water is stored in a 9 megalitre pond (dam) which is constantly overflowing to an adjacent dam (D6). It is pumped via an electric or diesel pump. These pumps are tested weekly to check the reliability. A smaller jockey pump is installed for small flow demands.

An annual flow test is performed on the fire water pumps (insurance requirement). The pumps have been found to continue to provide acceptable flow / head. The pressure switches that initiate the fire water pumps are tested by lowering the pressure to check the setpoint for pump start, i.e. the entire loop is tested.

The fire water pumps were inspected during this audit and no issues were found.

The facility is ringed with dual hydrants. Fire extinguishers (powder chemical) and hose reels are also located throughout the plant. Predetermined equipment, e.g. hydraulic drives, have fixed spray systems. Several fire extinguisher test tags were inspected and found to be in-test. Several hose cabinets were inspected and the hoses were found to be present and in good condition.

In addition to the above fire protection equipment, the site also has two fire trucks and spill response trailers near the main gate. In the event of a large fire, assistance from the emergency services can also be provided (as per the site's emergency response plan).

To help prevent potential sources of ignition, any hot work is controlled by a Hot Work Permit.

All fire protection equipment inspected was in accessible areas. The facility's fire protection equipment is maintained by specialist subcontractors (to the

requirements of AS 1851, "Maintenance of Fire Protection Equipment"). Test tags were in-place for the equipment checked during the audit.

Fire training for site personnel is performed and includes extinguisher use.

Appropriate staff members are also First Aid trained. First Aid facilities exist on the facility. Random checks of these showed that the necessary equipment was available.

As mentioned above, hydrogen cyanide gas monitors are installed to detect any gas releases (hydrogen cyanide is both toxic and flammable).

Contaminated fire water will flow to either to the processing plant bunded areas or to ground. As shown in the FSS (Ref 6), the risk associated with contaminated fire water is low.

There is a VESDA (Very Early Smoke Detection Apparatus) installed in the High Voltage switchroom. This system is maintained by an external contractor.

### **3.6 ENVIRONMENTAL PROTECTION**

Environmental systems to reduce or eliminate contamination of air, soil, surface water and groundwater systems were evaluated.

The facility has a number of Environmental Management Plans and Monitoring Programmes as required by the Development Consent.

Generally, the equipment and systems aimed at protecting the environment appeared appropriate to the types of materials handled at the facility, with staff showing a good understanding of the relevant environmental issues.

Environmental records are kept in both electronic and hard copy forms by the Environmental Manager. Any environmental incidents, including wildlife fatalities, are recorded in the Evolution incident reporting system.

#### ***Licensing:***

The site has an Environmental Protection Licence 11912 as issued by the NSW Environmental Protection Authority (EPA). This licence was discussed with the Environment and Social Responsibility Manager during the audit. There are no significant issues arising from the last three years of operation of the facility with respect to compliance with the licence requirements.

#### ***Stormwater, Effluent and Spill Management:***

There have been no discharges of stormwater and/or contained liquid wastes to any area outside the internal catchment drainage system. Stormwater and contained liquid wastes are reclaimed back into the process via bund sump pumps. The main process liquid effluent is the tailings flow and this is monitored for cyanide concentration as discussed above in Section 3.4. Water

is recycled as much as possible, e.g. thickener overflow stream, as water is not in plentiful supply at this location.

The integrity of the tailings bund walls are independently checked and reported. Regular inspections of the tailings walls and dams are performed by a number of people, e.g. multiple daily patrols by processing and environmental personnel and sampling visits by laboratory personnel. This includes wildlife inspections. The Southern Tailings Storage Facility has undergone its fifth wall lift. The Northern Tailings Storage Facility is now having the fifth lift performed. These were inspected and the design basis discussed during this audit with no issues found.

Dosing chemical transfer areas from road tankers etc are paved. Any diesel spills at the vehicle filling bay are pumped to an oil / water separator. Waste oils or absorbents with oil are disposed of via licensed contractors.

Absorbent material and spill response kits and trailers are available at the facility. One spill response container was inspected during the audit and found to contain the stated items.

There is a surface water sampling programme which includes sampling Lake Cowal waters. There are groundwater monitoring observation bore holes across the site. These are sampled quarterly (as witnessed during this audit). There are no known groundwater problems associated with the facility.

Given the containment designs for environmental protection, the designs do not pose unacceptable environmental risks provided the requirements of the safety management system are maintained.

**Solid Waste:**

Solid wastes include:

- General, non-hazardous wastes (disposed of via the Bland Shire Council Waste Management facility or on-site waste rock dumps as per varied EPL);
- Special waste – used haul truck tyres landfilled on-site as per varied EPL;
- On-site bioremediation and disposal of small quantities of hydrocarbons spilt to ground as per varied EPL;
- Used batteries (disposed of via a licensed recycler); and
- Drums with contaminated material (disposed of via a licensed contractor) and empty drums (returned to some suppliers).

The site is now asbestos free.

There were no new hazardous solid wastes identified during the hazard audit or any known issues with the disposal of the above wastes.

***Gaseous and Dust Emissions:***

The main atmospheric emission is dust. Dust emissions are reduced by techniques such as water sprays (water spray trucks are used in the mining operations) and road sealing programmes with emulsified bitumen. There are some local gaseous emissions, e.g. hydrogen cyanide from the leach tanks, but the levels must be kept low due to safety concerns.

There are no recommendations made for this area of review.

## **4 HAZARD AUDIT OF MANAGEMENT SYSTEMS**

Since the last Hazard Audit, there has been a change in ownership of the site, i.e. it was sold by Barrick to Evolution Mining (24 July 2015). Therefore, during this audit, the safety management system was checked to ensure it contains the requirements of HIPAP 9 (Ref 7). The site is in the final phase of the transition to the Evolution Mining corporate requirements, however, much of the former Barrick safety management system is still used and therefore the main requirements of HIPAP 9 are being achieved (e.g. Barrick RIMS converted to QHSE and Barrick Oracle converted to Pronto. ChemAlert remains in use).

As per the former Barrick system, the Evolution overall approach to safety management includes the following components:

- Safety, health and environmental Policies;
- Safety, health and environmental Standards; and
- Safety, health, environmental and community relations Management Systems.

Procedures, forms and checklists reside in the safety management system.

The established procedures include:

- Training;
- Operating instructions;
- Permits to work;
- Contractor management;
- Management of change;
- Emergency response;
- Incident recording; and
- Maintenance.

Auditing of the compliance with the company requirements is mostly achieved by the following means:

1. Internal audits, e.g. six monthly corporate safety, hygiene and environmental audits;
2. General Manager's ESH (Environmental, Safety and Health) meeting (monthly);



3. Quarterly Site environmental, health and safety governance meetings where key performance indicators are reviewed (also known as CHESS compliance - Community Health and Environmental Safety Security);
4. Daily walk-arounds, e.g. by the Superintendents, Managers and Mine Manager;
5. Plant monthly inspections, e.g. Planned General Inspections and Formal Risk Assessments;
6. Spot checks, e.g. permits reviews; and
7. External audits such as hazard audits, annual IEA, ICMI Cyanide Code, annual ISO 14001.

Supervisory Workplace Inspections are also performed. There is a target number of 400 per month. From August 2015 to May 2016, 2,994 internal audits have been performed.

The General Manager has responsibility for overall safety and environmental protection for the site.

As part of his role to the commitment of occupational health, safety and environmental best practice, the General Manager's activities include:

- Ensuring compliance with the safety and environmental management system's requirements, e.g. managers spend at least 30% of their time in the field;
- Review of safety and environment incidents reports;
- Chairing of the GMESH (General Manager Environmental, Safety and Health) committee with the Site HSE Representatives;
- Monitoring of the operations via daily walk-arounds;
- Involvement with Evolution corporate meetings / reviews; and
- Quarterly CHESS (compliance management review) meetings.

During this audit, the risk register was reviewed. In summary, hazards associated with the operations at the site are identified via the following techniques and then risk assessed.

- Process hazards are identified via HAZOP, Semi-Quantitative Risk Analysis and via an internal technique called Formal Risk Assessment;
- Approved operational procedures contain hazards and risk mitigation measures. Principal Hazards, i.e. higher risk tasks, also have critical controls nominated. These critical controls are monitored and maintained; and

- Maintenance hazards via Job Hazard Analyses and approved procedures.

From the reviews performed, the following recommendation is made. This is to assist the teams performing the Formal Risk Assessments to identify the causes for the hazards as best as possible.

Recommendation No. 13 Include in the procedure for performing Formal Risk Assessments (FRAs) guidance on how to identify hazards. For example, hazards checklists or guide words could be used.

## **4.1 PLANT PROCEDURES, RECORDS AND OTHER DOCUMENTATION**

### **4.1.1 Materials Handling**

Material inventory data is logged via the computer control system and alarms are utilised to alert operators when to replenish low stocks. Delivery records are kept for future use if required. Contractors responsible for various areas, e.g. liquid oxygen, will supply dosing chemicals etc when needed.

The handling of ore, slurry and chemicals, including explosives, have been previously discussed (Sections 3.1 to 3.3). There are no further recommendations made for this area of plant operation.

### **4.1.2 Operating Procedures**

Operating procedures for the facility were written during the commissioning period by a specialist company. There are more than 400 operating procedures for the processing plant and more than 80 for the environmental section.

The standard operating procedures (SOPs) are available to site personnel in both electronic and hard copy form. The operators also have electronic access to Chem Alert information (safety data sheets) and incident reporting (if required).

Operations such as startup and controlled or emergency shutdowns are included in the procedures. The Evolution Supervisor for Process Training and Safety now has responsibility for further procedure development and updating.

The procedures include the hazards associated with the particular activity and actions to be taken, e.g. chemical spill. Also included in the procedures are useful photographs, e.g. where to take the sample, and computer control system screen outputs. Exclusion zones are used for potentially hazardous operations, e.g. barricading and signage for sodium cyanide transfers from a road tanker.

The relevant Superintendents approve all changes to the operating procedures. Operations personnel are included in the review process for modified procedures.

Assessment of how well the requirements of the procedures are known by the process operators is included in the operator training program (see Section 4.2).

Activities that do not have written procedures are reviewed for hazards by conducting a JHA (job hazard analysis) when the field level risk assessment (FLRA) identifies an unacceptable task risk in a likely real-time situation.

New operators are constantly supervised until appropriate training has been received (see Section 4.2).

This area of the safety management system was previously found to be strongly developed. There are no known major changes to the operating procedures (other than routine updates). No recommendations are made for this area of plant operation.

#### **4.1.3 Maintenance Procedures, Permits, Testing and Records**

Maintenance programs and test records are kept in both soft and hard copy form. Maintenance requirements are stored within a computing system. Maintenance activities include both scheduled and unscheduled work (i.e. preventative and corrective maintenance).

The reviewed maintenance frequencies used / planned are typical of common industry practice (e.g. the hydrogen cyanide analysers are tested every month).

Preventative maintenance programs typically detail the maintenance and inspection requirements, including the maintenance frequencies, for the following generic equipment items:

1. Vessels, process tanks, machines (e.g. crusher and mills), conveyors, vehicles and other large equipment items;
2. Pipes;
3. Control valves and emergency isolation valves; and
4. Instruments, i.e. pressure, temperature, flow, level, analysis and other, e.g. vibration and position switches.

Corrective maintenance can be initiated by anyone (i.e. a work request is generated). Priorities are assigned to each task. For maintenance tasks, work permits are produced and supplied to the personnel performing the work. Permits are generated as required, e.g. hot work permit.

All preventative maintenance tasks are assigned a task number. When a preventative maintenance task is required, a work request is produced and this is reviewed by both the mechanical and electrical supervisors as well as operational staff. Again, a priority is assigned. Weekly forecasts for preventative maintenance are generated by the maintenance system. Test frequencies are performance based.

On completion of the job, the work is closed out within the maintenance system.

Checks on the work orders include:

- Morning tool box / pre-start meetings;
- Management by walking around; and
- Schedule maintenance planning meetings every Tuesday and Thursday.

The results of the maintenance activities, e.g. calibrations, tests etc, are recorded.

Maintenance manuals (including vendor manuals) are kept by the Maintenance Superintendent.

Trained external contractors are used to perform selected maintenance activities, e.g. fire protection systems maintenance and oxygen system maintenance. Contractors are chosen based on experience in the same field and the suitability to perform the required tasks.

The system for contractor selection was reviewed during the audit, in particular, the change in explosives supplier. Evolution's contractor assessment process includes reviews of the supplier's health, safety and environment plans, procedures and risk assessments. The process appeared thorough and no recommendations are made in this area of the audit.

Evolution has a permit to work system. This includes practices for lock out, tag out of process and electrical systems to make the work area safe. Permits include hot work, excavation, crane / man-cage, High Voltage, isolation and confined space entry. Any special precautions, e.g. hazard mitigation, are included on the work permit. JHAs and formal or field level risk assessments are performed for non-routine tasks for hazard identification. Higher risk areas are reviewed by the relevant Superintendents. Tool box / pre-start talks are held to clarify work scope and minimise the likelihood of incidents.

Line or equipment venting and isolation are performed by the operators prior to handover for the maintenance to begin. Isolation requirements are included in the work permit. Maintenance personnel also approve the permits to perform the work.

Should replacement parts be required for maintenance, materials of construction are determined by existing supplier information, by details of installed parts (which is included on the order forms when required), pipe specifications on the P&IDs or by supplier recommendations.

The following recommendations are made from the maintenance reviews:

- Recommendation No. 14    Review the controls used for any work-over-water, e.g. the leach tanks, for rescuing a person should they fall in. For example, are life buoys at the ready for work of this type?

Recommendation No. 15 Ensure all pressure safety and relief valves are included in the preventative maintenance procedures. For example, it is not believed that the hydrogen peroxide pump discharge pressure relief valves are routinely tested.

#### **4.1.4 Plant Modification**

One of the areas of change in the safety management system since the last Hazard Audit is how modifications are assessed. The former Barrick management of change system is currently being replaced by an Evolution procedure. Just prior to this audit, a draft management of change procedure was circulated for comment and revision. This draft management of change procedure is relatively simplistic and it is expected that it will be more robust once the review process is finalised. This will be required to adequately assess the impact of the proposed modifications at a facility of this nature. The finalised procedure is to be reviewed during the next Hazard Audit.

However, up to this point in time, all process changes (as defined within the Barrick management of change procedure) were reviewed via an electronic, change management system. The process for the former Barrick change management is summarised as follows:

- Requests for change were initiated by anyone. The changes could be temporary, permanent or emergency requirements;
- An electronic form was submitted to predetermined people for review, e.g. production, technical and maintenance staff;
- An evaluation was performed;
- Action items were sent to the appropriate people;
- Final approval was given by the nominated senior personnel depending on the modification scope / size;
- The change was completed as per the maintenance procedural requirements; and
- Field checks were performed including a final pre-startup review and then the modification was closed-out.

Larger, more complex and potentially hazardous changes are reviewed at site via the HAZOP technique.

For smaller, less potentially hazardous changes, a Formal Risk Assessment is performed.

The master plant drawings are stored electronically and in hard copy. These are revised on an as needs basis depending on the details of the modification.

During this audit, the following modifications were reviewed in detail, i.e. the design, assessment, implementation and close-out processes:

1. Tails Storage Facility lifts;
2. Install earth leakage protection to the ball and SAG mill 415V MCC's;
3. Increase the maximum elution oil temperature; and
4. Changing how the hydrogen peroxide addition is performed.

For the hydrogen peroxide addition (Point 4 above), drawing 11014-100-F0225\_6 had not been marked-up when the modification was finalised. Also, it is not believed that the new earth leakage protection (Point 2 above) has not been entered into the maintenance system for routine inspection and testing.

Therefore, the following recommendation is made from the management of change system review:

- Recommendation No. 16    Perform a review of all modifications made in the years 2014 to 2016 to ensure all have been closed out acceptably (including all relevant documentation updates).

## **4.2 OPERATOR TRAINING**

Elements of the training practices have been discussed throughout this report. A summarised description of operator and safety training is given below.

Operators and maintainers in the Processing Plant and Mining Department receive training via a number of means. These include:

- Induction training which includes hazards awareness as well as specific awareness training, e.g. hazards of hydrogen cyanide;
- Basic training and assessment in equipment, plant operation and computer systems from Evolution supervisors, e.g. spill response;
- External courses, e.g. Orica safety and operability course on sodium cyanide; and
- Tool box / pre-start talks and plant meetings.

The site training programme has been developed by an external company and is reviewed and updated by Evolution personnel.

On successful completion of defined training requirements that are based on the operating procedures, the new operators are graded to a “1” level. Further training and assessment is performed as required by the Evolution training system until the operators reach grade 4 (the highest grade possible, i.e. competent in all processing plant operations). Non-trained personnel are not permitted to perform the relevant operations by themselves.

Training procedures and records are kept by the Evolution training supervisor in both hard copy and electronic form. Competency and understanding tests are included as part of the training programme. Each employees training needs and what has been completed is included within the training system.

Safety training includes:

- Site induction for all employees, contractors and non-escorted visitors;
- Processing plant induction;
- Lock-Out Tag-Out procedures (Level 1 for all people, Level 3 for permit issuers);
- Fire protection;
- Confined space rescue;
- First Aid (all shift employees);
- Open air breathing apparatus;

- Dedicated training on specific hazards, e.g. sodium cyanide; and
- Job Hazard Analyses / Field Level Risk Assessments.

Again, records are kept for each employee. Contractors are included in the safety training. Reviews are performed, e.g. on permits, to ensure compliance.

At all times, there are people on-site trained in first aid, fire fighting and confined space rescue.

Monthly refresher training lists are produced which show people's training needs. These lists are sent to the Mine Manager for review.

In summary, appreciation of the inherent hazards of the plant, equipment and materials is achieved via:

- General and plant area inductions and training programs;
- Tool box talks;
- SDSs reviews for new materials;
- Operating procedures training;
- Permits to work; and
- Job Hazard Analyses and formal or field level risk assessments.

There have been no major changes to the training programmes at the site and hence there are no recommendations from this area of the audit.

### **4.3 EMERGENCY PLANNING**

An emergency response plan (ERP) exists for the entire site. It is routinely updated (latest revision is January 2016). Copies are distributed to selected personnel. The ERP was reviewed and found to contain the requirements of the Department of Planning's HIPAP No. 1, "Industrial Emergency Planning Guidelines" that are relevant to this site. This document has been reviewed and approved by the Department of Planning.

The ERP includes events such as fires, explosions, bomb threats, natural events and spills. Off-site impacts are also included. Contact numbers, e.g. police, ambulance, fire brigade and neighbours, are given.

As the site is large, there are a number of emergency assembly areas. Hence, there are options available for assembly if an assembly point is unsafe, e.g. fire nearby. Evolution has developed a system for accounting for personnel at each emergency assembly area. The emergency operations centre is located in the Administration Conference Room.

The person with overall control, the "Emergency Services Coordinator", is located in the emergency operations centre. Within each area, there are



nominated incident controllers for handling specific emergency response actions, e.g. the senior operator in the control room for the processing plant. These people are identified via a tabard. Control is handed over to the Fire and Rescue NSW / Rural Fire Brigade should they be required to attend.

All emergency response officers and members of the emergency response team are trained by the Rural Fire Service.

Given the site layout, there is adequate site access / egress for emergency vehicles via the main gate and perimeter road.

Emergency situations are noted via an audible alarm.

Emergency drills are routinely performed to practice the emergency response requirements, e.g. man-down in the cyanide area. The ERP is updated as a result of the learnings from all simulated exercises. One corporate level crisis emergency simulation is performed each year as well as four local emergency simulations.

First aid can be supplied by a number of means, e.g. shift personnel trained in First Aid as well as any of the Emergency Response Officers.

There are First Aid boxes / emergency PPE boxes located throughout the facility. Random checks performed during the audit showed that the necessary equipment was available in the inspected boxes.

For the last three years of operation, there have been no major emergency events.

## **5 SITE HISTORY**

### **5.1 INCIDENT HISTORY**

Hazardous situations, near misses or incidents are reported within the electronic incident reporting system. Environmental impacts are also included.

All incident entries are reviewed in the morning managers' meetings.

All employees are trained in how to use the incident recording system.

When an incident occurs, the following basic steps are taken:

- A supervisor assesses the scale of the incident;
- Verbal reporting to the relevant Superintendent is performed;
- The incident is reported, i.e. entered into incident recording system;
- The incident is graded, e.g. type of hazard, the hazard potential, injury or environmental;
- An incident report is produced and investigated;
- Incident investigation includes root cause analysis (TapRoot methodology used);
- Actions from the incident investigation are entered into the incident recording system with responsible people assigned to each action; and
- Managers ensure that each investigation is adequately closed out.

The incident reports for the past three years of operation were reviewed and/or discussed during the audit. There were 1,623 records with approximately 20% being near misses. This shows a continued high level of reporting vigilance and commitment to improve. The incidents reported were mostly of minor nature. Examples include:

- Wildlife injuries;
- Vehicle accidents;
- Injuries;
- Equipment failures;
- Machine oil fires;
- Near misses, e.g. valves left in the wrong position;

- Procedural failures; and
- Losses of containment.

The machine oil fires were mostly associated with the drilling rig operations in 2014 and 2015. The causes for these fires was investigated and fixed as no fires have been reported recently.

The more significant “Safety Occurrences” were reviewed (there were 16 of these). Events included pipe failures, chemical spills and equipment failure following deadheading of a pump. No adverse off-site impact was recorded for any of these events.

Statutory reporting, e.g. to the Department of Primary Industries - Mineral Resources, is also performed as required.

## **5.2 PREVIOUS STUDIES**

Since the third hazard audit, there have been no changes to the facility that required further Hazard Studies. Correspondingly, there are no recommendations from recent statutory Hazard Studies to be reviewed (the recommendations from the original facility Hazard Studies were reviewed during the first hazard audit).

The 18 recommendations made in the third hazard audit report (Ref 2) were reviewed during this audit. The following recommendations from the last hazard audit still need to be closed-out.

- |                       |  |
|-----------------------|--|
| Recommendation No. 17 | Provide means to track and audit overrides to ensure these are removed as soon as possible and signed-off in the register.   |
| Recommendation No. 18 | Confirm that all emergency stop buttons have been tested to ensure the design intent is achieved and develop a formal preventative maintenance programme to ensure all emergency stop buttons are routinely tested.                    |
| Recommendation No. 19 | Determine suitable means to control sources of ignition within the defined Hazardous Areas on the site (for example, the radios used at site are not intrinsically safe, flanged LPG line, reagent mixing off gases and oxygen lines). |

## **Appendix 1**

# **Department of Planning Approval Correspondence**

## **Hazard Audit Report for Evolution Mining, Cowal Gold Project**

Appendix 1 – Department of Planning Approval Correspondence.



Planning Services  
Resource Assessments and Business Systems

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Our Ref: 1087074-7

Mr Garry Pearson  
Environmental Manager  
Evolution Mining (Cowal) Pty Ltd  
PO Box 210  
West Wyalong NSW 2671

Dear Mr Pearson

**Cowal Gold Mine (DA 14/98)  
2016 Hazard Audit - Auditor**

I refer to your email dated 6 April 2016 requesting the approval of Mr Dean Shewring of Pinnacle Risk Management to undertake the hazard audit of the Cowal Gold Mine as required by condition 5.4(c) of Schedule 2 of the Cowal Gold Mine Development Consent (as modified).

Please be advised that the Department's hazard team has considered the qualifications and experience of Mr Shewring, and the Secretary approves his appointment to undertake the audit.

Should you have any questions about this letter, please contact Phillipa Duncan on 9228 6451.

Yours sincerely

A handwritten signature in blue ink that reads 'C. Preshaw' followed by the date '11/4/16'.

Clay Preshaw  
A/Director  
Resource Assessments  
(as nominee of the Secretary)

## **Appendix 2**

# **Selected Documents Obtained or Sighted**

## **Hazard Audit Report for Evolution Mining, Cowal Gold Project**

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**Appendix 2 – Selected Documents Obtained or Sighted.**

<i>Document Name / Type</i>
Emergency Response Plan
Results of Simulated Emergency Exercises
Safety Management System
Company Policies
Cowal Gold Mine Modification Procedure
Cowal Gold Mine Formal Risk Assessments
2013 – 2016 Incident Records
QHSE (Quality, Health, Safety and Environment) Reporting System
Lanyard Testing Procedure
Contractor Management Procedure and Selection Records
Semi-Quantitative Risk Assessments
Formal Risk Assessments
Job Hazard Analyses
Permits to Work
Documentation for Selected Modifications, e.g. Tailings Storage Facility Wall Lifts
Maintenance Records
Internal Audit Records
Piping and Instrumentation Diagrams

## **Appendix 3**

# **Recommendations Implementation Program**

## **Hazard Audit Report for Evolution Mining, Cowal Gold Project**



## Appendix 3 – Recommendations Implementation Program.

**Hazard Audit Actions Progress Report**  
**Evolution Mining**  
**Cowal Gold Project**  
**West Wyalong, NSW**

**Title:** DP&E Evolution Hazard Audit (May 2016) Action Plan  
**Owner:** Garry Pearson, Environmental Manager  
**Revision:** 1 **Date:** 20 May 2016

No	Recommendation	Actions	Due date	Date Complete	Responsible person	Department	Comments
1	Reaudit the structural steelwork, platforms and stairs throughout the processing plant and rectify any areas of significant corrosion. This activity will need to be performed on a routine basis.	1./ Annual audit currently takes place next audit due in August 2016. 2./ Create PM in Pronto for audit	9/06/2016		B. Boamah	Process_projects	<u>Last audit completed in Oct of 2015 for full reports please see "\Auscowfp2\asbuiltdrawing\0.00 Reports &amp; Registers\0.01 STRUCTURAL AUDITS\2015\07_2015 Audit\Audit Reports"</u>
2	The lanyards for the apron feeder and conveyor CV201 need to be through all the pigtail eyelets to ensure they are free to operate.		30/05/2016	30/05/2016	R. Buys	Process maintenance	Complete
3	Stop the oil leak on the primary crusher drive motor.		31/10/2016		R. Buys	Process maintenance	Will be done in Oct16 shut, need to remove pinion to replace seal
4	Confirm that the conveyor CV201 fire sprays are routinely operated to ensure there are no blockages from the dust.		31/10/2016		R. Buys	Process maintenance	This will only be a line flush
5	The covers for the inspection hatches to the rotating parts and belts for the apron feeder and CV201 sump pump, respectively, need to be left in the closed position (not left open as observed during the audit).		30/05/2016	30/05/2016	R. Buys	Process maintenance	Complete
6	The cable to the sulphuric acid truck unloading pump should be checked as it does not appear to meet the Evolution standard requirements for shielding.		21/06/2016	30/05/2016	R. Buys	Process maintenance	Complete
7	Remove the redundant LPG truck earth strap and repair the insulation at the tank-side of the new earth strap.		30/06/2016	30/05/2016	R. Buys	Process maintenance	Complete
8	Include in the preventative maintenance system a replacement strategy for the hydrochloric acid tank given it is fibreglass-reinforced plastic and hence it will have a limited life.		30/06/2016		R. Buys	Process maintenance	
9	Confirm that the tank inspections performed for the chemical storage tanks meet the		30/06/2016		R. Buys	Process maintenance	

	requirements of the relevant standards.						
10	Fix the bund surface protection in the sulphuric acid and hydrochloric acid bunds to prevent damage to the bund floor.		30/09/2016		I. Bonekamp	Process Operations	Warranty claim on HCl bund (was re-coated Apr-15), to be scheduled in with Protector.
11	The temporary PAX transfer hose is leaking at both connections. These leaks need to be stopped immediately.		15/06/2016	31/05/2016	I. Bonekamp	Process Operations	31/5/16 - another temporary line run to cell 4 with proper couplings. Not leaking anymore.
12	There are leaks in the copper sulphate, PAX and SMBS reagents storage and dosing bunds. These leaks need to be stopped immediately and the areas cleaned.		15/6/16 (will be ongoing)		I. Bonekamp	Process Operations	27/5/16 - only minor weeps from a few flanges. In process of entering work requests for all visible weeps. Also sump level sensors not functioning - w/r also to be entered.
13	Include in the procedure for performing Formal Risk Assessments (FRAs) guidance on how to identify hazards. For example, hazards checklists or guide words could be used.				HSEC		
14	Review the controls used for any work-over-water, e.g. the leach tanks, for rescuing a person should they fall in. For example, are life buoys at the ready for work of this type?		31/08/2016		R. Buys	Process maintenance	We only allow planned work over water off a platform if the tank is empty. If it's a breakdown lanyards would be used
15	Ensure all pressure safety and relief valves are included in the preventative maintenance procedures. For example, it is not believed that the hydrogen peroxide pump discharge pressure relief valves are routinely tested.		10/06/2016		R. Buys	Process maintenance	Yearly audit was recently completed, will verify compliance
16	Perform a review of all modifications made in the years 2014 to 2016 to ensure all have been closed out acceptably (including all relevant documentation updates).				Personnel that were interviewed for MOC's recently done?		
17	Provide means to track and audit overrides to ensure these are removed as soon as possible and signed-off in the register.		30/06/2016		A. Harland	Process_ projects	
18	Confirm that all emergency stop buttons have been tested to ensure the design intent is achieved and develop a formal preventative maintenance programme to ensure all emergency stop buttons are routinely tested.		31/08/2016		R. Buys	Process maintenance	
19	Determine suitable means to control sources of ignition within the defined Hazardous Areas on the site (for example, the radios used at site are not intrinsically safe, flanged LPG line, reagent mixing off gases and oxygen lines).		31/08/2016		A. Harland	Process_ projects	

## **6 REFERENCES**

- 1 Department of Planning NSW, *Hazardous Industry Planning Advisory Paper No. 5: Hazard Audit Guidelines*; NSW Government, Sydney, 2011
- 2 Pinnacle Risk Management Pty Ltd, *Hazard Audit Report for Barrick Australia Limited, Cowal Gold Project, NSW*, 4 May 2013
- 3 Pinnacle Risk Management Pty Ltd, *Final Hazards Analysis, Cowal Gold Project, NSW, Barrick Australia Ltd*, May 2006
- 4 North Limited, *Cowal Gold Project, Environmental Impact Statement*, 13 March 1998
- 5 Barrick Australia Ltd, *Transport of Hazardous Materials Study*, 2005
- 6 Pinnacle Risk Management Pty Ltd, *Fire Safety Study, Cowal Gold Project, NSW, Barrick Gold of Australia Ltd*, Dec 2004
- 7 Department of Planning NSW, *Hazardous Industry Planning Advisory Paper No. 9: Safety Management*; NSW Government, Sydney, 2011